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TEACHING IN A 21ST CENTURY EDUCATIONAL CONTEXT: A CASE STUDY
TO EXPLORE THE ALIGNMENT BETWEEN VISION, INSTRUCTION AND THE
NEEDS OF A 21ST CENTURY WORKPLACE

A Dissertation

Submitted to the School of Education

Duquesne University

In partial fulfillment of the requirements for
the degree of Doctor of Education

By

Evagkelia Irene Lendis

May 2014

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Evagkelia Lendis

2014

DUQUESNE UNIVERSITY

SCHOOL OF EDUCATION

Department of Instruction and Leadership

Dissertation

Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Education (Ed.D.)

Instructional Leadership Excellence at Duquesne

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February 21, 2014

TITLE: TEACHING IN A 21ST CENTURY CONTEXT:
A CASE STUDY TO EXPLORE THE ALIGNMENT BETWEEN VISION,
INSTRUCTION AND THE NEEDS OF THE 21ST CENTURY WORKPLACE

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ABSTRACT

TEACHING IN A 21ST CENTURY EDUCATIONAL CONTEXT: A CASE STUDY TO EXPLORE THE ALIGNMENT BETWEEN VISION, INSTRUCTION AND THE NEEDS OF THE 21ST CENTURY WORKPLACE

By

Evagkelia Irene Lendis

May 2014

Dissertation supervised by David Carbonara, Ph.D.

The purpose of this qualitative case study was to investigate how one secondary school, known for its high quality educational program, is infusing the pedagogical elements that are conducive for a 21st century education. The administration's vision along with teacher interviews and classroom observations were used to understand if the school was effectively articulating its program with the needs of the 21st century learner and the changing 21st century workplace. In order to successfully prepare the students and meet their educational needs, teachers are asked to integrate higher level thinking skills through the use of problem based learning while using technology in a meaningful way. Administration setting unrealistic professional goals without lending practical and

meaningful support has made it very difficult for the teachers to successfully implement a successful 21st century educational program.

The research questions focused on the administration's understanding of 21st century educational needs and teacher belief systems when approaching instruction for the Net-Gen students in order to explore how alignment between realities in the classroom and district vision can be reached. Interviews were conducted with three teachers and one administrator. Classroom observations were conducted using a rubric synthesized from the Partnership of 21st Century Skills and International Society of Technology Education (ISTE) that stress the new 3 R's of rigor, relevance and resources.

Common themes emerged through the case study. The district's vision and its approach to professional development were over arching themes that influenced much of the school's idea of 21st century learning. External and internal barriers to meaningful technology integration were also evident in the study. With many school reforms, teachers needed tailored professional development to facilitate instruction that incorporates real world relevance and critical thinking. The disconnect between the teacher and administrator's perception of 21st century education were also integral in exploring this school's approach to 21st century education. Although classroom observations showed that teachers are attempting some elements of a 21st century instructional context, the study found that there is a weak articulation of the vision to the teachers. Recommendations were included for school districts, administrative teams and further research.

DEDICATION

This book is dedicated to my beautiful mother, Zoe. Although you left us too soon, you will continue to be my sunshine, and the thought of you will always make me happy when skies are gray. I wish I could tell you how much I love you. So I promise that every day that you are not here, I will do my best to shine and keep the clouds away.

“She left pieces of her life behind her everywhere she went. It's easier to feel the sunlight without them, she said.” -B. Andreas

I love you Mom.

ACKNOWLEDGEMENTS

It's funny how writer's block can happen for the Acknowledgements page, after you have exhausted hundreds of hours of reading, writing and analysis. For those of you that personally know me, this is quite a shock that I am somewhat "speechless".

However, one thing is for sure, that any successes or milestones in my life, I always attribute to the way that I was raised. And the historian in me continually looks to the past in order to help shape my future.

My parents instilled in me that with hard work and sacrifice, anything is possible. Overcoming obstacles, pushing one's self all while being a honorable person has been the trademark of our family. Because my parents grew up with limited opportunities, I am so thankful that they strongly advocated for my educational endeavors. I can still hear my father say in Greek, that, "*whoever does not have brains, has legs.*" Roughly translated, it means, whoever does not use education to make gains in life, has the limited option of hard manual work. Personally and professionally, my parents have seen me through some difficult times. My only wish would have been that my mother could throw her arms around me at this important chapter in my life. I am thankful that throughout these challenging times, I found my other half, my husband; my biggest cheerleader, supporter, soul-mate and most importantly my best friend. I could never have done this without him in my corner calmly nudging me along.

When I graduated from my Masters program and made the decision to pursue my doctorate, I knew that continuing at Duquesne University was the perfect learning community for me. Working in a cohort was the best way to get through three full time

courses a semester for three years, full time work and obstacles like “reading until our eyes bleed.” To Gita, Anne, Keith, Alia, Amos, Jill, Mona and Bonnie, thank you for the laughs, the support, the ideas, the motivation, the gallons of coffee and most of all, the friendships. Through marriages, divorces, new babies, loss of loved ones and other life challenges, we have helped each other through it all. I am so very thankful. May God continue to bless you and your families.

I cannot forget the dedicated teachers who opened up their classrooms and their hearts to me. The school is wonderful place that I am certain will continue to grow and thrive.

This could not be possible without the support of Dr. David Carbonara, who accepted chairing my committee at a point where I seriously began to unravel. I won't forget his early advice to me as I was thinking about the doctoral program at Duquesne. As he drew a Venn Diagram on scrap paper, he told me that after hundreds of hours of reading, I would find that one area of education that little literature addressed.....and magically, *voila!*-that would be my research topic. Since I completed my Masters work at Duquesne, I must personally thank Dr. Mary Fran Grasinger who has played such an important role in my studies. Having her spiritual and professional support on my committee has been so appreciated as well. Even hundreds of miles away, I can feel her nurturing spirit, support and confidence in me. I would also like to truly thank Dr. Rose Mary Mautino and Dr. Wayne Brinda, my “wordsmith”, who have both helped me in this journey. You all have been not only mentors for me but role models as I continue striving professionally in education. Dr. Kush, thank you for your constant interest during my

journey. Duquesne University is so very fortunate to have a department and faculty like yours.

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CHAPTER I

INTRODUCTION

The emergence of the globalized information age impacts the needs and nature of labor that consequently affects the educational preparation of the new 21st century learner. Are American public schools ready? American students should be well prepared for citizenship, 21st century work and postsecondary education. Instead, nearly 40 percent of high school graduates feel inadequately prepared for college or the work force, according to a 2004 report by the American Diploma Project. A 2005 survey by the National Association of Manufacturers showed that 84 percent of employers say K–12 schools are not doing a good job of preparing students for the workplace (Partnership for 21st Century Skills, 2006). According to the Alliance for Excellent Education, college professors contend that 40 percent of U.S. high school graduates are not adequately prepared for expectations of college courses, compelling them to take remedial courses in basic content areas (2011). This statistic is corroborated by the National Association of Educational Progress (NAEP) from 2004 that indicated 55 percent of high school seniors need remediation in basic skills due to their 12th grade test scores. For young people, the impact of struggling in college and leaving without a degree can be profound. The current estimates show that at least some post secondary education will be needed for about two-thirds of all jobs by 2018 (Carnevele, Smith and Strohl, 2010).

The former Federal Reserve Chairman, Alan Greenspan, spoke before the Committee on Education and the Workforce (2000) and stated that “many of our students languish at too low a level of skill to compete” in a globalized era. He further stated that globalization poses a new challenge to our schools in which “our secondary school

system needs to serve the requirements of a changing economy in the same way that the expansion of high schools with a broad curriculum served us so well in the first half of the twentieth century.” Bill Gates, at the National Governors Association Summit (2005) bluntly concluded that looking at “the millions of students that our high schools are not preparing for higher education, America’s high schools are obsolete.” Schools must transform their instructional paradigms to align with the changing needs of our global digital world.

There is an increasingly daunting responsibility to respond academically to the changing needs of society in order to develop a literate and well-educated citizenry. As the nation continues its effort to improve teaching and learning, the stakes are getting higher. School leaders and teachers naturally believe that students are entitled to a challenging and rigorous education that will prepare them for the 21st century workplace and be able to adjust in a constantly evolving society. This development of citizens is vital to our nation. Much like the United States adjusted to the new industrialization in the mid 1800s’, it is also amidst another societal and economic upheaval as it enters the age of information and globalization of the 21st century (Daggett, 2005). Castells (1998) explained globalization as the “power of flows”. This is electronic technology, where an almost instantaneous flow and exchange of information, capital and cultural communication now characterize the global economy.

Friedman (2006) in his best-selling book, *The World is Flat*, described the phenomenon of globalization by stating,

Many companies hid behind technology. You could be very good,
but you didn’t have to be the world’s best, because you never thought

you were competing with the world. There was a horizon out there and no one could see beyond the horizon. But just in the space of a few years we went from competing with the firms down the street to competing with firms across the globe. Everyone can see what everyone else is doing now, and everyone has the same tools, so you have to be the very best, the most creative thinker (p. 474).

Historically, educational goals were designed to meet changing societal demands. If the world of work has changed due to our interconnected digital society, then young people must be armed with the necessary tools and skills to compete and succeed.

Technology has fueled globalization while broadening the skills necessary to be a successful worker. The workforce continues to change in regard to the types of jobs needed in the 21st century. According to a 2011 study from the Harvard Graduate School of Education called *Pathways to Prosperity Project*, the need for workers with four-year degrees and technological training is growing very rapidly. The 21st century prompted for these creative and innovative workers to be in extreme demand for the highest paid jobs because they require technical and specialized skills along with problem solving skills for a technologically driven workplace (Murnane and Levy, 1996; Wood, 2001).

Exacerbating this workforce crisis further, is the contribution of the Baby Boomer retirements. Smith (2007) reports Baby Boomer retirements have resulted in a loss of more than 75 million of these valuable workers in 2011. If these workers are not gradually replaced, the decrease in the American workforce will result in other nations competing for the same services. As the global economic playing field flattens, the competition for highly skilled work will also grow (Welsh, Gordon and Williams, 2008).

Technological advances have allowed educated workers from across the globe to compete for American company jobs. As a result, American workers will be compelled to gain valuable skills or risk not being integrated into the workforce.

When we examine the educational status of the United States against other established and growing nations, the findings are staggering. According to global assessments such as, the Trends in International Mathematics and Science Study (TIMSS) and Programme of International Student Assessment (PISA), the American student is lagging in comparison to his international counterpart (Wu, 2005). The United States ranks in the middle when compared to other fourth graders in industrialized nations in science and mathematics literacy and falls far behind with students in 8th and 12th grade. The Strong American Schools Organization (2006) points the finger at the American mathematics curriculum as a cause of for students' mediocre high school education. Another report from the Center for American Progress found that 50 percent of 12th grade math students do not feel they understand their math class while 21 percent do not feel challenged in mathematics courses (Boser and Rosenthal, 2012). Ultimately, there is a disconnection between the content and method of instruction in American schools and the needs of the current and future global workforce.

The greatest challenge public schools face is developing students who are prepared for the demands of a rapidly changing global landscape and have the content knowledge to apply their thinking skills. The traditional hierarchal organizational model of public schools poses a factor for stifling innovation and reform in American schools. Arnold (2007) completed a doctoral study that concluded that bureaucracies, inherent in public schools, are not the appropriate organizational model for a 21st century learning

program to flourish. Although, thinking skills are essential in the learning process, schools are publicly obligated to comply with legislative mandates regarding student proficiency in the core subjects of mathematics and reading. With such a strong emphasis on content accountability due to federal mandates, the innovations in instructional practices that foster higher order thinking, thus producing 21st century ready students, seem to only occur in smaller, private and mostly charter schools, such as New Tech High School in Napa, California (Pearlman, 2006a).

Although, secondary instruction is still predominantly teacher centered and content driven, without the administration having a grasp of the new literacy needed for the 21st century, instructional alignment is hindered. In an article by Davis (2008) she referred to this problem by quoting Scott McLeod, the founding director of the Center for Advanced Study of Technology Leadership in Education, (CASTLE), and the coordinator of the educational administration program at Iowa State University. He stated, “The people who are in charge of facilitating schools’ transition to the digital global economy—superintendents and principals—are typically the least knowledgeable about the digital global economy. It’s scary” (p. 15). It has mostly been private organizations that can offer schools resources and support in the implementation of 21st century skills, leaving many public schools left to address this growing problem on their own.

Moe and Blodget (2003) stated that in the 21st century, Americans “need to be better educated to fill new jobs and more flexible to respond to the changing knowledge and skill requirements of existing jobs. Lifelong skills development must become one of the central pillars of the new economy” (p. 22). If we are to produce generations of Americans who understand how to survive in our changing global society, an emphasis

must be placed on a more rigorous educational preparation of students that emphasizes thinking skills. Consequently, in light of the strong argument made, the understanding of 21st century education in public schools has been inadequately researched. Therefore, the need to investigate the crucial components for 21st century education is of paramount importance.

Statement of Problem

What educational approach must the American public school take in order to prepare our students for the ever-changing global 21st century workplace? The tired mantra of “that can’t work here” has haunted many public school systems during this significant time of change. Many of the initial theories regarding 21st century education focused on the mere acquisition of computers in the classroom. Yet, without a relevant instructional context, the mere addition of technology hardware into schools is not the solution to developing the skills necessary for succeeding in the competitive global economy. For instance, a survey conducted by the U.S. Department of Education (2010) indicated that only 40% of teachers regularly use or integrate computers and the Internet instructionally in their classrooms, even though 99% of public schools have Internet connections. In the 2007 Speak Up Survey, sponsored by Project Tomorrow, Nagel (2008) reported that merely a third of the 1.2 million teachers surveyed consider themselves technology experts (Nagel, 2008). Students in the same survey, a total of approximately 319,000, indicated that 40 percent of teachers limit or stifle student’s technology use. Meanwhile school administrators while inundated with so many responsibilities, lack the full expertise expected to be the “digital architects” to facilitate a technological learning community in their schools (Lee and Gaffney, 2008). In a recent

report by the National Association of State Boards of Education, they stated the average age of a school principal is around fifty, “so it will be some years before a large portion of school leaders are digital natives” (Cavanagh, 2013). This reaffirmed the existing research that students are on the cutting edge of technology development while educators and administrators struggle to keep up (Nagel, 2008).

The digital or information age is characterized as a time where individuals have the technological ability to transfer information freely and have instant access to information (Kluser, 2010). Therefore the skills needed to be successful in the 21st century global community have consequently changed (Ananiadou and Claro, 2009; Friedman, 2006; Pink, 2005). Because this task involves radical comprehensive changes in many facets of the educational process, such as curriculum and instruction, rarely has the information been meaningful for public school educators in the actual implementation of an effective 21st century educational program that addresses the demands of the 21st century workforce as well as the needs of the 21st century learner (Cuban, 2001). To compound this dilemma further, many research studies have found that school leaders are not equipped or have a true working knowledge of programs that effectively incorporate 21st century skills into the educational program. With varied perceptions of what constitutes 21st century education, administrators are having difficulty successfully communicating this vision to their staff (Davis 2008; Hess and Kelly, 2005; Riley, 2009). Further, this disconnection between administrative vision and actual teaching practices has manifested in reluctant teachers feeling they lack the professional development in the area of 21st century education (Nussbaum-Beach and Hall, 2012). Therefore, the need to investigate the most effective pedagogical approach for 21st century education is

paramount if American public schools are going to be competitive. Predispositions of school leaders and teachers must be examined in order to conclude whether their visions are aligned to the critical 21st century standards as well as articulated and supported in their organizations.

Based on the changes in economic and educational landscapes, there is a need for drastic pedagogical reform in the 21st century learning of American public educational programs (McLester and McIntire, 2006). The researcher will explore the multiple organizations that describe the critical skills, literacies, knowledge and expertise students need to be successful in 21st century work and in life in order to synthesize the most appropriate content and skills necessary to integrate in all secondary curricula. Because superintendents and other administrators are reported to be the least knowledgeable about the digital global economy, the researcher will address the issue of conflicting administrator and teacher beliefs regarding competencies of 21st century education and the resulting impact on classroom instruction. Along with triangulating data with interviews, and document reviews of curricula and organizational vision statements, the researcher will also observe instructional settings in one high performing award winning secondary public school to examine the quality and extent of integration of the essential skills needed for academic success and 21st century workplace readiness.

The study will explore the best pedagogical approach for 21st century learning, based on the Partnership for 21st Century Skills (2006) while taking into consideration the alignment of the leadership's vision with the actual practices in the classroom. Ultimately, the study will establish a platform for initiating a secondary program that is conducive for the integration of engaging 21st century skills with the intention of offering

insight and recommendations for the transference of this program in other public educational settings.

Definition of Terms

In constructing a rationale for the study, there are terms that are valuable to the research. The definitions are categorized by how they contribute to the rationale of the study.

Globalization: In the Organization for Economic Cooperation and Development's *Handbook for Economic Globalization Indicators* (2005) globalization was defined as "widely used to describe the increasing internationalization of financial markets and of markets for goods and services. Globalization refers above all to a dynamic and multidimensional process of economic integration whereby national resources become more and more internationally mobile while national economies become increasingly interdependent" (p. 11).

Rivzi and Lingard (2000), claimed that globalization refers to the movement of people, money and information across national and cultural boundaries that result in people having more access to markets, cultural practices and products. They assert that globalization is the "interconnectedness" across time and space that leads to exciting opportunities for society.

Information/Knowledge Age: Kluver (2010) explained the Information Age as a time formed by capitalizing on the computer microminiaturization advances, with a transition spanning from the advent of the personal computer in the late 1970s, to the Internet's reaching a critical mass in the early 1990s, and the adoption of such technology by the public in the two decades after 1990. Bringing about a fast evolution of technology

in daily life, as well as of educational life style, the Information Age has allowed rapid global communications and networking to shape modern society.

The US Army Field Manual 100-6, 1996 on Information Operations, identified the information age as the “future time period when social, cultural and economic patterns will reflect the decentralized, nonhierarchical flow of information” (as cited in, Narula, 2004). In this type of economic era, wealth is increasingly created by knowledge work, brain rather than brawn. In fact, the factory of today is very different than the old industrial model. Tapscott (1998) predicted this shift when he stated that 60 percent of American workers will be knowledge workers and 8 out of 10 new jobs will be in the information-intensive sectors. This trend would signal the number of college degrees to triple from 12 to 37 million (p. 127).

Gold collar worker: Due to constant industrial growth in the Information Age, knowledge workers are in high demand (Wonacott, 2003). Knowledge worker, a term coined by Drucker in 1959, is one who works with information or one who develops and uses knowledge in the workplace (Drucker, 1973). A gold collar worker is a new breed of worker because the nature of work has drastically changed. Among their most valuable assets are problem solving, creativity, talent and intelligence. These workers perform non-repetitive and complex tasks that are difficult to evaluate. Wood (2001) stated that knowledge workers exist in the fields of information technology, engineering, designing, law, and research.

Secretary’s Commission on Necessary Skills (SCANS): To launch a pro-active approach to the growing demands of the 21st century, the federal government created the Secretary’s Commission of Necessary Skills in 1990. After 12 months of interviewing

employers, the research asserted that understanding resources, having interpersonal skills, knowing how to use and access information, designing and improving systems and effectively using technology are the most important proficiencies for all workers.

This report essentially outlines three concepts:

- The qualities of high performance that today characterize our most competitive companies must become the standard for the vast majority of employers.
- The nation's schools must be transformed into high performing organizations
- All Americans should be entitled to multiple opportunities to learn (SCANS, 1991, p. xv).

The Secretary's Commission found that,

Despite sincere, well-intentioned efforts to respond, the schools-lacking clear and consistent guidance continue with the system and methodologies they inherited from a system designed nearly 100 years ago for the needs of business organizations that are now quite different (as cited in The Intellectual and Policy Foundations of the 21st Century Skills Framework, 2007, p. 4).

Digital natives/Net-Generation: Young adults growing up in the time of the Information Age have been studied extensively. Prensky (2001) coined the term "digital natives" to refer to students who were raised on video games, the language of the Web, instant messaging and cell phones.

Strauss and Howe (2000), in their work, *Millennials Rising: The Next Great Generation*, noted that these unique students were multi-taskers who can juggle school

work and extracurricular activities. This generation, the authors continue to state, will revolutionize education and future work.

Rushkoff (1995) wrote about the interesting rift between digital natives and most of their older educators. He stated that “Digital natives are children who are native to cyberspace and we, as adults, are immigrants.”

Tapscott (1998) described the digital natives as N-Geners or Net-Gen. The N-Geners refer to the generation of children who, were born after 1982. According to Tapscott, today’s digital natives are materialistic, self-absorbed, and demanding of immediate gratification. They are more knowledgeable and more aware of social issues than previous generations. This is due in large part to the convenient access to information that these young people have.

MILE Guide: The Partnership for 21st Century Skills (2002) designed a tool to help schools in the development of a 21st century learning program. The guide describes the characteristics of schools that are effectively implementing 21st century learning goals. It is broken down by, *Student Knowledge and Skill, Education Support Systems, Educational Leadership, Policymaking, Partnering and Strategic Planning*. Under each field, there are more specific benchmarks to assist in school’s planning. For the purposes of the study, the researcher examined the *Student Knowledge and Skills* tab that in addition to teaching core subjects, stated that schools need to focus on 21st century themes such as civic responsibility, learning skills, information and technology skills and career skills. Another pertinent area from the *MILE Guide* was the field of *Educational Leadership* that focused on the administration articulating the vision to its staff. *Education Support Systems* is another field from the *MILE Guide* that greatly shapes how

schools design 21st century learning programs. This field offered insights about assessments and the pedagogical approach of teachers that is most conducive for 21st century learners.

21st Century Instructional Context: The American Association of School Administrators published a large scale report in 1996 (Uchida, 1996) projecting that schools in the 21st century "will be laced with a project-based curriculum for life aimed at engaging students in addressing real-world problems, issues important to humanity, and questions that matter" (p. 10-11).

This report signaled a formal declaration to the school administrators that a dramatic departure from the factory-model education is necessary. It is the abandonment of textbook-driven, teacher-centered, paper and pencil schooling. It means a new way of understanding the concept of "knowledge" and a new definition of the educated person. A new way of designing and delivering the curriculum is also required in this educational environment. When all of these components are put in place with the proper resources and staff development, 21st century education can be achieved.

According to the Partnership for 21st Century Skills (2007), there are five major components to the 21st century learning context to help make meaningful connections for learning.

- Integrating high order thinking skills and technology tools all learning activities.
- Making content relevant to students' lives
- Bringing the world into the classroom
- Connecting students to the world of work

- Creating opportunities for students to interact with each other, with teachers and with other knowledgeable adults in authentic learning experiences.

These connections are vital in developing engagement, motivation and positive attitudes about learning.

Rigor: According to the *MILE* Guide and the Partnership of 21st Century Skills (2002), one of the most critical components to a 21st century education is the integration of the necessary skills into the core academic subject curriculum. To a great extent, the concept of a rigorous curriculum stems from Bloom's taxonomy (1956), which is composed of the following six escalating skill levels: knowledge, comprehension, application, analysis, synthesis, and evaluation.

As the educational community focuses on preparing students for the 21st century, the concept of rigor has evolved. In her book, *Rigor is NOT a Four-Letter Word* (2008), Barbara Blackburn stated, "Rigor is creating an environment in which each student is expected to learn at high levels, each student is supported so he or she can learn at high levels, and each student demonstrates learning at high levels" (as cited in Williamson and Blackburn, 2010).

Strong, Silver and Perini, (2001) stated that, "Rigor is the goal of helping students develop the capacity to understand content that is complex, ambiguous, provocative and personally or emotionally challenging" (p. 4).

Relevance: Within the *MILE* Guide's educational support systems, it stated that not only should 21st century skills be embedded in the core academic subject curriculum but taught within a 21st century instructional context. Authentic learning typically

focuses on real-world, complex problems and their solutions, using role-playing exercises, problem-based activities, case studies, simulations and participation in virtual communities of practice. Lombardi and Oblinger (2007) stated that authentic learning should be “A learning environment is similar to some ‘real world’ application or discipline: managing a city, building a house, flying an airplane, setting a budget, solving a crime.”

Marc Tucker and Judy Coddling, who cited decades of research, urged schools to adopt “a thinking curriculum – one that provides a deep understanding of the subject and the ability to apply that understanding to the complex, real-world problems that the student will face as an adult (2002).

Resources: Seels and Richey (1994) stated the importance of “the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning” (p. 1). The five domains within the definition include design, development, utilization, management, and evaluation. They are the foundations for practice in the field.

Educational technology is the considered implementation of appropriate tools, techniques, or processes that facilitate the application of senses, memory, and cognition to enhance teaching practices and improve learning outcomes (Aziz, 2010).

According to Jones and Flannigan (2004), digital literacy is the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers. They asserted, “Not only must you acquire the skill of finding things, you must also acquire the ability to use those things in your life” (p. 8). Acquiring digital literacy for Internet use involves mastering a set of core competencies.

Trends in International Mathematics and Science Study (TIMSS): The Trends in International Mathematics and Science Study (TIMSS) provides reliable and timely data on the mathematics and science achievement of U.S. 4th- and 8th-grade students compared to that of students in other countries. This assessment first offered in 1995, then subsequently in 1999, 2003, 2007 and 2011 measures students' progress in mathematics and science. During each test year, the United States randomly drew a sample that consistently ranged from 450-500 schools. Internationally, the number of students taking the assessment has ranged from 9,000-33,000 (Ruzzi, 2006). During the 1995 school year, students from up to 41 nations were assessed at different grade levels (4th and 8th) to establish a baseline in mathematics and science achievement for other nations. American fourth graders scored above the international average in mathematics and science comprehension. Eighth graders however in 1995 scored below average in mathematics. There were no measureable improvements or changes in students' scores between 1995 and 2003. (Mundy, 2004).

The 2003 TIMSS results show that nearly, half of participating 8th graders scored advanced levels in mathematics in Taiwan, Korea and Singapore, compared with only 6 percent of American students (Dillon, 2008). Although, the 2007 American mathematics results are slightly higher than the initial year of 1995, the results still show that American 4th and 8th grade students are making gains but still lag behind significantly in science and in both areas upon the completion of high school (Paulson, 2008). In the TIMSS report from 2007, Peterson and Hanushek (2011) state that only 32% of U.S. public and private students were proficient in mathematics. In 2011, the U.S. scored 32nd of 65 nations in mathematics which ranks the U.S. between Portugal and Italy. In the

latest TIMSS results of 2011, overall American fourth graders fare the best against the Asian countries in science.

The importance of the TIMSS results are that Asian countries continue to outperform the United States greatly in science and mathematics which are the subjects crucial to economic competitiveness and research. While the U.S. students gradually improve in math 2011, the growth may be too slow to forge the foundational skills needed for sustained growth for economic productivity.

