EDUCATION IN THE 21st CENTURY:

TOWARD AN EXPANDED EPISTEMIC FRAME OF LEADERSHIP

Randy Michael Ziegenfuss

A DISSERTATION

in

Educational and Organizational Leadership

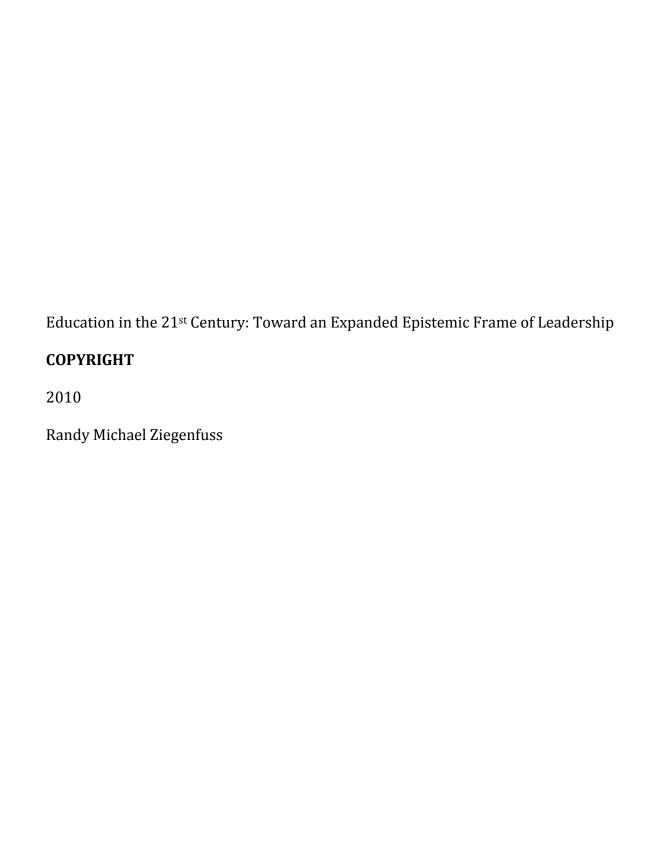
Presented to the Faculties of the University of Pennsylvania
in Partial Fulfillment of the Requirements for the
Degree of Doctor of Education

2010

Supervisor of Dissertation:

_____
Sharon M. Ravitch, Senior Lecturer

Dean, Graduate School of Education:

_____
Andrew C. Porter, Dean

Dissertation Committee:

Sharon M. Ravitch, Senior Lecturer
Susan A. Yoon, Assistant Professor
Louise A. Beauchemin, Assistant Superintendent

Education in the 21st Century: Toward an Expanded Epistemic Frame of Leadership

COPYRIGHT

2010

Randy Michael Ziegenfuss

ACKNOWLEDGEMENTS AND DEDICATION

The process of completing a doctoral degree has provided me with the opportunity to work with many intelligent, caring, supportive and creative individuals. I wish to thank my dissertation supervisor, Sharon Ravitch, for guiding me through this process. With your unwavering support, I never doubted that completing this research would be anything short of transformative. Thanks also to the members of my dissertation committee, Susan Yoon and Louise Beauchemin. Susan is an amazing scholar. Her depth of knowledge and high standards are worth the admiration of every scholar. As a colleague, Louise's daily questioning and engagement in this work kept me going when I suspected I had no more to give. Thank you for your support and friendship. Throughout the entire research process, my doctoral "team" of Cristina Alvarez, Melissa Saunders and Antoinette Dendtler were a means of constant support. Thank you for your collaboration throughout the entire doctoral program. Thank you to my good friend, Liz Drake. As a principal, you both challenged and endorsed my thinking throughout the research process, and helped me understand the relevance of this work for practitioners. I also wish to thank the participants in this study. Without inviting me into both your schools and your thinking, this work would never have been possible.

Finally, I wish to thank my family, particularly my mother, Lucille. I thank you for your love and support. Your determination to push forward in the face of your own challenges will always be an inspiration to me. I am grateful for everything you have done for me, and am especially pleased you were able to see me complete this dream. My work is dedicated to you.

ABSTRACT

EDUCATION IN THE 21ST CENTURY:

TOWARD AN EXPANDED EPISTEMIC FRAME

OF LEADERSHIP

Randy M. Ziegenfuss

Sharon M. Ravitch

New frameworks of education in the 21st century call for the reinvention of a system that is outdated and often disconnected from a technology-rich, networked world. Currently, the knowledge base pertaining to 21st century education addresses changes in teaching and learning. Research specific to the accompanying changes in leadership is not as detailed. If leadership is a key driver in changing school cultures, mindsets and practices, then effective leadership for 21st century education needs to be addressed more deeply.

This research supports the argument that in order to effectively lead schools in a technology-rich, networked world, leaders must acquire new knowledge, skills and dispositions for leading. Leaders must expand their epistemic frame of leadership to be effective in supporting staffs to create meaningful learning environments in a networked world. With this argument in mind, the research focused specifically on how nine school leaders – principals, assistant principals and district leaders – conceptualize teaching and learning for the 21st century; and how they translate their conceptualization into action.

This study utilized a qualitative research design that included interviews, school building walkthroughs, writing prompts, focus groups, analytic memos and journal writing. As a result of the data analysis process, a story of teaching, learning and leading in the 21st century emerged. Findings demonstrate the participants are developing their conceptualization of teaching and learning in the 21st century. The participants are also developing their understanding of leadership responsibilities associated with systemic changes referred to as second-order change. Recommendations resulting from this study focus on second-order change responsibilities in the areas of (1) setting direction; (2) developing people; and (3) redesigning the organization. The recommendations provide a framework for an expanded epistemic frame of educational leadership in the 21st century for a specific group of school leaders.

TABLE OF CONTENTS

Background and Problem
Research Questions
Conceptual Framework
Organization of the Study

How are learning and teaching conceptualized in the 21st century?
        Frameworks
        Standards
        Content area frameworks and position statements
        Summary
How is a conceptualization of teaching and learning in the 21st century translated
        to the classroom?
How do students use technology for informal learning?
What kind of environment is most effective for meaningful learning?
What are the qualities of effective school leadership?
        Setting Direction
        Developing People
        Redesigning the Organization
Chapter Summary

Research Approach
Context of the Study
Population and Participant Selection
Data Sources and Procedures
        Interviews
        School Building Walkthroughs
        Memos and Journal
        Reflective Writing Prompt
        Focus Groups
Data Analysis

LIST OF TABLES

CHAPTER 1: INTRODUCTION

New understandings of teaching and learning, coupled with innovations in technologies for information search, communication, and teaching, provide many new options for the work of students and teachers, with the potential for creating a whole new way of doing things in schools. (Leithwood & Riehl, 2003, p. 5)

The research in this study supports the argument that in order to effectively lead schools in a technology-rich, networked world, leaders must acquire new knowledge, skills and dispositions for leading. With this argument in mind, the research focused specifically on how school leaders conceptualize teaching and learning for the 21st century and how they translate that conceptualization into action. This study represents a qualitative inquiry utilizing the perspectives of nine school leaders – principals, assistant principals and district leaders. Currently, the knowledge base pertaining to 21st century education focuses largely on changes in teaching and learning. Research specific to the accompanying changes in leadership is not as detailed. The available 21st century leadership literature focuses on scaling up technology innovations at the systemic level and identifies effective, stable leadership as a key condition for success. The research in this study aims to provide school leaders with a frame to think about change and to operationalize broad themes within the literature. With an expanded frame, school leaders can better understand the relationship between what they know about 21st century teaching and learning and how they apply their understanding. If leadership is a key driver in changing school cultures, mindsets and practices, then an expanded epistemic frame for educational leadership in the 21st century is necessary for leaders to act effectively.

Background and Problem

From an historical perspective, much of the current structure of the American

public education system can be traced back to The 1892 Committee of Ten. The

Committee, established by the National Education Association, was established to

address the need for standardization of curriculum. During the late 19th century, different

schools embraced divergent educational philosophies. Some schools advocated for the

memorization of facts while others saw the need to focus on developing critical thinking

skills. Many of the recommendations of the Committee, designed to standardize

education, were adopted by school systems and remain a prominent part of our

educational system today. Among these recommendations, the Committee suggested all

students study a regimen of content including English, mathematics, history and civics,

and the sciences. It was also recommended that this curriculum span twelve years – eight

years of elementary education followed by four years of high school (Committee of Ten,

1894).

Over a century later, the structure of education embodies these same qualities to

negative consequence. Educators and the public read how students today do not have the

knowledge and skills to be productive workers and citizens in the 21st century. Solutions

to these challenges are offered, often representing divergent philosophies regarding

teaching and learning. Some suggest an emphasis on new skills for all students should be

valued over passive, rote learning. Still others suggest the importance of redefining skills

in the context of today's digital environment.

> We have moved from an industrial, assembly-line economy to one that is
> increasingly dominated by technology, information, and service – and the pace of
> change in this direction is accelerating rapidly. The skills required in this new

economy are radically different. "Smart hands" are no longer good enough. Today one has to have both intellectual and social skills in order to get a decent job. (Wagner, 2003, p. 16)

The implications of these economic changes for education are profound: *all* students must now learn *new* skills. (Wagner, 2003, p. 17)

These new demands cannot be met through passive, rote-oriented learning focused on basic skills and memorization of disconnected facts. (Darling-Hammond, Baron, Pearson, Schoenfeld, Stage, Zimmerman, et al., 2008, p. 6)

Today, everyone, if they are to have a job, needs the kind of higher order thinking skills that only those in managerial or professional positions formerly needed. We can only achieve this through major structural change to our education system. Schools are no longer the main source of knowledge in people's lives. Because we cannot know what we need in the future, it is pointless trying to teach it in advance. The world outside education is increasingly valuing the ability to learn – knowing *how* to *keep* learning, how to learn *with others* – over the ability to master specific bits of knowledge. (Gilbert, 2005, p. 67)

Tests that push instruction toward broad coverage rather than helping students to develop in-depth understanding of interrelationships will not help students to acquire the mindset and habits that characterize expert thinking. (Levy & Murnane, 2004, p. 148)

The solution lies in public acknowledgement that yesterday's education is not sufficient for today's learner. Academic excellence must be acquired within the context of today's technological environment in order to fully prepare students to thrive in the Digital Age. (Burkhardt, Monsour, Valdez, Gunn, Dawson, Lemke, et al., 2003, p. 4)

As *enGauge 21ˢᵗ Century Skills: Literacy in the Digital Age* (Burkhardt, et al., 2003) suggests, understanding what has changed in the 21ˢᵗ century is a step in the right direction to improving and changing our schools. Both youth and adults today use computers and smart phones to connect with each other locally and globally. With the development of the Internet and Web 2.0 technologies, users now expect to be consumers as well as producers of information. Technology and the Internet have brought about shifts in the economy and reshaped the ways citizens purchase and consume goods and

services. Most significantly, technology has impacted the job market by eliminating work that can be easily automated or off-shored to cheaper world labor markets (Levy & Murnane, 2004).

Despite changes in how adults and students live, amplified by the proliferation of technology (Wenk, 1986), our schools have not changed. Our current educational system is still largely based on the factory model of the 19th century. For example, *No Child Left Behind* (NCLB) mandates have led to a focus on test preparation of basic skills in reading, computing, writing (Levy & Murnane, 2004) and more recently, science. The focus on standardized testing and test preparation has led to a lack of customization of curriculum and instruction. The integration of technology has been superficial, focused on rote learning (Cuban, 2003; Jonassen, Howland, Marra & Crismond, 2008). In fact, surveys indicate the three primary uses of technology in schools are drill and practice, word processing and web surfing (Anderson & Ronnkvist, 1999). In the classroom, students are treated more like consumers than creators of knowledge, being told what and how to learn (Jorgenson & Vanosdall, 2002). Further, research shows schools are not preparing students for the best-paying jobs of the 21st century (Levy & Murnane, 2004). There is a dichotomy between schooling and society characterized by the seemingly immovable institutional structures of schooling and constant change in a technology-rich, networked society (Collins & Halverson, 2009).

Lankshear and Knobel (2003) explore schools' resistance to change in the context of technology and new literacies. They introduce a concept called the *deep grammar* of schooling. They suggest this organizational trait has inhibited the introduction of new ways of learning – new literacies – into schools. Where technology is concerned,

education has a "marked tendency to perpetuate the old, rather than to engage with and refine or reinvent the new" (p. 29). They refer to the lack of reinvention as "old wine in new bottles" syndrome. In other words, while educators give technology lip service in schools, teaching and learning are essentially unchanged. Conventional literacies remain conventional, only now adorned with the accoutrements of technology hardware and software. Where technology and new literacies are concerned, the tradition of the status quo more often than not trumps efforts at change. For an updated paradigm of education in the 21st century to become the standard throughout the education system, the deep grammar and blindly held traditions of schooling must be challenged, and school leaders will need to lead the way.

While the process of change will not be an easy task, it is not impossible. By expanding the epistemic frame of leadership, effective school leaders can overcome resistance to change and lead education into the 21st century. Organizational learning researcher, Gareth Morgan, offers a lens through which school leaders might examine resistance to change – the metaphor of the psychic prison. In organizations, "people can actually become imprisoned in or confined by the images, ideas, thoughts, and actions to which these processes give rise" (Morgan, 2006, p. 207). Educational leaders, policymakers, teachers and students are, as suggested by Morgan, imprisoned by a centuries-old paradigm of how schooling is defined. The "game of school" is so engrained in the unconscious of our minds that stakeholders do not often think about breaking out of this thought prison. Ideas that call for the reinvention, not just reform, of schools are met with resistance because they challenge all stakeholders to break with the past and venture into new, seemingly unknown territory. The first step in shifting the

paradigm of education is for leaders to break free of the psychic prison, reconceptualize what it means to be educated in the 21st century and influence others to think about education anew. The changes required rest on a strong foundation of educational leadership, rethought for a new era of education, and grounded in the literature supporting meaningful teaching and learning.

Research Questions

This study is the story of one case in which school leaders – principals and district leaders – are working to initiate and lead 21st century educational change district wide. The purpose of this study was to understand the relationship between concepts of 21st century education and school leadership. To guide an understanding of how concepts of 21st century teaching, learning and leadership relate, the following two research questions were developed.

How do school leaders conceptualize 21st century teaching and learning?

How do they act on their understandings?

Answers to these research questions have resulted in a story of teaching, learning and leading in the 21st century specific to the study participants. Through an analysis of the findings and the literature, specific recommendations suggest possible components of an expanded epistemic frame for 21st century educational leadership for the participants and strategies for implementation into practice. Since the research was qualitative and limited to a small group of leaders in a single school district, no claim of generalizability is made.

Despite a lack of generalizability, this research holds significance locally, and potentially, nationally and globally. Locally, the recommendations reported in the study

have informed the work of the participants as they continually refine and develop their knowledge of educational leadership. The recommendations of this research provide a road map for the participants to translate research and their own conceptualization into practice. Potentially, this study may also benefit the larger educational community. While the notion of redefining teaching, learning and leading for the 21st century is gaining momentum in the world of practitioners, there are a limited number of documented cases. This research can provide the educational community at large with further case documentation on how one school district is beginning to think differently about leadership and the translation of research into practice. Additionally, while there is an abundance of research pertaining to educational leadership, theory and empirical research focused specifically on 21st century educational leadership and implementation are less abundant. The emerging fields of 21st century education and 21st century educational leadership stand to benefit and grow from this research.