Program of International Student Assessment (PISA): This international assessment, administered by the Organization for Economic Cooperation and Development (OECD) is based on the challenges of 21st century modern life (2003). Each PISA data collection effort assesses one of the three subject areas in depth. Along with assessing the three key competencies of mathematics, reading and science, the PISA tests (1) The use of tools interactively for the means of language, technology and communication (2) Acting autonomously for independent learning (3) Interact cooperatively in groups (Ruzzi, 2005). Given exclusively to 15 year olds, it not only drew from the curricula from school, but from learning that occurred outside the classroom. The 2006 PISA assessment showed that out of 30 industrialized countries, the United States' science and mathematics results fared below the international average.

Research Questions

The research was guided by the following questions:

1. How does the district's vision reflect the critical skills needed for the 21st century workplace?
2. What are the beliefs of administrators regarding 21st century learning?

3. How do teachers approach planning for 21st century students?
4. Is there alignment between the components of 21st century learning, the articulation of the school's vision and the actual instructional practices in the classroom?
5. How are teachers effectively integrating higher order thinking, real-world relevance, and technology literacy in core classrooms in order to advance learning in a 21st century context?

Significance of the Study

Globalization and national economic interests call for American schools to examine secondary programs and preparation standards for graduates. The American Diploma Project (2004) concluded,

America must re-establish the value of the American diploma that will require the creation of an inextricable link between high school exit expectations and the intellectual challenges that graduates invariably will face in credit-bearing college courses or in high performance high growth jobs (p. 1).

With low graduation rates and higher demands, public schools are slow to change. Public school systems are traditionally monolithic and hierarchal resulting in their insensitivity to change (Provus, 1971). Schools that embrace innovation and reform embody more unique characteristics that allow for a climate of change. The most prevalent 21st century educational models have occurred in private or charter schools that have these characteristics. The decentralized and loosely regulated charter schools have the most appropriate organization system to foster innovations and reform efforts. Yet

public schools are controlled by federal and state accountability standards that have dictated the curriculum and direction of priorities.

This study will delve into what beliefs administrators and content teachers harbor about implementing a 21st century educational program in a public school setting. When compared to the existing 21st century educational frameworks, this study will show if there is any discrepancy between the vision's intended purpose and the actual interpretation of the vision by the staff. This will help with the future training of administrators and educators to be better equipped with the competencies needed to facilitate the integration of a 21st century education framework and skills into daily instruction. This study's findings will also contribute to the limited amount of literature of implementing a framework for 21st century skills in a public school system. The researcher will explore the major elements of a 21st century learning context, which include rigorous instruction, relevance in learning and the integration of technology in the learning process. Ultimately, this study will highlight what 21st century educational practices have been incorporated in a high school setting as part of its reform process.

Summary

According to the 21st Workforce Commission National Alliance of Business (2006), "The current and future health of America's 21st century economy depends directly on how broadly and deeply Americans reach a new level of literacy-21st century literacy-that includes strong academic skills, thinking, reasoning, teamwork skills and proficiency in using technology" (p. 4).

Many schools have turned to technology as the "21st century silver bullet" for their educational shortcomings. However, merely acquiring technology without a planned

relevant instructional context is not the solution to developing the skills necessary for succeeding in the competitive 21st century global economy (Cuban, 2000; Dobyns, 2011; Toyama, 2011). To compound this dilemma further, it has only been in the last decade that there has been an emphasis on assisting school leaders to design curricular programs that incorporate 21st century skills, integrate 21st century tools or plan effective professional development opportunities to enhance instruction.

To cope with the demands of the 21st century, people need to know more than the core subjects (Murnane and Levy, 1996). These competencies have been identified by various organizations, including international agencies, as the essential areas needed to be competitive in the 21st century workplace. Because schools are educating students for jobs that have not been created yet, educational programs must balance content with the ability to think, adapt and learn. The skills, such as information and communication skills, global, economic and civic awareness, self-directional skills, such as critical and abstract thinking, problem solving and drawing conclusions, interpersonal skills such as collaboration and empathy should all be integrated into the core curriculum in order to address the necessary competencies for the 21st century (Bellanca and Brandt, 2010; Powell, 2010; Trilling and Fidel, 2009; Wagner, 2008). To combat national dropout rates of approximately 30 percent, the Alliance for Excellent Education (2008) asserted that students prefer to learn when they are engaged in meaningful, relevant and intellectually stimulating work. Therefore, students of the 21st century who have a natural and inherent inclination to use technology in their learning interaction will need a technologically integrated curriculum that embeds 21st century skills into the content. As many schools

may embody this daunting 21st century vision, the research suggests that public school systems are the least progressive in achieving these goals.

Our students live in a global, digital world, transformed by technology. This societal phenomenon has also transformed the types of students that educators are teaching. Given the rapid rate of change and the vast amount of information that 21st century students confront, it is evident that an educational system, designed to meet the needs of an antiquated 19th century factory based economy, has become obsolete. This study of 21st century learning beliefs and implementation practices will add to the existing literature that will be reviewed in Chapter Two.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

How do we best prepare students to succeed in the 21st century? This question is vital in an era of high stakes accountability and international economic competition due to globalization. There are many direct and indirect factors that have contributed to this educational crisis. Globalization has not only affected the 21st century workplace, but also the skills needed to be successful. As a result, the approach to educational programs is changing to directly meet the needs of the 21st century learner.

History of Globalization's Impact on Labor

Globalization of the labor force has indirectly altered the educational requirements and priorities of our schools. Historically, average students with basic skills could get jobs and earn a middle-class income (Pletka, 2007). Traditionally, a strong will to work and a high school diploma were all that was needed to make a start in America.

While learned skills are extremely important, formal higher education is a natural means of advancing the American workforce. For thirty years, the United States boasted in having 30 percent of the world's college students. Although, more American students attend post-secondary schooling, in 2005, that number has dropped to 14 percent (National Center for Education and the Economy, 2005). If this decrease in attendance continues in the next decade, the U.S. will end up with a shortfall of workers with Associate's degrees or better of about 3 million (Carnevale, Smith and Strohl, 2010). Further, the salary rate difference between someone with a high school diploma and someone with a post-secondary degree has increased from 46 percent in 1973 to 76 percent in 2001 (Mishel, Bernstein and Boushey, 2003). This difference is a result of the

shift in the nature of work. As documented by Apte, Kamarker and Nath (2008), the Anderson School of Management at UCLA, in 1967, found 54 percent of America's economic output was based on production of material goods such as automobiles, chemicals and the delivery of material services such as construction and transportation. Due to technology advances, the report further stated, that in 1997, the production of information products such as computers, televisions and software as well as information services such as telecommunications and broadcasting accounted for 63 percent of America's economic output (Apte, Karmarkar and Nath, 2008). This has shifted America's economic focus from manufacturing to services. Between 1995 and 2005, the United States lost 3 million manufacturing jobs but gained 17 million service sector jobs (U.S. Bureau of Labor Statistics, 2008).

According to the RAND Corporation, the U.S. population and workforce has been changing for quite some time (Karoly and Panis, 2004). Major factors include the aging of the baby boomer generation as well as more women are entering the workforce. For the United States, the aging and retiring population increase has imposed greater burdens per working people. This demographic phenomenon has affected the growth of the American workforce. Consequently, the RAND (2004) report also stated that during the 1990s, the workforce grew at an annual rate of just 1.1 percent, in comparison to the 1970s when it grew at 2.6 percent. While the latest projections show an increase in the labor force, it is specifically in highly specialized areas. By 2018, the economy will create 46.8 million openings of which 63 percent will require workers with a least some college education (Carnevale, Smith and Strohl, 2010).

The Demand for New Skills in the Workplace

Innovations in technology have made it possible for millions of people to live, work, learn and be entertained in ways that were never thought possible twenty years ago. The immediate access to media and information through the use of the Internet has globally connected people and their ideas. In addition to making our lives more convenient, technology has played an economic role in leveling the playing field for other industrialized countries allowing for growing prosperity and global economic competition (Daggett, 2005). At the end of the Cold War, new nations began industrializing, tipping the scales for the United States (Tapscott, 1998). The United States, a major economic powerhouse, finds itself rigorously competing for goods and services. As the world speeds on the 21st century knowledge super highway, today's young people will have more opportunities to use technology for inquiry, analysis and self-expression that will contribute to their success.

Drucker (1973), a futurist, understood that work will change due to societal and economic changes and predicted this shift in the types of work people will perform. Kelley (1985) described an old distinction that divided the workforce into blue-collar and white-collar. Blue-collar workers tend to do manual labor paid hourly, while white-collar employees perform knowledge work in an office on salary. In the 21st century, he calls these new workers, knowledge workers. These new laborers conduct a number of activities that involve writing, creating, analyzing and organizing knowledge. Kelley (1985) capitalized on Drucker's idea and coined the term "gold-collar" to describe workers whose most valuable asset is their creativity. A more recent author, Florida (2007) reinforced Drucker's prototype of the creative knowledge worker. He asserted that

the antiquated industrial model is obsolete and has been transformed into the new economic paradigm where innovation, knowledge and creativity are key. This new economy has naturally demanded a new worker. Wonacott (2003) and Wood (2001) have also used the term “gold collar” worker for the new creative and strategic thinkers needed to compete in the global economy of the 21st century. Pink (2005) believed that economic survival for U.S. workers will rely on workers’ creative capacity as well as their ability to think unconventionally, question the status quo and deal with ambiguous situations and problems.

Technological progress has increased the demand for highly skilled work, increasing the value for the higher education degrees and unique skills. Tony Wagner from the Harvard Graduate School of Education (2008) documented the skills that American students need to thrive in a new flattened workforce. The skills were formulated by Wagner’s own personal discussions with Chief Executive Officers (CEO) of Fortune 500 companies. The company leaders stressed the lack of seven skills in their newly hired employees. Business leaders believe that the 21st century workers must encompass the ability to think critically, collaborate, adapt, have initiative, oral and written communication, access and analyze information and use imagination (Wagner, 2008). Wagner’s set of survival skills is reflected in many frameworks such as the SCANS from the nineties and other frameworks for 21st century skills.

Twenty-first century technological advances bring a demand for highly skilled workers in order to support high productivity. Huitt (1999) summarized the famous futurist author, Alvin Toffler, who predicted these changes in the nature of work. He believed that societies are caught up in the “third wave” of industrialization. Just as the

United States was fueled by its early industrial growth with steam and built a manufacturing empire with assembly lines. Society can look to computer technology as a means to shape a high-wage, high-skill future. Toffler (2004) asserted that mastering various literacies are the emphasis for learning. He described this concept of continuous learning in one of his trademark quotations, “The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn” (as cited in Hennessy, 2002). This statement reflects the studies conducted by the RAND Corporation (2004) that also assert that twenty-first century work requires higher level cognitive skills such as managing, interpreting, validating, transforming, communicating and acting on information. Non-routine analytic skills such as abstract reasoning and problem solving will be essential in jobs from high level engineers to package deliverers (RAND, 2004).

More predictions about the implications of the 21st century on the future of labor came from the Office of Technology Assessment (1990). This national initiative mapped the major differences between traditional industrial models of work and the new information technology-rich perspective of work (Table 1).

Table 1

Characteristics of Today’s and Tomorrow’s Workplace

Traditional Model		21st Century Model
	STRATEGY	
Mass production		Flexible production
Long production runs		Customized production
Centralized control		Customized production
	PRODUCTION	
Fixed automation		Flexible automation
End of line quality control		On line quality control
Fragmentation of tasks		Work teams, multi-skilled workers

Authority vested in supervisor	Work teams, multi-skilled workers
HIRING / HUMAN RESOURCES	
Labor management- Confrontation	Labor management- Cooperation
Minimal qualifications accepted	Screening for basic skills
Workers as a cost	Screening for basic skills
JOB LADDERS	
Internal labor market	Limited internal labor market
Advancement by seniority	Advancement by certified skills
TRAINING	
Minimal for production workers	Training sessions for everyone
Specialized for craft workers	Broader skills sought

Office of Technology Assessment. (1990). *Competing in the New International Economy*. Washington, DC

Not only has Friedman (2006) emphasized a global crisis, but the National Center on Education and the Economy (2007), claimed that due to the flattening of the global economy, Americans are losing ground while other industrialized countries like India and China are “seizing opportunities and improving their skills” (p.1). Daggett (2005) concluded that the goal was to emulate the prosperity of the United States after the rapid spread of capitalism that occurred after the liberation of Eastern European nations from the Soviet Union. Daggett (2005) also believed that these eager new democratic societies put forth much effort to become members of the successful middle class. As a result, newly democratic and industrialized nations were more economically aggressive in the workplace and in their training (p. 2).

Competition is evident due to the political changes in countries but the most dramatic shift in the global workforce has been the technological innovations and changes that have occurred. Globalization simply means to interconnect the world

through the instant access that technology allows humans. Therefore it is transparent that globalization will have a major effect on the kinds of jobs needed and the people skilled to fill the vacancies (Rivzi and Lingard, 2000). Highly skilled workers can now be found anywhere on the globe, regardless of the business' location. The RAND report (2004) explained the temptation to outsource by stating that major corporations, "no longer limit production to a single country, but carve up the production process into stages implemented in multiple countries (p. xxviii). By doing business in this fashion, companies are selecting locations that reflect low cost benefits during the stages of production. With the emergence of technology and information technology careers, workers can collaborate without physically relocating. Friedman (2006) stated, that emigration is not necessary for innovation to occur. For example, technology companies charge that failure of U.S. schools to produce enough graduates with higher level mathematics and science degrees is one reason corporations are hiring workers from other countries (Computer Systems Policy Project, 2004, as cited in Road to 21st Century Learning, 2008).

This new demand for skills has changed the face of work. More highly skilled persons with backgrounds in information and communication technology as well as biotechnology, nanotechnology, geospatial engineering and research, will be able to be found in other industrialized nations. In 2000, less than 20 percent of the workforce was in a job considered unskilled. This is a total reversal of the nature of the American workforce 40 years ago, when 60 percent of the U.S. workforce was classified to be unskilled (Lynch, 2000). Demographic shifts were predicted to increase the gap between qualifications and job demands, creating a shortage of 9 million workers by 2014

(DeRocco, 2007). During the 2002-12 decade, total employment in the U.S. was projected to increase by 21.3 million jobs or 15 percent. In a recent survey DeRocco's predictions were confirmed when it was reported that over 600,000 positions are still unfilled due to unskilled unqualified workers. A survey cited by the Financial Times (2011) stated, "the size of the skills gap has not diminished since its last report in 2005. In fact, manufacturers predict the problem to worsen-suggesting that the U.S. needs to focus on re-educating the workforce" (Weitzman, 2011).

The amount of jobs that require a college degree will continue to steadily increase by more than 40 percent. It is apparent that the demand for highly skilled labor has increased as well as the need for additional schooling and training to fulfill them. In fact, the number of American workers with some post-secondary schooling increased from 28 percent in 1973 to 59 percent in 2000 (Carnevale and Desrochers, 2002). According to Carnevale and Desrochers (2003), this disparity between worker skills and employer demands will produce shortages of workers with college level skills projected to reach 12 to 14 million by 2020.

Even with the increase in American workers with post-secondary degrees, according to the United States Bureau of Labor Statistics, in 2010, the U.S. faced a shortage of 12 million qualified workers for the fastest growing job sectors which include health care, computer technology and the sciences. Craig Barrett (2004) rationalized the shortage as due to new participants in the international economy. China, India and Russia combined make up 3 billion people on the planet. Merely ten percent of their population is highly educated with a technical or college degree. Even though, the United States sends 25 percent of its population to post-secondary schools, that number only makes up

75 million citizens as compared to 300 million people from the newly industrialized nations (DiGennaro, 2006). More recent estimates suggest that anywhere from 28 percent to 45 percent of the U.S. labor force works in these types of skilled jobs. Globally, knowledge industries are increasing in number—with up to 85 percent of new positions created since the turn of this century requiring specialized skill sets (Bison, Stephenson and Viguerie, 2010).

However, American college-age children may be contributing to this worker shortage by not pursuing degrees in mathematics, science and engineering fields, which have potential for economic growth. In fact, according to National Science Foundation's Science and Engineering Indicators of 2004, 2.8 million bachelor's degrees in science and engineering fields were awarded worldwide, with 1.2 million of the degrees earned by Asian students in Asian universities of which 400,000 of these science and engineering degrees were earned in the U.S. by American students. This trend is troubling when jobs in the science and engineering sectors grow at "five times the rate of other jobs in the workforce" (as cited in Friedman, 2006, p. 345). Sixteen other foreign nations ranked higher in earned science and engineering degrees than the U.S. The National Science Board noted that since the 1980s approximately 40 countries in the Organization for Economic Cooperation and Development (OECD) bolstered investment in science and engineering education. As a result, OECD countries observed a 23 percent rise in science and engineering jobs, while the U.S. indicated only an 11 percent growth (as cited in Friedman, 2006, p. 347). Despite efforts by President George W. Bush in 2006 pledging an addition of 35,000 math and science teacher recruitments, a national study showed that math and science are the fields most difficult to staff (Ingersoll and

Perda, 2010). Ingersoll and Perda's research confirmed preliminary projections from the National Science Foundation's Commission on Mathematics and Science Teaching, chaired by former astronaut, John Glenn, that the number of math and science teachers will dramatically decrease by two-thirds in 2010 (p. 564). Ultimately, there has been a shortage of approximately 200,000 science and math teachers, whose backgrounds make them prime candidates for high-paying positions in the private sector (Gardner, 2012).

It is apparent that the shift in the global economy and changes in technology impacts the nature of business and work. Florida (2007) described this innovative new global economy as the creative age. In some cases, jobs are obsolete, in others they have not been invented yet. The Association of Graduate Recruiters (2007) postulated that that the new careers of the 21st century do not offer the security and clear functional identities of the past. They stated that, "Graduates today will live in a world where life-long learning, self-development are overwhelming needs in order to stay employable" (Association of Graduate Recruiters, 2007, p. 1). However, in all cases, the challenge is to prepare future workers, our students, to be prepared for these changes. Yet results from the National Assessment of Adult Literacy found that 30 million adults have below basic levels of literacy with more than half of those adults not having a GED or high school diploma (Fitzgerald, 2011). The former Secretary of Labor, Alexis Herman (2000), reflected optimism in light of continuous low literacy levels by supporting the education for future work. She stated:

To say there is a worker shortage is to say the people we need don't exist. But they *do* exist. They are people who have bills to pay, children to raise, and dreams to pursue. What they lack are the skills

demanded by today's economy. Some of them are young people who left school without a skill. Some are workers whose factory has closed, or whose company switched to a new technology. Some are coming off welfare, or are Americans with disabilities. All of them must be brought into the main-stream of our information-based economy, where *what you know* determines *how far you go* (Speech delivered to the U.S. Department of Labor on January 11, 2001).

Therefore, the economic health and future of the country depends upon the education of new workers better equipped to succeed in the new economy.

Impact of Globalization on American Education

Carnoy and Rhoten (2002) asserted that the method in which knowledge and information is delivered in school systems is closely related to how successful students can be in a knowledge-production society.

Globalization has forced American society to realize that economic competition for jobs has multiplied across the globe. To compound the conundrum, the skill sets that students require to be successful have also changed dramatically. For new highly skilled jobs, in addition to the initial set of seven that Wagner (2008) stated: thinking critically, collaborating, adapting, having initiative, accessing and analyzing information, imagining and communicating, students also need to learn processing skills such as technology fluency, research and collaboration in order to create products. Yet in the wake of content accountability, it is not as simple to merely teach additional skills to 21st century students. In order for students to truly be successful in their educational experiences, the

instructional model and pedagogical paradigm of education must shift from content driven to a focus on the processes needed to be successful (Bassett, 2002).

Table 2 depicts the differences in the areas of work and education for the 21st century.

Table 2

Why Students Need 21st Century Skills

	20 th Century	21 st Century
Average number of jobs most people hold in lifetime	One or two	Ten to fifteen
Academic, civic and economic expectations	Mastery of one field	Flexibility and adaptability
Teaching model	Subject matter mastery	Integration of 21 st century skills into subject matter mastery
Assessment model	Standardized tests based on mastery of facts	Authentic demonstrations of student understanding

Partnership for 21st Century Skills. (2008). *The Road to 21st Century Learning*

It is imperative for educational organizations to stay abreast of the needs of the global workplace in order to adjust the instruction and curriculum accordingly.

Globalization affected the nature of work through decentralization of industries, therefore school systems must allow for more flexible instruction and learning. The 20th century classroom prepared our students for the industrial age relying on lecture, individualized work and strict accountability. The 20th century classroom exhibited the traditional American school paradigm of timed activities that focus on facts and recall. It is teacher centered with the teacher as the judge, not allowing sharing of work or choices. The 21st century classroom is quite different. Instead of timed activities, outcome based

approaches are encouraged which ask students to work together to solve problems through research and dialogue. There are peer and self-assessments that allow the student to revise work and projects. The curriculum is not fragmented but instead interdisciplinary and integrated. As a result, the 21st century classroom advances students in a learner friendly environment where students flourish using 21st century skill sets. By embracing the blend of technology and 21st century skills while weaving them into the educational fabric of instruction, educators are increasing the effective preparation of graduates in the 21st century.

India and China are also making an impact in the global community both economically and educationally, with more than half of engineering degrees awarded to foreign students from countries like China (DiGennaro, 2006). In a speech delivered to the Education Writers Association, Margaret Spellings (2005), the former U.S. Secretary of Education, expressed her concern regarding the nation's position in preparing competent graduates. She stated, "38 percent of bachelor's degrees in China were awarded in engineering as opposed to less than 6 percent in the U.S." In the decade from 1990-2000, India increased its number of students enrolled in college by 92 percent (Barrett, 2004). If the new knowledge jobs are in the areas of engineering, design, research and computer technology, the United States needs to confront this educational problem if it intends to succeed in the global workplace.

Even the business sector has echoed the remarks of the federal government. The prominent former CEO of Lockheed Martin shared the view that the global economic landscape will impact education. Norm Augustine (2005) pointed out this fact in his

remarks to Congress when he chaired the Committee on Prospering in the Global Economy of the 21st Century. He stated:

Human capital—the quality of our work force—is a particularly important factor in our competitiveness. Our public school system comprises the foundation of this asset. But as it exists today, that system compares, in the aggregate, abysmally with those of other developed—and even developing—nations . . . particularly in the fields which underpin most innovation: science, mathematics and technology (Augustine, 2005).

Donna Klein, a former executive of the Marriot cooperation, while commenting on the Workforce Readiness Report of 2006, discussed the discrepancy between the American educational system and the current needs of business. She stated, “We have changed to a knowledge economy, culturally, socially and economically, but have not yet figured out how to reinvent ourselves to keep up with this, including in the area of education” (McLester and McIntire 2006, p. 23). The report further concluded that the United States’ educational system focuses on the accountability of a fragmented curriculum. The legislative efforts, such as No Child Left Behind, have perpetuated this notion of mere accountability and fact recalling in the era of high stakes testing. The 21st century requires that students see the whole picture of learning, not just show proficiency in the basic skills of mathematics and reading. This educational need is also resonated by a 2005 report from the Gates Foundation, which reported only 2-3 percent of parents and educators feel the prime goal of high school is the mastery of basic content skills (Bridgelan, DiIulio and Morison, 2006).

Education in the International Arena

As the United States combats the educational crusade at home, there are significant international initiatives that are raising the bar for the United States. Much like

changing economic landscape affects the American educational system, Europeans have also viewed education as the springboard for 21st century preparation.

The International School of Brussels identified what independent learners and international citizens look like. They believe that their students must develop a set of understandings that will make them literate in all fields of learning. They feel the ideal learner should be, “empathic, positive, responsible, open-minded, collaborative, curious, reflective, principled and systematic” (Bartlett, 2006). This approach embraces Toffler’s belief of true literacy being able to adapt and learn from many sources of information. The school’s leaders asserted that the most optimal way to produce these results is with the focus on structured inquiry, collaborative problem solving and real-world task based assessments.

Another international example of educational reform comes from The Royal Society of the Arts (RSA) in Great Britain. This organization has responded to the changing demands of the 21st century by launching an educational campaign called, *Opening Minds*. In 1999, the RSA launched this framework based on eight years of educational research in teaching specific student competencies. The overarching goals for this educational reform initiative in Great Britain have been to prepare young people for the uncertain social and economic demands of the future. The *Opening Minds Framework* emphasizes practices and standards that will engage students to become lifelong learners. The organization advocated a student-centered approach to learning that integrates educational standards and competencies that are needed to be successful workers and responsible citizens. Competencies such as meta-cognitive skills, citizenship and global awareness are examples of skills that the RSA feels are integral for 21st

century success. They reiterated the development of a new digital literacy for 21st century learners. Along with the technology skills, the RSA believes that self-directional skills such as managing time, handling change as well as high order thinking skills are needed in all school curricula and offer the resources for schools to implement these components in their school organizations. The RSA continues to champion the pedagogical shift that 21st century educational preparedness is more than low-level understanding.

Another European effort was undertaken at a conference of the Inter-Parliamentary Union and United Nations Educational Scientific and Cultural Organization or UNESCO. This collaboration supported the need for education to adapt to the changing forces of the 21st century. In the findings and recommendations it outlined world educational standards to cope with the tumultuous times of the 21st century (1996).

Learning to know: To acquire the instruments for understanding the world, which also involves learning to learn so that the capacity to acquire fresh knowledge can be continued throughout life.

Learning to do: While learning an occupational skill is certainly important, the ability "to do" is necessary in all aspects of life.

Learning to live together, in order to participate and co-operate with others in all human activities. This means "learning to desire to live together" by learning about other people.

Learning to be, that is to have a greater capacity for autonomy and judgment, which goes together with strengthening the feeling of personal responsibility for our collective destiny.

These important but generalized elements from UNESCO emphasized the “soft skills” needed for young people to be successful when interacting with a globalized world.

The accelerated pace of technology propelled changes in labor markets, jobs and skill requirements that ultimately affect American students. Along with the interdependence of many newly industrialized nations, Europe understands the need to act educationally in order to prepare for the ripple effects that the aforementioned agents of change will create. As a result, Europeans aimed efforts to examine teacher quality and standards. In a recent report to the Organization for Economic Cooperation and Development (OECD) the United States was identified as having lower educational standards for schools that can have a detrimental impact on the American economy (2009). In regards to effective teachers, British educational expert, Michael Barber, told the New York Times that “top-performing education systems around the world all select their teachers from the top third of their college graduates, whereas the United States selects its teachers from the bottom third of graduates” (as cited in Dillon, 2007). When examining the majority of the teaching force, Murray (2007) stated, seventy-five percent of elementary and secondary teachers are female. The Program on Education Policy and Governance from Harvard University (2005) also focused on female high school students to examine a decline in the teaching force. They asserted that the 10 percent of highly talented female high school graduates who enter teaching has declined by nearly half from 1964-2000 (Hoxby and Leigh, 2005). In essence, the problem becomes more complex when standards and skills for the 21st century are being taught by a majority of mediocre educators while not attracting more highly skilled students into the teaching force.

The European approach to curriculum development is different than that of the United States. Europeans stressed a broadened perspective regarding the curriculum that encompasses the global issues that students will inherit, such as the environment, health and economics. Even at the higher education level, Papadopoulos (1995) believed that many universities “merely pay lip service to the notion of interdisciplinary curriculum” when in fact it needs to be the norm (p. 499). Later on, Bassett (2007) looked at European higher education institutions more favorably in that they allow for students to specialize in a field by taking fewer courses in general educational requirements. This allowed students to not only specialize but also focus on the self-directional skills needed to be successful in those areas. He further stated that Europe’s primary goal is to create someone “with a scholarly penchant and at least some level of deep knowledge in one or more academic disciplines” (p. 1). This European model is at odds with the foundational philosophy of American education. David McCullough (2001), in his biography of John Adams, reflected how Adams viewed the future of American education, by stating that his sons, “will study mathematics, philosophy, geography, natural history...and navigation...in order for their children to study, painting...tapestry and porcelain” (p. 236). This depicted our forefathers’ admirable thirst for a well-rounded curriculum that has been manifested into a content driven instructional approach. In this century, it is still debatable whether an eclectic secondary education, that is content rich, contributes to the preparation of a successful citizen.

In a publication from the Asia Society called, *Educating for Global Competitiveness*, Mansilla and Jackson (2011) found students need “to be competitive, ethical, and effective workers, today’s students must understand key topics of global

significance in areas like engineering, business, science, history, ecology, and other domains that may constitute their future work” (p. 2). They further stated that students should “deploy and develop this expertise as they investigate such issues, recognizing multiple perspectives, communicating their views effectively, and taking action to improve conditions (p. xiii). The 21st century demands capacity for continuous lifetime learning – learning to learn and on sophisticated intellectual skills, such as seeing connections across disciplines. The most telling part of the report is the illustration of the 21st century skills needed for a global competitive economy. Mansilla and Jackson (2011) rejected the traditional method of rote instruction, with students absorbing knowledge, only to retell it to the teacher. They call for learning to access new sources of information, and to distinguish between various sources of information. The publication provided specific learning opportunities for students to use skills of 21st century interconnectedness is to prepare students for a world of change, instantaneous communication and new human relationships in virtual as well as real worlds.

While the United States enjoyed the highest high school completion rates among OECD countries in the 1960s, in 2009 it ranked 21st out of 26 countries in high completion rates. In its effort to stay competitive with other industrialized nations, the United States also participated in international assessments. The PISA (Programme of International Student Assessments) assesses whether 15 year-old students can recall what they have learned in science, mathematics and reading, and how well they can apply their knowledge in new situations. More than 400,000 15-year-old students from 57 countries, including the 29 OECD countries took part. These countries make up close to 90% of the world economy. The United States measured 27th out of industrialized countries in the

first PISA in 2000 and 25th in 2003. The assessment measured literacy in mathematics, reading, science and problem solving as well as served as a tool to revise and guide new international competency domains. The test's objectives were to measure the aptitude of an individual working in teams, independently and with information tools such as language and technology (OECD, 2009). The United States scored considerably lower in mathematics than in science literacy with 23 other industrialized countries scoring above American students (Baldi, Jin and Green, et. al, 2007). In 2009, according to OECD, the PISA tested reading literacy in depth. Students were tested on accessing, retrieving, integrating, interpreting, reflecting and evaluating information. There was no measurable difference between the average score of U.S. students in overall reading literacy in 2000 and 2009.

The Trends in International Mathematics and Science Study (TIMSS) report measured the academic performance of the United States against other participating nations. However, unlike the PISA, the TIMSS study examined lessons, instructional practices and texts. Wu (2005) summarized that even from the 1990's to 2003, the United States showed a steady decline from 4th grade to the last year of secondary school compared to 46 other countries. Many have attempted to discredit the results of the TIMSS by stating that the U.S. has a more diverse population. American demographics, coupled with a compulsory education system with a well-rounded curriculum and a legislative emphasis on standards and accountability poses a great challenge for American public schools in the international arena. Despite the supplemental evidence that explains the international assessment results, "there is still a major disconnect between our student's preparation and the global community" (Wu, 2005, p. 2).

Although the United States lags behind other industrialized nations in regards to educational achievement, American schools have been exceptionally funded in comparison to its international counterparts. In 2007, the Organization for Economic Cooperation and Development (OECD), calculated that the United States spent \$10,768 per primary school student and secondary school student that is 45 percent higher than the OECD average. One explanation for the spending is America's commitment to special needs students and technology. At the secondary school level, the United States spent per pupil, 30 percent more than Germany, 16 percent more than France, 41 percent more than Japan, 48 percent more than the United Kingdom, 40 percent more than Sweden, 29 percent more than Belgium, 45 percent more than Finland and 118 percent more than South Korea. Of all the world's nations, only Switzerland equaled the United States in spending per pupil (Hess, 2004). Improvements in overall student progress have not improved despite federal education funding doubling between 1996 and 2003 in the United States that translates into a jump from \$23 billion to more than \$50 billion annually (National Center for Educational Statistics, 2003). The American educational reform philosophy must shift from the belief that pouring money into inefficient programs will improve the quality of education in public schools.

The international outlook for the United States' educational program is confirmed by both the TIMSS and PISA assessments. The U.S. is not producing students who are proficient in mathematics and sciences by the time they graduate high school (Hanushek, 2011). This is quite alarming in a changing economy where technology and engineering seem to be the most highly skilled and sought after skills.

Conceptual Framework for 21st Century Skills

As a teacher and administrator, the researcher has seen many schools include in their vision and mission statements, the importance in the preparation of students for a 21st century global economy. The dilemma for school districts has been aligning a global educational vision with the actual daily instruction and integration of 21st century skills. The challenge for administrators is maintaining one clear comprehensive 21st century educational framework to follow or implement. Another hurdle is that administrators and teachers have limited training in the integration of these skills into the existing curriculum. Ertmer and Ottenbreit-Lynch (2010) also noted teachers' reluctance to technology-driven student centered instruction that is paramount for a 21st century classroom. In response to this discrepancy in many schools, organizations such as North Central Regional Educational Laboratory (NCREL) and the Partnership for 21st Century Skills created critical skill sets for students. In addition, the newly formed Common Core Standards for mathematics and language arts literacy have also placed a strong emphasis on critical thinking skills such as deciphering, evaluating texts and problem solving. All of these skill sets took into consideration changes of the 21st century learner, globalization's impact on the workforce and an increase in technological advances.

There is a long history of the American federal government calling for many of the same competencies that foreign and local educators and business leaders have urged. One attempt by the federal government was to create a framework of standards for the 21st century in the form of the 1990 Secretary's Commission of Necessary Skills (SCANS). This initiative was the response to the 1983 report, *A Nation at Risk*, which outlined the failures of the American educational system when compared to international

counterparts. The report stated that in order for schools to be transformed into high performing organizations, five competencies must be incorporated into the daily instructional practices of educators. The report states the competencies that all effective workers can productively use:

Resources-allocating time, money, materials, space and staff

Interpersonal Skills-working in teams, teaching others, serving customers, leading, negotiating, and working well with people from a culturally diverse background

Systems-understanding social, organizational, and technological systems

Technology-selecting equipment and tools, applying technology to specific tasks
(SCANS, 1991, p. iii).

The Secretary's report also mentioned that three foundational competencies are needed to achieve the aforementioned skills. (1) Basic reading, writing and mathematics skills, (2) thinking skills that involve problem solving, critical thinking and reasoning and (3) personal qualities such as integrity, responsibility and sociability are all cited as necessary attributes for American high school students (SCANS, 1990, p. iii). Since the SCANS report was introduced at the cusp of globalization era, it was the U.S. government's initial step to confront the globalization and educational crisis. As technology became more developed and prevalent, more organizations both private and government funded, led the crusade for better 21st century schools with 21st century skills. Later, the Metiri Inc. (2006) funded through the NCREL, upon completion of a two-year study, developed its own list of necessary skills for schools called enGauge 21st

Century Skills. To achieve highly productive instruction and learning, NCREL (2006) claimed students need a variety of digital age literacies to succeed.

The NCREL list of 21st century standards consisted of four domains. The organization claimed that this new generation of workers must have digital age literacy that is defined as scientific, economic and technological competencies along with multicultural and global awareness. The second domain of skills needed for 21st century learners is called inventive thinking. This is the competency area where students are actively reflective in their learning. This characterizes self-direction, adaptability, curiosity, reasoning and higher order thinking. The third domain of necessary competencies that North Central Regional Educational Laboratory identifies is called effective communication. This promotes teaming, collaboration and interpersonal skills. It advocates personal, civic and social responsibility. The last domain is called high productivity where students are expected to use real world tools such as hardware and networking effectively as well as prioritizing, planning and managing for results. This translates into students gaining the skills to efficiently solve projects or problems using a variety of resources (Figure 1).

enGauge 21st Century Skills



Figure 1. *List of the four areas of competency for 21st century education*, NCREL, Metiri Inc. (2006)

The Partnership for 21st Century Skills (P21) is another organization that advocated school reform for the demands of the 21st century. The values of this organization are reflected in its mission statement, which state that it “is a public-private organization formed in 2002 to create a successful model of learning for this millennium that incorporates 21st century skills into our system of education.” The P21 Framework advocated that 21st century education consists of (1) emphasis on mandated core subjects (2) learning skills (3) use of 21st century technology tools (4) a 21st century context and (5) 21st century assessments (www.p21.org). Although assessments are vital to student achievement, the research must begin with learning skills, 21st century technology tools that facilitate instruction and the overall 21st century context of the learning environment.

21st Century Skills

The Partnership for 21st Century Skills developed a compilation of skills needed to succeed in tomorrow’s workplace that include various areas of research. According to

the Partnership for 21st Century Skills (2002), the list of skills were influenced from the American Library Association, the Center for Media Literacy, The Educational Testing Service, National Skills Standards Board, North Central Regional Educational Laboratory's enGauge and the Secretary's Commission on Achieving Necessary Skills (SCANS), state the critical skills for the 21st century are Information and Communication Literacy, Thinking and Problem Solving Skills, Interpersonal and Self-directional Skills.

Schools have the daunting responsibility to balance teaching students appropriate content while integrating thinking and application skills. Success in a flattened 21st century workforce, asks for flexibility, life-long learning, teamwork and a well-developed capacity to think (Noddings, 2008). The demands of the 21st century workplace are requiring less focus on narrowly defined disciplinary knowledge and more emphasis on thinking skills. The P21 organization stressed that the ideal learner utilizes higher level thinking to adapt and solve complex problems or situations while drawing on past knowledge. Technology advances in the 21st century digital age facilitate these important skills. Thinking and problem solving skills involve critical thinking, reasoning in order to understand and make complex choices as well as the ability to frame and solve problems. Critical thinking has been described as a sort of mental activity that uses facts to plan, order and work toward an end. By seeking meaning or explanation, the learner uses self-direction and reason to question claims and make judgment (Noddings, 2008). The P21 organization defined creative curiosity as the development and implantation of new ideas to others by staying open and responsive to new and diverse opinions. Interpersonal and self-directional skills demonstrate teamwork and leadership while adapting to a variety of roles as one respects others. The Partnership for 21st Century Skills (2006) believed that

the ideal learner must monitor their own understanding and learning needs. This would entail locating the appropriate resources and transferring learning.

21st Century Content

The skills outlined by the Partnership for 21st Century Skills (2002) are the competencies that all administrators must ensure teachers are providing to students in order for them to become successful workers in the new information age. The content that all schools need to enact in their curriculum are global awareness (promotion of understanding and tolerance of diversity), civic awareness (understand, analyze and participate in government, locally and globally) and financial and economic literacy (understanding the choices for personal prosperity) and health literacy (understanding nutritional choices that will allow for a long life). The 21st century learning skills working in tandem with the 21st century tools for content will ensure that our young people will have the ability to act, think, adapt and communicate creatively.

21st Century Instructional Technology Tools

A critical set of skills and knowledge in today's economy centers around the understanding and use of technology. According to the Partnership for 21st Century Skills, digital tools should be woven into daily instruction for students to research, organize, evaluate and communicate information (2007). Stakeholders of education, who include business leaders, policymakers and educators, understand the role ICT integration has in student engagement and achievement. According to the National Research Council, fluency in information technology is described as information and communication technology (ICT) skills such as contemporary skills, foundational concepts and intellectual capabilities (1999).

- (1) Contemporary skills consist in the basic ability to use computer applications.

(2) Foundational concepts are the basic principles and ideas of computers and networks.

(3) Intellectual capabilities are the ability to apply information technology in complex situations encapsulating high level thinking in the context of information technology. This skill involves the manipulation of various mediums to foster and advance abstract thinking.

Later the Association of College and Research Library defined ICT as the “set of skills needed to find, retrieve, analyze and use information” (as cited in Slebodnik and Zeidman-Karpinski, 2008, p. 1).

Digital technology used regularly in instruction can enhance student learning especially in writing. Goldberg, Russell and Cook (2003) found that students who used digital technology in their writing composition, not only produced higher quality compositions but exhibited more engagement and motivation. As technology continues to permeate the daily lives of our students, it needs to be embedded seamlessly within instruction. Reading and writing can also be enhanced by the use of technology. (Sternberg, Kaplan and Borck, 2007; Wolfson, 2008). Further, Desmet, Griffin, Miller, Balthazor and Cummings (2006) concluded that students who kept e-portfolios have a higher rate of academic achievement and retention rate than their peers. They believed that the natural technological inclination of this generation of students allows for greater reflection and collaboration.

Although the benefits of instructional technology are impressive, Hennessy, Ruthven and Brindley (2005) warned school organizations that these innovations take time. Their study showed that two-thirds of secondary English teachers feel very

reluctant to use technology in their daily instruction. These studies showed the importance of computer integration in the successful preparation of the 21st century learner. The NCREL organization (2006) and the Partnership of 21st Century Skills (2006) both indicated that ICT literacy alone is not sufficient in the development of a global 21st century worker. Thinking and problem solving skills that are fostered through authentic problem based learning opportunities must be researched as well. Unless schools find ways to bridge the gap between the delivery of instruction and the way this generation of tech-savvy students learn, educational initiatives will be irrelevant.

21st Century Context

The connection between a 21st century curriculum and the instructional approach is the cornerstone in the successful implementation of a 21st century educational program. The literature indicated that curriculum must blend thinking skills with the content from core classes. Merely learning the traditional reading, writing and arithmetic will not be enough for highly skilled work in the 21st century. The directors of the Change Leadership Group at Harvard University, Wagner, et. al. (2008), recommended a curriculum that is built on rigor, relevance and respect. By providing a positive environment while challenging students' thinking and connecting the content to the real-world, students will acquire academic and social competencies. Perkins (2008) also researched this concept of integrating innovative instructional approaches, high level thinking skills and real-world contexts and labeled it a "thinking" curriculum. This curriculum provided a rich understanding of the subject and skills in order to apply understanding to complex real-world problems. Perkins' (2008) research further indicated that the curriculum must reach beyond content knowledge to include a strong emphasis on 21st century skills, such as thinking skills, technology competencies and global

awareness. Vars and Beane (2001) concluded that almost without exception, students engaged in an integrative curriculum fare better than students in a conventional departmentalized program. Their position is based on the results of various standardized achievement tests designed for the traditional content driven instructional approach. Bransford and his colleagues (2004) later reaffirmed that instructional technology tools were not only vehicles to find information, but should be a platform for social interactions that can support student learning. These research findings support the correlation made by Newmann, Bryk and Nagaoka (in Lemke, 2005) between student learning and meaningful, relevant and intellectually stimulating work.

An integrative approach to curriculum is paramount for any educational institution's journey to educational reform. Deciding which instructional strategies are the most appropriate to deliver this curriculum is also imperative. The Partnership for 21st Century Skills (2002) defined the most optimal 21st century learning context as an environment where students can through learn real-world examples, applications and experiences both inside and outside of school.

The Contemporary 21st Century Learner

As we have seen, the rapidly changing global community, spurred by globalization, has altered the types of students that schools must educate. Although they value education highly, Net Geners learn differently from their predecessors. This generation is unique in that it is the first to grow up with digital and cyber technologies. Not only are Net Geners acculturated to the use of technology, they are saturated with it. (Bonamici, 2005). Therefore, as we tailor the educational context to their needs, the integration of educational technology must be included.

The unique learners called the Net-Generation, born after 1982, transformed the educational paradigm of the United States. As this technologically savvy group of students demand more digitally driven, relevant and challenging learning, schools need to understand these students and meet their needs. Rodgers, speaking at the Annual Conference on Distance Learning and Teaching (2006) explained the net-generation's implications on education. He stated, "Today's students live in a digital world where multimedia pervades every aspect of their lives. Their characteristics also reflect the society they live in. Because these students have the world's knowledge at their fingertips, they developed a heightened sense of curiosity and interactivity" (p. 2). Another study by John Palfrey and Urs Gasser (2008) of the Berkman Center at Harvard Law School called "Born Digital" showed, "Unlike those of us a shade older, this new generation didn't have to relearn anything to live lives of digital immersion. They learned in digital the first time around" (p. 4). The authors argued that young people like to use new digital ways to express themselves: shooting a YouTube video where their parents would have written an essay, for instance. The unique disposition of this generation of learners also results in employers adapting to the Net-Gen's preference for collaborative work rather than traditional command and control and their need for immediate feedback about their performance.

The lifestyle of the 21st century students has a direct impact on their instruction and the educational reform initiatives in the United States. Technology has made an impact in all facets of society including education. With an emphasis on technology integration, teachers have more ways to approach instruction for 21st century students. Instructional technology tools such as podcasts, blogs, smartboards, wikis and other

innovative software packages such as Photostory and Camtasia, are all exciting ways to deliver the curriculum while cultivating necessary skills needed for engagement and lifelong learning.

Marc Prensky, an acclaimed speaker and author about connecting learning with technology, compared student's everyday lives of the traditional classroom as a "somber place" (Prensky, 2008, pg. 40). Due to the accelerated growth of information, Prensky (2006) described Net-Gen students as viewing the computer as a sole medium for learning and communication. The average person processes more information in 24 hours than a person 500 years ago processed in his lifetime. Net-Gen students spend 5,000 hours of their lives reading, but over 10,000 hours playing video games, another 10,000 hours on their cell phones and 20,000 hours watching television. They download 2 billion songs per month and send 6 billion text messages and 250,000 emails before they turn 21 years of age (Prensky, 2006). With this extreme integration of digital technology in their lives, educational paradigms must be aligned with the natural tendencies of these students' thinking, learning and social preferences.

The Net-Gen students acquire and process information in ways that are far different than previous generations (Prensky, 2001). According to Oblinger (2004),

There is a growing body of evidence that students have developed a different set of attitudes and aptitudes as a result of growing up in an IT and media-rich environment. While this may provide great advantages in areas such as their ability to use information technology and to work collaboratively, it may create a disconnect between their expectations and the learning environments they find in formal schools (p. 15).

Through the daily use of technology, these students possess the tools to question, challenge and disagree. Net-based discussions, interacting with various services, gaming and emailing friends for advice or searching for additional sources of information are all important skills sharpened by the regular use of technology while increasing new avenues for exploration. Another characteristic of these “digital natives” is their preference to inductive discovery where they learn more effectively through discovery than by direct instruction. Discovery involves a personalization of the learning that is another preference of the Net-Generation of students. Without a genuine interest in the material or an understanding of its relevance in their lives, Net-Gen students will become disengaged (Oblinger, 2005; Hurley, 2007). These attributes, if channeled in proper learning environments are manifested in the classroom as critical thinking (Tapscott, 1998).

Evidence is strong that children who grow up tech savvy are more intelligent than their predecessors at similar stages of growth. According to research conducted by Patricia Greenfield and other psychologists at the University of California children scored average raw intelligence scores that are 15 points higher than those reported on tests 50 years ago (Neisser, 1997). This line of thinking shows an improvement in intellectual performance scores exists because current IQ tests have not changed over time (Flynn, 2007; 1998). Further brain research supported that Net-Gen students do think differently. In the past 25 years, neurobiology found that the brain is massively plastic, which allows it to continuously adapt to changing stimuli. Ongoing research in brain development concluded brains that undergo different developmental experiences, develop and learn differently (Prensky, 2006, p. 34).

If the Net-Gen youth are stimulated by digital technology, their brains have adapted and developed to allow for various cognitive skills to develop. Therefore, the visual, verbal and spatial skills which are developed by Net-Gen students using technology for gaming and learning, translates into having an advantage in composing ideas into text. As a result, these 21st century learners have strong visual-spatial skills and tend to lean toward non-linear thinking and parallel processing which results in fast responses and shorter attention spans. In a recent study called, “Your brain on Google”, Barseghian (2011a) reported that a test was conducted on the brain activity of two groups. One was “Internet-naïve” (mostly 65 and older who had very little experience online) asked to read a book and the other, “Internet smart.” In the “Internet savvy” group, there was twice as much brain activity in all parts of the brain when they were asked to conduct a Google search rather than read a book. And in the “Internet-naïve” group, after a week of Googling subjects online, there was a significant burst in frontal lobe activity, which controls short-term memory and decision-making (Barseghian, 2011a).

These unique students expect a similar approach in their learning. DiPaola, Dorosh, and Brandt (2003) concurred that 21st century students need meaningful learning with relevance and authentic activities while utilizing technology as an instructional tool. For example, the *Thinker Tools Curriculum* for teaching physics in an interactive computer environment focuses on fundamental physical concepts and properties, allowing students to test their preconceptions in model building and experimentation activities. The program included an "inquiry cycle" that helps students monitor where they are in the inquiry process. The program asked for students' reflective assessments

and allowed them to review the assessments of their fellow students. In one study, sixth graders in a suburban school who were taught physics using technology performed better at solving conceptual physics problems than did eleventh and twelfth grade physics students in the same school system taught by conventional methods. A second study that compared urban students in grades 7 to 9 with suburban students in grades 11 and 12 again showed that the younger students taught by the inquiry-based approach had a superior grasp of the fundamental principles of physics (White and Frederickson, 1998). This instructional approach has been explored for many years indicating that when educational technology tools are used appropriately and effectively in science classrooms, students actively engage in their knowledge construction and improve their thinking and problem solving skills (Trowbridge, Bybee and Powell, 2008).

Tapscott (1998) concluded that the “net generation” has unique needs and characteristics that must be examined by school leaders. He asserted that today’s children view the world very differently from adults, due to an unprecedented access to information, people, and ideas across highly interactive media. It is precisely this real-time webbed interactivity that has spurred societal changes in ways prior technologies did not. The learning preference of 21st century learners is to work in peer-to-peer situations that focus on exploration, experiential tasks and solving problems. Salpeter (2003) referred to the research that problem-based learning consultant Eeva Reeder (2002) conducted by stating, “All humans learn by doing, analyzing and problem solving. Talking at kids never has been and never will be an effective way to help them learn” (as cited in Salpeter, 2003, p. 5). Twenty-first century students are ready for this type of learning. They are what, Prensky (2001) names, digital natives; immersed in technology

as a means for communication and daily living activities as well as demand a more flexible and relevant curriculum that recognizes student experiences.

The teacher's role is as critical as the students; it has evolved from transmitter of knowledge to someone who can structure learning experiences that foster motivation, provide context and integrate disciplines. This shift in educational ideology is paramount as our nation struggles with one-third of our students dropping out of high school, according to the National Education Association (2007). In *the Silent Epidemic*, a study performed by the Gates Foundation, four out of five students (81%) reported that there should be more real-world connections between learning and their future work choices (Bridgeland, Dilulio and Morison, 2006). This group of students also named teacher centered lecturing classrooms as reasons why classes were not engaging or interesting. According to Pletka's research (2007), students he interviewed preferred more technology use in their learning. As interactive learners, the Net-Gen students are dissatisfied and uninspired with the old model of education and will bring with them a new paradigm of interactive learning with them as they enter the classrooms and the workforce (Figure 2, p. 60). Figure 2 depicts the range of instructional strategies as they relate to higher order thinking skills.

Relevance in the Learning

In the 21st century, students learn better when education is more relevant, engaging and meaningful to their lives. Authentic learning is paramount to the effective implementation of a 21st century educational program. Although problem based learning can be time consuming and difficult to execute on a daily basis for the teacher, it is reflective of important characteristics of a 21st century instructional context.

In a traditional problem based learning classroom (PBL), students normally work with classmates to solve complex and authentic problems that help develop content knowledge as well as problem solving, reasoning, communication and meta-cognitive skills (Pearlman, 2006a; White, 2001). Gordon (1998) described problem based learning as “freeing students from the fact driven curriculum and allows them to focus on large ideas; they place in students’ hands the exhilarating power to follow trails of interests, to make connections, to reformulate ideas and reach unique conclusions” (p. 390). Although PBL has been used for many years, this research based instructional strategy is very effective for 21st century educational programming because it encapsulates the elements of the 21st century educational philosophy, such as higher-level thinking and real-world context.

Problem based learning (PBL) begins with the concept that all learning is active and integrated. Wilkerson and Giljselaers (1996) claimed that PBL is characterized by a student-centered approach with teachers as facilitators instead of disseminators. Duch, Groh, and Allen (2001) described the methods used in PBL and the skills developed as including the ability to think critically, analyze and solve complex, real-world problems, to find, evaluate, and use appropriate learning resources; to work cooperatively, to demonstrate effective communication skills, and to use content knowledge and intellectual skills to become continual learners. Torp and Sage (2002) defined PBL as focused, experiential learning organized around the investigation and resolution of messy, real-world problems. They described students as engaged problem solvers, seeking to identify the root problem and the conditions needed for a good solution and in the process becoming self-directed learners. Hmelo-Silver (2004) described PBL as an instructional

method in which students learn through facilitated problem solving that centers on a complex problem that does not have a single correct answer. She noted that students work together to identify what they need to learn in order to solve a problem, engage in self-directed learning, apply their new knowledge to the problem, and reflect on what they learned and the effectiveness of the strategies employed.

Problem based learning is one way that teachers can fully engage their students in authentic learning. The most important component of 21st century learning is that students investigate rich and challenging topics and issues in the context of real-world problems. The goal for instructors is to develop students' interest in the subject matter by focusing on the learning process, as opposed to recalling facts. Teachers are responsible for creating well-designed real-life scenarios, activities or projects that promote communication, meta-cognitive skills and rigor (Cohen, 1994). Unless there is a relevance and application of the learning, students would merely be absorbing information, not truly learning. Knowledge requires the application of information, student engagement, exchange of ideas, students building on each other's ideas and apply this new learning in meaningful ways (Reynard, 2008). Combining personal experience, information and knowledge transforms the learning process.