Conceptual Framework

Since this research was designed to support the argument that school leaders must acquire new knowledge, skills and dispositions for leadership, Shaffer's theory of *epistemic frames* (Shaffer, 2004, 2005) is used as a foundation for the argument. In Shaffer's theory, an epistemic frame is associated with any particular profession and consists of five inter-related components:

1. Skills – the norms of what people do within a profession
2. Knowledge – the norms of what people in a profession know and understand
3. Identity – how members of the professional community see themselves and relate to others within the community

4. Values – the norms of what people believe within a profession

5. Epistemology – how the members of a profession act upon and think about their beliefs

The theory of epistemic frames has been engaged by Halverson (Halverson, Shaffer, Squire & Steinkuehler, 2006; Halverson, 2005) in the study of educational leadership. In developing the Instructional Leadership Game, a simulation designed to engage school leaders in what-if experimentation, Halverson, et al. (2006) needed to uncover an epistemic frame of educational leadership. To do this, the researchers defined key components of school improvement efforts. They then interviewed school leaders and visited schools to determine more clearly the ways theories were applied to practice. While the goal was to create a simulation, the most important feature of Halverson's research pertaining to this study was the need to articulate an epistemic frame for school leadership.

As Halverson suggests (2005), educational leadership embraces a particular epistemic frame specific to leading improvement in teaching and learning. The work of Leithwood, Seashore-Louis, Anderson and Wahlstrom (2004) is one way of framing the current epistemic frame of educational leadership. Leithwood, et al. (2004) suggests a core set of leadership practices: setting direction, developing people and redesigning the organization. Within this broad framework, other research addresses the importance of vision (Kouzes & Posner, 2003; Fullan, 2001; Deal & Peterson, 1999), change (Fullan, 2001, 2008; Marzano, Waters & McNulty, 2005), and collaborating with others (Kouzes & Posner, 2003; Kotter, 1996; Marzano, et al., 2005). This body of leadership literature represents a specific epistemic frame of educational leadership.

This research proposes that in order to effectively lead schools in a technology-rich, networked world, leaders must acquire new knowledge, skills and dispositions for leading. Leaders must expand their epistemic frame of school leadership through an understanding of current research in 21st century teaching and learning. The components of a traditional frame continue to prove important, but additional literature suggests components that augment and redefine the traditional epistemic frame of educational leadership in the 21st century.

New areas of knowledge, skills and dispositions to consider in an expanded epistemic frame of educational leadership include new skills for the 21st century (Partnership for 21st Century Skills, 2007; Burkhardt, et al., 2003; Wagner, 2008a), technology and the knowledge age (International Society for Technology in Education, 2007, 2008, 2009; Wagner, 2008a; Ito, et al., 2008), pedagogy and the learning sciences (Sawyer, 2006; Wenglinsky, 2005; Law, Pelgrum & Plomp, 2008), types of change (Heifetz 1994; Marzano, et al., 2005; Argyris & Schon, 1974), systems thinking (Fullan, 2005, 2008; Dede, Honan & Peters, 2005), and theories of action (Argyris & Schon, 1974). With an expanded epistemic frame, the goal is for the educational leader to extend their knowledge, skills and attitudes beyond a traditional epistemic frame of educational leadership outlined in the literature.

In the context of the conceptual framework for this study, it is theorized that in order to influence change, leaders will need to develop a conceptualization of teaching and learning for the 21st century, acquiring an understanding of 21st century skills. Included in this new understanding is the use of technology in both informal and formal learning, and the pedagogical choices most effective for its integration. The potential

change that leaders can influence is significant (Marzano, et al., 2005). Therefore,

knowledge of second-order change, systems thinking (Fullan, 2008) and theories of

action (Argyris & Schon, 1974) are critical for meeting goals and translating research into

practice. With the adoption of an expanded epistemic frame for leadership in the 21st

century, it is theorized that leaders will be better equipped for influencing the changes

required to bridge the gap between educational practice and research.

Organization of the Study

This research study is presented in five chapters. Chapter One provides the

background and context of the problem, the research questions and an explanation of the

conceptual framework that guided the research.

Chapter Two presents a review of the literature using the conceptual framework

as a guide. Literature highlighting a conceptualization of teaching and learning in the 21st

century is explored. Meaningful learning in the 21st century is defined and explored

through appropriate examples of teaching and learning in formal and informal

environments. Finally, leadership literature is presented, outlining a traditional epistemic

frame. Concepts of change, systems thinking and theories of action are explored using the

traditional epistemic frame as lens.

Chapter Three presents the methodology of the research study. The chapter

explains the research type, context of the study, population and participant selection, data

sources and procedures, and data analysis processes. The chapter concludes with a

discussion of validity and the role of the researcher. Chapter Four presents the findings of

the research organized around the research questions. Chapter Five reviews the entire

study, provides recommendations and discussion, suggestions for further research and a final researcher reflection.

CHAPTER 2: LITERATURE REVIEW

This chapter weaves a story supporting the argument that for school leadership in the 21st century to be most effective at bringing about changes in teaching and learning, an expanded epistemic frame of school leadership is necessary. A variety of literatures supporting the conceptual framework for this study will be explored. First, skill frameworks, learning standards, and content area frameworks and position statements will be discussed. This set of literature provides a foundation for new learning skills valued in a technology-rich world. A second set of literature examines how new skills appear in meaningful learning environments, with and without the use of technology. This distinction, to be explored further, is important in reframing the use of technology. A third set of literature is specific to the use of technology for informal learning. Understanding how students use technology for learning outside of school offers an avenue for matching new uses with new skills and meaningful classroom learning environments. A fourth set of literature offers research suggesting pedagogical practices proven most effective for teaching new skills. Finally, literature pertaining to effective school leadership will be presented. Change, systems thinking and theories of action will be investigated through a leadership framework developed by Leithwood, et al. (2004). Together, these literatures support the conceptual framework of this study and the need for an expanded epistemic frame of educational leadership. Through an investigation of the outlined literature, an emerging epistemic frame for leadership is proposed.

Shaffer (2004, 2005) argues all professions involve a certain way of doing, caring, being and knowing – an epistemic frame. Different professions embrace specific ways of doing, caring, being and knowing. School leaders behave like leaders; they identify

themselves as principals, directors, and supervisors. They are interested in policy, management, and teaching and learning. In essence, they behave and think as school leaders based on their understanding of what it means to be a school leader. An epistemic frame, therefore, is "the conventions of participation that individuals internalize when they become acculturated" (Shaffer, 2005, p. 2) in a profession such as school leadership. It is argued that the current conventions of school leadership focused on teaching, learning and leading are insufficient for the 21st century.

When proposing solutions about how schools can and must change, the literature is focused on what students and teachers need to do differently (Partnership for 21st Century Skill, 2007; Wagner, 2008a; Burkhardt, et al., 2003; International Society for Technology in Education, 2007, 2008). For example, students need to learn new skills. They need to be critical with large amounts of information available through technology tools (Wagner, 2008a). Students need to learn new ways to effectively communicate and collaborate in a networked world, and they need to become skilled problem solvers rather than cogs in a factory model of education, memorizing information and regurgitating facts (Darling-Hammond, L., et al., 2008). In contrast, it is suggested teachers embrace a more effective model of pedagogy, creating new learning environments (Darling-Hammond, et al., 2008; Wenglinsky, 2005). Teachers must stop learning for their students and give ownership of the learning process back to students. In the context of updating pedagogical models, teachers must learn how technology assists in developing new ways of teaching and learning, and they must learn to collaborate with their peers (International Society for Technology in Education, 2008). It seems logical if students and teachers embrace new ways of doing, caring, being and knowing, leaders must do the

same. The literature proposes how teaching and learning must change for the 21st century, yet less specificity is provided about the changing role of leadership. What epistemic frame will school leaders need to embrace in the 21st century? Leadership standards (International Society for Technology in Education, 2009) and literature pertaining to scaling up innovation and improving teaching and learning (Dede, et al., 2006; Snipes, Doolittle & Herlihy, 2002) provide guidance. However, this study proposes more specific recommendations.

The literature review is organized around the following questions:

1. How are learning and teaching conceptualized in the 21st century?

2. How is a conceptualization of teaching and learning in the 21st century translated to the classroom?

3. How do students use technology for informal learning?

4. What kind of environment is most effective for meaningful learning?

5. What are the qualities of effective school leadership?

How are learning and teaching conceptualized in the 21st Century?

Ever since *A Nation at Risk: The Imperative for Educational Reform* (National Commission on Excellence in Education, 1983) was published, the American public education system and policymakers have been hard at work trying to create a "fix" for the problems of schooling. The primary message in the report was that our nation's schools were underperforming and failing to prepare students for a competitive workforce. A decade later, the Department of Labor published a report, *Learning A Living: A Blueprint for High Performance: A SCANS Report for America 2000* (U.S. Department of Labor, The Secretary's Commission on Achieving Necessary Skills, 1991), in which the skills

required for working in the new millennium were broadly defined. The skills included:

(1) solid literacy and computational skills; (2) thinking skills necessary to put knowledge

to work; (3) personal qualities that demonstrate worker trustworthiness and dedication;

and (4) technology. Nearly a decade before the new millennium, American government

was suggesting the need to prepare workers for the changes ahead.

Nearly two decades after the *SCANS Report*, Americans continue to receive notice

of how schools are failing students and the negative consequences of this ineffectiveness

on the workforce and the country's economic well-being (National Center on Education

and the Economy, 2006; Casner-Lotto & Barrington, 2006). There have been new calls

for new skills, most frequently referred to as 21st century skills. These calls are largely a

result of rapid technological innovation that some believe to be reshaping the workforce

(Levy & Murnane, 2004). Several frameworks, sets of technology standards, and most

recently, frameworks and position statements from content area organizations propose a

blueprint for change in 21st century learning and teaching.

Frameworks

The literature base on 21st century skills includes several theoretical frameworks.

The two most frequently cited include the *Framework for 21st Century Learning*

(Partnership for 21st Century Skills, 2007), and *enGauge 21st Century Skills: Literacy in*

the Digital Age (Burkhardt, et al., 2003). A third, more recent framework is outlined by

Tony Wagner in *The Global Achievement Gap: Why Even Our Best Schools Don't Teach*

the New Survival Skills Our Children Need – And What We Can Do About It. (2008a).

The *Framework for 21st Century Learning* and *enGauge 21st Century Skills: Literacy in*

the Digital Age are the most frequently referenced 21st century skills frameworks and

thus are presented here. Tony Wagner's work is included because it is grounded in his

research focused on the gap between schooling and the world of work. Wagner is a

respected scholar who serves as the Co-Director of the Change Leadership Institute at the

Harvard Graduate School of Education. This section will present a synthesis of the three

skills frameworks.

An analysis of the frameworks reveals similar conceptualizations of updated skills

for the 21st century. These skills can be distilled into four themes focusing on student

outcomes:

1. Critical thinking and problem solving

2. Communication and collaboration

3. Creativity and innovation

4. Soft skills such as agility, initiative and responsibility

Critical thinking and problem solving are inseparable skills that share the

common element of questioning (Wagner, 2008a). In order to solve problems, students

ask effective questions that reveal potential solutions to the problem at hand. Once

solutions are generated, critical thinking is utilized to evaluate the pros and cons of each,

arriving at the best solution. Terminology such as higher-order thinking (Burkhardt, et al.,

2003) and learning and innovation skills (Partnership for 21st Century Skills, 2007) is also

used in the frameworks to refer to critical thinking and problem solving skills. In the

current model of schooling with its emphasis on accountability and standardized testing,

rote memorization driven by assessment is often valued over critical thinking and

problem solving. Rote memorization is no longer enough for many fields of work (Levy

& Murnane, 2004; Wagner, 2008a). Educators must rethink the value of critical thinking

and problem solving if schooling is to adequately prepare students for the world of work and citizenship.

Communication and collaboration are skills developed through face-to-face as well as virtual interactions (Wagner, 2008a; Partnership for 21st Century Skills, 2007; Burkhardt, et al., 2003). In the 21st century, the potential for collaboration is expanded beyond face-to-face interaction as a result of technology. Written communication should no longer be limited to correct spelling and punctuation. Instead, Wagner (2008a) suggests effective communication "create focus, energy and passion" (p. 36). He contrasts this kind of writing with the formulaic writing process taught in schools. Students might be successful at writing according to a formula, but it does not necessarily translate into effective communication. Collaboration and communication are referred to in the frameworks as effective communication and interactive communication (Burkhardt, et al., 2003). Communication is often viewed in school as a static process focused on traditional reading and writing (Collins & Halverson, 2009). In a media-rich world, thinking about communication and collaboration is expanded to include contexts such as multi-media documents and social networking. Traditional collaboration and communication skills of speaking, listening, reading and writing are more important than ever, but the manner in which these skills are developed and practiced has changed. School leaders must understand how traditionally valued skills change for new contexts.

Creativity and innovation require curiosity, imagination and managing complexity (Burkhardt, et al., 2003). Tied closely to critical thinking and problem solving, the skills of creativity and innovation require the ability to think about possibilities involving reinvention (Wagner, 2008a). Burkhardt, et al., (2003) suggest asking the questions, "Can

students modify their thinking, attitudes, or behaviors to be better suited to current or future environments? Are students able to bring something into existence that is genuinely new and original, whether personally or culturally?" (p. 2) By focusing on these questions, educators can approach the teaching of creativity and innovation with concreteness. Schools today are focused on preparing students for routine work requiring basic skills with little expectation for creativity or innovation. Evidence of this assertion can be found in the predominance of classrooms that embrace instructionism (Sawyer, 2006). The 21st century skills frameworks, however, call for a citizenry that is creative and innovative in the creation of new ideas, products and services.

Additionally, the frameworks focus on what are referred to as *soft skills* (Bronson, 2007). Included are a variety of skill sets such as agility and adaptability (Wagner, 2008a); flexibility, initiative and responsibility (Partnership for 21st Century Skills, 2007) and interpersonal skills, prioritizing and planning (Burkhardt, et al., 2003). The world is changing more rapidly than ever. It is unlikely for a worker to hold the same job for an entire career. In fact, Bureau of Labor statistics indicate that learners today will hold 10-14 jobs by the time they reach the age of forty (Bureau of Labor Statistics, 2006). The ability to transition through different jobs will be critical for economic success. Wagner (2008a) suggests the rigidity of schooling, with standard curriculum and high stakes testing, does not contribute to the soft skills workers need in the 21st century. Schools often avoid the intentional development of soft skills because they are difficult to assess and evaluate. In the age of technology and knowledge work, these skills are more important than ever.