In the 21st century, using technology tools, collaboration, resources and higher level thinking and meta-cognitive skills, students are seeing a connection between what they are learning and what is relevant and personal for them. As a result, engagement and motivation increases in these types of learning situations. Students will be more likely to be engaged not only because they are relating the subject to real-life applications, but because students are given opportunities to collaborate, choose and be creative. The

literature is clear that problem based learning environments advocate the processes and skills that are vital for 21st century high school graduates. Although this type of instructional context may seem daunting to many school districts, it is the primary platform in which to deliver a 21st century education.

Curriculum and instruction are the heart of any educational initiative. This integrated approach allows for the balance of content accountability and the process skills, such as critical thinking and problem solving, which are demanded from our future workers. The skills needed for success and 21st century workplace readiness reflect the nature of today's learners. Technology has made an enormous impact on the deriving of the skills, yet more importantly it directly reflects the type of student that needs these skills.

Upon review of the research and literature regarding 21st century learning and skills, the researcher has proposed that 21st century thinking skills, 21st century technology tools and the 21st century instructional context enhance learning. This study will focus on a school's ability to triangulate thinking skills, real-world context through authentic learning activities and the use of technology tools to enhance student learning. The Three R's of Rigor, Relevance and Resources are the most transferable in secondary content areas and prove to be necessary for students to be successful in a 21st century knowledge based society.

Technology in Schools: A Range of Use

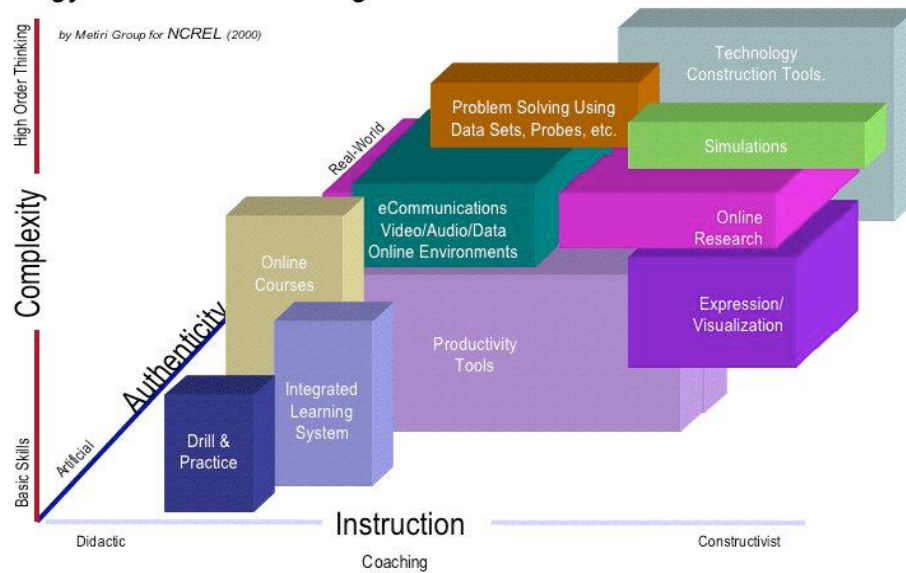


Figure 2. Lemke, C. (2005). Technology: A range of use, Metiri Inc. for North Central Regional Educational Laboratory.

The implications of understanding the contemporary Net-Gen learner is to tailor the instructional approach schools take in preparing them for a globalized 21st century workforce. A new pedagogical framework has emerged due to the characteristics of these learners as well as continuous technological advances.

Instructional Beliefs of Teachers

For many years, the 20th century educational model was characterized by a lack of group work, lectures, classroom organization that impedes communication by assigning students to sit in rows and the one-dimensional use of the blackboard. As technology plays a greater role in education, most of the research regarding teacher's perceptions, willingness and dispositions to technology driven student centered classrooms, have relied on self-reporting data from teachers. This type of data too often presents a less than accurate picture (Judson, 2006). Therefore a pressing need exists for teachers to be

transformed from purveyors of information to facilitators providing learning opportunities that promote critical thinking and multi-step problems with real world relevance within their curriculum. This constructivist approach to teaching and learning is extremely compatible with the natural learning tendencies of the net generation students. There is a direct connection between the teachers who frequently use technology and their tendency to believe in the benefits of a dynamic student centered classroom (Judson, 2006). In a study of over 4,000 teachers in the United States, Riel and Becker (2000) found a strong correlation between the designation of a teacher as a constructivist and the teacher's frequent and effective use of instructional technology. Rodgers, Runyon, Starrett and Von Holzen (2006) at the Conference of Distance Teaching and Learning, concluded however, that although studies show a positive link between instructional approaches and technology, most faculty is not in step with the changing characteristics of the 21st century student and classroom. "Students multi-task, desire random access to knowledge and prefer interactive and networked experiences in their learning. The instructors, on the other hand, deliver information using text, in a linear or sequential format while asking students to perform individually in class" (p. 3).

Constructivist learning tasks include problem solving, reflective and investigative learning and open discussion in a collaborative setting. Constructivists believe that the teacher facilitates learning; not controls it. This student-centered approach to instruction is in line with the natural tendency of how the Net-Gen students learn. Jones, Valdez, Nowakowski, and Rasmussen (1994) developed an Engaged Student Model where they describe the characteristics of engagement. Initially, students should be responsible for their own learning. The project must be relevant and the questions it answers, essential.

The students must be energized and feel excited, intrigued and motivated about their learning. Further, students must reflect strategic behaviors where they make thoughtful choices, evaluate options and solve complex problems. Lastly, Jones, Valdez, Nowakowski and Rasmussen (1994) describe engagement as a collaborative activity by sharing responsibilities and ideas. According to the *enGauge 21st Century Skills*, sponsored by the North Central Regional Educational Laboratory and Metiri, Inc., students must receive opportunities from their teachers to purposefully access information from a variety of sources, analyze and evaluate information, and then integrate it to construct a personal knowledge base from which to make intelligent decisions (2006). Bransford, Brown and Cocking (as cited in Lemke, 2005) supported the examination of the unique needs of the digital learners when he stated that, “all learning is deeply personal, the frequency and relevance of such moments increase when technology enables us to tap outside experts; visualize and analyze data; link to real-world contexts; and take advantage of opportunities for feedback, reflection and analysis” (p. 1). It is clear that effective instruction for 21st century students and skills must infuse technology as the bridge to fill the gap between instruction and learning.

It is imperative that schools maintain a progressive vision that reflects the impact of the rapidly changing economy and its effects on necessary skills for the 21st century. In the wake of the educational digital boom, many school leaders look to innovating technology to enhance teaching and learning. Godfrey (2001) defined technology in the classroom as a way to enable a manipulation of environments to allow for multiple perspectives and information on complex phenomena. In order to build flexible learning, the teacher adapts the technology to cater for individual differences. This alignment

ensures that the unique educational needs of the digital natives are appropriately met. Technology must become woven into the educational fabric of classrooms. It personalizes students' learning, paces their education while creating opportunities for interaction. This cooperative learning is integral to promote belonging and engagement. Currently, daily instruction in K-12 settings is mostly auditory, therefore not surprising that this type of discrepancy between needs of the student and instruction cause one-third of all students to drop out of high school (Pletka, 2007). The Twenty-first Century Skills Organization (2008) depicted the most prominent differences between the traditional classroom instructional styles of the 20th century and compared them to the new more student-centered approach of the 21st century.

Table 3

The Differences between Traditional Classroom Settings and Twenty-Century Classrooms

20th Century Classroom	21st Century Classroom
Time-based	Out-come based
Focus on memorization of discrete facts	Focus on what students, KNOW, CAN DO and ARE LIKE after all details are forgotten
Lessons focus on lower level of Bloom's Taxonomy: recall, comprehension and application	Learning is designed on upper level of Bloom's Taxonomy: synthesis and evaluation
Text-book driven/fragmented curriculum	Research driven/integrated curriculum
Learners work in isolation-classroom within four walls	Learners work collaboratively with classmates and others around the world-the Global Classroom
Teacher-centered: teacher is provider of information	Student-centered: teacher is facilitator and coach
Little or no student choice and freedom	Great deal of choice and freedom
Discipline problems-educators do not trust students, and vice versa-no student motivation	Minimal discipline problems-students have mutually respectful relationship as co-learners making them motivated
Low expectations	High expectations/rigorous activities

Teacher is only judge	Self, peer and authentic assessments/public audiences
School curriculum is irrelevant	Curriculum is connected to students' interests, experiences, talents and real world
Print is primary vehicle of learning	Multiple forms of media are used for learning
Literacy in the basic content areas	Multiple literacies for 21 st century-aligned to living and working in a globalized millennium

Note: Adapted from 21st Century Schools Organization (2008)

Resistance to Change

Lack of successful educational reforms can be the result of teachers' instructional beliefs not matching the original goals of the particular innovation, thus eliciting resistance (Haynes, 1996; Williamson and Blackburn, 2010). Teachers, because of their personal, experiential and practical knowledge, can either be obstacles or vehicles of change. Cuban (1993) explained the power that teachers have in the implementation of educational reform efforts by stating, "The knowledge, beliefs, and attitudes that teachers have...shape what they choose to do in their classrooms and explain the core of instructional practices that have endured over time" (p. 256). His study of teacher resistance further stated that teacher's skepticism and lack of administrative trust also plays major factors in effective reform (Cuban, 2011). Godfrey (2001) also warned educational leaders by citing a number of studies where teachers, "are reluctant to hand over control of the learning environment to their students" (p. 15). Teacher perception regarding the change process needs to be explained, explored and confronted in order to better serve the needs of this unique generation of learners. These hurdles in the change process generally originate in the foundational philosophy of the teacher (Kerr, 1996).

In examining these barriers specifically to 21st century skill integration, it requires that teachers rethink and shift, “how classrooms are laid out, how evaluation is conducted, how teachers relate to their colleagues, and a hundred other particulars of daily life in schools” (Kerr, 1996, p. 24). Building a 21st century problem based learning classroom is also very difficult for teachers. This transformation involves adopting a new philosophy about learning. Due to the teacher’s main role of facilitator, one major obstacle is the giving up of control in the classroom (Boud and Feletti, 1999, as cited in Ward and Lee, 2002). Another factor inhibiting problem-based learning in 21st century classrooms is the lack of preparation in many teacher preparation programs that leads to many teachers feeling like they are not capable of finding the appropriate resources (Inan and Lowther, 2010). Issues with administrators and curriculum developers lacking a true sense of what defines a technology driven 21st century problem based learning curriculum, is cited as another inhibitor of integration (Albion and Gibson, 2000, as cited in Ward and Lee, 2002). Although both technology and pedagogical barriers are not difficult to breakdown, educational leaders must understand that innovative student centered classrooms make a positive impact on student achievement when the proper supports are in place (Honey, 2001).

The Knowledge Gap

Although, many studies show that teacher instructional beliefs directly impact the implementation of school reform, educational leadership is also a major factor in the effective educational program design for 21st century learning. In order for schools to be proactive and progressive in the 21st century, the educational leadership must embody a vision to maintain momentum, inspiration and collaboration in an organization. Vision is

the basis for effective leadership and the driving force for organizational change (Gill, 2006). Findings from numerous studies have reported that a clear vision is essential to the survival and success of any organization (Kakabadse, 2001). According to Kotter (1997), there are five characteristics to an effective vision. A clear vision should be desirable, feasible and focused. Further, an ideal vision is flexible, allowing for differing opinions in the light of changing conditions. Lastly, it should be easy to communicate and explain. While all of these elements are significant, continually looking to the future to drive education is key when examining the global community and its demands for our graduates.

Although the vision creation process is a collaborative effort taking into account all stakeholders interests, the superintendent truly embodies the role of chief decision maker of the organization. Unfortunately, school administrators usually lack time, resources and proper training to provide the support needed by teachers in fully implementing any change in their instructional process (Fullan, 1991). As instructional leaders, school administrators must be knowledgeable about the instructional value of 21st century skills and technology integration.

The digital revolution demanded schools to begin transforming their learning communities to keep up with innovations and the changing 21st century. The people who are in charge of facilitating schools' transition into the digital global economy- superintendents and principals-are typically the least knowledgeable and overwhelmed about the digital global economy. The data suggests principals and other administrators are ill equipped and unprepared to keep pace with changes in the larger world of education. In a 2003 report, the nonpartisan research organization, Public Agenda,

reported that today's school superintendents want their principals to display prowess in everything from accountability, teacher quality and instructional strategies, but principals themselves do not think they are equipped for these duties (as cited in Hess and Kelly, 2005). The results of a 2009 Walden University study found that after interviewing over 1000 educators and school administrators, many of them did not believe that are equipped to integrate 21st century skills and technology into their curriculum (Riley, 2009). The survey also found that there are disparities in how administrators and teachers understand the value of technology in the learning process. Ultimately, the survey recommended that administrators are more involved in how technology and 21st century skills can be integrated in their schools as well as how to support their teachers (2009). Another survey of 125 superintendent and administrators in five Southern states conducted in 2007 by Southeastern Louisiana University showed that school leaders are lacking in technology training. For example, more than 96 percent of those surveyed claimed that they were not aware of national, state or local technology standards, while 88 percent said that they have not attended a technology training session for administrators in a three year period (Davis, 2008). A recent survey also concluded that administrators, namely school principals are inundated with so many managerial tasks that contribute to a lack of time to stay abreast with technology training. This results in a lackluster approach to technology integration for the school (Sincar, 2013).

Chip Kimball, superintendent from Washington School District in Redmond, Washington, stated, "If a superintendent doesn't understand enough about the tools to articulate and create a vision, they'll never be able to move the system along and prepare kids for the 21st century" (Davis, 2008, pg. 2). There are also major barriers to creating a

technology-rich, real world, student centered modern educational environment. Along with teacher reluctance to new roles, funding and training limitations, educational administrators resist change and are unwilling to share leadership responsibilities with the teachers and other staff (Kook, 1997).

This lack of technological competency and confidence is trickled down into the classrooms as well. Cuban (2001; 2000) found, after a large-scale and costly study, that only 20 percent of teachers in K-12 schools integrate computer technologies into the regular academic courses. A more recent study from the National Center for Educational Statistics Teachers reported that teachers or their students used computers in the classroom during instructional time often that translated to 40 percent. While 29 percent of teachers self reported that they use technology “sometimes” (NCES, 2010). Levin, Arafeh, Lenhart and Rainie (2002) in the Pew Internet and American Life Project Study, this educational disconnect was further examined. Because technology is a primary vehicle to the integration of 21st century skills in the classroom, computer and Internet use were examined. This qualitative study of the attitudes and behaviors of 136 students from 36 different high schools identified the primary reasons for this knowledge gap or “digital disconnect.” A few of the reasons students cited are teacher feelings toward technology integration, their ability to integrate on-line tools into instruction and their perceived barriers toward technology in the classroom (Levin, Arafeh, Lenhart and Rainie, 2002). The most telling aspect of this landmark study is in the area of the educational leader. Internet-savvy students in this study emphasize that administrators, not individual teachers, set the tone for computer usage in class instruction (p. 2).

It is evident that the value system of any educational organization

determines if innovative, engaging and technology based instruction is a priority for teachers. This vision would permeate into the curriculum, professional development opportunities and expenses of the district. It was very common for school administrators to have placed computers in teachers' rooms with the expectation that computers will become part of the teacher's instructional repertoire, even though the teachers did not ask for them and did not have specific plans to use the technology (Cuban, 2000; Joyce 1990 and Leiberman, 1999). If used correctly during instruction, technology as an instructional tool can increase student performance, research proficiency and writing competencies. Several investigations into educational integration have noted that many educators, including educational leaders have little understanding of relationship between technology and student engagement and achievement (Bauer and Kenton, 2005; Cunningham, 2003).

Solutions to this dilemma have been staff development that has been predominantly used to address the challenges facing our schools. Creating professional development opportunities that are in line with the adult education theories is critical when administrators are leading their organizations into the 21st century. Smylie (1995) noted that when thinking about professional development of teachers, the practices are "virtually uniformed by theories of adult learning and change" (p. 93). The adult learning model is grounded in the following principles; developing a climate of respect, utilizing collaborative modes of inquiry, building on participant experience, learning for action and cultivating a participative environment. This atmosphere occurs when the facilitators of the professional development are credible, authentic and respectfully showing consistency (Brookfield, 1995; 1986; Knowles, 1980 and Lawler, 1991).

Visionary Instructional Leadership

Technology has rapidly evolved, changing education over the last several years. Without genuine visionary leadership that reinforces technologically driven 21st century education, it is clear that students are likely to be dissatisfied with conventional approaches to teaching and learning. Most importantly, the leadership of the organization must model the attitudes, values and beliefs implicit in the vision. The vision is the compass or rudder for an organization's mission that provides a standard of excellence to aim for and encourages improvement (Gill, 2006).

It is the responsibility of the instructional leader to understand the needs of the 21st century learner and offer the support to his/her teachers in order to serve those students better instructionally. Instructional leaders must embody trust and credibility when initiating change in the organization. Bass (1995) outlined that these educational leaders must inspire and communicate high expectations, be intellectually stimulating and promote reflective inquiry in their employees. Lastly, he emphasizes that transformational leaders, individually consider members of the organization by exhibiting equity as well as influencing their constituents by modeling good behavior. As managers merely administer and maintain the status quo, it is evident that transformational leaders must focus on the strengths and weaknesses of the people of the organization in order to accurately support the vision for the future of the organization (Gill, 2006).

Another aspect of the school leader's role is to ensure sustainability after the change is implemented. The primary focus for sustainability is to formally embed technology skills into the educational institution's framework. Therefore there must be

on-going professional development that not only focuses on the integral technological innovations that impact instruction but varying methods of instruction that reflect authentic real-world strategies for engagement. In 1989, Sparks and Loucks-Horsley identified five models for staff development. These include (a) individually guided staff development (b) observation and assessment (c) development/improvement process (d) training (e) inquiry. It is critical that leaders of organizations use the most appropriate staff development model in order to correspond with the nature of the initiative. In order to prepare teachers to teach in a 21st century educational context, the training model is most appropriate because it encompasses a clear set of objectives and focuses on cooperative learning and skill development.

A leadership team designs the objectives by researching successful instructional methods that infuse 21st century skills into the curriculum. The training model is usually led by “expert” teachers that allow for “student” teachers to feel more comfortable and be more productive during the trainings (Wu, 2005). Because the staff development trainings involve instructional practices and curricular revisions, the professional development should involve follow up sessions most likely in the form of observations/visits in the classroom. Joyce and Showers (1988) asserted that in-class assistance, or the coaching model, is the most effective strategy in the training of educators. The most dramatic finding in Joyce and Showers’ (1988) work is that with a coaching model “teachers can acquire new knowledge and skills and use it in their instructional practice when provided with adequate opportunities to learn” (p. 72). The school leader has a major role in ensuring that the culture of the school is one of change and innovation that values both the integration of technology and 21st century skills in the

classroom and teaching excellence. When innovation and change is part of the leadership's driving force and woven in the fabric of the school and its operations, it can easily become part of the best practices in the classroom (Morrison, 2008). Teachers need administrative support, feedback and resources in order to competently change their instruction and engage students by integrating 21st century skills into the content areas.

Sparks (2004) warned that "Learning to teach better, to be a continuously improving professional, involves more than just implementing other people's ideas and agendas, but building learning communities even for the best teachers, is hard intellectual work..." (p. 49). In all, the leader must be cognizant of the most appropriate strategies to change the instructional practices of his staff while promoting collaboration. This is especially true when the change involves using technology as one vehicle in the changing of instructional beliefs and practices. Therefore, personal modeling, time for collaboration and coaching, highlighting successful integration of 21st century skills and celebrating benchmarks, are all effective strategies of building the foundations for a 21st century technology savvy school.

If teachers are going to make the necessary changes in their teaching methods to accommodate information and communication technology (ICT) as well as the other critical 21st century skills, they also need the support from their administrators during the process (Dawson and Rakes, 2003). Many educators are reluctant in the integration process because they feel a lack of training and expertise to be successful. Therefore, school leaders need to use a proactive approach and introduce plans that will generate continuous improvements for the school.

21st Century Educational Models

The Partnership for 21st Century Skills (2002) identified nine crucial areas when designing and implementing 21st century education in schools. This established agency for 21st century skills believes the following elements to be significant in the case study of a public school claiming it has a successful 21st century educational program.

1. Embrace a powerful *vision* that includes 21st century skills: The collaborative process of creating a powerful vision will help articulate the values of the education that integrates the necessary skills for the future.
2. *Align leadership, management and resources with educational goals*: The appropriate stakeholders must commit their resources to the vision of the school.
3. Use the *MILE guide*: This tool will help gauge the school's current capacity to succeed in the implementation of the 21st century curriculum. From this tool, schools can identify the gaps between the current realities and the vision for the future because it identifies the specific benchmarks schools should meet to be successful.
4. Develop a *professional development plan* for 21st century skills: Teachers will be the first line of defense in the classrooms. They need the support and training to be competent when delivering the 21st century embedded curriculum.
5. Make sure your students have equitable access to a 21st century education: All students need highly qualified and effective teachers who offer reliable access to *modern technology*.

6. Begin developing *assessments* to measure: Assessments provide data that is essential in driving instruction. Schools need to devise personalized assessments to evaluate the program.
7. *Collaborate with outside partners such as businesses*: Twenty-first century education is the preparation of the learner to interconnect with various resources, businesses, parents and higher educational institutions. This idea must contribute to the school's plan.
8. Plan collectively and strategically for the future: Much like any academic action *plan or model*, it must be revisited and revised for its sustainability. This process needs to involve many stakeholders to build capacity and ownership.

The nine components outlined by the Partnership of 21st Century Skills are the recommended characteristics of an effective 21st century educational model.

For many years, the challenge for public schools is to align 21st century knowledge and skills initiatives with the myriad of legislative mandates in standards, assessment and curriculum and instruction (Partnership for 21st Century Skills, 2010). As schools find guidance, they can look to some successful models of a 21st century education that have heeded the recommendations of the Partnership of 21st Century Skills. With the sponsorship of the Royal Society of the Arts, British educational reforms are visible at a high school level. The standards of the *Opening Minds Framework* reflect many of the same skill sets and competencies that the Partnership of 21st Century Skills and the Metiri Group emphasized. It is evident that these universal organizations evaluated the demands of the global community and concurs that students must become

global learners with learning skills that will prepare them for innovative, technical and highly skilled work.

With the exception of a few international models, the challenge for public school systems is that there are few examples of 21st century educational models for public schools, making it frustrating to holistically employ the recommendations of the Partnership of 21st Century Skills. In Singapore, the Minister of State for trade, industry and education, believed that one of the key adjustments under way is in the way they educate the young so as to develop in them the willingness to keep learning and an ability to experiment, innovate and take risks. Students in Singapore form collaborative teams to solve real world problems, construct knowledge, explore ideas and build projects. The prime minister reassured the public of Singapore of its readiness to tackle 21st century demands by stating, “our ability to create and innovate will be Singapore’s most important asset in the future” (Pearlman, 2006a, p. 1). In fact, Singapore’s commitment to problem based learning and constructivist instruction has prompted the national slogan as, “Thinking Schools, Learning Nation” (p.2). This vision resonates with Toffler’s beliefs of process skills with students being able to learn and relearn and not necessarily know disconnected facts.

Phrases like the Prime Minister’s that reflect a commitment to innovative education also serve as the catalyst for the inception of one of the most impressive prototypes of a 21st century learning environment: New Tech High School in Napa, California. The most unique aspect of this non-traditional school is the absence of grades for courses. Instead eight learning outcomes are identified as integral to the preparation of the 21st century worker. (1) Content standards (2) collaboration (3) critical thinking (4)

written communication (5) oral communication (6) career preparation (7) citizenship and ethics (8) technology literacy are the major components to the educational program of the 9-12 school. In fact, to begin each unit, instructors, “throw students into a real-world or realistic project that engages interest and generates a list of things they need to know” (Pearlman, 2006a, p. 3).

New Tech High School of Napa, California is one example of an American charter school that has gone beyond traditional educational instruction and assessments. The school was created in 1996 when business leaders, educators and students were frustrated with the state of education in California. At that time, current options were leaving students ill prepared for college or a career and leaving local businesses searching for skilled employees. Like other schools that were looking beyond traditional educational knowledge and skills, New Tech High School uses predominantly project-based learning to teach its students in both an academically rigorous and relevant-to-the-real-world manner. Projects allow students to see how what they are learning relates to what they are interested in and to real-world careers. Projects offer students more than just the traditional educational experience, and include skills such as time management and teamwork. The typical week at New Tech High School is anything but typical. On Monday, students have six 45-minute periods to catch up on projects and meet with teachers. Tuesday through Friday, there are three two-hour blocks a day for students to work on projects and for teachers to assign and explain new ones. After the new projects are assigned, students present their ideas to the class and decide which projects they want to work on in teams. For example, one such project cited was the creation of an interactive flash Web site that uses 3-D modeling to teach an old subject in a new way.

As one student wrote,

I was used to cramming information just to pass the next test, only to have it dissipate the next day as the information was no longer useful. So when I came to New Tech, my standards for learning changed quite dramatically. After the lectures we are free to do what needs to be done. In any other school, this would mean free time for fooling around. But at New Tech it means getting what needs to be done, done. It means working on my group projects and finishing assignments. I was amazed with how I wasn't the only one working on my group project, that my entire group did it (as cited in Kiker, 2007, p. 39)

One of New Tech High Schools' core values reinforced Pearlman's claim creating a school with a "flexible business/education environment that teaches and encourages student responsibility, independence and resilience while building life skills in collaboration, project management and leadership" (Pearlman, 2006b). With over a decade of students to learn from, New Tech High School is in a unique position to see how well they have achieved this core value.

Using traditional California educational assessments, New Tech High School students perform at high standards. The California State Academic Performance Index (API) is a summary of California standardized tests. Since 2000, New Tech High School has exceeded the average local and state API scores in all but one year. Every year, 100 percent of New Tech High School students complete the full requirements for entry into University of California and California State University.

New Tech High School excels in its graduation rates and its postsecondary attendance rates when compared to local and state levels. New Tech High School graduates 100 percent of its students. This exceeds the 94.9 percent of the Napa Valley Unified School District, the 95.4 percent of Napa County, and the 85.3 percent for the state of California. At close to 90 percent, New Tech High School's postsecondary attendance level significantly exceeds local, California and national levels (Kiker, 2007).

In addition to the rigorous academic standards, New Tech High School students are learning 21st century skills at a high level as well. A quick look at the New Tech graduation requirements showed how seriously these skills are taken. To graduate, students must complete a digital media requirement, a service-learning/internship, a demonstration of competencies in Word, Excel, Access, PowerPoint and keyboarding, and must complete a Web-based digital portfolio, in addition to classroom assessments.

New Tech High School found an innovative way to see if the school was teaching its students skills that were useful in college or career. New Tech High School hired Rockman et al, an independent research and consulting group, to conduct a six-month study of alumni. The integration of real-world skills and experiences with academic skills through project-based learning was of particular value, stated the alumni to the consultants. The consulting group also reported that the alumni expressed positive feelings about collaboration skills, problem-solving and communication skills that they would not have gotten through a more traditional approach to school. Pearlman (2006a) reported that one former student commented that the concepts of personnel management, time management, research and development, and presentation skills are infinitely valuable in his goal as a professional in the 21st century.

As Pearlman continued to report on the progress of New Tech High School, Paul Curtis, the founder of the New Tech High School, claimed that, “We need a new type of instruction that reflects the goals that we want in each student; to achieve, demonstrate and document” (2006b). This goal can be accomplished when the instructors integrate the outcomes in all facets of the curriculum using problem-based learning. Curtis clarified that problem based learning differs from projects in that problem based learning is more complex, rigorous and deep, instead of the project which is a short isolated activity. Two examples of problem based learning activities are presenting a plan to Congress on solving the oil crisis and or inventing, under a contract from NASA, a new sports program astronauts can play on the moon so they can get exercise. This holistic type of learning has been coined in Australia as “rich task” and in Great Britain as “total learning” (p.4). Once again, the constructivist, student-centered approach to instruction is proving to be the most effective for 21st century students and classrooms.

A critical piece to the effectiveness of problem based activities is to make them rigorous. Wagner (2006b), an advocate of problem based learning increasing higher level thinking skills, also stated that the epiphany happened in educational reform when, “principals began to realize that rigor had less to do with how demanding the material the teacher covers is than with what competencies students have mastered as a result of a lesson” (as cited in Pearlman, 2006a). The important aspect of rigor is to have students ask themselves how they can apply, communicate or assess what they learned. Wagner (2006b) continued to critique systems that believe in content accountability that is aimed at school system’s progress and not individual student learning.

At New Tech High School, many of these important elements are integrated into the school's physical design. It is even physically designed to promote a high performing learning environment. There are larger classrooms, wired with tech stations as well as availability for team teaching and teaming. Further, glass walled corridors promote rigor and an academic atmosphere where students and personnel can observe learning happening.

New Tech High School has made great strides in showing other educational institutions the benefits of technology driven 21st century education. As of 2006, New Tech High School was only one of 14 schools in the U.S. that were dedicated to technologically based collaborative learning environments that genuinely reinforce 21st century instructional philosophy. According to Pearlman (2006a), that number is expected to double in the coming years. Over the last eight years, these details have culminated into approximately 89 percent of New Tech's seniors go onto to post-secondary schools while 40 percent of them move into mathematics and sciences (p. 8). New Tech High School in Napa, California has become a driving force in the progressivism of the 21st century education movement. Unfortunately, New Tech High School is one of a limited number of charter schools that has built its educational vision with a solid foundation in 21st century skills. New Tech High School has been recognized as the first California Digital School, a New American High School, one of the initial grantees of the Bill and Melinda Gates Foundation chosen to replicate its model, and as a national model secondary school. Innovations such as those of New Tech High School must become the paradigms for many public educational reforms in order to help our high school students succeed in a global market (Barseghian, 2011b).

Designing the 21st Century Educational Program

Developed by the Partnership for 21st Century Skills, the Milestones for Improving Learning and Education Guide (MILE) is a visual mapping tool and guide that allows districts to gauge the critical areas of 21st century education implementation (2002). This guide can aid educational organizations to answer questions regarding their current preparedness and their future potential for addressing 21st century educational needs. The Partnership asserts that this comprehensive guide can serve as an assessment tool to serve the purpose of setting benchmarks for districts, applying for grants and determining funding priorities. The major categories that are described in MILE Guide are:

- Student Knowledge and Skills: This explains the skills and expertise that students should master to succeed in work and life
- Education Support Systems: This category explains the curricula, standards, learning and instructional environments that are critical for students to succeed.
- Education Leadership: This category stresses administrators' roles in ensuring 21st century knowledge and skills are mastered among students.
- Policymaking: The *MILE* Guide recognizes that policymakers at national, state and district level can influence the implementation and success of the district's 21st century skills initiative.
- Partnering: This category focuses on how various stakeholders, such as business leaders, higher education leaders and parents can help play a role in the success of the program

- Continuous Improvement: This category lays out a description for schools to plan for the future with strategic planning, which may involve professional development.

Each of the six categories has specific indicators and benchmarks to help school leaders track their progress. The three levels that the school may fall into when examining each category are early stage, transitional and 21st century. With this comprehensive guide, school organizations can forge ahead into the deliberate designing of a 21st century educational program. For the purposes of this study, the researcher will use the indicators from *MILE* Guide as a tool during the analysis stage of the study. The researcher will especially examine the level of preparedness in the Student Knowledge and Skills category that is broken down into the 3 R's from 21st Century Context (Relevance), 21st Century Skills (Rigor) and 21st Century Learning Tools (Resources).

There are many factors that are directly impacting education. Due to the sheer magnitude of human knowledge, globalization and the accelerating rate of change due to technology, necessitates a shift in our children's education-from plateaus of knowing to continuous cycles of learning" (NCREL, 2006, p. 5). Maynard (2007), the associate dean of the Harless Center at Marshall University, reported that there were significant implications for methods used to prepare future teachers in college. He asserted that educators must remember that the 20th century school model will not enable all the children of the 21st century to have the opportunity to succeed in the global marketplace., "Information and communication technologies are raising the bar on the competencies needed to succeed in the 21st century, therefore compelling us to revisit our assumptions and educational beliefs" (NCREL, 2006, p. 4). Currently, there are a few successful

models of high performing schools that have transformed their instructional approach to meet the needs of 21st century students. The 21st century demands that all public schools ensure alignment between the needs of society, the secondary curriculum, the instruction, classroom assessments and the school leadership.

CHAPTER III

RESEARCH DESIGN

When a researcher wants to investigate a phenomenon or program, the real-life context may be too complex for a quantitative survey or experimental strategy. Bromley (1986) wrote that qualitative research designs, “get as close to the subject of interest as they possibly can, partly by their access to subjective factors, such as thoughts, perceptions and desires” (p. 23). Merriam (1998) stressed the predominance of case studies in the social sciences, especially education, because the research is focused on discovery, insight and understanding from the perspectives of those being studied. It significantly contributes to the knowledge base and practice in education. Experiments and surveys only use convenient data such as test scores to prove a narrow focused hypothesis. Case studies “spread the net for evidence widely” thus offer more insight and perspective (Bromley, 1986, p. 24).

This qualitative case study investigated the beliefs of teachers and administrators in regards to the implementation of a 21st century educational program in a public school setting. The study sought to answer the following questions:

1. How does the district’s vision reflect the critical skills needed for the 21st century workplace?
2. What are the beliefs of administrators regarding 21st century learning?
3. How do teachers approach instruction for 21st century students?
4. Is there alignment between the components of 21st century learning, the articulation of the school’s vision and the actual instructional practices in the classroom?

5. How are teachers effectively integrating higher order thinking, real-world relevance, and technology literacy in core classrooms in order to teach in a 21st century context?

Each research question targeted how the school approaches the integration of the three crucial components of Rigor, Relevance and Resources (3 R's) in its educational program. The interview questions and observation tools were designed to gather data that will show the school's understanding of 21st century learning and any misinterpretations of the vision of the school.

The rationale to use a case study design is grounded in the fact that the case study research design can be used to study a phenomenon systematically. Merriam (1988) defines a case study, as “an intensive, holistic description and analysis of a single instance or phenomenon” (p. 21). This research design is more interested in uncovering insight, and understanding rather than testing and hypothesis (Merriam, 1988). It is common in educational research in that qualitative designs, such as the case studies, operate under the assumption that the world is not an objective entity but filled with personal interactions and perceptions. Therefore the research paradigm needs to be exploratory and inductive. Case study designs are appropriate when the objective of the evaluation is to “develop a better understanding of the dynamics of a program. When it is important to be responsive, to convey a holistic and dynamically rich account of an educational program, a case study is a tailor made approach” (Kenny and Grotelueschen 1980, p. 5).

Evaluative case studies involve description, explanation and judgment. This specific type of case study weighs information to produce judgment. Guba and Lincoln

(1981) asserted that case studies are appropriate forms for reporting information. “It is holistic, grounded, lifelike and simplifies data to be considered by the reader. This illuminates meanings and communicates tacit knowledge” (p. 375). According to Yin, (1984) the case study approach is used for evaluative purposes in most situations in which the intervention being evaluated has no clear single set of outcomes. Provus (1971), the creator of the discrepancy model of educational evaluation emphasized that evaluation is a “detailed analysis of program inputs and processes and the verification that programs are in fact operating as people believe them to be operating” (p. 22). Specifically, a discrepancy evaluation determines whether discrepancy exists between actual performance and the standards and intentions governing that aspect of the program. Evaluative case studies emphasize implementation concerns in a change process. They also shed light on problem solving solutions for program performance alteration. Lastly, a broadened evaluation procedure includes the possibility of altering the standards to confirm with reality. McDonald and Walker (1977) believed that this investigation of peoples’ perceptions in regards to program implementation is crucial in capturing a true assessment of the program’s worthiness.

“At all levels of the system, what people think they’re doing, what they say they’re doing, what they appear to others to be doing, and what in fact they are doing, may be sources of considerable discrepancy.

Any research which threatens to reveal these discrepancies threatens to create dissonance (p. 186).

The research design for this study was a qualitative evaluative nested case study. Its intent was to examine the articulation of administrative vision to the instructional

practices in a school with a publicly recognized 21st century educational program by specifically interviewing three teachers and formally observing those same teachers multiple times. The researcher also interviewed one administrator at the school in order to specifically answer research question two that asks about administrator's 21st century education beliefs as well as gain insight into the other research questions. The researcher used a qualitative approach in this study because qualitative research explores values, assumptions and human behavior that can only be achieved by talking directly with people and observing their environments (Creswell, 2007). The responses helped show if there was a discrepancy or alignment between the administrative intent and the interpretation of 21st century education by the teachers.

Case Study Demographics

The nature of the study is to gather insight from a school that has a reputation of preparing students for the 21st century, and is full of high expectations that also promote teacher innovation and student achievement. The district that the researcher used is a suburban school district located in Southwestern Pennsylvania. The district is comprised of six municipalities that cover a 36 square mile radius. With approximately 35,000 residents, there are over 1500 students enrolled in grades 9-12 at the high school grades. The students represent a wide array of economic, cultural and religious backgrounds. From 2003-2011, the high school exceeded the state average in both math and reading literacy on the state assessment, Pennsylvania System School Assessment (PSSA). In 2009, the high school students have scored proficient on the PSSA with 82% of tested students scoring proficient or advanced in Math; 85% in Reading and 93% in writing. In 2010, 86% of the students scored in the proficient category, while 55% of the tested

population scored in the advanced proficient category in all categories of reading, math, writing and science. Over 92 percent of the 2008 graduating class reported continuing their education in some post-secondary schooling. The high school students also continue to outscore the state's students in the Scholastic Aptitude Test (SAT), by one hundred points in the three areas of critical reading, mathematics and writing. The 2008 state average for critical reading is 494; 501 in mathematics and 483 in writing. The high school students scored 561 in critical reading; 581 in mathematics and 560 in writing.

Like many school districts, this particular high school, believes in providing students with a world-class rigorous education that allows them to become knowledgeable, ethical, self-directed life-long learners for the 21st century. In order to help answer research question one in how the school's vision is reflecting the critical skills of the 21st century, the researcher examined the school's vision statement and belief statements. The district's vision statement clearly stated the, "school community will nurture and inspire students' desire for knowledge and provide the foundation for them to be successful in a global society..." Not only has the school district been nationally recognized as an award winning Blue Ribbon school district, but its high school was also named as a New American High School by the U.S. Department of Education in 1999. The national award was based on the following criteria: academic rigor, advanced placement courses, connections with the real world or post-secondary schools and engaging at-risk students for success. This tedious selection process resulted in visitations to the high school to evaluate the school's execution in the criteria. In 2008, the high school also received a silver medal rank by *U.S. News and World Report*, Best High Schools across the county. In 2003, *Newsweek* magazine named the high school as one of

the nation's top high schools. This type of recognition is based on the school serving all students while producing measurable student outcomes for success. The school district shares the belief that the educational programs of the high school should serve the needs of all students, and not just college bound scholars. This is evident by the district applying for and receiving the Classrooms for the Future Grant that allows the high school's educational initiatives to focus on providing a technology rich, student centered learning community that exhibits high academic excellence with collaborative support.

An important factor in the high school's success has been the quality of its teachers. Sixty-five percent of the professional staff at the high school holds a master's degree or its equivalent. The average years of teaching experience among the high school's teaching staff is 12.2 years. Over the years, teachers have been awarded honors in various competitions such as the Disney Teacher Award, Pennsylvania Teacher of the Year Award and the Fulbright Teacher Exchange Program.

The academic expectations of students at the high school are rigorous. With 80-minute block class periods, students are required to complete a six-hour service learning experience and a graduation project over the course of each year of high school. In keeping ahead of the technological advances in the modern workforce, the high school offers accounting, computer business applications, entrepreneurship, Web page design, media, graphic communications, manufacturing technology and production systems courses. These types of courses require technology upgrades to the infrastructure of the school. There are more than 1,200 computer systems for students with complete wireless access in writing, mathematics, business, technology education, art, media and music resources areas. Each classroom is equipped with a television monitor that is connected to

a central television studio and programming is delivered via cable connection. The high school also offers 20 advanced placement courses and nine alternative programs such as work experience, community service, professional experience, independent study, dual enrollment in college, early admission, early graduation, spring semester abroad and course audit (enrichment). With such a plethora of academic offerings, the high school believes that it is fulfilling its vision of reaching all students.

As a result of these expectations, the high school has opted to participate in the Classrooms for the Future state grant. Classrooms for the Future is a Pennsylvanian grant that is issued to participating schools in order to facilitate 21st century technologies such as the Promethean Board, laptops for teachers and students as well as digital cameras. The CFF grant offers on-line courses that range from technology integration strategies to understanding digital natives, such as the Net-Gen students. The grant's vision focuses on recognizing and embracing the need for high school reform, enabling teachers to use technology as an effective tool for educating students, and preparing students to enter and successfully compete in the ever-expanding high-tech global marketplace. The school district leaders believed that this grant will enable high school students to handle jobs that have not even been created. The technology tools provided with the grant will spark the innovation, imagination and collaboration necessary to enhance learning in a global society. With this philosophy, the school district has led various state funded professional development opportunities in order to fulfill the requirements of the grant and the mission of the school district.

Sample Selection

The researcher used a purposive sampling for this study. Patton (2002) described this type of sampling procedure as a way to not obtain an average opinion but instead acquire precise information from participants because of their special circumstances or characteristics. The criteria for the sample selection were rooted in the fact that this high school publicly acknowledges its proficiency in the instruction and preparation of 21st century students. It is this type of public recognition of the high school's educational accomplishments in the area of 21st century education that resulted in its participation in this case study. The selected high school is an information rich environment that will provide insight into teachers' understanding of the district's interpretation of a successful 21st century learning program. Examining the school district's educational initiatives will emphasize its teachers' capabilities and expertise in integrating 21st century skills into the content curriculum. The participants were chosen after several invitations were sent to administration and various teachers in Social Studies, Mathematics and Science departments. The three participants and one administrator expressed interest in participating in the study. Through interviews of one administrator and three teachers, the researcher gauged the level of understanding of all stakeholders, regarding 21st century educational literacy in the classroom. Observations of classroom instruction revealed to the researcher if the vision of the district was reflected in the classroom instruction and student learning.

Data Collection

Qualitative data consists of detailed descriptions of situations, events, people, interactions and observed behaviors. It revolves around people's interpretations,

experiences, beliefs and thoughts. In qualitative research, the researcher becomes the primary instrument for data collection. Qualitative case studies rely heavily upon data obtained from interviews, observation and documents. Therefore, it is imperative to consider, the researcher's background and what values, assumptions, beliefs or biases she brings to the study. In this case, the researcher is a former secondary social studies teacher and a current administrator in a public school setting with a strong background in instructional practices. As an administrator, the researcher evaluates and supervises teaching performance regularly. As an administrator, the teacher evaluation and supervision practice involves providing feedback, suggestions or developing action plans to improve teaching.

Interviewing is necessary when the researcher needs special information that cannot be observed. People's intentions, feelings, interpretations or attitudes are all important pieces of data for a case study researcher. In this study, the researcher conducted one on one structured interviews, thirty minutes in length with an administrator, such as the principal with a set list of questions that involve the leadership concerns and professional development support systems necessary to align the vision with teacher needs and instruction (Appendix A). The researcher also interviewed a total of three teachers from grades 9-12 who teach core subjects, Social Studies, Science and Mathematics (Appendix B). The questions touched on perceptions of the administrative vision and integration of 21st century skills into current instruction. In the framework from the Partnership of 21st Century Skills (2002), one of the goals for 21st century learning is the integration of thinking and learning skills into the content subject curricula. To gain more insights, the researcher asked questions aimed to elicit

descriptions of experiences, behaviors and actions that would have been observable if the researcher were present at the time. For instance, the researcher asked how the participants approach lesson planning and instruction. Other questions delved into the values of the district's 21st century educational program, such as activities that promote student collaboration, rigor and technology skills. In addition, the researcher asked questions aimed to understand emotional responses to professional and reflective experiences.

The nature of qualitative research is one of discovery and personal connections and would be difficult to anticipate the direction of the interview. Therefore, there were instances when the researcher asked supplemental questions that were relevant to the study. These unplanned follow up questions help the researcher gain a better understanding of the subject or delve into another area or topic that may be relevant. The researcher recorded the contents of the interview to allow for transcription. In order to provide depth to the study, multiple observations of classroom instruction were conducted using a detailed observation tool (Appendix C). This tool was based on the Partnership for 21st Century Skills' (P21) five areas of 21st century learning context (2007) which consist of:

- Integrating higher-order thinking skills and technology tools all learning activities
- Making content relevant to students' lives
- Bringing the world into the classroom.
- Connection to the world of work

- Creating opportunities for students to interact with each other, in authentic learning experiences.

To create a more practical and efficient observation tool, the five areas were then divided into the three major elements needed to create an effective 21st century integrative curriculum and learning environment- the 3 R's. Rigor, describes the higher order thinking skills that are outlined by major agencies that advocate 21st century education, such as the Partnership for 21st Century Skills. Rigor was also examined more closely as it related to the overwhelming vision of the school and its ability to articulate this goal to the staff. Relevance indicates the instructional context in which the skills must be integrated. In this case, problem based learning or real world applications were investigated as the platform to facilitate these important skills. Resources, describes the instructional technology tools used in the classroom that increases engagement and understanding. The teacher's role overarches all these competencies in that he/she must design and facilitate this learning environment. The researcher identified specific characteristics that are ideal in the integrating of the 3 R's. All of the areas in the observation tool have been compiled from national standards organizations, such as the International Standards in Technology Education (ISTE) and the Partnership for 21st Century Skills.

To establish face and content validity, five secondary school teachers and two administrators reviewed the observation tool that outlines the three R's. The focus of the review was to match their expertise as educators and as evaluators to the 21st century educational elements listed in the observation tool. The experienced educators and

administrators agreed that this tool would be a comprehensive and practical resource tool in gauging classroom instruction and progress towards 21st century education.

The researcher formally observed the three content classroom teachers on two separate occasions. In addition to the formal observations, the researcher intended to glean insights from informal observations. The teachers observed were the same respondents used in the interview phase of the research study to deepen understanding. The observations were intended to offer insight into the research questions that examine how the 3 R's are embedded into the instructional fabric of the school. The successful integration of the 3 R's are vital to understand how 21st century skills such as real-world relevance, taking the form of problem based or authentic learning, higher thinking skills such as problem solving, critical thinking skills and technology literacy are integrated into the classroom instruction in order to foster a 21st century learning environment.

School documents such as the administrative directives, district vision and mission statements, teacher lesson plans as well as curricular records were reviewed prior to the observations and interviews. These documents and artifacts offer the researcher insight in the articulation and alignment of the program's intentions and implementation. One of the benefits in using documents is its stability. These objective sources of data contribute descriptive information that not only enhance the interview process but add to developing theory (Glaser and Strauss, 1967). The researcher then deciphered meaning and discovered insights relevant to the research problem. In this case, the researcher was specifically looking for alignment between the lesson planning, instructional practices and the administrative expectations of promoting a high quality 21st century education. By examining the learning and behavioral objectives in the plans, the researcher

determined if there is a focus on the authentic teaching methods that are conducive to creating a 21st century learning environment that focuses on rigor in the instruction, relevance in the learning and resources, such as educational technology to be used as the platform in the discovery.

Triangulation of data is also crucial in a qualitative research design. Interviews with educators offered the researcher bias information due to pressure of how they are perceived by colleagues or the researcher. Using multiple sources of data such as documents like lesson plans, vision statements, interviews with teachers and administrators and indirect and direct observations, helps strengthen the study's validity.

Data Analysis

Data analysis describes the interpretative process that the researcher undergoes once the data is collected. In qualitative studies, narrative data is gathered. The final case study is defined by the information that is collected throughout the collection process. In order to bring focus to the data, it is imperative that the researcher analyzes the data to create an illuminating report of the case.

The researcher organized interview responses, field notes, classroom observation reports, data from informal visits and other reflective records of the investigation to analyze the mass amount of data. In order to guide the analysis of findings, in addition to the pertinent research questions, the researcher also referenced the *MILE* Guide. This tool was developed by hundreds of educators, researchers and employers under the leadership of the Partnership for 21st Century Skills (Partnership for 21st Century Skills, 2002). It is a visual mapping tool for districts to plot and guide their approach and progress in the implementation a 21st century educational program. The *MILE* Guide's specific fields and

performance standards, pertinent to this study, were used to guide the findings regarding the level of 21st century technology readiness from the perspectives of the stakeholders. The 3 R's are represented in the *MILE* Guide in the fields of Instruction (relevance), Learning and Innovation Skills (rigor) and Information, Media and Technology Skills (resources).

This information was then examined and sorted into comprehensive highlights of the intended areas of interest for the researcher. These units of information served as the basis for defining categories during the analysis process (Lincoln and Guba, 1987). From that point, the data was consolidated and reduced into categories or themes. The goal of data analysis, according to Taylor and Bogdan (1984) is to “come up with reasonable conclusions and generalizations based on a preponderance of the data” (p. 139). Devising clusters of related information allows for the researcher to conceptualize the data in order to achieve insights regarding the case. Miles and Huberman (1984) advocated that subsuming particular instances within the study into a general context is another tactic of how to analyze the data. Therefore, descriptive details of student or teacher behavior or responses were fitted into a more generalized context. For instance, if a student puts his head down in class, the researcher may deduce that disengagement has occurred during the instruction. It may be possible for a teacher in the interview to roll their eyes that would suggest their distaste regarding a particular subject.

Upon transcription of the interviews, data was categorized using open coding. This means taking all data and developing a smaller number of themes that shed light on each research question (Creswell, 2007). When the data from interviews, observations and document reviews were analyzed and coded into categories, patterns and themes

emerged. This inductive process not only produces meaning for the phenomena, but was crucial for developing a descriptive information-rich study. The researcher transformed raw data from a predominantly narrative form and devised generalizations and conclusions. This process further ensured that misinterpretation does not occur.

Upon collection of the data from interviews and observations, the *MILE* Guide was referenced to gauge the school's demonstration of the successful integration of the 3 R's. This mapping tool outlines the characteristics of an optimal 21st century educational environment. In addition to organizational components such as strong leadership and community participation, the *MILE* Guide reinforces the instructional elements such as rigorous instruction (Rigor), authentic learning experiences (Relevance) that integrate technology (Resources). The characteristics that the *MILE* Guide suggests are necessary to create a 21st century learning environment. The tool helps schools determine where they are located on the spectrum of 21st century skills integration. Schools would look to the benchmarks and performance indicators to map an approach that would move the school to a successful educational program. In addition to observing how teachers integrate essential components of 21st century learning into their instruction (3 R's), the study sought to answer if there was alignment between the school's 21st century educational vision and the actual instructional practices of the teachers. By using the framework of the 3 R's which are derived from the Partnership of 21st Century Education, variance in the *MILE* Guide's expectations and interviews or observations would suggest or reveal a discrepancy of the preferred educational values and the actual practices occurring in the school system.

Limitations of the Study

The research focused on one specific school system, with an extreme emphasis on a Southwestern Pennsylvania public high school. Therefore, the study could be hindered by the limited scope of the participants. Every state has various grants and legislative mandates that drive school vision and reform initiatives. Therefore, Pennsylvania's emphasis on 21st century skills and learning may be a factor in the study's findings. Because 21st century educational programs require the dedication of monetary resources, the study is easily limited if the school chosen for the case study is financially stretched with other initiatives or has an abundant budget to finance educational programs. Further, the study asked educational leaders and teachers about their truthful perceptions regarding 21st century learning. Educators merely self-reporting is not an accurate method of evidence gathering due to administrators or teachers embellishing their perceptions of topics for the sake of their status or position or to provide what the researcher expects (Cook and Campbell, 1979; Judson, 2006). Therefore, interviews were not the only means of acquiring information for the qualitative study. Multiple formal classroom observations were conducted to elicit a broader understanding.

Another limitation regarding the data collection was with the three teacher participants. Firstly, they varied in experience levels; Teacher 1 (T1) has been teaching science at the high school for 14 years, Teacher 2 (T2) has been teaching social studies at the high school for 7 years and Teacher 3 (T3) has been teaching mathematics at the high school for three years. With varied levels of experience, their responses and teaching capabilities may be at different levels of performance with the school's expectations and vision. Secondly, all of the teacher participants attest that their primary professional

experience has been at the high school. By not having other work experience in other school environments, their responses and perceptions may be limited and not broad or comprehensive enough to draw meaningful conclusions regarding their educational beliefs. The way that teachers perceive their role in the classroom, their belief system, is so crucial to how they approach instruction and whether they are ultimately creating a learning environment that is student centered, rigorous and technologically engaging or one that is resistant to innovation and reform (Boud and Feletti, 1999; Cuban, 1993; Kerr, 1996; Rodgers, Runyon, Starrett and Von Holzen, 2006).

In qualitative research, other limitations may include the fact that interviews are subject to common problems such as bias, poor recall, and inaccurate articulation. The study's intention was to identify the pedagogical strategies that develop 21st century skills and shed light on the most effective methods of preparing our graduates for the global workplace and offer recommendations for transference in other public school systems.