In addition to sharing a common core of skills as outlined above, the frameworks view technology as a critical component of 21st century education. While the skills at the core of each framework are not new, the increased prevalence of technology in society affords new ways of learning and demonstrating traditionally valued skills. Wagner's framework (2008a) demonstrates how the presence of technology has generated new ways of communicating, collaborating, and assessing and analyzing information. The *Framework for 21st Century Learning* (Partnership for 21st Century Skills, 2007) speaks specifically to the need for developing technology skills in students while *enGauge 21st Century Skills: Literacy in the Digital Age* (Burkhardt, et al., 2003) views technology as so pervasive that all literacies reflect a digital dimension. The report further states, "Technology serves as a bridge to more engaged, relevant, meaningful, and personalized learning – all of which can lead to higher academic achievement. Research indicates that when technology is used appropriately, children learn more, even as measured by conventional tests" (Burkhardt, et al., 2003, p. 10). When schools embrace the core values of 21st century education – critical thinking and problem solving, collaboration and communication, creativity and innovation – the ways in which they use technology change. This idea will be explored later in this literature review.

To embrace the full range of learning in the 21st century, educators are challenged to rethink skills in the context of a technology-rich, networked world. In fully conceptualizing teaching and learning for the 21st century, educators must consider areas beyond skills such as the role of content, the purposes of education and the role of support systems such as professional development and learning environments. While the frameworks offer a consistent identification of skills for the 21st century, they offer

differing emphases on content, purpose of education and support systems. These areas are

important for educational leaders to address because they help shape overall ideals and

beliefs about teaching, learning and leading in the 21st century.

Even though the frameworks suggest content as the vehicle through which

students learn 21st century skills, each framework affords content different prominence.

In Wagner's framework (2008a), specific content is never explicitly mentioned. Skills are

the centerpiece of his work. In schools, increased amounts of unrelated content

masquerade as rigorous learning, sacrificing skills necessary for lifelong learning (Collins

& Halverson, 2009). In *Rigor Redefined* (2008b), Wagner challenges the paradigm of

more content as increased rigor. More content and more testing are not "rigor" for the 21st

century. In fact, Wagner asserts there is a new dynamic between content and skills in the

21st century.

> We need to use academic content to teach the seven survival skills every day, at
> every grade level, and in every class. And we need to insist on a combination of
> locally developed assessments and new nationally normed, online tests—such as
> the College and Work Readiness Assessment (www.cae.org)—that measure
> students' analytic-reasoning, critical-thinking, problem-solving, and writing skills.
> (Wagner, 2008b, p. 30)

Wagner (2008a) argues that schools, particularly high schools, have focused on

delivering content and standardized assessments while sacrificing skills. Because of ever-

increasing amounts of information, content is no longer of greatest importance. What

matters most is what students can do with the content they learn. A shift deemphasizing

rote memorization of facts requires a new emphasis on skills. The outcome of Wagner's

work is focused on the need to develop skills more deeply. Content is still valuable, but

not in the way it has been traditionally viewed. Skills are of primary importance with content the means through which the skills are taught and developed.

While Wagner values content in general terms, the *Framework for 21st Century Learning* (Partnership for 21st Century Skills, 2007) specifically identifies core subjects as a part of its framework. The list of content areas includes subjects students encounter in traditional models of education – both present and past. The Partnership includes additional content under the heading of "21st Century Themes," defining what students need to know for the 21st century. Themes include financial literacy, health literacy, civic literacy and global awareness. The *Framework for 21st Century Learning* offers a different approach to content. Educators seeking to develop their conceptualization of teaching and learning in the 21st century need to determine how content fits into that conceptualization. The *enGauge 21st Century Skills: Literacy in the Digital Age* (Burkhardt, et al., 2003) framework provides another lens that may prove helpful to educators – the lens of digital age literacy.

The *enGauge 21st Century Skills: Literacy in the Digital Age framework* (Burkhardt, et al., 2003) redefines content as Digital Age Literacies, making the argument that content should look different in the 21st century than it did in the past. The framework communicates the idea that technology has transformed much of what adults and children do, including how and what is learned in and out of school. "Given the realities of globalization, knowledge work, and accelerating societal change, it's obvious that what students learn – as well as how and when they learn is changing" (Burkhardt, et al., 2003, p. 10). As with other frameworks, the *enGauge 21st Century Skills: Literacy in the Digital Age* framework supports the idea of content as the vehicle through which 21st

century skills are learned. However, content as defined in the past must necessarily change as reflected in work and society.

The frameworks offer three different views of content as a construct of 21st century education. Content can be viewed as general, with the primary focus on skills needed for survival in the 21st Century (Wagner, 2008a); content can be viewed as in the past, compartmentalized into various subject areas (Partnership for 21st Century Skills, 2007); or content can be viewed as similar to the past but transformed as the result of the effects of a digital world (Burkhardt, et al., 2003). Whichever lens educators use to engage content, it is the vehicle through which 21st century skills are learned. When making determinations about the role of content in any conceptualization of 21st century education, educators will need to reflect on the vocational and democratic purposes of education.

Arguably, education has served two purposes – to prepare students to be productive workers and productive citizens in a democratic society (Dewey, 1916). Conceptualizations of 21st century education focus heavily on the need to prepare workers for the 21st century with minimal emphasis on democracy and citizenship. Wagner's focus on interviewing business leaders as part of his methodology demonstrates his interest lies in learning what students need to succeed in the 21st century workplace (Wagner, 2008a). A committee of business leaders developed the *Framework for 21st Century Learning*. Their collaboration resulted in a framework that represents their beliefs – the beliefs of business – about what students should learn in order to succeed in careers of the 21st century. And finally, the *enGauge 21st Century Skills: Literacy in the Digital Age* framework examined numerous workforce reports to better

understand the needs of business and industry (Burkhardt, et al., 2003). It is clear that the quality of workers and the economic well-being of the United States are driving forces behind the development of all three frameworks.

Developing a productive, engaged citizenry is also addressed in each of the frameworks, but not with the same prominence or detail. Wagner (2008a) emphasizes the democratizing role of education more than can be found in the other frameworks. He suggests critical thinking and problem solving are not only important in the workplace, but also in a democratic society. "Equally important, they are skills that our kids need in order to participate effectively in our democracy" (Wagner, 2008a, p. 15). Wagner shares the strengthening connection he sees between the skills needed to meet both goals of education. "Increasingly, it seems to me that there is a convergence between the skills most needed for work in the global knowledge economy and those most needed to keep our democracy safe and vibrant" (p. 28). Each of the other frameworks makes a single reference to the democratic purpose of 21st century education.

While each of the frameworks addresses the vocational and democratic purposes of education, the frameworks have been more a response to the lack of preparation of students to be workers than to be productive citizens in a democracy. As stakeholders redefine their beliefs and ideals for education, it is important to consider both aims of education and maintain a balance. If the frameworks are to be taken at face value, any conceptualization of 21st century education will unduly emphasize careers and economics over civics. The sole purpose of education is not only to develop students into productive workers, but to also develop students into informed citizens.

Having discussed the frameworks' heavy economic and vocational focus, it is

appropriate to address the business affiliations of the Partnership for 21st Century Skills.

The *Framework for 21st Century Learning* is the only framework presented here with the

direct involvement and affiliation of the business community. The Partnership consists of

thirty-seven board members primarily representing technology organizations and

professional education organizations such as Intel, Microsoft, Apple Computer, the

Association for Supervision and Curriculum Development (ASCD) and the National

Education Association (NEA) (Partnership for 21st Century Skills, 2007). While the

Framework for 21st Century Learning is one of the most frequently referenced

frameworks, the contribution and influence of the partner organizations has contributed to

a framework that has been criticized as a "catch-all" for special interests (Willingham,

online, 2009; Ash, online, 2009). Practically every content area currently available in

schools is included in the Core Subjects section: English, reading, language arts, world

languages, arts, mathematics, economics, science, geography, history, government and

civics. The 21st century themes include global awareness; financial, economic, business

and entrepreneurial literacy; civic literacy and health literacy. The Partnership believes

21st century themes are not separate subjects but are engaged by schools to "move beyond

a focus on basic competency in core subjects to promoting understanding of academic

content at much higher levels by weaving 21st century interdisciplinary themes into core

subjects" (Partnership for 21st Century Skills, 2007). The Partnership does not make

specific suggestions pertaining to content standards nor does the organization offer

recommendations for how content might look different in a new century. When

conceptualizing education in the 21st century, educators should be aware of the business affiliations and biases that may have influenced the components of the framework.

A final area of consideration for educators when developing a conceptualization of education in the 21st century pertains to support systems. One framework, the *Framework for 21st Century Learning,* addresses the conditions necessary for students to master 21st century skills. These include standards, assessments, curriculum, instruction, professional development and learning environments (Partnership for 21st Century Skills, 2007). The inclusion of support systems in the framework acknowledges that transforming teaching and learning is complex systemic work. The issue of "scaling up" was the topic of a conference at Harvard University in 2003 – *Scaling Up Success: Lessons Learned from Technology-Based Educational Improvements* (Dede, et al., 2005). While the researchers concluded there is much to be learned about "scaling up" innovation, their recommendations generally focused on the relationships of components such as leadership and policy within the larger educational system. It appears the Partnership understands, in concept, the "scaling up" of innovation will require the engagement of multiple facets of the educational system.

This section of the literature review presented several frameworks that serve as a foundation for leaders seeking to expand the knowledge, skills and dispositions associated with an expanded epistemic frame of educational leadership. As presented, conceptualizing 21st century education is a complex challenge with many considerations. – defining skills, understanding the pervasiveness of technology, determining the role of content, embracing the purposes of education and addressing support systems. Frameworks are not blueprints but can be used to help reframe aspects of complex

change. The skills outlined in the frameworks can be reduced to four themes: (1) critical

thinking/problem solving; (2) communication/collaboration; (3) creativity/innovation;

and (4) soft skills such as agility, initiative and responsibility. The frameworks challenge

educators to think about the role of content, the purposes of education and the importance

of support systems. Leaders consulting these frameworks must be attuned to the

complexities of such frameworks and the inter-relationship of each consideration outlined

here. When asking the question, "What are 21st century skills?" educators must not be

deceived by a simple list of skills.

Standards

In addition to 21st century skills frameworks, standards related to 21st century

education are useful for educators to consult. Standards build on the foundation of skills

outlined in the earlier frameworks by proposing learning outcomes. Two organizations

have developed student standards focused on information literacy and technology

literacy. The American Association of School Librarians (AASL) and the International

Society for Technology in Education (ISTE) have developed standards that deepen

understanding of the skill areas pertaining to information literacy and technology. ISTE

has also developed a set of standards for teachers and administrators. The teacher

standards will be examined here while the standards for administrators will be referenced

within the leadership section of the literature review.

In *Standards for the 21st Century Learner*, AASL places an emphasis on varying

kinds of media – print, text, and video. Each of the four information literacy standards

has four subcomponents – skills, dispositions in action, responsibilities, and self-

assessment strategies (American Association of School Librarians, 2007). While the

focus of the standards is information literacy, it is important to notice how other 21st century skills are also incorporated – critical thinking, problem solving, initiative, curiosity, collaboration and core content. The AASL standards help reinforce the notion that 21st century skills cannot be compartmentalized, but are best examined in relation to one another. The AASL standards highlight the value of digital media and technology across the 21st century skill areas.

The often-complex relationship between skills is reflected in the latest ISTE standards for students – *National Educational Technology Standards for Students* (International Society for Technology in Education, 2007). In 1998, ISTE developed standards for students that focused primarily on technology skills: Basic Operations and Concepts; Social, Ethical and Human Issues; Technology Productivity Tools; Technology Communication Tools; Technology Research Tools; and Technology Problem-solving and Research Tools (International Society for Technology in Education, 1998). The concept appearing most frequently in these older standards is *technology*. With the release of updated standards in 2007, ISTE embraced the idea that technology skills should no longer be viewed in isolation. The current standards represent the integration of technology with other 21st century skills. The most recent version of the ISTE standards reflects skills and concepts similar to the 21st century skills frameworks.

1. Creativity and Innovation

2. Communication and Collaboration

3. Research and Information Fluency

4. Critical Thinking, Problem Solving and Decision Making

5. Digital Citizenship

6. Technology Operations and Concepts (International Society for Technology in Education, 2007)

As with the previously outlined frameworks, the ISTE standards for students embrace the concept of technology as a key element of learning. While 21st century education is being driven by rapid developments in technology, change is not only limited to technology. Change is about redefined skills in a technology-rich world. As indicated within the ISTE standards, understanding the skills necessary to operate technology is important. However, it is the ways of redefining old skills that are the focus of the new ISTE standards.

The standards put forth by AASL and ISTE help to define specific student performances in the skill areas of information literacy and technology, complementing the frameworks outlined earlier. The work of AASL and ISTE, coupled with the frameworks, can help educators think more clearly about 21st century skills by outlining behaviors students should be able to demonstrate.

While the concepts outlined in the frameworks clearly focus on student learning and change, it is impossible to separate changes in learning from changes in teaching. ISTE has defined a set of standards for teachers, *National Educational Technology Standards for Teachers* (International Society for Technology in Education, 2008). With this publication, performance indicators are defined for five standards:

1. Student learning and creativity

2. Digital-age learning experiences and assessments

3. Digital-age work and learning

4. Digital citizenship and responsibility

5. Professional growth and leadership

ISTE's standards for teachers reflect many skills necessary for the 21st century. Similar to the ISTE standards for students, the teacher standards approach technology as a natural part of the teaching and learning ecology. The ISTE standards for teachers are important since they recommend changes in the role of teacher for the digital age by addressing technology and changes in instructional practice.

Standards as outlined in this section provide depth and further refinement of the skills and issues addressed in the frameworks. The standards reflect the role of technology as used outside school and encourage educators to understand the similar role technology can play in formal learning. In addition to the frameworks, an understanding of standards provides educators with information to assist them in their conceptualization of 21st century education. While the frameworks and standards provide a general roadmap to understanding, they do not generally offer specific recommendations about core content such as English, mathematics, science and social studies. Content area frameworks and position statements from professional organizations add further depth to an understanding of 21st teaching and learning.

Content Area Frameworks and Position Statements

Recently, four professional organizations – National Council of Teachers of English (NCTE), National Council of Teachers of Mathematics (NCTM), National Science Teachers Association (NSTA), and National Council for the Social Studies (NCSS) – have developed position statements, frameworks and other resources designed to bring both teaching and learning in the content areas into the 21st century. While the literature developed by these organizations varies in terms of level of advocacy, all of the

organizations realize the need to address the issue of relevancy of their specific content in the 21st century. Educators will find these resources useful as they develop an understanding of content-specific issues related to 21st century teaching and learning.

Likely because of the need for basic literacy throughout all content areas, NCTE has developed the most progressive body of literature on the topic of literacy education in the 21st century. Having recently developed a definition of 21st century literacies (National Council of Teachers of English, 2009b), NCTE has also developed a framework (National Council of Teachers of English, 2009a) that reflects many of the skills outlined in other frameworks – technology skills, problem solving, communication, critical thinking, information literacy and digital citizenship. NCTE realizes the need for changing pedagogy and has developed guidelines for teachers that focus on assessment practices for new literacies in the 21st century. Additional resources are available that help teachers answer questions such as, What are 21st century literacies? Why should I teach 21st century literacies? and How do I integrate 21st century literacies? (National Council of Teachers of English, 2009c) Like the ISTE standards and the 21st century skills frameworks, NCTE does not specifically address new skills from a technological point-of-view. Instead, the organization embraces technology as a key component in an ever-changing teaching and learning ecology.