Study Validity and Reliability

Validity was originally established by having the observation tool, defining the 3 R's, reviewed by five current secondary teachers and two administrators. The validity of the study was further improved in this study through the triangulation of the data. Interviewing participants, observing instruction and reviewing school documents, strengthen the validation of the study because multiple sources of information are examined. The researcher's point of view and bias were revealed to all participants during the data collection process. Because the nature of this study was qualitative and delved into the perceptions, feelings and interpretations of human beings, reliability was not assumed. This case study was unique to the participants of the high school and

replicating this study in another school or to a larger population may not yield the same result. However, the study described the ideal platform for a successful 21st century educational program that is hinged on the framework of the 3 R's in the teaching and learning (Rigor, Relevance and Resources). Further, the study offered insight regarding the feelings and perceptions of teachers and administration when in the process of promoting a 21st century educational learning community.

In order to strengthen reliability, Merriam (1998) suggested that the investigator's position and bias be revealed and described. He also recommends using multiple sources of data for triangulation. Lastly, Merriam (1998) stressed that the research process should be clearly documented for others to possibly replicate the study. The researcher had addressed these concerns in the case study by using various methods of data collection such as observation, document review and interviews in which the researcher's position of a current administrator was revealed to the participants of the study.

CHAPTER IV

DISCUSSION OF FINDINGS

This qualitative study investigated the beliefs of teachers and administrators in regards to the implementation of a 21st century educational program in a public school setting. Specifically, the study sought to answer the following questions:

1. How does the district's vision reflect the critical skills needed for the 21st century workplace?
2. What are the beliefs of administrators regarding 21st century learning?
3. How do teachers approach instruction for 21st century students?
4. Is there alignment between the components of 21st century learning, the articulation of the school's vision and the actual instructional practices in the classroom?
5. How are teachers effectively integrating higher order thinking, real-world relevance, and technology literacy in core classrooms in order to teach in a 21st century context?

The study focused on the essential framework for 21st century learning, the integration of the 3 R's: thinking skills (rigor), technology usage (resources) and instruction in a real world context in the form of authentic learning (relevance). These components also influenced the observation tool that was used to guide the classroom observations (Appendix C). The 3 R's were drawn from the *MILE* Guide that described the components of an effective 21st century learning program. The *MILE* Guide's fields of Student Knowledge and Skills, Education Support Systems and Education Leadership were also examined to support the research findings. Data was triangulated through

observations, teacher and administrator interviews and review of district documents such as vision statements, lesson plans and curriculum. After transcription by an independent professional agency, the participants' responses were categorized in order to develop themes that help support the research questions.

Research Question 1

How does the district's vision reflect the critical skills needed for the 21st century workplace?

The first research question was designed to reveal how the vision of the specific school reflects the necessary skills needed in the 21st century workplace. To cope with the challenges of a 21st century workplace, students must know more than content. Focus on skills, such as information and communication skills, global, economic and civic awareness, self-directional skills, such as critical and abstract thinking, problem solving and drawing conclusions, interpersonal skills such as collaboration and empathy must be integrated into the core curriculum in order to increase the necessary competencies for the 21st century. In addition, there needs to be an emphasis in establishing proficiency in technology as thinking and creating tools. These components must be taught in a 21st century context that includes an authentic instructional style (NCREL, 2006; Partnership for 21st Century Skills, 2006; Trilling and Fadel, 2010; Wagner 2007).

Although the high school recognized the critical skill of cultivating lifelong learning within its vision statement and other school correspondence, the interviews and informal observations discovered that teachers feel that the district's broad vision is not aligned with the realities in the classroom. In each case, the participants recognized that

the school's priority was preparing students for the 21st century, but felt that the steps in professional development and leadership have not directly related to that goal.

Culture of High Standards

The first theme that permeated through the interviews and supportive documents was the school's devotion to high standards. The philosophy of the school reflects high standards, challenging educational opportunities and rigorous curriculum. With national and statewide recognition, the high school is well known as a rigorous high school that prepares students for the globalized world. In the school's correspondence with the community, not only does the superintendent state that this high school strives to be the best secondary school in Pennsylvania but that the school district has set high standards and expectations that result in high performance of its students. The school further stated that these high school students have traditionally achieved high academic and extracurricular success on local, state and national levels. The strategic plan of the district included goals, vision, mission and belief statements that have great emphasis on "improving individual student achievement, providing academic safety nets in the curriculum but also preparing all students for success in a global 21st century society." In the school's district goals, it states its desire for students and staff in "becoming proficient in skills needed for success in the 21st century".

The district's vision statement, reads that,

Students in the district will enter schools that are prepared to address individual needs. The school community will nurture and inspire students' desire for knowledge and provide the foundation for them to be successful in a global society and to become lifelong learners.

Aforementioned in Chapter Three, the school district is nationally recognized and claims it will meet the needs of every student. The superintendent noted in district

documentation and newsletters to the community as “having set high standards for its learning community, and these expectations result in high performance of its students.” With a school perspective that reflects high expectations of rigor, technology proficiency and 21st century education preparedness, the school created lofty goals for its staff. One example of these expectations came from the administrator who stated, “The school is in its second year with the Classrooms for the Future (CFF) grant and running huge amounts of Differentiated Instruction (DI) training at the same time. Because the CFF and DI hit at once, it was exhausting to many.” The administrator (A1) interviewed also mentioned that, “there have been a lot of things thrown at the teachers.” A1 went on to mention that with the change in leadership came the change in direction and vision. The administrator also stated that there is a lot of pressure placed on the teachers in regard to achieving the goals of the district.

The teachers were aware that their school district is continually moving in a direction to improve and reform their school program, as noted by participation in various professional development initiatives. Teachers were candid and supportive of their school in their responses regarding the culture of the school’s expectations. During the interview process, the researcher focused on the school vision of high standards and its impact on classroom instruction. Teacher 3 (T3) positively stated:

Our school’s vision would be to develop students toward their maximum potential especially now in the 21st century workplace. This includes being a team player and leadership...but definitely using cooperative learning as well as implementing technology skills.

T3’s response suggested that cooperative learning in the classroom aligns with the 21st century education. Although peer interaction is a necessary part of student engagement,

teaching in a 21st century context requires more than cooperative learning and technology. Teacher 2 (T2) concurred with T3's interpretation of the vision by stating:

We want to make sure that we're able to reach all students so that we differentiate and that we're able to teach all kids how to problem solve to a certain degree...that we're engaging then with outside resources through authentic real learning.

Based on their responses, it is apparent that teachers understood the school's mission of preparing students. Teacher 1 (T1) connected the mission of the school with his/her definition of 21st century preparedness. T1 stated:

It is important for our students to know that when it comes to basics, they need to complete tasks in order to progress. They will all have requirements in their jobs. We must help them become responsible and capable.

Along with the school's many accolades and impressive student test scores, the teachers interviewed emphasized being engaged teachers who work hard for their students. All of the teachers felt that their efforts improve their students' learning.

Teacher 2 stated:

We are a highly collaborative staff and feed off each other's ideas when we're struggling. The school has a culture of collaboration and the administration supports that.

Teacher 1 commented about the high expectations of the school.

Self-efficacy in the school is very high. We love what we do and need time to perfect it-cultivate it. The teachers here really want to believe that they make a difference. There is a lot of responsibility on our performance in the classroom.

In this study, the teachers and the participating principal that served as the administrator in the research process, exhibited pride in their school and in their teaching during the interviews. Although they all spoke of their experiences at the school with smiling faces, their responses suggested that the school's vision was too broad and not

broken down or connected to the daily practice of its teachers. Teacher 2 described the climate resulting from the school's initiatives by saying, "Teachers feel overwhelmed... Could you just give us a break for now? The administration doesn't understand the reality of our classrooms." Even the Administrator admitted that the school's initiatives occurred quickly and changed frequently. The administrator stated in the interview,

Since I have come here, we had focus on reading strategies, and making sure teachers were integrating reading and writing in the curriculum, then working on middle states accreditation while changing graduation for seniors with career portfolios. So that was two not four years ago. So that there were a lot of changes that kind of happened between then and when the new Superintendent started.

These comments affirmed that teachers perceived the school's mission as daunting, continually changing and overwhelming.

Technology in the Classroom

Another theme that was revealed in the study was the school's dedication in the area of technology. Knowing that technology resources, one of the 3 R's, need to be present in a learning environment that supports 21st century learning, a priority of the high school since receiving their *Classrooms for the Future* grant was building a physical infrastructure for technology with more computer access, better internet connections and availability of computer labs. The administrator spoke favorably of the *Classrooms for the Future* (CFF) grant as the pathway to becoming a more cutting edge school.

We are gaining more computers in the classrooms and teachers are getting training through cohorts and coaches. They are using technology with students and feeling comfortable about it.

Although the administration was complying with the regulations of the state funded grant, the focus was to accumulate more hardware in the building for instruction.

Teachers commented on technology usage since being awarded the CFF grant.

Teacher 1 remarked:

Even though we are still sharing laptops in the classroom, we're heading in the right direction to be able to truly incorporate technology to its fullest extent. Before, we had one lab...impossible to get into.

Teacher 2 also hailed the acquisition of technology in the classrooms as making teacher's lesson planning more efficient. When assigning a scrapbook activity, the teacher discussed how difficult it was before students used laptops in class. Where in the past, T2 spent countless hours looking for stock pictures, now T2 can assign that task as part of the assignment, knowing students can access a myriad of historical images using technology in the classroom. T2 was also excited about having the students stay engaged in the classroom because of the technology. The teacher said:

Being able to have all my files in one place and not having to fidget with this or that is invaluable. Everything is on my computer. So I can the night before, or even that morning, get everything prepared, any sites we're going to visit in class or pictures. Like today at the end of class, the kids were on the vision board doing online quizzes while other students were finishing up their projects.

Access to physical hardware is merely one component of technology integration. In order for technology integration to be effective, it needs to be strategically infused in the constructivist approach of instruction (Judson, 2006).

The researcher observed Teacher 3 (the math teacher) and Teacher 1 (the science teacher) where they both integrated laptop use in their classrooms as routinely as students getting into their seats. Students entered the classroom and quickly logged onto their computer stations before taking book bags off their shoulders. By observing students seamlessly using the technology in their classroom routine, this showed the researcher

that high school's teachers established a protocol for computer usage in their classrooms. In Teacher 2's classroom, the students also used the laptops to complete an activity with their lab partners where web sites were provided from the teacher. In T3's math class, the students each had their own laptop where they logged onto a tutorial program and continued their work after a previously taught lesson from the instructor. In both of these classrooms, upon observation, laptop technology was used. In ideal 21st century educational settings, all types of technology must be integrated for higher order thinking and problem solving (Beetham and Sharpe, 2013).

Observing the level of rigor in the students' computer activity told a different story. Just as traditional learning can be categorized based on Bloom's Taxonomy (Bloom, 1956), the revised version of this well-known scale can be used to determine what level of higher order thinking students were asked to employ in the two classes when technology was specifically integrated (Churches, 2007). Basic searching or "Googling" is listed as level one while podcasting and wiki-ing would fall into highest level of creating. As students logged onto the laptops for both a science lesson and a math lesson, students were asked to complete more of a level one activity that involved completing a worksheet with basic information searched from the Internet. During this low level activity, students were holding side conversations with each other as they partnered in science and randomly surfed the web when assigned a math on-line program. This behavior suggested that instructional delivery might need to be tailored in order to keep students on task, increase rigor and prevent distractions.

Professional Development

In order to support high standards in regards to 21st century learning, another theme that developed was the school's encouragement for teachers to embrace the instructional changes to support the district's vision. A specific professional development plan needs to be implemented in order to support many initiatives primarily, Classrooms for the Future (CFF) and Differentiated Instruction (DI). Along with some of the school's success in its professional development plans, teachers felt that the magnitude of the school's vision is hindering professional development efforts causing frustration and confusion.

For the most part the participants that were interviewed agreed that the district has made many changes in its strategic plan due to leadership shifts that has changed reform efforts. The administration responded to the challenging demands by increasing professional development opportunities in areas of technology integration, the focus area that reflects the school's mission of technology acquisition. Administrator 1, a building principal stated:

We've had a lot of changes in the last three years because of our vision of moving into a 21st century school. I'm really working hard to prepare kids for when they leave here. And that means preparing their teachers to prepare the kids. So I mean the professional development initiative has been huge...I think the struggle is really about balancing all of the professional development for the teachers and making sure that they value it as much as we do. We (administrators) want them to work together and take risks, try something new. We know they can make a mistake or two. We support them since we also know that it is still scary because no one wants to fail.

The principal genuinely feels that the administration was being cognizant of teacher sentiment and respectful of their workload. Despite the many priorities in the

school's mission, Administrator 1 had positive remarks in terms of the professional development and technical support given to teachers during these district changes.

The administrator stated:

I think our school meets teacher's needs quite well. We have Classrooms for the Future coaches and the technology necessary. We have the staff that helps us figure out how to integrate new techniques in the classroom. There is a lot of collaboration between staff members, a lot of in-services on how to differentiate and incorporate 21st century learning skills.

Teacher 1 shared:

The coaching model is so much better than the "one stop shop" in-services.

Teacher 2 agreed:

The coaching model is invaluable because there is a learning curve in attempting new techniques with technology.

When asked to comment about the existence of a professional development model, teachers agreed coaching is better than the traditional in-service. The coaching was used for technical support as teachers begin to use more technology devices that the school acquired through the grant. However, genuine 21st century learning (3 R's) of increasing thinking skills (rigor), engaging students through an authentic learning approach (relevance) with the integration of technology tools (resources) is a shift in the instructional approach. Therefore, teachers are not receiving support to initiate those changes in their classrooms. There were strong sentiments of frustration on the part of the teachers due to the unclear definition of school's vision and district expectations for teacher performance. This lack of focus was supported by Teacher 3's response.

When asked what he would change about the school, T3 openly shared:

...Changing our professional development yearly and on a whim.
I've been here two years and I have already done so many different things...
that you never stick with one idea is the worst for a teacher. We are

constantly told to learn something else and then it immediately changes to something else. We never really master anything.

Teacher 2 concurred with T3:

I think a lot of people feel overwhelmed and it's become partly because of administration. I think to bring in some other new ideas that are great because people are like, "Could you just stop, give us a break for now." Teachers are getting stressed out. They feel that administration doesn't understand the reality of their classrooms. There's an understanding gap between administrators and teachers.

Teacher 2 went on to share frustration with the unclear vision and the need for real professional development that is clearly aligned to the district goals. T2 stated that the "reality in the classroom does not always meet the theory that the administrators want to see." This was coupled with T2's disagreement of the administration arbitrarily making teachers do "busy work" on professional development days so that they can have "proof that their teachers are improving." The "busy work" was described as filling out lots of paperwork that "no one checks on" such as completing goal setting plans and action research plans in their classrooms. Teacher 1 also shared feelings about the professional development not being clearly connected to district expectations. Teacher 1 stated:

The vision and expectations of the school and administration are so big. There is technology, there is differentiated instruction, there is getting to know your students, another initiative that helps us differentiate. There is data driven instruction. We have all these catch phrases. But nothing ties together.

Although the district offered the time for teacher professional development in the form of CFF courses and faculty meetings, Teacher 1 felt that some professional development is not used wisely or meaningfully.

T1 further stated:

I think our administration is aware. I think they provide us time. But

there are things where-this might just be a building thing-we're sometimes asked to complete professional development that is sheer busy work. I think many teachers would agree that we feel like we're not trusted. I know that sounds horrible to say, but I don't think that we're any different than other schools.

Despite the administration's perception that they offer support of new initiatives such as promoting differentiating instruction, teachers feel that they are not receiving valuable feedback from the administrators who seldom visit their classrooms using informal "walk-thrus". Teachers received supports like coaching to help with initiatives. However Teacher 1 shared that administrators do not provide practical feedback or advice when monitoring the initiatives of differentiated instruction, technology integration and teacher action research in the school. The teachers' opinions reflected that being valued individually instead of generalizing the praise and professional development would be more beneficial for growth.

Teacher 3 stated:

I think that if principals were more present in the classrooms, and didn't have so many meetings, I mean, I know that they have a lot of expectations in their positions too...but it would be great to get personalized feedback after having them see what they make us learn. Occasionally you'll get an email when you do something wrong. When they send feedback it seems generic. I think they send the same email to everyone. I'm not sure. Other times, they might just walk by your classroom and wave and not give feedback at all. From principals to curriculum coordinators, it seems like they all have a different focus so it feels like there are multiple priorities-visions.

Teacher 3 also mentioned that some teachers are incorporating thinking skills and technology in their classrooms while others are still teaching using archaic techniques, such as lecture and worksheets. With so many initiatives, and the expectations and deadlines administrators relay to the staff, teachers felt that a lot has been thrown on their plate with support to master it, but not much accountability or follow-up. Having many

administrators with different opinions has contributed to the unclear articulation of the school's vision of 21st century education.

Teacher 3 stated:

The vision is more than just muddled, staff members feel like it is distinctly different depending on each administrator's passion... She likes technology lessons, he likes high level questions...you get it. Therefore it is getting interpreted differently by everyone. What you see on our website is not what is actually happening...Let's make one single initiative and make sure we all know it and are doing it.

How does the district's vision reflect the critical skills needed for the 21st century workplace?

In summing up the investigation of Research Question 1, the participants shed light on the important areas regarding the district's vision. The school's philosophy in all of its written correspondence to the public community indicates an acknowledgement of the important characteristics of 21st century educational preparation such as, preparing students to be productive in a global society while being lifelong learners. During the interview process, the school initiatives indicate a dedication to students in the area of technology and a challenging curriculum, as shown by the number of Advanced Placement opportunities. However, participants, including the Administrator felt that the school's expectations were demanding and overwhelming for the staff.

The Partnership for 21st Century Skills (2006) outlined a model framework that emphasized embracing the collaborative vision for 21st century learning. However, the evidence from the research indicated that the teachers have not interpreted the vision in the way the administration intended. Because of the school's culture of high standards, teachers understand the emphasis on promoting rigorous and challenging classrooms by using technology and differentiated instruction. Although, the participants agreed that the

school has high standards, the *rigor*, one of the important elements in a successful 21st century educational program, was not consistently reinforced in the school's instructional practices, especially in the area of technology integration with more low-level use of the technology in the classroom. The evidence showed a disconnection between the administration and the teachers' view of the professional support they receive during the reform process. It was clear that the school is moving in a positive direction with the acquisition of hardware and infrastructural needs due to the CFF grant. While the administration felt that they were being supportive with professional development, teachers did not view the support as meaningful. In order for professional development to be beneficial, a unified culture that values innovation and change needs to exist. Further, trusting leadership with follow up observations and personalized support is critical when facilitating change in a school (Morrison, 2008; Wu, 2005). This makes it challenging for teachers to fulfill the district goals if they are not cohesively understanding the rationale of the school's vision.

In regard to professional development opportunities in the school, the school embraced the integration of technology, an important element in the facilitation of a 21st century educational program, by participating in the Classrooms for the Future grant. The grant provided hours of professional development in the form of on-line coursework for the staff. But the course work only introduced teachers to integrating technology into their lesson plans. However, the observations of the classrooms showed that although the teachers are finding more technology access convenient, there still needs to be more training on not only using digital tools but how to design more constructive deliberate educational experience for the students. The teachers discussed that the professional

development and administrative support were not assisting them in understanding the goals and expectations or reaching them.

Evidence of authentic learning or *Relevance*, did not emerge in the investigation of Research Question 1. When exploring the district's vision and direction of the school, the concept of pedagogically shifting the instruction to one more aligned with evidence of authentic learning did not surface from the teacher or administrator responses. While the school reported preparing students for the 21st century, acquiring technology tools, its response to this was to train teachers to integrate technology, mainly through the state funded Classrooms for the Future grant. Evidence from the interview process did not show a connection between the vision and challenge of creating a highly effective educational environment where thinking skills are incorporated into authentic relevant instruction.

Research Question 2

What are the beliefs of administrators regarding 21st century learning?

The second research question intended to explore administrators' beliefs regarding 21st century education. Because, many administrators do not have a clear grasp of what effective 21st century teaching and learning looks like, this question was vital to the research study (Hess and Kelly, 2005; Riley, 2009; Thomas, 1999). Twenty-first century learning has been interpreted in many ways since it became an important part of the educational debate. Initially, 21st century education meant increasing technology tools and Internet access (Cuban, 2000; Joyce, 1990; Leiberman, 1999). However, technology and globalization have prompted schools to shift from content driven instruction to focusing on necessary skills such as problem solving, creative thinking, collaborating and

critical thinking such as analyzing, synthesizing and interpreting information (NCREL, 2007; Partnership for 21st Century Skills, 2002; Trilling and Fadel, 2009). As technology becomes more infused in our lives and careers, these learning skills must be integrated with technology literacies within our classrooms.

Administrator 1 is one of the three building principals at the high school. In a series of questions (Appendix A), Administrator 1 shared thoughts regarding technology integration and the needs of the 21st century workplace. Administrator 1 believed that he/she had a grasp of the pertinent literature in the areas of 21st century education and workplace skills, but in the interview much attention was dedicated to the various fragmented district initiatives that were consuming A1's time as a principal. It was clear that A1 understood components of 21st century education, but also stated that acquiring hardware was the district's strategy in making progress toward a 21st century educational program.

Challenges of Net-Gen Students

In addressing the unique needs of the 21st century workplace, the researcher focused on the administration and teachers' awareness of 21st century students. One theme that became abundantly clear was the administrator's understanding of the Net Generation students in the school. During the interview process, the researcher described the generation of students currently in the high school as "Net-Gen." Understanding the values and dispositions of the students is critical in successful school reform. In the 21st century, Net-Gen students bring various challenges to a school setting (Tapscott, 1998). Administrator 1 did not describe instructional implications, such as authentic learning opportunities that Net-Gen students need in their learning. A1 instead described

disciplinary concerns that are unique to Net-Gen students from their dependency on technology. Administrator 1 stated:

About forty to fifty percent of my discipline has involved technology. Kids are using cell phones, texting during class. Students are not handing over expensive iPods to their teachers. Students are using the Internet inappropriately. It's all new to us, but this behavior is totally normal to them. Even social networking, like Facebook, that might not be happening in the school, comes into the school and you (administrator or teacher) have to deal with the conflict. It's frustrating.

Teachers at the high school feel that tougher rules need to be implemented by the administration to combat the nuisance that technology discipline issues pose.

Administrator 1 stated:

It's interesting we have many teachers who are adaptable and know it may happen in their classroom and you just roll with it, not letting it disrupt the lesson. Then you have many teachers who are very black and white about it. They believe that kids should not have cell phones, iPods in school. You (administration) should collect it. Discipline needs to be harder for those kids. But how do you fight that and keep tabs of what is happening in their classrooms.

Despite the issues that 21st century students bring to the school setting, the school is committed to integrating technology resources in their instructional practices. But the interview with the administrator failed to show how the technology was specifically addressing a challenging rigorous curriculum. There was no mention of how specific technology tools or programs were being used to enhance learning. Instead, Administrator 1 commented on the availability and school's responsibility to updating infrastructure of its classroom technology. A1 stated:

If you are going to bring the technology in the school, you need to keep it available to the students and not restrict it or lock it down. You of course need to teach students responsibility with using it, but you cannot be afraid of allowing them to explore.

A1 also commented on the district's response to technology usage that she admitted can be tricky for many schools. She explains:

We revised our technology usage forms. We have both students and parents sign off on it as well. But this is tough. You now have technology embedded in the classroom and the student accesses a website that is not appropriate for class and the teacher catches him. If they lose their technology privileges, and we want technology embedded classrooms, how does he complete the work. Does the teacher need to do more work as well? These are the challenges that technology brings.

As the researcher walked in the hallways to go from classroom to classroom, the administrator's beliefs about technology and the role it can play in students' school lives, were affirmed. Many students had ear buds in their ears for their iPod music device or using their cell phones. The researcher did not witness any school personnel correct the students. It appeared that this type of usage is permitted in the school.

Knowledge of 21st Century Education

Another theme that emerged from the interview was Administrator 1's knowledge of 21st century education. Administrator 1 shared thoughts regarding how education must change to meet the needs of Net-Gen students. The researcher concluded that although Administrator 1 was enthusiastic and knowledgeable in this area, the district's vision is widely focused. This position is affirmed by examining the district correspondence and newsletters informing the public about the school's reforms and initiatives. The newsletters indicate that senior projects are implemented to reinforce career education and awareness. Administrator 1 further explained that seniors were expected to create a PowerPoint presentation for their senior project that demonstrates their research in a career. The correspondence to the community also informs the public of the new acquisitions of technology in the district and stories of technology integration into

classroom instruction as one of the ways the school will continue to move forward as a top rated high performing high school.

The researcher inquired of any relevant literature that Administrator 1 has read that supports 21st century educational contexts hence the development of the district's vision. A1 shared:

One book that totally changed my perspective was *The World is Flat* by Friedman. When I read that book, I said, "Oh my God", I have a lot of re-thinking to do. Daniel Pink's, *Whole New Mind* which really gives what we know about technology and the focus in other countries on whether their students are going to be engineers or in math and sciences. It talks about the creativity and not losing that with our kids. Creativity in classrooms is so important so we don't want to lose that. We must find ways to incorporate that into our curriculum.

Even though the Administrator did not go into details of how a school would incorporate creativity and thinking skills into classroom instruction, A1 was obviously passionate about the district's various initiatives such as CFF. Happily, A1 expressed the need to support the teachers with valuable professional development. Professional development, she said is a "keystone in the building of a 21st century school." From organizing cohorts for the Differentiated Instruction initiative as well as organizing teachers in cohorts for the phasing of Classrooms for the Future which involves an in-depth 30 hour on-line course for the teachers, Administrator 1 felt that adding instructional and technology coaches as well as offering highly skilled students the chance to "in-service" teachers in technology, has been pivotal in the school's success. A1 stated:

Let's say you have a burning interest in integrating I-movies into your lesson. You want to find other who know how to do it. Open Space is a great format for that. It is a brainstorming session that creates groups interested in the same thing. Even principals have to sometimes let go of their ego to learn from a tech savvy teacher or even a student. How can we gauge progress if we are not familiar with technology?

As an administrator, being knowledgeable with 21st century education does not only mean understanding instructional techniques but also nurturing the staff to create the learning environments in their classrooms (Bauer and Kenton, 2005; Honey, 2001). Coaches, on-line courses, in-service days with consultants for various initiatives have been implemented at the school. It was evident to the researcher that both teacher participants and the administrator felt that the school is progressive with its approach to professional development, but concerned with seemingly disjointed reform initiatives. Transformational leaders must articulate and support the collective vision in order for the teachers to thrive (Gill, 2006). As reflected in the Partnership for 21st Century Skills' *MILE* Guide (2002), ideally, the school should consolidate its various efforts into a comprehensive 21st century educational context and not frustrate its staff with multiple projects that don't make sense to the teachers.

What are the beliefs of administrators regarding 21st century learning?