While not as progressive in explicitly articulating their position on technology and 21st century education, NCTM, NSTA and NCSS acknowledge the role technology has played in changing the learning environment, particularly outside of school. All three organizations believe technology should be used when it offers experiences to students beyond what could be experienced without technology (National Council of Teachers of

Mathematics, 2008; National Science Teachers Association, 2008; National Council for

the Social Studies, 2006). NCTM cites experiences involving cognitive tutors and

interactive geometry software (National Council of Teachers of Mathematics, 2008),

while NSTA advocates for using technology for "viable and effective models for teaching

important science content and for meeting diverse student needs" (National Science

Teachers Association, 2008, p. 3). NCSS believes technology can be used to revitalize

citizenship education (National Council for the Social Studies, 2006). Through networked

technology, students can access information about current issues with multiple

perspectives, thereby promoting the development of core civic ideals and beliefs. The

NCSS position on technology is particularly notable provided economic prosperity drives

previously outlined frameworks (Partnership for 21st Century Skills, 2007; Burkhardt, et

al., 2003).

Summary

The literature contains many resources that propose a new vision for teaching and

learning in the 21st century. Educators seeking a better understanding of the current

movement can access frameworks, standards for teaching and learning, and literature

from curriculum content organizations. These literatures can help educators establish a

foundation on which to develop their own ideals and beliefs about education in the 21st

century. The frameworks provide the broadest understanding while engaging thinking

about skills, technology, content, purposes of education and support systems. Broad

understandings about teaching and learning can be further refined through an

investigation of student and teacher standards. Educators wishing to explore deeper into

content areas are encouraged to consult content area frameworks and position statements

of professional organizations. Collectively, the literatures explored here provide educators with a theoretical foundation of teaching and learning in the 21st century. While a theoretical understanding is important for reshaping ideals and beliefs, it is also important to gain an understanding of how theory has been applied to achieve meaningful learning in the classroom. The next section of this literature review will explore empirical literature representing and supporting the new vision of education in the 21st century outlined in this section.

How is a conceptualization of teaching and learning in the 21st century translated to the classroom?

Skills such as critical thinking, problem solving, communication, collaboration, creativity and innovation have been espoused as valuable in education for decades. While presently not the norm (Jonassen, Howland and Crismond, 2008), such skills are the foundation of the most effective classrooms that embrace *meaningful learning*. Jonassen, et al. (2008) defines meaningful learning in terms of social constructivist (Vygotsky, 1978) tasks.

- Active – Students interact, observe and interpret the environment.

- Constructive – Students explain their actions and reflect, leading to the creation of new mental models.

- Intentional – Students work to achieve goals that are personally meaningful.

- Authentic – Students work on real-world tasks.

- Cooperative – Students converse and learn with others in knowledge-building communities (Jonassen, et al., 2008, p. 3).

Since the frameworks and standards call for redefining learning and teaching in the 21st century, meaningful learning is an important concept for leaders to understand if they hope to influence change. The model for meaningful learning suggested by Jonassen, et al. (2008) mirrors the skills and concepts articulated by the 21st century skills frameworks. For example, well-designed constructive activities require students to apply critical thinking and problem solving. Cooperative activities require students to engage in communication and collaboration with fellow students. Through conversation, students build knowledge with their peers, enlisting the skills of creativity and innovation to develop new knowledge.

Petrosino (1998) provides an effective example of meaningful learning. The researcher studied the impact of reflection and revision on hands-on science experiments with model rockets. Using a series of three exit interviews at various intervals in the study – hands-on activity only, hands-on activity accompanied by the opportunity for reflection and revision, and hands-on activity accompanied by repeated opportunities for reflection and revision – the researcher found students initially scored low on the hands-on only activity. Scores increased significantly with increased opportunities for reflection and revision of the model rocket experiments. In this example, students engaged 21st century learning skills through meaningful learning activities that were active, constructive, intentional, authentic and cooperative. Meaningful learning is more than completing an activity. The research demonstrated the importance of constructive activity and the value of increased opportunities to think critically about learning and revise accordingly.

Schwartz and Martin (2004) further reinforce the importance of inquiry, problem solving and critical thinking in meaningful learning. The focus of the research was middle school statistics. Students worked collaboratively in groups to invent a model of probability using a specific problem. After a period of time, each group presented their brainstormed solution. Class discussion followed. Students then collaborated in small groups and were asked to use their new knowledge to invent a new model of probability using a different problem. After a second round of sharing, the teacher presented the expert solution. Following this process of discovery, students applied the new learning individually to new problem sets. The results of the study suggest that despite initial faulty models of thinking, the experiences of inventing rather than hearing solutions prepared students to better learn once the expert solution was presented. The researchers learned this by using a control group that was provided the expert solution directly. The control group did not demonstrate the same depth of background knowledge in order to appreciate the expert solution. The research of Schwartz and Martin (2004) demonstrates how learners use background knowledge to solve problems. Even when students were not successful at inventing a solution, the active problem solving experience allowed them to better understand the context of the expert solution. This example also demonstrates the value of collaboration in the problem solving process.

Darling-Hammond, et al. (2008) poses a valuable question for educators when critically evaluating learning research and classroom instruction for meaningful learning: "Does it aim for rote understanding and recall, or does it aim for the kind of meaningful learning that would allow learners to use what they've learned to solve a problem?" (p. 7) Petrosino (1998) and Schwartz and Martin (2004) demonstrate that meaningful learning

is about inquiry and problem solving, not mechanized rote learning. While meaningful

learning can occur without the use of digital technologies, Jonassen, et al. (2008) argues

"learning technologies can be any environment or definable set of activities that engage

learners in active, constructive, intentional, authentic, and cooperative learning"

(Jonassen, et al., 2008, p. 7). Learning with technology can be a powerful amplifier for

deep understanding and social constructivist learning (Vygotsky, 1978). Technology

should be considered an important component of any conceptualization of 21st century

learning and teaching. Some of the most powerful examples of meaningful learning with

technology are software-based applications such as CSILE/Knowledge Forum, WISE,

cognitive tutors and epistemic games. Each of these tools will be discussed to

demonstrate how meaningful learning with technology embodies qualities of 21st century

education. Through an understanding of inquiry-based technology tools educators can

develop a rich conceptualization of 21st century learning and teaching.

One of the earliest and most well documented technology-based tools for

collaboration and inquiry learning is the Computer-Supported Intentional Learning

Environments (CSILE) project (Scardamalia, Bereiter, & Lamon, 1994). CSILE, based

on research in reading, writing and expertise (Scardamalia, 2004) began as a social

network for learners to collaboratively develop a knowledge base through interactions

with academic content (text and graphics), other students and teachers. CSILE is

considered to be the first networked database system designed for collaborative learning.

The technology has been used at all levels of education and has since developed into a

second-generation tool know as Knowledge Forum.

In a study by Caswell and Bielaczyc (2001), Knowledge Forum was utilized by a classroom of grade 5/6 science students during an investigation of island biogeography, specifically the study of the evolution of the Komodo Dragon. In a knowledge-building classroom, students no longer focus on activities such as completing worksheets and projects but on collaboratively designing and making sense of their own inquiry focused on content. Such was the case in this study. The researchers provide a rich description of the learning and how the technology amplified inquiry learning.

> This change can be characterized as a shift from activity centers to students forming research groups according to common interests; from teacher-designed experiments to student-designed experiments; from the gathering of resources by teacher only to collection by both teacher and students. The focus of classroom work and discussion revolves around trying to gain a deep understanding of a unit of study. Students work collaboratively and independently to gain understanding of materials, and to improve ideas. Their dialogue ranges from face-to-face whole group discussions, to small group research team meetings, to reflective discourse within the database. The teacher's goal is to create a classroom environment where genuine productive work can take place and where students are immersed in a culture of inquiry. (Caswell & Bielaczyc, 2001, p. 284)

In this case study, the researchers reported the shifts described above resulted in (1) more open exchanges between students; (2) deeper student inquiry; and (3) a student-driven research agenda that resulted in a more flexible sequencing of the curriculum.

Knowledge Forum reflects the skills outlined in the 21st century frameworks for education. Most obvious is its collaborative nature. While it is a technology tool, the questions posed online often lead to rich face-to-face discussions. Caswell and Bielaczyc (2001) demonstrate how technology acts as an amplifier – the use of the technology provided a broad base of background knowledge that was later brought by students to face-to-face discussion. The requirement to pose questions and drive inquiry independent

of teacher direction led to the development of student problem-solving skills and deeper critical thinking.

A similar technology-based inquiry tool is the Web-based Inquiry Science Environment (WISE). In WISE activities, students learn to use the Internet productively for inquiry, critiquing Web sites, designing approaches, or comparing arguments (Slotta, 2004). Each project includes lesson plans, pre- and post assessments, links to the National Science Education Standards, and a description of the learning goals and ideas that students will likely bring with them to the project. All student work is saved on central project servers that enable student accounts and teacher accounts to be coordinated.

The WISE program consists of a library of projects developed and produced by design teams following several years of testing. Topics of interest to students include stream ecology, the worldwide threat of malaria (using handheld technology) and Wisconsin plants (Linn, 2006). The major tenets of the WISE framework include making science accessible, making thinking visible, learning from others, and promoting autonomy and lifelong learning (Slotta, 2004).

Another software-based application for inquiry learning can be found in mathematics with advanced computer tutoring systems such as Cognitive Tutor (Anderson, Corbett, Kodeinger & Pelletier, 1995). Cognitive tutoring systems focus on providing individualized guidance as learners work on challenging real-world problems. As students progress through the program, student strengths and weaknesses are identified. The software generates a customized path of learning based on the identified strengths and weaknesses. Cognitive tutor software programs are developed based on domains such as computer science, algebra and geometry. Of particular importance in

the design of software are the common skills and misconceptions associated with the

domains (Pittsburgh Advanced Cognitive Tutor Center, 2003). Students who use the

program spend approximately 40% of instructional time working with the software and

60% experiencing face-to-face instruction (Ritter, Kulikowich, Lei, McGuire & Morgan,

2007).

Ritter, et al. (2007) studied the effectiveness of cognitive tutoring software on the

ability of 9th grade students to learn algebra. Ten classrooms utilizing the cognitive tutor

software were compared with nine classrooms that utilized a traditional textbook,

teacher-directed curriculum. All students, including those in the control group, were

administered the Algebra end-of-course assessment published by Educational Testing

Service. The researchers reported a positive effect of the algebra cognitive tutor on

student achievement (Ritter, et al. 2007). Based on this study, the *What Works*

Clearinghouse sanctioned the algebra Cognitive Tutor software as a research-based

intervention (U.S. Department of Education Institute of Education Sciences, 2009).

The most important contribution of an example such as the cognitive tutor is the

ability to personalize learning. Through the pairing of instructional technology and face-

to-face classroom instruction, student achievement is positively impacted. In addition to

teacher-directed instruction, the face-to-face component of the course also incorporates

collaboration and student presentations (Ritter, et al., 2007). Another notable feature of

the software is the connection of abstract concepts to real-world events. For example,

when studying the Pythagorean theorem, students connect the concept to a major league

baseball diamond (Carnegie Learning, 2009). The ability to customize learning in the

context of an authentic problem makes software such as the cognitive tutor compatible with 21st century skills frameworks and meaningful learning.

Technology-based games and simulations are two of the more recent innovations in teaching and learning that align with the tenets of 21st century education. The value of gaming in education has been underrated but is increasingly viewed as a viable solution to challenges of curriculum and pedagogy (Gee, 2007; Collins & Halverson, 2009; Shaffer, 2005). Epistemic games have shown promising results in connecting student learning to the ways workers think within specific professions. An epistemic game simulates the epistemological praxis of a particular domain (Shaffer, 2005). Using authentic learning experiences, epistemic games allow learners to acquire the skills and knowledge utilized by experts in fields such as architecture, biology and urban planning

To date, Shaffer has developed four simulations: The Pandora Project, The Byline Project, Escher's World and Madison 2200. In 2005, Beckett and Shaffer published a study of Madison 2200, a technology-supported simulation in urban planning. Eleven students who attended a special summer learning program participated in the study. The researchers reported two findings: (1) the participants developed an understanding of ecology; and (2) the participants developed this understanding through urban planning practices and the feature of the GIS model (Beckett & Shaffer, 2005). In a study of Escher's World, students learned transformational geometry skills in the context of design activities using Geometer's Sketchpad software. Pre- and post-tests indicated significant growth in student understanding of transformational geometry concepts. Students also provided positive feedback on the experience. Common responses from students indicated they wished formal math class would be structured more like the

Escher's World experience (Shaffer, 2004). While simulations such as Madison 2200 and

Escher's World are grounded in a theory of pedagogical praxis, the researchers suggest

the need for more testing of the theory (Beckett & Shaffer, 2005). In a related paper,

Shaffer (2005) explains the potential value of epistemic games for education in the 21st

century.

> The implications of epistemic frames and their role in developing epistemic
> games are thus quite profound. They suggest that the ways in which professionals
> acquire their practices may provide an alternative model for organizing our
> educational system. (p. 4).

Shaffer (2005) further describes the value of epistemic games as "...a new model of

learning for an era of dramatic social and economic transformation brought about by new

technology." (p. 4) The epistemic games developed to date are characterized by authentic

uses of technology, challenging problems with multiple solutions, and autonomous

learning coupled with critical thinking. Advocates of meaningful learning and 21st

century skills embrace these same qualities.

Schools find the adoption of technology innovations such as Knowledge Forum,

WISE, cognitive tutors and epistemic games challenging because their introduction into

the learning environment requires change in pedagogy, classroom management,

curriculum, and technical support (Fishman, Best, Foster & Marx, 2000; Slotta, 2004).

The complexity of the relationship of the innovation to support systems has made

meaningful learning with technology the exception rather than the norm in most

classrooms. Systemic change is the focus of The Center for Learning Technologies in

Urban Schools (LeTUS). LeTUS focuses on "new learning technologies, but [also] on a

range of systemic issues that are needed for success: curriculum design, development and

enactment; teacher professional development; and creating and sustaining policy and management structures that support reform" (Marx, et al, 2004, p. 1063). A key to the success of the program's work is the support of leadership to embrace curriculum grounded in inquiry and rich in the use of technology.

The multiple systemic components involved in an innovation are evident in a study by Marx, et al. (2004). Middle school students participated in four standards-based, technology-infused science curriculum modules using modeling, visualization and information searching software. Data from three years showed a significant increase "on curriculum-based test scores for each year of participation" (p. 1063). Additionally, results showed that the strength of the effects grew over the course of the three years of the study. While the results of this study demonstrated positive outcomes for students, collaborative curriculum development between university and district personnel as well as professional development focused on inquiry instructional approaches were believed to be key components in the success of the research project.

One of the primary research questions of this study asks school leaders to conceptualize teaching and learning for the 21st century. This section of the literature review provides examples of teaching and learning through the lens of meaningful learning (Jonassen, et al., 2008). While meaningful learning in the classroom can occur with or without technology tools, examples in the literature demonstrate how learning skills are enhanced through the use of technology. The examples also demonstrate how meaningful learning requires changes in teaching practice. The structures and systems of schooling, including the present climate of testing, do not easily allow for the necessary pedagogical changes to occur. It is critical that school leaders understand and embrace

meaningful learning in order for teachers to navigate barriers to successful

implementation of learning innovations in transformed learning environments.

Other barriers exist to implementing learning innovations such as those described

here. Innovations such as Knowledge Forum, WISE and cognitive tutors require the

development of specialized software. Without university partnerships, development of

cognitive tutors, inquiry-based science software and simulations may seem impractical.

Content areas such as English and social studies may experience additional barriers.

While examples of meaningful learning do exist within these content areas, much of the

research is focused on mathematics and science teaching and learning. This is likely due

to the fact that university research monies are dedicated to math and science through

grants from the National Science Foundation (NSF). Finally, promising models such as

epistemic games require shifts in the allocation of time. The typical 45-minute period

does not lend itself well to allowing students to develop in-depth skills as required by

innovations such as simulations. While the specific examples may have their limitations,

the literature is clear in identifying the underlying qualities that make a learning

experience meaningful.

An area that is gaining more widespread popularity in schools is web-based

Internet technology, specifically Web 2.0. Anderson (2007) associates several concepts

with Web 2.0 including user-generated content, the power of the crowd and vast

quantities of data. Popular Web 2.0 tools include blogs, wikis and Really Simple

Syndication (RSS). Even though there is very little research in the area of formal learning

with Web 2.0 (Greenhow, 2007), educators are beginning to learn how students use these

and other technologies outside of school in informal ways.

Wagner (2008a) argues for seven "survival skills" that workers, students and citizens should acquire for success. If education in the 21st century is to reflect authentic learning experiences in the real world, technology will be an important component. Technology has become a necessary part of nearly every aspect of our lives, except in school (Collins & Halverson, 2009). Educational leaders can benefit from learning how students are using technology outside of school. By tapping into the learning habits of students, educators will be better informed when exploring new ways of making learning relevant and expanding their own conceptualization of teaching and learning. The following section will examine how students are using technology, particularly Internet technology, for informal learning.

How do students use technology for informal learning?

Research studies conducted by organizations such as the Pew Research Center and the MacArthur Foundation show how today's students rely heavily on technology for connecting with their peers and for learning outside of school (Levin & Arafeh, 2002; Ito, et al., 2008). While informal learning frequently focuses on personal niche interests (Ito, et al., 2008), students also rely heavily on technology to enhance their studies in school (Levin & Arafeh, 2002). In *The Digital Disconnect: The Widening Gap Between Internet-Savvy Students and Their Schools* (Levin & Arafeh, 2002), student participants articulated five informal ways they use the Internet and computers to supplement formal learning in school.

- A research tool for assignments, papers and projects
- A tutor to learn about content that interests them or they find confusing
- A means to connect with classmates and others to collaborate and study

- A guidance counselor to learn more about life decisions, careers and college

- An online storage location for school materials and papers (p. 6)

While youth today are using technology for informal learning to supplement classroom studies, the way students use technology for formal school learning is disconnected from informal learning. This argument is supported by the findings of a study by Spires, Lee, Turner and Johnson (2008). A survey of 4,000 middle school students indicated that learners felt school restricted their use of technology, especially cell phones. While such applications of technology may seem foreign in schools, DeGennaro (2008) demonstrated how the use of technologies popular with teens such as instant messaging lead to positive 21st century student learning outcomes including co-constructed problem solving and supportive argumentation.

A significant percentage of teens also use blogs, video sharing web sites and other Web 2.0 technologies, web-based technologies and participatory media that allow for the simultaneous creation and consumption of content (Lenhart, Madden, Smith & Macgill, 2007). In 2006, 39% of teens were sharing user-created content such as art, photos, and videos online. 33% of teens created their own web pages and wrote their own blogs. It is likely these statistics have increased in the last three years. Despite the increasing use of Web 2.0 tools in informal learning, little research is available on how Web 2.0 tools are used for formal learning in schools (Greenhow, 2007). Greenhow (2008) suggests, "More empirical research is needed that critically examines the interrelationships between the affordances of these emerging participatory media, pedagogy, and learning in the contexts within which they occur." (p.191) As the educational research agenda for Web 2.0 technologies develops, teachers and leaders should be able to learn more about how

Web 2.0 can bridge formal and informal learning, expanding thinking about how to create meaningful learning environments. *Living and Learning with New Media: Summary of Findings from the Digital Youth Project* (Ito, et al., 2008) suggests that an understanding of how youth learn informally with new media will be important in order for schools to remain relevant in the 21st century.

> Youth's participation in this networked world suggests new ways of thinking about the role of education. *What,* the authors ask, *would it mean to really exploit the potential of the learning opportunities available through online resources and networks? What would it mean to reach beyond traditional education and civic institutions and enlist the help of others in young people's learning?* Rather than assuming that education is primarily about preparing for jobs and careers, they question what it would mean to think of it as a process guiding youths' participation in public life more generally. (Ito, et al., 2008, p. 39)

Learning more about how the latest web-based technologies are used by students and working with them to develop new uses in schools will expand adult thinking about creating meaningful learning environments that mirror the informal learning lives of students. Since web-based technologies are inexpensive beyond the cost of hardware, more pervasive use of Web 2.0 technology can remove the barriers of expensive software development necessary for programs such as Knowledge Forum, cognitive tutors and simulations. Web technologies enhance the opportunities envisioned by examples in the previous section and are more scalable since they are free or require minimal financial resources. In addition, web technologies are participatory and often serve as a vehicle for creativity. For leaders to ignore Web 2.0 tools is to ignore the primary avenue that learners informally develop social and technology skills and to limit their understanding of learning in the 21st century.

What kind of environment is most effective for meaningful learning?

The exemplars of meaningful classroom learning presented in the literature are significant because they embrace 21st century skills as well as the social constructivist learning principles espoused by Donovan and Bransford (2005). The learning sciences focus on understanding how to design the most effective learning environments. Based on years of learning sciences research, Sawyer (2006) suggests a series of meaningful learning principles learning scientists agree upon.

1. Teaching and learning focus on deeper conceptual understanding so that facts and procedures can be more easily applied and modified for real-world application.

2. Student learning processes are as important as instructional techniques.

3. Learning environments help learners acquire deep conceptual understanding as well as facts and procedures.

4. Effective learning environments build upon learners' existing knowledge.

5. Reflection through the creation of conversation, reports and other artifacts is an important process in learning. (p. 2-3)

This list of principles represents the role discursive interaction, language and culture play in the learning process (Vygotsky, 1978). Social constructivist learning is at the heart of the learning sciences because almost all learning occurs in a complex social environment, not within the mental processes of a single learner (Wortham, 2007).

Computers and technology are a natural fit for the kind of learning espoused by the learning sciences (Sawyer, 2006). As presented earlier, specialized computer software such as WISE, CSILE, cognitive tutors, simulations and Web 2.0 tools can help learners collaborate and reflect as they develop knowledge. When used in meaningful ways,

technology can reinforce the principles of social constructivism at the core of the learning sciences. Using the domain of science, Quintana, et al. (2004), developed a framework for designing scaffolded learning using computer-based science software. The framework, grounded in the learning sciences and social constructivism, offers scaffolding guidelines and strategies focused on three science inquiry components: sense making, process management, articulation and reflection. In proposing the framework, the researchers map various computer software programs that support the suggested strategies. The framework, resulting from a synthesis of theory and empirical research, rejects instructionism and behaviorism while promoting a social constructivist theory of learning.

Two additional studies support the argument that instructional technology is most effective in specific learning environments. Wenglinsky (2005) offers High Tech High in San Diego, California as a constructivist learning environment conducive to the integration of technology. The environment Wenglinsky describes is tied closely to real-world problem solving with a focus on interdisciplinary projects, portfolio assessments and higher-order thinking. In this environment, technology is described as "the medium through which effective teachers helped students construct their own knowledge" (p. 58). In studying learning environments that positively impacted student achievement, Wenglinsky used data from the National Assessment of Educational Progress (NAEP), a standardized test he suggests is suited to both constructivist and didactic ways of teaching. The data set included test scores in reading and math from over 40,000 students as well as data from teachers providing information about teaching style and technology

integration. Wenglinsky's research was designed to determine the relationship between type of pedagogy, technology use and student achievement.

Using data from multiple editions of the NAEP, Wenglinsky (2005) reported several conclusions about the relationship of pedagogy, technology use and student performance. First, non-technological constructivist instructional practices as he outlines were most often associated with high student performance. This finding supports the assertion of Jonassen, et al. (2008) that meaningful learning is active. Second, in mathematics and science, computer use coupled with constructivist pedagogy was positively associated with student achievement. In these same subjects, didactic pedagogy and computer use was unassociated or negatively associated with student performance. Third, in reading, students performed better when computers were used for word processing and reflection. Performance was compromised when computers were used for spellchecking and reading stories. While it is not clear whether Wenglinsky defines constructivism in social-constructivist terms, his research is significant because it demonstrates the importance of the learning environment created by teachers for effective technology use. The learning environment advocated by Wenglinsky reflects the active nature of learning supported by the learning sciences and 21st century skill frameworks and standards.

Another large-scale study conducted in twenty-two countries in 2006 examined the relationship of pedagogy to the learning of 21st century skills through technology. For the purpose of the study, the phrase "21st century skills" was defined as, "the capacity to engage in life long learning (understood as self-directed and collaborative inquiry) and as connectedness (communication and collaboration with experts and peers around the

world) (International Association for the Evaluation of Educational Achievement, 2006). The study concluded that the impact of technology use on student achievement was highly dependent on the teaching approaches used by instructors (International Association for the Evaluation of Educational Achievement, 2006). Data analysis showed a correlation between collaborative inquiry and perceived gains in 21st century skills. Additionally, no correlation was found between traditional instructionist forms of pedagogy and students' learning outcomes (Law, et al., 2008). While the use of surveys to gauge participant perceptions regarding pedagogy and student performance weakens the findings, the study represents a significant, large-scale inquiry into the relationship of pedagogy and the development of collaboration, communication and inquiry. It should also be noted that the United States was not a participant in the study.

The learning sciences as well as research in social constructivist learning environments with technology provide scientific evidence that teaching strategies must be altered if education is to reflect 21st century skills and frameworks. Instructionist models that view knowledge as a collection of facts and procedures to be transmitted from teacher to student and then tested for mastery (Papert, 1993) are not sufficient for developing the skills of problem solving, critical thinking, collaboration and communication. Knowledge of social constructivist pedagogy coupled with knowledge of meaningful learning can be a powerful force in reshaping the ideals and beliefs school leaders espouse about teaching and learning.

What are the qualities of effective school leaders?

School leaders must demonstrate many kinds of leadership - instructional, cultural, managerial, human resources, strategic, external development, micropolitical

(Portin, Schneider, DeArmond, & Gundlach, 2003) and technology (International Society for Technology in Education, 2009). Increased levels of accountability, organizational and political complexity have further complicated leadership to the point where the role of a school leader is very different from what it was only a decade ago. This argument is supported by the recently updated *Educational Leadership Policy Standards* (Council of Chief State School Officers, 2008). "These mounting demands are rewriting administrators' job descriptions every year, making them more complex than ever." (p. 3) Even with mounting complexities, school leadership is critical to the success of teaching and learning reform efforts (Leithwood, et al., 2004).

Leithwood, et al. (2004) proposes a three-pronged framework outlining a core of successful leadership: (1) setting direction; (2) developing people; and (3) redesigning the organization. These themes characterize the type of leadership Bass and Avolio (1993) define as transformational leadership. Additionally, the framework is reflected in the standards for school leaders established by the Interstate School Leaders Licensure Consortium (ISLLC) *Educational Leadership Policy Standards* (Council of Chief State School Officers, 1996, 2008), originally published in 1996 and recently updated. Understanding the basic core of effective school leadership provides leaders with a foundation for thinking about an expanded epistemic frame of leadership. The conceptual framework for this study acknowledges the importance of the basic leadership core outlined by Leithwood, et al. (2004). It is argued, however, leading change in teaching and learning for the 21st century requires more than basic leadership. Educational leaders need to develop leadership skills, knowledge and attitudes encompassing systems thinking, types of change and theories of action. This section of the literature review will

explore qualities of effective leadership through the framework proposed by Leithwood, et al. (2004).

Setting Direction

Leithwood and Riehl (2003) explain that identifying and articulating a vision, fostering the acceptance of group goals, and creating high performance expectations are actions that pertain to "setting direction." Leaders cannot implement a vision without the help and work of others at all levels of an organization. Effective leaders gather stakeholder to collaboratively develop goals. Goals related to the improvement of teaching and learning often become non-negotiable (Waters & Marzano, 2006). Offering intellectual stimulation, providing individualized support, and providing appropriate models are all important actions that school leaders take in developing an effective staff. Building a collaborative school culture, one that is open to modifying ineffective organizational structures, is necessary for school leaders to be change agents within their organizations.

In order to communicate a vision for teaching and learning, school leaders must have a clear conceptualization of teaching and learning in the 21st century. The *National Educational Technology Standards and Performance Indicators for Administrators* (International Society for Technology in Education, 2009) places visionary leadership and digital-age learning culture at the top of its list of standards. Effective leaders inspire others with a vision for learner-centered environments and advocate for policies, programs and funding to support a technology-infused vision. As leaders develop a vision, they may consult available frameworks and standards. For leaders and teachers who embrace differing ideals and beliefs about learning, the challenge will be to embrace

a new vision, replacing old ideals and beliefs based on "folk theory" (Bereiter, 2002) with new ones based on meaningful learning with technology. Seeking out examples of teaching and learning that reflect 21st century ideals will help to influence change. Identifying and articulating a vision is only one component of effective leadership. Leaders communicate vision, influence people to embrace the vision and work with others to achieve changes in teaching and learning outlined by the vision.

Developing People

Effective leaders support and develop the people they work with, especially teachers, by promoting an environment of professional learning and innovation (International Society for Technology in Education, 2009). Offering intellectual stimulation, providing individualized support, and providing appropriate models are important for developing an effective staff (Leithwood & Riehl, 2003). Effective leaders also cultivate leadership in others (Portin, et al., 2003). Teacher leadership roles that are most typically supported by principals include lead teacher, department head and mentor (Leithwood & Riehl, 2003).

Changing one part of a system impacts other parts of the same system (Salisbury, 2008). From his work on leadership and sustainability, Fullan (2005) advocates for the importance of systems thinking in action. Thinking systemically includes developing the leadership capacity of others within the organization, both horizontally and vertically. "Capacity building involves developing the collective ability - dispositions, skills, knowledge, motivation and resources - to act together to bring about positive change." (Fullan, 2005, p. 4) Developing leadership skills in teachers can significantly impact the positive effects of an innovation. Rogers (2003) refers to this as opinion leadership – "the

degree to which an individual is able informally to influence other individuals'

attitudes…" (p. 281). As more teachers become opinion leaders and embrace an

innovation through the influence of leadership, effects become more visible, more

rapidly.