In summing up the investigation of Research Question 2, it was evident that during the interview, the building principal was knowledgeable about 21st century educational learning. As presented in the *MILE* Guide, education leaders must promote, model and support the integration of 21st century skills into the management and operations of the school. A1 described that resources, the technology tools that are necessary to facilitate a 21st century learning context, are pivotal to encouraging a 21st century learning environment. The Administrator further discussed the district's challenge to balance technology accessibility with student responsibility. The school is committed to continually improving the teacher's ability to infuse technology into the classroom. The state grant provided the primary professional development and technical

support in the area of technology integration for teachers. However, other than the individual senior project that most commonly takes the shape of a student powerpoint presentation, the administrator did not convey how relevance, the real world authentic learning in the classroom, connects with the integration of resources such as technology.

To successfully implement a 21st century learning environment, a shift must occur in the pedagogical focus from a teacher-centered classroom to one where students are engaged with technology tools in an authentic learning experience (Boud and Feletti, 1999; Godfrey, 2001; Kerr, 1996). However, this concept has been very challenging for most teachers. However, this pedagogical transition for teachers was not part of the leadership's vision for the school in its journey towards 21st century learning. The vision stated that the school prepares students for the 21st century, but there was no evidence in the reviewed district documents where the district defined a 21st century instructional context for its teachers. Therefore, the administrative team was not focusing on the 3 R's as the framework for achieving 21st century education. The administrative focus emphasized bringing technology in the classroom without deliberate efforts made to embed the rigor of 21st century skills and relevant problem based authentic learning in the classroom setting.

Research Question 3

How do teachers approach instruction for 21st century students?

The third research question asked how teachers approach instruction for a 21st century educational environment. The Net-Gen students have brought with them new challenges and pressures for teachers. Yet there also needs to be a functional

understanding of what the 21st century workplace demands from young people entering the workforce and how that impacts content and instruction.

Didactic and teacher centered strategies are ineffective with these tech-savvy students. Net-Gen students are interactive learners who require the challenge of continuous engagement in the classroom with a connection to the learning (Oblinger, 2004; Pletka, 2007). The participants agreed that an emphasis on student-centered activities is a priority in their classrooms.

Concern over Basic Skills

One theme that emerged from discussing the teacher's approach to learning and lesson planning was the concern of basic skills in the 21st century learner. Teacher 1 was concerned that Net-Gen students are not equipped with basic skills due to the reliance on technology. In addition to the concern that handwriting skills are poor, T2 pointed out spell-check, texting and social media can hinder rudimentary skills such as reading. T2 stated in the interview:

I think it hurts particularly reading comprehension, and I think that's something that, in my class at 9th ninth grade, is a focus of our class; also social skills...another would be being able to make conclusions about what they are reading or studying and be able to express their own thoughts and opinions. I mean besides that, I'm just thinking almost a work ethic. I mean, it is technology, yes, but too much could get to hurt students' learning.

In the interview with T1, the teacher expressed concern that adding rigor for students in instructional planning can be a challenge. Although Net-Gen students are more adept with technology, the teachers feared students cannot solve problems with ambiguous or abstract directions. T1 understood the school's desire to raise the academic bar, but has mixed feelings if students can stand up to the challenge. Teacher 1 also noted

in the interview process that the 21st century students were merely focused on getting the right answer and not engaged in the process of problem solving on their own. T1 stated,

Students are so used to saying, I can just look that up... The students ask so many questions of me when I teach because they don't like to delve deeper into an assignment and use thinking skills.

Teacher 3 also noted a sense of concern for basic skills in math classes. In an observation of a math class, the teacher repeatedly needed to review basic equations with students in a more didactic manner, indicating that the students are not remembering rote formulas or understanding how the formula was developed. When the teacher asked a student to explain the mathematical formula in words to the class, he was not able to do so, suggesting a lack of understanding in the logic behind the formula's principles. T3 used more of a teacher centered instructional approach to compensate for this deficiency. Teacher 1 notes that students today, lack the skills to adapt to complex situations that pose multiple solutions. Teacher 1 agreed that adapting, and other self-directional skills, is an area of concern for current teachers. T1 mentioned in the interview that that today's students have a hard time "coping and being proactive to a situation, learning how to be reflective and learning from mistakes." These important soft skills were not formally addressed by the administration to be infused into the school's content curriculum. Teachers have been introduced to the characteristics of Net-Gen students and how to experience success in the classroom through the CFF professional development training.

Differentiation and Choice

In teaching 21st century students, teachers must allow for differentiated learning and student choice. In successful 21st century instructional programs, understanding that young adults need to feel personalization to learning is critical (Hurley, 2007; Perkins,

2008; Tapscott, 1998). Another theme that emerged in the study was teachers allowing for differentiation and choice.

In the classroom observation of Teacher 3, students were able to independently log onto the Cognitive Tutor math program and complete different tasks of interest and difficulties. Students were able to work on a section of the program that was tailored to their ability. Along with selecting a program that allowed for differentiating, Teacher 3 also related the math problems to real-life situations for these 11th grade students, such as describing how compounded interest works when buying a new car. Although there was differentiation in the math class, it was driven by the technological instruction and not through teacher instruction. Further, the test that students were asked to complete in my observation did not show differentiation. Therefore, differentiated learning only occurred in the instruction but absent in the assessment of polynomial functions. Further, the assessment, mostly computation problems, did not have any other components that related the learning to the real world.

In Teacher 2's classroom, student choice and differentiated instruction were more evident. The researcher observed Teacher 2's social studies classroom as an engaging learning environment where students were able to collaborate, create and problem solve. The teacher made the Great Depression relevant to the 21st century when T2 tasked the class to engage in a problem based learning activity. Students were grouped and assumed the roles of economists, studying primary source documents, examining authentic footage from the Great Depression through on-line media while devising an economic plan for recovery. Students had specific roles in their group and were totally engaged for the 80-

minute period. This classroom environment was reflective of how Teacher 2 viewed 21st century learners in her interview. T2's approach to 21st century learning was defined as:

I need to constantly question. Not just stand in front of the room, but walking around while students explore and do the work. Student centered activities, students in groups, presenting; gets them engaged while I am just the facilitator.

In order to meet the unique needs of the Net-Gen student, teachers must approach lesson planning with student options and appropriate ability tracking while still increasing the rigor in their classrooms.

Understanding the Relevance to the 21st century Workplace

Because Net-Gen students are more engaged when they understand the application of their learning to the real world, it is critical to investigate if there were connections between content and outside world experiences in the classroom. (DiPaola, Dorosh and Brandt, 2003; Pletka, 2007; Prensky, 2006). A major component of 21st century instruction is one of the 3 R's, relevance or the awareness of how the content connects with the skills necessary for the future workplace and outside world (Bransford, Brown and Cocking, 2004; Cohen, 1994; Wagner 2008). The theme that emerged regarding the instructional approach to 21st century learning was with the teacher awareness of the unique skills students must cultivate to be successful in the global society.

Administrator 1 stated in the interview that the high school hosts a career fair where students also are responsible for doing a career portfolio that resembled a senior project. However, A1 did not comment on any district initiative that encourages teachers to employ authentic learning activities such as problem-based learning. Further, A1 did not refer to authentic learning as a means for teachers to achieve a 21st century classroom.

Each teacher described their role on how they help shape the preparedness of students for the world of work in the 21st century. In the interviews, Teacher 1's role as a science teacher was described as one "who is preparing future doctors and engineers". T1 viewed the integration of technology as a means to bring the "outside world into the classroom." Teacher 2 viewed the social studies curriculum as a way to help prepare students for higher education by sharpening writing and thinking skills. Teacher 3 felt that math allowed for problem-solving skills that are necessary in the workplace.

The Partnership for Twenty-first Century Skills (2006) stated in its framework that developing 21st century skills needed for future work must be integrated into a core academic curriculum. However, it is important to note that the researcher cannot cite specific instances from classroom observations where teachers directly related how skills learned in class would help for future work. Further, there were no instances where global awareness or civic awareness was demonstrated or embedded into the instruction of the class. This type of connection of classwork to the workplace or global society was not evident in the researcher's observations and review of lesson plans.

Problem Based Learning for Relevance

As part of the 3 R's of *Rigor, Resources and Relevance*, one significant theme that developed in examining this research question was the importance of authentic learning strategies and activities within teachers' instructional planning. Relevance in the learning is critical for students to make connections and employ skills necessary for future work and education. Problem based learning activities are one way that teachers can offer students opportunities to collaborate, create and be engaged in real life scenarios in the classroom (Cohen, 1994; Pearlman, 2006a). One of the 3 R's, relevance

to the learning, is essential for making students use skills such as high-level thinking, collaborating and problem solving in the classroom. Further, the relevance of the instruction to the student's lives is critical for Net-Gen students.

Because PBL is very time consuming for daily practice, embedding some elements such as simulations, problem solving tasks and collaboration were techniques that were demonstrated in the 9th grade social studies class. Teacher 2 demonstrated an understanding of authentic learning by relating the learning to the students' lives by asking them to assume the role of a business owner in order to understand economic upheaval during the Great Depression. In addition to assuming the role of economists and business owners in the social studies activity, students were in groups with specific roles. They were asked to work together to support and justify their positions in how they would tackle the particular task they were given while examining primary source materials. These high level thinking objectives are integral in an authentic learning activity as the objectives charge students to exchange ideas about real world problems in order to come up with a legitimate solution. Teacher 2 briefly mentioned in the interview how social studies can lend to making connections to the learning.

Teacher 3 connected the math class to areas that would be of interest to students. He gave the 12th grade students the example of buying their first car and calculating compounded interest. Although, this was the only component of PBL in the lesson, it still showed the researcher that the teacher understood the importance of relating the content to students' lives and incorporated it where or when possible.

How do teachers approach instruction for 21st century students?

During the interview and observation process, it was clear to the researcher that many of the three crucial elements of rigor, relevance and resources were important to the teachers in theory, but were not consistently reflected in their instructional practices or planning. The teachers discussed that Net-Gen students, albeit tech-savvy, were also at risk of their foundational skills such as spelling and summarizing, deteriorating. When the administrator was asked about Net-Gen students, Administrator 1 mainly raised the concern of disciplinary problems with cell phones and digital tools. This prompts teachers like Teacher 2 to push students to utilize 21st century skills such as problem solving, adapting and critical thinking in their learning. By incorporating some choice into their instruction, it shows that teachers have a basic understanding of how high school students learn. However, these were small-scale individual efforts and were not woven into the instructional culture of the school. The Partnership for Twenty-first Century Skills' framework, describes that for students to be successfully prepared for and compete in the ever changing modern workplace, the 21st century learning context of Rigor, Relevance and Resources must be evident in the instructional planning (Newmann, Bryk and Nagaoka, 2001; Partnership for Twenty-first Century Skills, 2006; Perkins, 2008; Wagner, 2006a;).

Research Question 4

Is there alignment between the components of 21st century learning, the articulation of the school's vision and the actual instructional practices in the classroom?

The fourth research question aimed at showing whether there was alignment between the established 21st century educational context of the 3 R's of rigor, relevance and technology resources and the school's actual practices. The teachers all expressed their commitment in challenging students, but did not mention one meaningful school initiative that helps them do this effectively in their classrooms. Although the Classrooms for the Future grant provided the school with a technological infrastructure, the use of technology for 21st century learning was not something that the teacher participants felt was a school focus.

Meaningful Technology Integration: Resources

Computer access is one factor that can pose as an obstacle to comprehensively and cohesively integrating technology into daily. But for the seamless integration of technology tools into the daily instructional culture of teachers, there are many concerns for a school to consider such as teachers' technology skills and training (Bingimlas, 2009; Ertmer, 1999). Despite the school's one-dimensional approach to 21st century educational reform, of acquiring more technology tools, one theme that emerged in the research process was the teachers' belief that technology integration blended with effective learning strategies is critical in an effective 21st century instructional context. Not only is basic computer literacy necessary but applying technology resources in order to critically think, research, create and problem solve is paramount for students to be

ready for a 21st century workplace (Rotherham and Willingham, 2009). Net-Gen students prefer the integration of technology in order to make the learning deeply personal and relevant (Bransford, Brown and Cocking, 2004). The interview with Administrator 1 also echoed the district's commitment to weaving technology into instructional practices. The administrator was upfront about the district and school's participation in the Classrooms for the Future grant that has supported not only technology infrastructural additions to the school, but trained teachers in how to utilize it meaningfully in the classroom.

Administrator 1 stated:

We are working towards technology integration, 21st century skills, we want our students to be ready. We are having lots of discussions with administration and teachers to give them what they need.

However, in order for one of the 3 R's (Resources) or effective technology to align with district's expectations, barriers to changing traditional instructional practices need to be addressed. Although the staff received training in technology integration, the three teachers interviewed *all* agreed that implementing these new strategies is not occurring school wide. This revealed a disconnection in how the teachers perceive the initiative's progress from the administration. Issues such as time, access to the technology and more training were mentioned in the interviews. These external barriers are not as serious as the internal ones of disparate vision, administrative trust and teacher confidence levels (Cuban, 2011; Ertmer, 1999). The social studies teacher commented about one barrier, reliable computer access. T2 stated:

We only had one computer lab that was dominated by the English department. It would be impossible to get in. Then you get stuck to take your kids to the library and they're sitting with laptops, surrounded by books and not using books, kind of ironic. Now with our second year of CFF, the computers are getting better, faster and better connection.

In classroom observations, the researcher observed students' use of technology in two of the three classroom settings showing some alignment with district expectations. The researcher used the Observation Tool (Appendix C) as a guide in the investigation of 21st century technology integration. Teacher 1, the science teacher, conducted what was called a web-quest or a digital worksheet where students with their partners researched various websites provided by the teacher to gather information about the lesson objective. The partners did not have specified roles and the researcher observed many pairs where one partner took the lead in the task. The information students gathered however, was categorized as level one or two on Bloom's Taxonomy (Bloom, 1956). This type of recalling information that can easily be looked up in a one-dimensional process does not describe the type of rigorous learning that the 21st century instructional framework promotes.

During the second observation, T1 designed a creative way to introduce the animal kingdom classification concept by asking students to create a "storybook." However, the technological component of a "digital media-book" was only entertained after a student raised the point, "Hey, couldn't this be way cooler if we could get pics, videos from the net and created our book digitally?" Teacher 1 agreed and allowed for that digital option. Her behavior could suggest that Teacher 1 was not completely secure with the premeditated planning of a technology component for the assignment's outcome and only acquiesced when students recommended it.

As referenced in the observation tool from Appendix C, in order for technology use to be meaningful and effective, students should be communicating, collaborating, creating and researching with technology tools. Teacher 3 asked the students to log into

their account of a tutorial math program called Cognitive Tutor and continue with their personalized math program that is customized to their level of learning. The differentiation of learning was naturally a positive component in the lesson. However, in regard to the use of technology, the program was not being utilized in a meaningful way. Students were not working or interacting with each other in a collaborative way to manage projects or conduct research. The computer program could easily take the place of a workbook or set of problems selected by the instructor. In Teacher 2's classroom, the 80-minute block period consisted of students working in pairs looking up various components and vocabulary words from the unit. Students showed no signs of difficulty in logging into their laptops or navigating to specific web sites provided by the teacher. The simple task did not employ higher level thinking skills as suggested by the Digital Bloom's scale of evaluating, creating or designing (Churches, 2007).

Critical Thinking: Rigor

Another major skill that is needed to be successful in the 21st century workplace is the ability for students to make judgments, plan, evaluate, and question by critically thinking (Perkins, 2008; Wagner, 2008). Even though each teacher was able to verbally share the importance of incorporating high level questioning and skills into their lesson planning, the researcher saw little evidence of this in the classroom observations or in the lesson plans themselves. It is important to note that the teachers explained to the researcher in informal conversations that they are not expected to submit lesson plans nor is there a school wide format with essential components required. This information shed light on the extremely basic lesson plan designs that were provided.

In the interview, T2 stressed the importance of inquiry and questioning in the social studies class. T2 stated that in the 21st century, students have this, "...attitude that they can just look something up on Wikipedia." Therefore, the teacher emphasized how important it is to look for multiple sources of evidence to prove one's perspective. T2's tone was passionate indicating a personal investment in this task. Teacher 1 felt that Net-Gen students already have this natural ability to be inquisitive and noted how easy it is to work with Net-Gen students in the classroom. Teacher 1 positively commented that,

Students 10 years ago would hang onto my coattails; forcing me to be more didactic. Now I can give them a more open ended question and have them go out and explore it on their own.

However, when comparing Teacher 2's selection of instructional materials to the Observation Tool (Appendix C), the selected assignment was not characteristic of a rigorous task. Part of critical thinking, in the Observation Tool is described as making complex choices and justifying results. T2's question sheet for the Great Depression corresponded with various bar graphs and consisted of questions that were all basic inquiries that asked students to recall one-word answers. For instance, one question asked, "What year showed the worst stock progress? Unemployment?" After being shown many graphs that show economic decline, the most thought provoking question, of "Why do you think Hoover was not re-elected?" only elicited a correct answer without a student comprehensively grasping the economic collapse of the 1930's.

Teacher 3 offered insight on the school wide inconsistency of how these 21st century components, such as critical thinking, were being integrated into school wide instruction. T3 stated, "Teachers are doing different things, teaching differently. Its pretty much varied classroom to classroom; some are focusing on 21st century skills and

implementing those, while others not.” But T3 quickly qualified the comments by saying that everyone is still “new to technology.” With the focus once again misinterpreted as technology equaling 21st century learning, it reinforced that misalignment between vision and instructional practices.

According to the administrator in the interview process, when discussing how the school must shift in preparing students for the 21st century, A1 emphasized that the school requires teachers to complete the technology integration courses for the CFF grant. A1 did not attribute 21st century educational context to higher order thinking skills with a change in the instructional model of the school. Instead, in the interview, the administrator, spoke heavily about technology integration, suggesting that a multitude of electives helps define a high performing 21st century school. A1 mentioned the Classrooms for the Future (CFF) grant as the vehicle in creating a 21st century school. A1 stated, “I’m really working hard to prepare kids for when they leave this school. This means preparing teachers to prepare students.” A1 then continued by explaining the cohort-training schedule for the CFF courses and need for professional development in order to help the staff reach the district’s goals. However, the professional development and staff training was solely based on the Classrooms for the Future grant and did not offer a personalized approach to the individual needs of the students and the teachers because it did not take into consideration a teacher’s prior knowledge and comfort level with technology.

Authentic Learning: Relevance

One of the critical elements of 21st century educational context is the ability for the classroom learning to extend into the real world in order to make the learning authentic (Cohen, 1994; Pearlman, 2006a; Pletka, 2007). This relevance for the student helps connect the learning and its application for the actual skills needed to succeed in the 21st century workplace (Hurely, 2007; Oblinger, 2005). This type of constructivist teaching style also requires that the learning consist of more than recalling and understanding, but include inquiry, discovery, critical thinking, collaborating and creating (Jones, Valdez, Nowakowski and Rasumssen, 1994).

In terms of understanding the school's expectations in preparing students for their future, the interview with the administrator demonstrated that the school recognizes the need to expose their students to career opportunities for their future. A1 mentioned the existing "senior project" that begins during a student's 9th grade year and culminates in their 12th grade year as a career portfolio. The student would create a presentation that explored a career of interest and share practical experience or observations of that career. However, when compared to the Observation Tool (Appendix C), this research project still falls short of the many components that encompass an authentic relevant learning experience, such as developing and communicating and implementing new ideas, collaborating with classmates, and employing higher order thinking skills.

In order for relevance to the workplace to be effective, it must be woven into the instructional practices. T1 described the role of the science teacher as one that prepares future doctors, scientists and engineers. However, in the observed lessons and review of the lesson plans, the instruction was more textbook driven with lessons designed to

disseminate information instead of students discovering information and applying it to a real world situation. The Observation Tool (Appendix C) reflects that teachers should act like facilitators instead of depositors of content, in order for a more authentic learning experience to occur. T1 indicated in one of the lesson plans high level thinking skills such as students being able to research hydroelectric dams in order to construct a biome project. In Teacher 2's classroom, students were aware of the skills they were using to complete various problem based learning activities, but did not discuss how those skills may be beneficial to their future careers or real life scenarios. In both classroom observations, the researcher did not see a deep connection between real world and the learning that would be deliberately designed by the teacher.

Is there alignment between the components of 21st century learning, the articulation of the school's vision and the actual instructional practices in the classroom?

Research question 4 delved into whether there was alignment between the desired 21st century context of rigor, relevance and resources and the actual instructional practices of the teachers. Teacher 1 defined that meaningful technology integration is to “use those resources in the context of authentic learning, to differentiate and research...” However, there was not sufficient evidence of this practice in the classroom. The district's vision does focus on acquisition of technology tools that was affirmed by its use in the classrooms. However, technology usage only occurred on a level where students were employing low level thinking skills. In the interview process, the teachers described that the reluctance of teachers to integrate technology into everyday learning was based on the once limited and recently growing computer accessibility. The administrator

interviewed, felt that teachers will gradually become more comfortable with technology as they complete required CFF courses in technology tools for the classroom.

In regard to rigor in the learning, the teachers and administrator agreed that the high school is committed to providing a challenging education to its students. The interviews and classroom observations however, reflected that its implementation of a rigorous program is fragmented and does not reflect a school wide message of what are the critical components of a lesson for 21st century learning, such as the 3 R's of authentic learning (relevance), technology integration (resources) and high level thinking skills (rigor). Without clear direction from the administration, teachers were interpreting this mission individually in their classroom. A genuine integrative curriculum for learning would effectively incorporate the 3 R's with the subject content areas. Students would fare better from a 21st century instructional context than from departmentalized programs with a strict focus on content (Judson, 2007; Vars and Beane, 2001; Perkins, 2008). The ideal curriculum would reach beyond content knowledge and provide thinking skills, technological competencies and global awareness.

Research Question 5

How are teachers effectively integrating higher order thinking, real-world relevance, and technology literacy in core classrooms in order to teach in a 21st century context?

The evidence to investigate the final research question was primarily gleaned through classroom observations that showed how the teachers were integrating higher order thinking skills, real world relevance and technology literacy in their daily instruction. The teacher-centered paradigm of defining words, memorizing dates and low-

level thinking is not optimal for preparing our students for the 21st century workplace (; Judson, 2006; Oblinger, 2005; Pletka, 2007). This research question essentially is examining how the 3 R's of a successful 21st century program of rigorous 21st century skills, authenticity of the learning and technology integration are being infused into the daily instruction and teaching culture of the school.

Rigor in the Instructional Planning

Rigor in instructional planning asks teachers to incorporate 21st century skills into the daily context of the learning. Overwhelmingly, the participants stated that a challenging student-centered environment was important for students to think and work together. One theme that emerged in the research process was the need to plan for 21st century educational context. The *MILE* Guide states that all instructional planning should utilize best practices and be redesigned to ensure that 21st century skills are integrated.

As the researcher reviewed documents such as lesson plans, there was little evidence in the plans of higher order questioning techniques, such as Bloom's Taxonomy (1956) being integrated into the instruction. Because there was no formal lesson planning structure or requirements of lesson planning elements, teachers are not asked to follow through with important components such as 21st century skills of critical thinking, differentiation, authentic learning activities or technology integration. While the *MILE* Guide states that schools should use some type of curriculum mapping model such as Wiggins and McTighe's, *Understanding By Design* (2005), T2 stated to me in the hallway that,

I think that Backward Design stuff was a push years ago before I was here. But no one asks us of that anymore. They don't ask us for what we are doing unless they need them for something.

In the interview, Teacher 2 described the use of lesson planning as “required but not required.” T2 meant that lesson plans were technically required by the administration, but teachers did not turn them in or when asked for them randomly or after a classroom observation, did not get any feedback regarding their planning in their observation report.

When reviewing various lesson plans, it was evident to the researcher that there was no formalized structure or template that all teachers must follow. The lesson plans from Teacher 1 and 3 were very basic and only outlined materials. The textbook pages and the objective or directions for the student task were the crux of the plan. The plans from Teacher 3 merely outlined pages from the mathematics book or workbook and chapter names, resulting in a two to three lines in the plan book. Although Teacher 2 acknowledged that as a social studies teacher one must question students and challenge their thinking, there has not been much emphasis of this from school wide initiatives. However, T2 felt a personal responsibility to plan differently from the other teachers I reviewed. Knowing that the administration is not collecting the lesson plans, T2 provided more detail in the lessons and included assessment or checking of understanding which many times was a closing question that synthesized major points from the lesson. T2 also planned for more elaborate student centered activities, many of them technology infused, such as problem based learning activities, creating podcasts and digital scrapbooks or newspapers. The disparity in how teachers plan instruction reinforced the concern that teachers and administrative goals were not aligned.

Authenticity of the Learning

Another theme that developed in the research process was how authentic and relevant the learning was for the students. In order for a 21st century educational program to be implemented correctly, a holistic instructional approach combined with the integration of the 21st century skills is crucial. When students are employing 21st century skills along with being engaged in a student centered environment, learning is optimized (Bransford, Brown and Cocking, 2004; Rotherham and Willingham, 2009; Trilling and Fadel, 2009).

In the classroom visits, the observation tool (Appendix C) characterizes authentic learning with the classroom being a positive learning community where students collaborate, create, problem solve, research and make connections with each other to complete tasks. In the classroom observations, there was limited evidence that this type of instructional approach was being implemented. During most of the observations, the students were engaged in a series of lower level activities and tasks that ranged on level one or two on the Bloom's Taxonomy scale (Bloom, 1956). However, there was more evidence of collaborative problem based learning with students asked to problem solve while using evidence from their learning to support their decisions and points of view in Teacher 2's social studies classroom.

Technology Integration

The research question asked how teachers are effectively integrating technology tools to enhance instruction. Because technology integration was the focal point in the professional development initiatives at the high school, there was definitely an awareness that teachers need to plan lessons with technology as part of the medium of instruction or

the student outcome. In regard to technology infrastructure, the school made it a priority to make computers accessible for all students in the classroom. With laptop carts and smartboards, classrooms were equipped for technology integration. However, in evaluating lesson plans and observing classrooms, there was not a solid understanding of how technology can be used in a more meaningful way to enhance student learning. In Teacher 1 and 3's classrooms, the technology, in this case, laptops were used as glorified workbooks or worksheets. In the math class, Teacher 3 used a computer program to assess student progress in the class. However the program although known to customize the level of difficulty for each student, was only used as an insular activity with the students that limited collaboration and student engagement.

During the Biology class, Teacher 1 asked students to begin a webquest that reflected more of a rote worksheet and appeared to have taken much time and effort for the teacher to create, but students quickly accomplished this task. During classroom observation, the majority of student behaviors indicated that they did not feel challenged by the task. There were many side conversations occurring as students were completing the task. One-word answers found from their web surfing or student textbooks were exchanged with each other and then written on the worksheet to show completion. The lack of rigor and classroom management was also reflected in the math class when the researcher observed a few students "googling" prom dresses and shoes even though they were instructed to continue working on their Cognitive Tutor math review program. Although, these behaviors may be more due to classroom management, the students did not feel any academic urgency to stay on task for the majority of the class. It is also

important to note that the researcher did not observe the teacher address the students' behaviors during the observation.