　　　　While leaders play a large part in developing vision for an organization, he/she

cannot act alone in implementing that vision. Effective leaders influence others to

embrace the vision and work to carry it out to its fullest. Kouzes and Posner (2003)

identify how leaders pay attention to those who are following, providing personal

recognition and celebrating as an organization when goals are achieved. These actions

represent the emotional dimension of leadership (Goleman, 2005). When leaders

acknowledge outstanding performance, provide personal attention to employees and

utilize the personal strengths of staff, employees feel a sense of ownership for the vision

(McColl-Kennedy & Anderson, 2002).

　　　　As has been referenced earlier, a 21st century vision for teaching and learning

focused on skills, meaningful learning and social constructivist learning environments is

not the norm in schools today. To replace ideals and beliefs that run counter to a 21st

century vision will require leaders skilled at working with and developing others

throughout the organization. Godin (2008) suggests leaders focus their initial influencing

efforts on a "tribe" – a group of early adopters who can be developed into leaders in the

early stages of innovation. The idea of a "tribe" suggests educational leaders identify

teachers with ideals and beliefs similar to the vision, develop the "tribe" while building

vertical and horizontal leadership suggested by Fullan (2005). Only when a leader has set

the direction through a compelling vision and influenced others to lead and follow can an organization move toward change and redesign.

Redesigning the Organization

The most effective leaders are characterized by their ability to bring about change through innovation. They are skilled at identifying what is not working in an organization and proposing solutions (Portin, et al., 2003). They lead a culture that is open to modifying ineffective organizational structures (Leithwood & Riehl, 2003) and turn them around to be more effective (Davis, et al., 2005). Effective leaders are constantly monitoring change efforts and allocating appropriate resources to achieve the goals of the organization (Waters & Marzano, 2006).

In 2003, researchers met at Harvard University for the conference *Scaling Up Success: Lessons Learned from Technology-Based Educational Improvement*, presenting their research and practical experiences in redesigning organizations through scaling technology-based innovations. Dede and Honan (2005) synthesized four themes from the conference presentations and discussions. Scaling technology-based innovation requires:

1. Coping with change: context, leadership, and funding

2. Promoting ownership: building constituent support; institutionalizing innovations

3. Building human capacity: working with collaborators and partners; providing professional development

4. Effective decision making: interpreting data; creating and applying usable knowledge (p. 227)

Throughout all four themes, leadership is valued as a key component of success. While the themes expressed by Dede and Honan (2005) reflect the leadership core of

setting direction and developing people, the focus on scaling up innovation reflects the

particular importance of leadership in achieving a redesign of the organization. Many of

the research papers shared at the conference offer a broad picture of the role of leadership

in redesigning the organization through innovation, supporting the framework offered by

Leithwood, et al. (2004). For example, in a study of the Milwaukee Public Schools, Dede

and Nelson (2005) identified three essential leadership attributes of success: vision,

building trust to inspire others to work toward the vision, and collaborative leadership.

Outcomes such as these are important for leaders to understand as they attempt to

implement various innovations to bring about a new frame of education in the 21st

century. While the papers and conversations at the conference focused on changing the

organization through innovation, it is important for educational leaders to understand

different kinds of change.

Marzano, et al. (2005) conducted a groundbreaking research study using a meta-

analysis methodology of over thirty-five years of school leadership studies. The research

demonstrates school leadership can significantly impact student achievement and outlines

responsibilities (Appendix A) necessary for school administrators to embrace in order to

positively impact student achievement. The responsibilities are associated with two types

of change – first-order change and second-order change. Marzano, et al. (2005) defined

first-order change akin to managing the daily life of a school, the most common type of

change in education.

> First-order change is a by-product of the day-to-day operations of the school. The
> routine business of schooling demands corrections and alterations that, by
> definition, are first-order in nature. The responsibilities then can be considered the
> management tools of effective school leaders. (p. 70)

Further, first-order change:

- Is perceived as an extension of the past

- Fits within existing paradigms

- Is consistent with prevailing values and norms

- Can be implemented with existing knowledge and skills

- Requires resources currently available to those responsible for implementing the innovations

- May be accepted because of common agreement that the innovation is necessary (p. 113)

In contrast to first-order change, Marzano, et al. (2005) defines a deeper, more radical type of change called second-order change. Second-order change "is anything but incremental. It involves dramatic departures from the expected, both in defining a given problem and in finding a solution" (p. 66). Second-order change:

- Is perceived as a break with the past

- Lies outside existing paradigms

- Conflicts with prevailing values and norms

- Requires the acquisition of new knowledge and skills

- Requires resources currently not available to those responsible for implementing the innovation

- May be resisted because only those who have a broad perspective of the school see the innovation as necessary.

Marzano, et al. (2005) is not the first to propose theories of change. The conceptualization of first-order and second-order change proposed by Marzano, et al.

(2005) is supported by similar theories. In *Leadership Without Easy Answers*, Heifetz

(1994) proposed a dichotomy of challenges that leaders face – technical and adaptive.

Technical challenges require a solution, typically prescribed by a leader. The solution

utilizes an already-established knowledge base to "fix" the problem. In order to address

the problem and bring about change, a leader need only rely on past experience and

established routines. Heifetz refers to challenges with these characteristics as Type I

challenges.

Adaptive challenges, in contrast, require new learning. Adaptive challenges are

broken into two types. Heifetz (1994) defines Type II challenges as a combination of

technical and adaptive processes. Type II challenges require both the leader and the

constituents (in the case of schools – teachers, students, school board members and other

stakeholders) to act in order to address the problem. The leader may provide possible

solutions, but others will also need to take action in order to solve the problem. Type III

situations are the most challenging. The problem is not clearly defined, and the solution is

not readily available. Potential solutions that require new learning must be developed.

These are the most challenging situations because organizations naturally seek technical

answers regardless of the type of challenge. According to Heifetz (1994), leaders

frequently attempt to address Type II and Type III challenges with Type I solutions.

School leaders, too, fall into the trap of providing technical answers for problems that

require adaptive solutions. Type III challenges require everyone in the organization to

learn and adapt – leader and stakeholders.

The work of Argyris and Schon (1974) on single-loop and double-loop learning

resembles that of Heifetz (1994) and Marzano, et al. (2005). Single-loop learning is

similar to first-order change and Type I challenges. Single-loop learning requires a leader

or organization to apply already devised strategies. Double-loop learning, on the other

hand requires the development of new strategies to address problems. Single-loop

learning tends to reinforce strategies that have been successful while double-loop

learning is the process by which leaders and organizations develop new strategies for new

situations.

Many of today's reform efforts are approached as first-order change. The

integration of technology provides an effective example. Teachers, administrators and

students have typically used computers to electronically extend common tasks (Cuban,

2003) rather than to provide meaningful learning (Jonassen, et al. 2008). For example,

instead of writing an essay by hand, students use computers and word processing

programs to type an essay. Instead of using an overhead projector, teachers use

presentation software to enhance classroom lectures. Administrators use email to quickly

distribute documents to faculty and staff instead of using paper and pen. While these

examples seem simplistic, they represent the kind of change Marzano, et al. (2005) refers

to as first-order change. In these examples, stakeholders have not shifted their ideals and

beliefs about education, nor have they acquired the knowledge or skill sets necessary for

meaningful teaching and learning.

A shift toward a model of 21st century education requires second-order change.

The 21st century education frameworks and the research on meaningful teaching and

learning prompt school leaders and all stakeholders to break with an educational system

rooted in the past and embrace a new paradigm that will prepare students for the

workforce and democratic life in the 21st century. Stakeholders are being asked to rethink

their ideas about education. The education of a decade ago will not suffice for preparing students for a rapidly changing, global, technology-rich future. Ubiquitous computing, a requirement of 21st century education is out of the reach of most schools and is not yet the norm. Additionally, the deep grammar (Lankshear & Knobel, 2003) and an educational psychic prison (Morgan, 2006) drive resistance for a model of second-order change, requiring new knowledge and skills for teaching, learning and leading.

In addition to providing a frame for examining change, Marzano, et al. (2005) identified the responsibilities required for leading different kinds of change in schools. Using additional quantitative calculations, the researchers determined the relationship of leadership responsibilities to first-order and second-order change. Connecting leadership responsibilities to second-order change is valuable for a study of 21st century education and school leadership because change is radical and not incremental.

In the studies of first-order change examined, Marzano, et al. (2005) uncovered a daunting list of 21 leadership responsibilities found to be necessary to lead first-order change (Appendix A). Many of the findings of Marzano, et al. (2005) correspond with the leadership framework proposed by Leithwood, et al. (2004). The five leadership responsibilities with the highest correlation to student achievement included, in order: monitoring/evaluating; culture; ideals/beliefs, knowledge of curriculum, assessment and instruction; involvement in curriculum, assessment and instruction; focus and order (Marzano, et al., 2005). Current and past school reform models focused on improving standardized test scores embrace these responsibilities. In this model, school leaders typically establish a culture focused on the improvement of student performance. Using traditional models of school improvement, stakeholders develop and implement plans for

improved standards, curriculum and instruction. The school leader manages this process to maximize the greatest improvement. Change occurs, but within a traditional scripted paradigm of education.

In contrast, only seven of the twenty-one responsibilities were found to have a significant positive correlation to student achievement in studies of leadership and second-order change. These seven responsibilities, ranked in order of highest positive correlation to student achievement included knowledge of curriculum, instruction and assessment; optimizer; intellectual stimulation; change agent; monitoring/evaluation; flexibility; and ideals/beliefs (Marzano, et al., 2005). Unlike first-order change, second-order change was found to have several responsibilities with a negative correlation: culture, communication, order, and input (Marzano, et al., 2005). As schools shift toward a 21st century model of education, the second-order change leadership responsibilities outlined by Marzano, et al. (2005) show promise for providing a revised framework for action.

The calls for meaningful learning being advocated by the literature require leaders to develop knowledge and skill with second-order change – "dramatic departures from the past" – rather than simply "day-to-day" change. A new vision for education requires teaching and learning to change, not just incrementally, but significantly. This change requires both teachers and leaders to acquire new knowledge. With second-order change, technology becomes a requirement – no longer an option. Presently, many schools do not have the technology infrastructure and resources necessary to support a shift toward 21st century teaching and learning. Since 1991 and the *SCANS Report* (U.S. Department of Labor, The Secretary's Commission on Achieving Necessary Skills, 1991), educators and

the public have heard calls for shifts in education to better prepare students for life and work. Since then, very little has changed with teaching and learning in schools, signifying resistance to change. Resistance has occurred on every level – teacher, administrator, and even student. For 21st century innovations to be successful in school, change of the second-order must be implemented.

Underlying the framework of leadership proposed by Leithwood, et al. (2004) is the idea of *theories of action* proposed by Argyris and Schon (1974). In 1971, the researchers became involved in a project to train educational administrators in school reform. With this project, Argyris and Schon were offered the opportunity to extend their previous work integrating theory with practice. Through their work they concluded that the trainees in the program needed to learn new theories of action in order to carry out their work (Argyris & Schon, 1974). Fundamental to an understanding of theories of action are *espoused theories* and *theories-in-use.*

Whether setting direction, developing people or redesigning an organization, it is important for espoused theory and theory-in-use to be in alignment. Argyris and Schon (1974) define espoused theory as, "the theory of action to which [a person] gives allegiance, and which, upon request, he communicates to others." (p. 7) Asking someone how he/she would act in certain situations leads to an answer that can be labeled as espoused theory. In contrast to espoused theory is theory-in-use. Argyris and Schon (1974) define theory-in-use as, "the theory that actually governs [a person's] actions." (p. 7) The defining term for theory-in-use is *action*. For the kind of educational leadership being argued to be effective, espoused theory and theory-in-use must be in alignment. The link between espoused theory and theory-in-use is action. It is action that translates

an espoused ideal or belief into reality. Transformation of education in the 21st century

calls for new theories of action – both espoused theory and theory-in-use.

School leadership is critical for reframing teaching and learning for the 21st

century. Traditional qualities of leadership as suggested by Leithwood, et al. (2004) are

critical – setting direction, developing people and redesigning the organization. It is the

school leader who establishes a vision for education that includes newly defined skills,

meaningful learning, technology and constructive pedagogy. It is the school leader who

thinks systemically, understanding the dynamic relationship between skills, pedagogy,

learning and technology. It is the leader who thinks systemically to influence others in the

organization to embrace the vision, learning while leading. It is the leader who

acknowledges what is working and proposes solutions for what is not.

Within the framework of setting direction, developing people and redesigning the

organization, school leaders must be aware of types of change and theories of action.

Since the reframing of teaching and learning in the 21st century suggests significant,

radical change, it is important for the school leader to understand second-order change

leadership responsibilities outlined by Marzano, et al. (2005). For many leaders, the

required responsibilities may call for new theories of action. For leadership to be

effective, ideals and beliefs must be translated into reality through action.

Chapter Summary

This chapter supports the argument that effective educational leadership in the

21st century will require an expanded epistemic frame. The argument is grounded in both

theoretical and empirical literatures. An expanded epistemic frame for educational

leadership in the 21st century consists of new knowledge, skills and attitudes. The

literature presented in this review helps to define new knowledge, skills and attitudes as (1) knowledge of 21st skills; (2) knowledge of how people use 21st century skills to enhance their civic and vocational responsibilities; (3) knowledge of technology tools and how students use new tools for informal learning; (4) knowledge of effective learning environments to ensure meaningful learning; (5) development of skills and attitudes for first-order change, including thinking systemically; and (6) a disposition for second-order change.

The most significant feature of an expanded epistemic frame of leadership is recognizing that ideals and beliefs about teaching and learning must change. To develop a foundation for new thinking, leaders can effectively consult available skill frameworks, standards and content area frameworks. Through the process of consulting these literatures, leaders will develop new knowledge of skills, learning outcomes, content, support systems, pedagogy and technology – both formal and informal. As leaders set direction through a new vision for 21st century education, they will need to aggressively challenge old assumptions.

Having established a new, non-negotiable vision grounded in inquiry and social constructivist learning theory, leaders will need to enlist traditional skills of influence to convince an array of stakeholder of the value of the vision. This will require leadership behaviors associated with second-order change: knowledge of curriculum, instruction and assessment; optimizer; intellectual stimulation; change agent; monitoring/evaluation; flexibility; and ideals/beliefs. For the new vision to become reality, leadership will need to continuously think systemically and monitor theories of action throughout the change process.

The literature examined here provides the basis for an expanded epistemic frame of educational leadership. It proposes how leaders for the 21st century can update and expand their ways of doing, caring, being and knowing as leaders. Collectively, the literatures provide a framework for changes in 21st century teaching, learning and leading. The literature served as a blueprint in developing the main research questions for this study, asking how leaders conceptualize teaching and learning in the 21st century and how they enact that conceptualization through leadership actions. The literature also positions this study in a larger field of traditional educational leadership literature and literature highlighting the importance of leadership in implementing technology-based innovations. The research in this study aims to provide school leaders with strategies for integrating broad themes outlined in the literature into practice, resulting in leadership grounded in an expanded epistemic frame.

CHAPTER 3: METHODOLOGY

This chapter presents specific facets and stages of the research process beginning with a description of the research design. Additional sections describe the context of the study, population and participant selection, data sources, data collection procedures, and data analysis, the role of the researcher and validity. A final section addresses limitations of the study

Research Approach

As stated earlier, this research was designed to support the argument that school leaders must acquire new knowledge, skills and dispositions for leading in a technology-rich, networked world. Research questions were developed to understand how a specific group of school leaders conceptualize and understand teaching and learning in the 21st century. Of equal importance was how this group of school leaders chose to act upon their understanding. Since this study was designed to, "understand and interpret how the various participants in a social setting construct the world around them" (Glesne, 2005, p. 4), it was a qualitative research study. Throughout the research process, leaders were asked to share their thinking and attitudes about 21st century education and to describe how they lead espoused ideals and beliefs in their schools.

Additionally, the study worked from a practitioner research approach since it was closely connected to my role as Director of Data and Technology. Anderson, Herr and Nihlen (2007) suggest that practitioners are constantly engaged in questioning their own practice. They further suggest that practitioner research is the manifestation of informal questioning. This study was an in-depth examination of the questions I struggle with daily. As I have worked with my administrative colleagues since 2006 to develop and

implement a contemporary vision for teaching and learning, the questions for this study are my most urgent focus. I have become passionate and curious about the role of building level and district level leadership in efforts to develop a more relevant educational system.

Context of the Study

This study was implemented in the Salisbury Township School District. In 2008, stakeholders in the District developed a six-year Strategic Plan (Salisbury Township School District, 2008) that established a vision, mission and accompanying set of beliefs representing a shift toward 21st century education. The mission is stated in the phrase, "Salisbury…Inspire, Think, Learn, Grow…Together!" (Salisbury Township School District, 2008). The vision statement further articulates a shift toward 21st century education.

> Salisbury Township School District empowers students to become innovative, critical thinkers who develop and apply skills to solve real-world problems. We challenge all students with a curriculum that stimulates personal growth and life-long learning. We embrace the importance of caring relationships and a safe learning environment to ensure a sense of belonging and respect for every individual.

The mission and vision are based on a set of shared values that include:

- We believe student achievement is positively affected by the active involvement of caring adults in a supportive, safe environment.

- We believe the goal of education is to develop literate, self-directed learners who possess the critical thinking and communication skills necessary to be successful and competitive in the 21st century.

- We believe learning is a lifelong process.

- We believe student engagement begins with relevance to today's world and success in that world requires integration of ever-evolving technologies and 21st century skills.

- We believe teaching methods must address and be responsive to individual students' needs.

- We believe in the value and power of collaborative dialogue with all stakeholders.

- We believe every student and educator must be both a learner and a teacher to be successful in the 21st century. (Salisbury Township School District, 2008)

The 2008-09 school year marked the first year for implementation of the Strategic Plan (Salisbury Township School District, 2008). Acting on this framework, the District leadership identified two multi-year initiatives designed to move the organization closer to its vision for 21st century education for its 1,700 students. Prior to the development of the Strategic Plan, the teaching and administrative staff received professional development in Academic Literacy, an approach designed to strengthen student comprehension in all curricular areas. For the 2008-09 school year, professional development continued with a focus on academic literacy and technology integration, with an emphasis on how the two initiatives relate within the District's vision for 21st century education. In addition, during the 2008-09 school year, the District invested $750,000 to provide core instructional areas with sufficient access to laptop computers, interactive whiteboards and multimedia projectors. The School Board, administrators and teachers embraced the notion that without appropriate technology access, an important bridge would be missing to make the vision a reality.

To support school leaders in such a complex, transformative process, regular leadership team meetings were scheduled beginning in September 2008. Meetings have focused on the District's literacy/technology initiatives and have provided an opportunity for the leadership team to develop expertise in these areas. Early meeting agendas focused on planning evaluation and assessment activities. Through team discussions, evaluation questions were developed focused on three areas:

1. The integration of technology and literacy initiatives. The District's vision indicates these initiatives are related.

2. The impact of improved literacy and technology integration on student achievement. It is expected that student achievement will look different and that students will demonstrate understanding in new ways in the 21st century.

3. The shifts in instructional design as a result of new attitudes and expectations. It is expected that teaching and learning will look different. It is also understood professional development will be an important element in bringing about changes in instructional practice.

Leadership team meeting agendas have focused on 21st century education. Team meetings have been a time for principals and District leaders to develop their conceptualization and leadership of 21st century education through the sharing of practices. This study and its research questions are timely and relevant to the challenging work of the leadership team and complement the administrative professional development meetings with its dual focus on 21st century education and leadership.

Demographically, the District is primarily composed of students who are white and middle class, although increases in the population of Hispanic and black students

have been observed in recent years. Statistics for the 2008-09 school year indicate 81% of

students were white, 9% were Hispanic, 4.5% were black, 3% were multi-racial and 2.5%

were Asian. Approximately 18% of the District students received free or reduced lunch.

One elementary school and the middle school are classified as Title I schools, receiving

additional financial support from the federal government to support struggling readers.

All schools, with the exception of the Title I elementary school, maintained Adequate

Yearly Progress (AYP) for the 2008-09 school year. The Title I school was in its first

year of Warning, failing to achieve AYP.

Population and Participant Selection

The population for this study consisted of nine members of the administrative

team. The functional roles on this team include principals and central office personnel.

Included were the Superintendent, Director of Special Education, Supervisor of Special

Education, two Elementary Principals, High School Principal, High School Assistant

Principal, Middle School Principal, and Middle School Assistant Principal. Women are

represented in this group with seven positions, while men hold two positions. All

participants are Caucasian. As the Director of Data and Technology, I am a member of

the administrative team. However, as the researcher conducting this study, I did not

participate. Table 3.1 provides information about administrative role, gender, race,

number of years in the District and number of years in a leadership role.

Table 3.1

Demographics of the Study Participants

Role	Gender	Race	Total Years in a Leadership Role in the District	Total Years in a Leadership Role (including service in other districts)
Superintendent	Female	Caucasian	5	18
Director of Special Education	Female	Caucasian	6	6
Supervisor of Special Education	Female	Caucasian	3	3
High School Principal	Female	Caucasian	3	5
High School Assistant Principal	Female	Caucasian	2	5
Middle School Principal	Male	Caucasian	15	16
Middle School Assistant Principal	Male	Caucasian	1	2
Elementary School Principal	Female	Caucasian	5	5
Elementary School Principal	Female	Caucasian	1	3

As Marshall and Rossman (2006) suggest, the decision to define the population

for this study emerged from careful consideration of the research questions and data

collection methods. Salisbury Township School District is a small district with a small

administrative team that meets regularly and works closely together to define and

implement District goals. It was believed a total of nine participants would provide

sufficient data to answer the research questions, draw conclusions and propose

recommendations within the allotted time. With all these considerations in mind, it was realistic to invite the entire administrative team to participate. As a result of this decision, no selection strategy was necessary.

Data Sources and Procedures

Data for this study were collected from February through June 2009. Glesne (2005) suggests that, "…the more sources tapped for understanding, the richer the data and the more believable the findings" (p. 36). She further suggests that this does not mean collecting a list of every possible collection strategy, but rather first contemplating what needs to be learned and selecting only the appropriate methods. Based on the research questions, there were six data gathering methods that contributed to a robust set of data for this study: (1) individual interviews; (2) school building walkthroughs; (3) researcher memos and journal; (4) reflective writing prompts; (5) follow-up individual interviews; and (6) focus group sessions.

Data gathering methods were specifically selected to address triangulation in several ways: (1) multiple participants; (2) multiple perspectives; and (3) multiple data collection methods (Anderson, Herr & Nihlen, 2007). This study consisted of nine participants, each representing a unique role in a unique setting within the organization. Participants represented building leadership perspectives as well as District-level leadership perspectives. Elementary school, middle school and high school were represented as well as special education. The use of unobtrusive data collection methods such as school building walkthroughs and memoing helped illuminate tacit understandings communicated through interviews and focus groups (Maxwell, 2005). This manner of triangulation led to a significant finding related to theories of action.

Addressing the issue of triangulation within the research design provides credibility to the study's conclusions (Maxwell, 2005).

The data collection methods were sequential, informing subsequent data collection as the research process unfolded. Data from the initial interviews informed the school building walkthroughs that in turn informed the second round of interviews. Interview data and school building walkthrough data were then used to inform focus group interview protocols. A more detailed description of data collection methods follows.

Interviews

Structured individual interviews occurred in February 2009 and were designed to uncover more deeply the participant's perspectives on the research questions (Marshall & Rossman, 2006). Initial interviews were conducted with each of the nine participants for approximately one hour. The goal of these interviews was to establish a baseline understanding of the thinking of each administrator about 21st century teaching, learning and the leadership skills they utilize in their practice. All administrators were asked the same questions (Appendix B); however, probing and clarifying questions frequently surfaced depending on the direction of the interview. The interviews were recorded and transcribed for later coding and analysis.

A second one-hour follow-up interview with each participant occurred in May 2009. The focus of these interviews varied depending on content and themes that emerged from the initial interview, the school building walkthroughs and the reflective writing prompt. As with the initial interviews, follow-up interviews were recorded and transcribed for later coding and analysis.

School Building Walkthroughs

Upon completion of the initial round of interviews, school building walkthroughs occurred during March 2009. The walkthrough strategy was designed specifically to highlight and triangulate evidence pertaining to conceptualizations offered in the initial interviews. Lytle (1996) effectively used the walkthrough strategy to gather data to inform his understanding of issues pertaining to grade retention and student report card grades. Lytle used the walkthrough to better understand the context of this quantitative data.

Information provided during the initial interviews was used to determine the plan for what to observe during the walkthroughs. During this phase of data collection, five walkthroughs were executed in each school building. A typical walkthrough consisted of classroom visits lasting no more than twenty minutes and observations of the general school environment, including the actions of administrators. Detailed field notes were taken and transcribed for later coding. Within the context of this study, building walkthroughs were an important data source to match administrators' words with actions. Argyris and Schon (1974) remind us,

> When someone is asked how be would behave under certain circumstances, the answer he usually gives is the espoused theory of action for that situation. This is the theory of action to which he gives allegiance, and which upon request, he communicates to others. However, the theory that actually governs his actions is his theory-in-use. (p. 6)

The walkthrough strategy allowed me to, "gain firsthand involvement" in the environment the participants operate in daily (Marshall & Rossman, 2006). Experiencing the reality of the participants' work provided me with a set of data to help in supporting

or challenging perceptions communicated through the individual interviews (Marshall & Rossman, 2006).

Memos and Journal

Throughout the duration of the study, and particularly during the data collection period, memos were composed to reflect upon the collection process and emerging themes as connected to the literature. Glesne (2005) describes memoing as the, "links across your data" (p. 148). Memo writing is the beginning of the analysis process (Glesne, 2005). Memos helped to provide a stream of continuous analysis as the data pieces were collected and became part of the story behind this study. Throughout the process of thinking and writing about the data, new concepts emerged that moved the analysis of the study forward. For example, during the walkthrough phase of data collection, questions emerged about the gap between espoused theory shared in earlier interviews and in-use theory as observed. Through the analytic memo process, theories specific to the research context were developed and literatures were investigated to illuminate observations and further analysis.

Less formal than memoing, journal writing was used to, "write notes, reassess roles, retreat from the setting, [and] question the direction of the research" (Marshall & Rossman, 2006, p. 77). This electronic data source was useful in revealing biases and addressing issues of validity throughout the process. In addition to maintaining a researcher journal, a log was maintained reflecting each step of the research study. The activity log became a record of major data gathering and included records of informal talks with participants and critical friends. (Glesne, 2005) Conversations with the participants as well as critical friends often led to the analytic memo writing. Notes from

conversations were maintained electronically and were consulted when applicable in the memo writing process and throughout data analysis.

Reflective Writing Prompt

During April 2009, the participants were asked to respond to a reflective writing prompt (Appendix C). The administrative team developed a series of reflective evaluation questions as a part of professional development meetings. The questions focused on three areas outlined earlier: (1) evidence that literacy and technology were being jointly integrated into instruction; (2) evidence of increased student achievement and what this increase looked like in the classroom; and (3) evidence of shifts in instructional design. The reflective writing prompt questions provided an additional opportunity for the participants to share their conceptualization of 21st century education through specific examples from their practice. Participants had the opportunity to articulate their role as a leader in bringing about change in their building and throughout the district.

Focus Groups

Focus group sessions occurred in May 2009. The participants were either principals or District leaders. Therefore, it was reasonably assumed each of these groups would have different perspectives on their role in leading and implementing a vision for 21st century education. The focus group interviews were designed to probe further into different group perceptions. After all previously outlined sets of data were collected and preliminarily analyzed, a series of questions (Appendix D) were developed for two focus group sessions that included three District leaders in one group and six school building leaders in another group. Marshall & Rossman (2006) note that focus group interviews are valuable because there is interaction between participants. This interaction can lead to

new data that might be missing in individual interviews. Questions for the focus group session relied heavily on the data from previous data collection sources. The focus group sessions were recorded and transcribed for later coding and analysis.

Data Analysis

For this study, data analysis consisted of inductive and deductive methods outlined later in this section, and occurred during and after data collection. After each data source was collected, a preliminary thematic analysis and interpretation was completed through the analytic memo writing process. The preliminary analysis, especially early in the data collection process, informed the implementation of subsequent data collection methods. Marshall and Rossman (2006) suggest a similar series of analytic procedures for making sense of a data set. At the heart of these procedures are the tasks of generating categories and themes, coding the data, and offering interpretations through analytic memos (Marshall & Rossman, 2006).

Upon completion of the data collection process, there was a prolonged period of data analysis. Miles and Huberman (1994) propose three areas of data analysis: data reduction, data display and conclusion drawing and verification. This section will describe the areas of data analysis in detail.

The data analysis process began by selecting 20% of the data set to pilot data analysis strategies. Data were selected for the pilot to ensure a variety of leadership roles and sources were represented. Data were coded using Atlas.ti software. The first challenge was to develop a coding scheme. Initial efforts at developing a scheme resulted in codes too numerous and too undefined. It was decided that returning to the key concepts in the research questions would yield the most useful and most

efficient codes. As a result, the following coding scheme was used for initial coding

using the Atlas.ti software.