How are teachers effectively integrating higher order thinking, real world relevance, and technology literacy in core classrooms in order to teach in a 21st century context?

Although the evidence from the administrator's responses reflected that the school is working toward 21st century learning as reflected in 3 R's, evidence gathered from teachers failed to show deliberate and cohesive instruction within a 21st century context. The successful integration of the 3 R's within the teachers' instruction was inconsistent. The Partnership for 21st Century Skills (2007) outlined that, digital tools need to be woven into daily instruction for students to research, organize, evaluate and communicate information. It is clear that although the school is moving toward the acquisition of more technology and providing the teacher training to integrate more technology in classrooms, teachers are still left with their own definition of meaningful technology use that would also support a rigorous authentic learning environment. This was also been evident in teachers' inconsistent use of high-level questions within their instruction. The instruction still mirrored elements of a traditional didactic 20th century classroom with teacher lecture and passive student learning. The lesson plans, without a mandated format, depends on the individual teacher's personal preference to include important instructional elements such as critical thinking skills or relevance to the outside world for the students. In some lesson plans, merely an objective and page numbers from the textbook were mentioned. The 3 R's are the building blocks and foundation for a 21st century educational program. The optimal curriculum for the 21st century include challenging students' thinking and connecting the content to the real-world while focusing on

technology literacy (Dede, 2009; Perkins, 2008; Wagner, 2008). When targeting how teachers are articulating and integrating these components into their daily instruction, the researcher failed to see effective demonstration of a 21st century educational context which includes three important areas of relevant problem based learning, rigorous high level work and the use of technology as a meaningful tool in the learning.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

This qualitative case study revealed the characteristics of one secondary school in its interpretation and application of a 21st century educational program. The insights revealed from the teacher and administrator interviews and classroom observations are critical in understanding how a public 9-12 school implemented particular aspects of a 21st century educational program. The participants that were interviewed during the study stressed the importance of the school's role in preparing young people for the demands of the 21st century global society. The 3 R's of Rigor, Relevance and Resources were the key elements that distinguished a successful educational program of a 21st century school.

In order for this transformation to occur it is imperative that the school establishes a comprehensive vision and articulate its importance to the staff. This along with constant professional development is key in the success of the implementation of a 21st century educational program. By using the *MILE* Guide as a tool for gauging the effective rate of implementation of all the necessary elements of a 21st century educational program, the study shed some insight on the practical and realistic experiences of a school organization.

The major findings from this study revealed that:

- There should be a united focus for the district that is communicated regularly and accurately to the teachers with specific expectations from the administration.
- This united focus should include the creation of a lesson plan format with the essential components for 21st century learning, such as the 3 R's.

- There is a need for a more personalized professional development in the form of Professional Learning Communities that integrate individual teacher needs with the district focus.
- To achieve 21st century capability, there should be an instructional emphasis on the 3 R's, using technology as a resource to promote rigor and relevance in the curriculum as reflected in Appendix C.

Relationship to Previous Literature

The changing information based, globalized society is demanding more of our workers and ultimately our students. They need to be able to collaborate, innovate, critically think and problem solve (Carroll, 2007; Pacific Policy Research Center, 2010; Trilling and Fadel, 2009; Wagner, 2008). As indicated on page 64 in Table 3, there needs to be a shift in the pedagogical ideology of teachers from a 20th century educational context to a 21st century context in order for our students to compete in a globalized society. In addition to traditional content driven curriculum in school, there is a true focus on the skills that are necessary to become successful lifelong learners of the 21st century. The Carnegie Corporation of New York (2011) released a study outlining the principles for high performing high schools. It describes the “next generation” of learning as “personalized and deeply engaging, focused on deeper learning of higher order content, complex skills and the integration of the two” (p. 2). Learning is enabled by technology and performance based assessments and offers students supports in their learning. The study further contended that these practices need to be embraced by schools in order to be successful under the demands of the newly adopted Common Core State Standards and assessments for college and career readiness (2011). Schools have the responsibility to

design educational programs that address the needs of the Net-Gen student as well as incorporate rigor in the form of high order thinking, relevance in the form of challenging student driven classroom with real life scenarios and resources that integrate technology tools that facilitate in the creation of knowledge. The Partnership for 21st Century Skills outlines these important skills such as learning and thinking skills, ethics, global awareness and communication (2006). In addressing these skills in the classroom, a pedagogical shift is pivotal in public schools. Net-Gen students require instruction relevant to their lives, with a focus on technology and soft skills (Prensky, 2001). Although the participants were aware of the changing needs of society, there was not a uniform or united way in how each teacher was addressing those needs in his or her classroom. Without strong direction from the administration of the school, the classroom teachers interpreted 21st century education differently.

Another area that was confirmed by the literature is the need for a strong professional development plan when introducing a pedagogical reform effort. Teachers need continuous support with specific goals and benchmarks from the administration (Joyce and Showers, 1988; Sparks and Loucks-Horsely, 1989). All of the teachers agreed that the coaching model is the most effective in implementing such a feat in their classrooms. In addition visionary leadership is needed in order to support teachers in the educational endeavor. However, the participants all agreed that the leadership is not cohesive or consistent in its efforts to undergo a pedagogical change in the school. Teacher interviews reflected that teachers were not aware of the specific benchmarks and expectations that the administrators desired. Visionary leadership is most effective when the educational leaders are united under one vision (Bass, 1996; Gill, 2006). As a result,

the culture of the school should be sculpted so stakeholders can share the vision.

Participants all agreed that the magnitude of the vision was detrimental to the successful implementation of a 21st century educational program.

Another area of the study that is critical to preparing students for the 21st century workplace is the need to adapt instruction for Net-Gen students (Oblinger, 2004; Pletka, 2007; Prensky, 2001; Tapscott, 1998). Both teachers and administration during the interview were knowledgeable and understood that pedagogical styles and methods must change as we face a generation of digital natives who require a personal connection to the learning. However, where the teachers focused more on how their instructional planning was impacted by these types of students, the administrator, in the study, did not demonstrate a deep level of understanding of how the instructional program in the school may need reformed to address these unique learners. During the administrator's interview, A1 merely emphasized how discipline has changed due to this generation of students. Again, this continued to show the discrepancy regarding how teachers and the administration viewed the changing needs and priorities of the Net-Gen students.

Overwhelmingly 21st century students, due to major lifestyle and societal changes, require a non-traditional approach to learning. However, when asked what an ideal classroom looks like with 21st century skills, the administrator's definition of problem solving skills was weak. A1 defined a 21st century classroom as a place where, "students will be deep in conversation with each other and that is good problem solving." Because A1's explanation did not include the 21st century instructional context that is outlined in the Partnership for 21st Century Skills, the 3 R's, this response showed an incomplete understanding of 21st century teaching and learning.

The three primary components of an effective 21st century educational program that have been defined in the study are the areas of rigor, relevance and resources. The literature stressed that teaching high level thinking skills need to be cultivated in student centered classrooms where students see the relevance to the real world learning as well as the seamless integration of technology in the tasks (Daggett, 2005; Noddings, 2008; Oblinger, 2005; Pletka, 2007). Although there was some evidence of teachers using some of these components, there was no demonstration that the teachers were trained on making the 3 R's work together in an educational context much how the *MILE* Guide recommends. Therefore classrooms using technology did not integrate it in a way that employed high level thinking skills such as problem solving or critical thinking. When analyzing the responses from the teachers in their interviews and interactions with them, the researcher discovered that the reason for this disconnect lies in how differently the stakeholders view 21st century education and the school's journey to accomplishing that goal.

Implications of the Study

The implications of this study are important for many reasons. As more of an emphasis has been prevalent in the field of 21st century literacy skills, the world is demanding a highly skilled creative worker for the 21st century. Therefore, reforming the traditional educational paradigm is critical. Rotherham and Willingham (2009) warned educators that the history of U.S. school reform should be of great concern for all stakeholders. They asserted, "Many reform efforts, from reducing class size to improving reading instruction, have devolved into fads or been implemented with weak fidelity to their core content. The 21st century skills movement faces the same risk" (p.

16). Students that are fortunate to attend schools where 21st century learning is a focus are getting these important skills. But that scenario may be more a matter of chance than a deliberate design in our American school systems. As a result, school leaders and ultimately policymakers need to utilize a common definition and framework of 21st century learning that reflect the realistic needs of the modern workplace and shape the educational program to reflect those characteristics. The study supports the literature that teachers and their administrators are scrambling to understand their role in the preparation of our young people for the 21st century. This reinforces the position that more studies are necessary to understand teacher instruction, professional development, school curricula and educational technology resources.

One of the recommendations from the study is in the area of leadership. When the visionary leadership is not cohesive and collaborative, teachers feel unsupported in helping to achieve the vision. Further, when ineffective articulation regarding the vision occurs, teachers interpret their role and responsibilities differently causing more fragmentation and disconnect. If professional development is not aligned with student and teacher needs, and curriculum is not aligned with society's demands, the result is a major breakdown for schools. (Carroll, 2007). This results in fragmentation that can impact the implementation and success of a reform or initiative in the school.

The success of any initiative depends on the ongoing and meaningful support for the teachers. Collaboration can ease this concern but the reality is that 93 percent of a teacher's workday is spent in isolation of their colleagues (MetLife, 2009). One-stop workshops and drive by in-services are not effective for long-term school change. Teachers rarely have the time to reflect on the new learning and find the connections to

increase student achievement. Therefore, professional development that is meaningful and consistently available is crucial to this type of reform in schools. The *MILE* Guide points out how critical professional development is to the effectiveness of 21st century student learning. The *MILE* Guide states that effective professional development elements should include job-embedded, technology based, customized and collaborative components. Teacher collaboration in the form of professional learning communities (PLC), a forum where teachers can discuss, share and refine their craft, can have a positive effect on teaching and student learning (Goddard, Goddard and Tschannen-Moran, 2007). In Goddard's research, schools with teachers actively collaborating had higher test scores on standardized tests. Taking this research a step further, a more structured approach to professional learning in schools is found in the form of Professional Learning Communities (PLC).

The study found that the school was not accurately fulfilling teachers' professional needs with meaningful and consistent feedback. Therefore, one major recommendation from this case study is the implementation of PLCs because they offer a personalized structure for teachers. PLCs increase individual and group capacity of teachers to improve student learning. The key components of a professional learning community are: shared vision and values, collective responsibility, reflective professional inquiry, collaboration, group and individual learning is promoted (DuFour, 2004; Stoll, Bolam, et. al., 2006). There is a priority for schools to facilitate some type of professional development structure that is owned by teachers' needs and interests but driven by the school's clear vision. In order for a PLC to be effective, administration should be supportive by providing teachers release time from traditional faculty meetings to meet in

a PLC. The PLC must be structured based on meeting times, topics and teacher needs. Further, the structure must keep teachers accountable with specific tasks that will enhance their instructional practice as well as promote collaboration. Lastly, either one administrator or an administrative team must supervise the PLC to ensure compliance, feedback and guidance. More specifically, a school that has aspirations for 21st century cutting edge learning, must allow teachers to collaborate with each other in order to gain more perspectives on technology teaching tools, authentic teaching styles and instructional strategies that infuse 21st century skills such as critical thinking

Recommendations for School Administrators

There are disparities between the teachers' and administrators' perceptions of how the school's reforms are being implemented. Based on the findings of this study, school administrators must recognize how the culture of their school and teacher dispositions can have an impact on the success of any reform initiative. The *MILE* Guide clearly states that education leaders must develop a consensus around the vision for student learning that includes both content mastery and 21st century skills and communicate this alignment to the staff regularly. It is paramount that everyone in the school organization interprets the goals the same way. Dede (2009) from the Harvard Graduate School of Education, warned educators of the reverse "Tower of Babel" problem, in which people may use the same words or language but mean quite different things or expectations. In this study, teachers overwhelmingly had a different interpretation of what were the actual reform efforts and unclear of their personal responsibility in contributing to its success. A major consideration for school leaders would be to contemplate their vision carefully and its articulation to their staff.

There is a misconception that many educators think that 21st century education equals more computers. However, 21st century education involves pedagogical shifts along with the sharpening of technology literacy. Without this clear direction, there was a lack of strong cohesive leadership and inconsistent monitoring of the reform. As a result, teachers' feelings shift to being lost, unsupported and resentful. Hargreaves and Fink (2005) cautioned educational leaders that change in schools falters if the change is poorly conceptualized or not clearly demonstrated or too broad where teachers must work on too many fronts. In this case, teachers did feel that the daunting vision of the school was a major factor in impeding their effectiveness in implementing a rigorous 21st century educational program. Further, administrators seldom walked through classrooms commenting on meaningful technology usage and types of teaching practices. Professional Learning Communities (PLCs) would be an effective way to allow teachers to sharpen their skills while promoting collegiality and collaboration. Therefore a recommendation would be to seek out or create formalized opportunities to share experiences using technology while implementing 21st century education elements such as Rigor, Relevance and Resources.

Teachers stated that administrative "walk-thrus" were not meaningful due to their inconsistency and lack of feedback. One recommendation for the administrative team is upon clearly articulating the expectations to the staff, an agreed upon set of criteria should be established, called the "look-for." Some examples of "look-fors" could be questioning techniques that promote rigor, technology integration techniques, clear objectives, type of anticipatory sets or various closure activities. Being aware of the focus or the "look- for," allows teachers to sharpen specific components of their instruction and

allow for more accurate feedback or praise; thus helping and supporting teacher growth and collaboration.

The definition of a genuine 21st century educational program is also a factor in the success of its implementation. Although the school administrator appeared to understand the changing needs of the Net-Gen student, the fragmented emphasis on technology skills as the sole vehicle to 21st century learning did not demonstrate a holistic understanding of 21st century learning that is vital for the modern workplace. Without this true working knowledge, administrators cannot offer the support, tools and resources that their teachers need to be successful in their classrooms.

Recommendations for Teachers

Ultimately, the effective instructional practices that facilitate 21st century learning fall on the classroom teacher. The recommendations from this study revealed that teachers must continually design learning opportunities that incorporate the critical skills such as problem solving, critical thinking and collaborating in a relevant context. Knowledge of Net-Gen students and how they learn elicits instruction that incorporates more student based projects or problem based learning activities where students are still learning the content, but also reinforcing important skills that will make them thinkers and creative problem solvers in post-secondary work environments. This can be achieved by using individualized professional development. For example, it was evident that Teacher 2 was more astute with 21st century principles than the other participating teachers. Effective 21st century education requires that technology tools be integrated in student learning. Teachers would benefit from getting mutual support on areas of common need in regard to professional development and technology courses. Others

would appreciate the administrative feedback, meaningful praise and professional development opportunities from their schools to broaden their understanding of implementing effective 21st century teaching practices. In this study, the teachers did share that there is a collegiality among them but did not cite specific professional development opportunities to help shift teaching practices. The recommendation would be to capitalize on the collegiality of the teachers and empower them to share best practices.

In this study, the instructional approach used by the observed teachers was not reflective of the outline from the *MILE* Guide. Schools that are conducive for 21st century learning have teachers that use a wide array of techniques that include both student-centered and teacher centered strategies that differentiate instruction. The Guide also states that the instructional practices actively engage students with self-directed learning. The lessons should be rigorous and relevant to student experiences and call for authentic application of knowledge. The most important recommendation for teachers is to reshape educational ideology and allow for more student-centered classrooms that follow the framework of the *MILE* Guide and Observation Tools (Appendix C). This translates into classrooms of the 21st century where the content is naturally taught, but it becomes the vehicle where the applied skills such as creating, innovating, critical thinking, analyzing and problem solving and collaborating are cultivated.

Limitations of the Study

As this study provided a glimpse into how one school is transforming its initiatives to better prepare its students for the 21st century, some limitations exist that could have affected the data and results of the study. One limitation of the study was that

the three content teachers have only taught in the high school that was studied. Because their dispositions and beliefs regarding teaching were only formed by that school's particular culture, it may have swayed their perceptions and insight.

The number of classroom observations could have impacted the study. Although the block instructional periods consisted of 80 minutes, only two classroom formal observations per each teacher were conducted. Also, the time of year may have affected the study. The observations and interviews occurred in May as teachers may be winding down their curriculum. Another limitation was the timing of the observations and interviews may have affected the study. They occurred in May as the curriculum was winding down. As an administrator knowledgeable of the process of change, the researcher is well aware of the time consumed to disseminate and implement a significant change. The district is focusing on the acquisition of technology and training the staff to use it. The researcher is confident that this district is rated so highly among educational institutions, will move to the next phase, using technology to accomplish deep conceptual 21st century learning on a global level.

Lastly, the students were not interviewed or studied directly regarding their perception of 21st century instructional practices, integration of technology or skills needed in preparation of the 21st century workplace.

Recommendations for Future Research

This study provided insight into how one school prepares its students for the 21st century, discussing its pitfalls and successes. The school from the case study embodied the beliefs of a high performing school with high standards for its students. Therefore, it was prudent to begin this research with a school that has expressed its confidence in the

implementation of a 21st century educational program. This information rich setting exposed any discrepancies of how the staff interprets 21st century education while offering possible recommendations for the future. The dilemma of how to accurately rate and assess school programs would be another area of research that can be explored. The study revealed that even a school with students earning proficient scores on state tests, winning accolades and gaining public acclaim, is not comprehensively effective in implementing 21st century educational classroom instruction that is aligned with the needs of the 21st century workplace.

Future research would be necessary to continue to learn, revise and shape how schools are tackling this daunting task of not only incorporating the skills needed for the 21st century, but gradually changing the pedagogical beliefs of teachers. This study focused on simplifying the overwhelming picture of 21st century education by breaking it down to Rigor (the skills), Relevance (the student centered classroom) and Resources (the use of technology). Perhaps future research could be performed more narrowly in just one area in one school or multiple schools. Multiple observations over a longer period of time would also provide more insight into classroom instruction. In addition, more than three teachers in one school could be interviewed and studied. In this study Teacher 2 was the most in tune with a student-centered classroom with high levels of student engagement and rigor. It would be interesting for future research to examine the methods of teachers who do embrace 21st century pedagogical beliefs. It may be beneficial to investigate why teachers stick to traditional methods of teaching and outline ways to break through the barriers that make them resist student driven classrooms.

As stated in the *Education Support Systems* field of the *MILE* Guide, professional development is a crucial component in facilitating a pedagogical shift. In this study, the *MILE* Guide was used as a tool to help outline the important elements of a school that successfully implements and supports a 21st century learning environment, such as the 3 R's. Because New Tech High School is a model of an effective 21st century education environment, future research could continue to follow New Tech High School's progress and initiatives. Future researchers could use the *MILE* Guide on-line assessment instrument to ask many districts to gauge their performance in how they are implementing characteristics of a 21st century educational program. This survey may provide a generous amount of data that could lead to more specific case studies. Professional development and teacher support were major factors in how teachers were able to integrate 21st century elements in their classrooms. Future researchers may also want to survey educators in order to gauge the integration practices of research based 21st century instructional components as they relate to a 21st century educational context.

Perhaps, more research can be conducted to investigate what type of professional development programs in schools, such as the use of PLCs and instructional coaching, is most effective in implementing the 21st century educational framework. An effective PLC must be structured but personalized. Teachers with similar needs can share knowledge and expertise while problem solving collaboratively. With administrative support and communication, teachers would feel comfortable expressing their needs and showcasing their strengths with colleagues. In smaller groups with a narrowed customized focus, teachers feel empowered and invested in the professional growth.

Another area to explore would be the administrator's technology competency in schools that are implementing 21st century learning since leadership plays such a critical role in a school's reform efforts. Determining how powerful the administrator's understanding not only technical literacy, but also its impact on the 21st century instructional context would be valuable to further studies. The International Society for Technology in Education (ISTE) developed technology leadership standards for administrators in 2009. Perhaps more research among school administrators can be conducted to understand how leadership has changed in the digital age of education.

The vision and mission statements of the school played important roles in establishing the school's expectations to the students, community and the staff. Because there was a discrepancy in how the statements were being articulated to the staff and ultimately the instructional practices of the teachers, more investigations of vision and mission statements in schools regarding Net-Gen students and 21st century learning need to take place. Schafft and Biddle (2013) have scratched the surface in this area with examining 480 school districts' mission statements in Pennsylvania and debating their true purpose in education. Therefore, more research can be conducted to further expand on the power and impact of vision statements to guide schools in the journey to 21st century reform.

Conclusion

From interviews, informal and formal observations and review of district documents, the unique findings in this study revealed that although this school perceived itself as a successful cutting edge 21st century educational program, it was not aligned with the components of an effective 21st century context: rigor, relevance and resources.

The interviews with both teachers and administrator showed that there was a strong dedication to the school and its students. Teachers discussed the time and thoughtfulness in preparing lessons that reflect their understanding of content. However, the teachers did not fully connect how their classrooms are the primary vehicles to cultivating 21st century skills and learning for their students.

It was clear that the school has high expectations of its teachers and its students. The teachers however expressed that the school in its continuous journey to better its educational program, generated an expectation for the teachers that has become massive and overwhelming. This study confirmed that along with teacher ownership, any initiative the administration implements must include teacher support with meaningful professional development and feedback. Hargreaves and Fink (2005) agreed that a lack of continuity is another self-destructive pattern in schools. If schools swing from one educational initiative to another or school leadership is constantly changing, teacher enthusiasm can be undermined. The administrator, although very knowledgeable about 21st century students and their learning, focused on technology acquisition as the means to implementing effective 21st century learning and not cultivating rigorous 21st century classrooms. A genuine 21st century learning program is a combination of meaningful technology use, high-level thinking and literacy skills within a student-centered authentic learning environment that promotes problem or project learning activities. This shift in instructional context must be clearly understood by administration and articulated as the mission of the school to the staff.

In conclusion, the opportunity to study this school and its journey in preparing students for the 21st century should serve as the beginning for more research of individual

schools, various frameworks, professional development programs and even teacher or principal certification programs. Twenty-first century skills and learning has become another trend or “buzz word” in the eyes of educators and society (Matthews, 2009). In order for 21st century skills and learning to not fall victim to being another fad in education more research that provides practical, meaningful insight is needed. Schools have a long road to successfully preparing Net-Gen students for the changing 21st century workplace. It will be important to understand the intricacies of how school organizations are engaging and thoroughly preparing our students for the workplaces of the future.

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APPENDIX A

INTERVIEW QUESTIONS FOR ADMINISTRATORS

1. How long have you been in the field of education?
 - What have been your various roles in the field of education?
2. How did the school district change in the past five years?
 - How do you think it will change in the next five years?
3. How do you get teachers “on board” with the changes and initiatives the district is proposing and implementing?
4. What professional organizations that you belong to, help influence your thinking in the development of your district’s vision?
 - What professional readings can you attribute to shaping your thinking about the future of education in your district?

APPENDIX B

INTERVIEW QUESTIONS FOR TEACHERS

GENERAL

1. What subject(s) do you teach and how many years have you taught?

GLOBAL UNDERSTANDING

1. We prepare our students for their future. How would you describe your students' future life and work that you feel affects you as an educator.
2. Name 3 skills or competencies that all students need to be successful in life and work.
3. If an education genie could grant you three wishes about education changes, what would you change about our education system that would help our students?
4. How would you personally define technology integration and its importance in instruction?

SCHOOL COMMUNITY

1. In your own words, how would you describe your school's vision for 21st century student learning and achievement?
 - How would you describe the way that your school meets the needs of 21st century students?
2. How does the administration share and articulate this 21st century vision with its staff?
3. As a principal myself, I know that there is always an informal rift between faculty and administration. How would you rate the understanding and acceptance of the faculty in regards to the administration's initiatives on 21st century learning?

- If you were principal or superintendent, what would you change about the process by which the vision is articulated and accepted?

CLASSROOM INSTRUCTION

1. As a former high school teacher myself, I know that today's students are challenging in new ways due to technology advances? What are specific challenges you face with teaching these contemporary students?
 - How do you compensate for these challenges?
2. If I could only visit one classroom in your school, describe what the instruction looks like in the classroom that you referenced?
 - What skills would be incorporated in the lesson/content?
 - How would this teacher be delivering the material?
3. How do you personally know whether your administration is satisfied with your commitment to 21st century teaching and learning.

APPENDIX C

OBSERVATION TOOL

Adapted from, Model of a 21st Century Context with an Integrative Curriculum
(Judson, 2006);
Twenty-first Century Skills Organization and Partnership for Twenty-First Century Skills
(2007).

21st Century Context – RELEVANCE

OUTCOME	COMMENTS
Involves all students in the class activities <ul style="list-style-type: none"> • Teacher acts as facilitator • Lessons are based on student outcomes • Great deal of choice and freedom • Learning and thinking skills are integrated into the content 	
Models effective thinking, meta-cognitive and questioning skills <ul style="list-style-type: none"> • Lessons focus on upper level of Bloom’s Taxonomy-synthesis and evaluation 	
Fosters a positive learning environment (respect/cooperation) that resembles a learning community <ul style="list-style-type: none"> • Self, peer and authentic assessments • Learners collaborate with classmates, and others around the world-modeling a global classroom • Students work in teams toward common goals with individual responsibilities • Developing, implementing and 	

<p>communicating new ideas to others</p>	
<p>Lesson/instruction reflected a genuine real world context where higher order thinking skills were necessary (PBL)</p> <ul style="list-style-type: none"> • Curriculum is connected to students' lives, interests experiences, talents and real world • Provides opportunities to promote critical thinking and multi-step problems with real world relevance • Visible use of past knowledge to raise questions, propose solutions and design action plans 	

Adapted from the Partnership for 21st Century Skills Framework (2007)

21st Century Skills- RIGOR

OUTCOME	COMMENTS
<p>Accurately interprets evidence, statements, graphics and questions by gathering and assessing relevant information</p> <p><i>Critical thinking and problem solving</i></p> <ul style="list-style-type: none">• <i>Exercising sound reasoning in understanding</i>• <i>Making complex choices and decisions, justifying results with research and evidence</i>• <i>Understanding the interconnections among systems</i>• <i>Identifying and asking significant questions that clarify various points of view and better solution</i>• <i>Drawing conclusions to make connections to understand greater implications</i>	

Adapted from the International Society of Technology Education, (2008)

21st Century Technology Learning Tools –RESOURCES

OUTCOME	COMMENTS
Research: Apply digital tools to gather, evaluate and use information	
Communication: Use of technology and digital media to communicate and work collaboratively Examples of Digital Media <ul style="list-style-type: none">• Overhead• Smartboard• PDA• Laptop• Digital camera• Blogs• Wiki• Email• Powerpoint	
Thinking: Use of digital media to manage projects, conduct research and make informed decisions and conclusions	