Table 3.2

Coding Scheme – Data Reduction Using Atlas.ti Software

Code	Description
Teaching Story - Espoused **(TSE)**	Description of teaching grounded in a theoretical understanding of teaching in the 21st century. There is no evidence of the teaching story grounded in the school leader's actual practice.
Teaching Story - Actual **(TSA)**	Description of teaching grounded in both a theoretical understanding of teaching in the 21st century as well as the school leader's practice. This is an actual example of teaching in the 21st century as seen through the lens of the leader's own understanding.
Learning Story - Espoused **(LRNSE)**	Description of learning grounded in a theoretical understanding of learning in the 21st century. There is no evidence of the learning story grounded in the school leader's actual practice.
Learning Story - Actual **(LRNSA)**	Description of learning grounded in both a theoretical understanding of learning in the 21st century as well as the school leader's practice. This is an actual example of learning in the 21st century as seen through the lens of the leader's own understanding.
Leadership Story - Espoused **(LEADSE)**	Description of leadership grounded in a theoretical understanding of leadership in the 21st century. There is no evidence of the leadership story grounded in the school leader's actual practice.
Leadership Story - Enacted **(LEADSA)**	Description of learning grounded in both a theoretical understanding of leadership in the 21st century as well as the school leader's practice. This is an actual example of enacted leadership in the 21st century as seen through the lens of the leader's own understanding.

Once the data were reduced, further content analysis was completed for the

teaching and learning data using the conceptual framework for the study as a guide.

Preliminary themes emerged for the teaching and learning categories (Appendix E). Data

displays were created for the themes, including the number of occurrences for each theme

throughout the partial data set.

An inductive approach was used to analyze data in the leadership category using the 21 leadership responsibilities (Appendix A) outlined by Marzano, et al. (2005). Data displays were created representing the number of occurrences of each responsibility throughout the leadership data.

Choosing to test data analysis strategies prior to analysis of the full data set proved to be valuable, informing later data analysis. Themes representing teaching and learning became refined and more clearly defined. Refinement of the deductive analysis process on a sample of the data set allowed for a more efficient and accurate analysis of the complete data set.

As a result of the pilot data analysis, two modifications were made to the data analysis of the full set of data. First, when teaching, learning, or leadership responsibilities were represented in the pilot data set, they were described in terms of either espoused theory or theory-in-use as defined by Argyris and Schon (1974). It was necessary for this distinction to become a part of the data analysis process. Second, *challenges* emerged as a significant theme in the leadership data. It became necessary to code the leadership data for challenges in addition to the 21 leadership responsibilities. It became apparent that the challenges would need to be further coded using the categories of teaching, learning and leading. Additionally, categories within these codes needed to be established for (1) no actions shared; (2) future action shared; and (3) present or past action shared.

After defining a clear set of data analysis strategies through the pilot process, the entire data set was analyzed. Themes that emerged from the pilot teaching and learning data were used for coding with sub-codes of espoused theory and theory-in-use (Argyris

and Schon, 1974). The leadership data was coded using the 21 leadership responsibilities (Marzano, et al., 2005) with sub-codes of espoused theory and theory-in-use (Argyris and Schon, 1974). Additionally, the leadership data was coded for challenges as described above.

In summary, data analysis occurred during and after the data collection period. Data analysis procedures were arrived at through a pilot data analysis process that included both deductive and indicative processes. Final data analysis procedures included analyzing data for themes associated with teaching, learning and leading. Data were further analyzed for espoused theory and theory-in-use. Leadership data were also analyzed for challenges since they emerged as a significant theme.

Role of the Researcher/Validity

Glesne (2005) speaks to two roles of researcher – researcher and learner (p. 46-47). There are certain "norms" that are expected of a researcher whether it be inside or outside of the professional setting. As a learner, the researcher does not come to the research as an expert or authority (Glesne, 2005, p. 46). Throughout this study, it was important for the participants to feel comfortable being themselves and sharing thoughts that were to become valuable pieces in the data set. As the researcher, I made time to reflect on these two roles in journal entries and memos.

Zeni (2001) writes about the challenges of practitioner research and ethical issues that often develop over the course of a research project. She advises practitioner researchers to develop awareness of location, relationships, interpretation/definition, publication and institutionalization. In my formal role as Director of Data and Technology, the participants viewed me as an inquiring colleague throughout the research

process. The role of Director, however, located me as a District-level leader, as opposed to a building-level leader. Having never been a principal, I wrote frequent journal entries about potential biases in relation to my positioning within the organization. Even though I am a District-level leader, it is important to note there is no power relationship between the participants and me, except with the Superintendent. This relationship was never an issue.

Throughout the research process, with individual and group member checks, I took great care when communicating my interpretation of the data and findings. Where the findings represented gaps between practice and literature, I embraced an approach that balanced honesty with sensitivity for the participants and the work they do. In sharing participant data, I have taken great care with de-identification. However, with a small population of nine, de-identification presented challenges. While there were few conversations initiated by the participants outside of formal data collection, I shared my research openly while maintaining confidentiality when conversations occurred.

Finally, I identify myself as a strong proponent of the shifts in education espoused in the literature on teaching and learning in the 21st century. Since I am so deeply committed to this kind of change in schools, it was important for me to keep my biases in check. This self-check was done through frequent journal and memo writing, member checks and sharing my thinking and findings with critical friends. Written member checks were conducted after each individual interview and focus group session. After each interview, a document was developed outlining preliminary themes with researcher interpretation. These documents were shared with individual participants in order to seek further input. When necessary, written member checks were followed with conversations

when requested by participants. Member check documents consisted of interview and walkthrough data organized according to the categories of knowledge, skills and dispositions. These categories were used as a way to present pertinent data and interpretations for ease of use by the participants. This example from a member check document reflects a principal's view of leadership and the kind of interpretation and example offered in a written member check.

> P1 believes that the principal plays a key role in influencing change: "it's going to have to take some leadership and really pushing them and almost compelling them to do some things that are right for students." (Participant #3, Interview Protocol 1 Member Check, February 14, 2009)

After the member check document was provided, participants were encouraged to read the document and offer feedback concerning accuracy of data and validity of researcher interpretation. Participants were offered the option of providing feedback in writing or verbally. One instance of participant feedback was received, requesting a minor clarification of researcher interpretation.

In addition to individual member checks, a group member check was conducted in October 2009 at the conclusion of the data analysis period. During the presentation, the purpose of the study, research questions and data analysis methods were reviewed. Initial findings were shared with the study participants and feedback was solicited. It is important to note that during the presentation the disconnect between leadership action and leadership challenge, one of the most significant findings of the study, was made clear to the participants. In conjunction with this particular finding, an accompanying quote from Marzano, et al. (2005) was shared: "If leadership techniques do not match the order of change required by an innovation, the innovation will probably fail regardless of

its merits" (p. 74). At the conclusion of the presentation, the participants were asked for their reactions to the findings of the study. Two of the participants spoke briefly about their interest in the work, while the remaining team members remained silent. I later approached two participants individually to share my disappointment in the lack of conversation. They confirmed my thoughts that the findings were valid and that the participants were not eager to address them at that time. Another participant shared her feeling the presentation provided a large amount of information, requiring additional time for processing. Since the October 2009 group member check, the participants have not discussed the findings as a group.

Throughout the data collection process, member checks prompted much reflection on my part as the researcher. The lack of significant feedback in both written and verbal member checks was puzzling. My reflections became part of journal entries and analytic memos. Member checks helped me to reflect on my role as researcher and validate the research findings.

Limitations

This study has the following limitations:

1. The sample size (n=9) was limited, thereby impacting the generalizability of the findings.

2. The unit of analysis was the entire group of participants. No effort was made to disaggregate data based on demographics, different leadership roles, experiences with technology or other identifiers, thus impacting the generalizability of findings to individual leaders.

3. Inter-rater reliability was considered in improving the validity of findings. Due to time constraints, inter-rater reliability was not part of the research design.

Chapter Summary

This was a qualitative research study involving nine leaders in Salisbury Township School District, a small suburban school district located in Allentown, Pennsylvania. Data collection sources were chosen to enhance triangulation and included interviews, school building walkthroughs, follow-up interviews, reflective writing prompts, focus group interviews, journal entries and analytic memos. Data analysis was both inductive and deductive. Thematic data analysis strategies were defined through an initial analysis of a subset of the data. Measures of validity included individual member checks, a group member check, and reflective journal writing focused on the role of the researcher.

CHAPTER 4: FINDINGS

The purpose of the study was to understand how a group of school leaders conceptualize and understand teaching and learning in the 21st century. Of equal importance was how this group of school leaders act on their understanding. Research questions were developed to guide an understanding of the relationship between teaching, learning and leadership. Through an analysis of the various data sources outlined in Chapter 3, findings have emerged resulting in a story of teaching, learning and leadership in the 21st century specific to the participants. In this chapter, findings are presented in relation to the three main components of the primary research questions – teaching, learning and leading.

How do school leaders conceptualize teaching and learning for the 21st century?

How do they act upon their understandings in the school setting?

Since the research questions focus on the conceptualization of teaching and learning in the 21st century, the first section of the chapter begins with a presentation of key concepts about teaching that emerged from the data analysis process. Concepts include real-world application, instructional design, technology, teacher as learner, professional collaboration and shifting roles. The second section presents key concepts about learning that emerged from the data analysis process. Concepts include real-world application, redefined skills and personalized learning. The third section examines themes across the domains of teaching and learning. Themes include conceptual clarification, frequency of conceptual understanding in-use, examples of technology integration, positioning of the leader and change. The fourth section presents key themes about leadership that emerged from the data analysis process. Themes include first-order and

second-order change, and theories of action. The fifth and final section presents a

summary of the findings.

Teaching in the 21st Century

Six themes emerged through conversations with the participants about teaching in

the 21st century. <u>Teaching in the 21st century:</u>

1. Reflects an understanding of the world outside the classroom, including the role
   of technology

2. Requires a rethinking of lesson design

3. Embraces the view that technology is a priority in rethinking education

4. Requires teachers to be learners and embrace change

5. Requires collaboration among teachers

6. Requires a shift of control and ownership to the learner

A deeper analysis of the themes revealed patterns that tell a more detailed story

about how the participants think about teaching in the 21st century. First, the themes

represent concepts that appear in the literature. Specifically, the first three themes focus

on teaching using a knowledge/skills lens: What new knowledge and skills must teachers

develop to be effective? The participants suggested the need for teachers to acquire

knowledge of real-world application, effective instructional design and technology.

Themes four and five focus on teaching using an attitude lens: What dispositions must

teachers embrace as they develop new skills and knowledge? The participants suggested

teachers learn collaboratively. The final theme focuses on the outcome of the acquisition

of new knowledge, skills and dispositions: transformation in the roles of teacher and

student.

Two additional patterns emerged from an analysis of the themes. The participants were clear that the manner in which they conceptualize teaching is not the norm within their particular leadership context. For a majority of the themes, the participants offered specific challenges that prevented teachers from developing espoused knowledge, skills and dispositions. What is most interesting, and relevant to this study, is that it is unclear what the participants have done through leadership to make the espoused concepts a reality for all teachers. In telling their stories, the participants stopped at articulating their espoused beliefs, often not connecting the stories to how they are leading teachers to embrace new knowledge, skills and attitudes.

In the following sections, the individual themes will be explored, highlighting the patterns outlined above with specific data. It is important to note these themes and patterns emerged across the data set provided by all nine participants. No one individual articulated all six themes in exactly the same way. Therefore, the six themes represent the participants as a whole rather than any specific individual.

Real-world Application

The data relating to this theme supports the idea that teachers in the 21st century must develop authentic activities that connect learning to what students do or will be doing outside the classroom. In some way, all nine participants shared how they believe teaching today must be closely aligned with activity in the real world, particularly where work and careers are concerned. The words of a central office administrator directly communicate the idea of relevancy. "The situations we create in our classrooms have to mirror that which students will be doing outside of our classrooms" (Participant # 7, First Interview Protocol, February 3, 2009). Reiterating this concept about teaching, all

principals and assistant principals shared openly how the teaching practices they observe

are often disconnected from knowledge of real world relevancy.

> Good teaching must make learning relevant, make it timely for students, make it
> rigorous so that it deals with things that really matter, things that are sustained.
> We've not taught them purposefully or systematically in our school system.
> Teaching needs to show, "What does this mean for my life right now?" I want
> teachers to have a solid understanding of how to plan lessons that involve real
> world application, that they're using some of the tools that the world is using in
> the 21st century, and that they're understanding why they are using it. It's
> important that they're not just using technology because they think it's on a
> checklist. It makes sense to use it. I'm not so sure we're there yet. (Participant #5,
> First Interview Protocol, February 6, 2009)

Four participants shared how they believe a strong emphasis on content in the

process of teaching can work counter to the need to connect to the real world.

> I think sometimes, and it gets tough when you're focusing on your content, to not
> just focus on your content but to look at the big picture and figure out what's the
> real purpose for learning all the information that's here in this textbook.
> (Participant #2, First Interview Protocol, February 27, 2009)

All nine participants believe technologies can aid in bringing the classroom closer

to the outside world. The participants described how students live in a world filled with

technology and media. They believe schools should aim to teach students how to

problem-solve with technology in ways similar to adults outside of school.

> We can teach them to use technology, but they already know how to do that. I
> think what we need to do is teach them how to use the tools in a collaborative
> setting and also teach them the critical thinking skills so they can use the tools to
> solve real problems. In my mind, the world is going to be so different, even ten
> years from now. I can't imagine that it's worthwhile spending a lot of time
> teaching kids technology tools. In my mind, it's not an extremely valuable use of
> time and energy. What we need to do is teach them the learning skills, to learn
> how to use the tools to solve a problem and to create something new. (Participant
> #1, First Interview Protocol, February 20, 2009)

Each participant reflected on the powerful role the teacher plays in connecting the

classroom to the outside world. One principal shared her observation that the most

successful teachers are better at making real-world connections in the classroom. Her

belief is based on the premise that in today's world, people create and consume products.

She theorized that for teachers to better understand the world as it is today, they, too,

must be consumers *and* producers.

> There are a few teachers I would say understand what a quality product looks like because they produce them. They have a stronger connection to the real world and therefore bring that into their classroom. But most teachers are more consumers than producers. (Participant #5, First Interview Protocol, February 6, 2009)

The direct quotes demonstrate the participants as a whole envision teachers as

comfortable planning instruction that embodies real world application, particularly in

relation to what adults do in their careers. The participants believe technology use is an

important part of authentic learning when it reflects ways in which the technology is used

in the real world. Designing authentic learning experiences, especially those that integrate

technology, is a key feature of meaningful learning as outlined by Jonassen, et al. (2008).

The observation by the principals and assistant principals that teaching in the District

does not clearly connect learning to relevant experiences was reinforced during school

building walkthroughs. Coding of walkthrough data revealed seventeen observed

instances of teaching and learning coded for real-world application from a total of eighty-

four teaching and learning observations.

All of the participants suggested ways in which teachers might increase the

amount of authentic learning in classrooms. Many classes focus on content driven by the

outline of a textbook. Since meaningful learning is active, constructive, intentional,

authentic and cooperative (Jonassen, et al., 2008), it often results in the development of

student products and knowledge. The participants suggest meaningful learning may

become more prevalent once teachers experience the roles of both producer and

consumer within the teaching and learning process. In other words, teachers might not

have the required knowledge, through experience, to understand real-world application.

Since meaningful learning and the accompanying pedagogy is a critical component of

21st century teaching and learning, an understanding of this theme is an important bridge

to the participants' expanded conceptualization of teaching. Through an expanded

conceptualization of teaching, the participants gain new knowledge they can use to lead

needed change.

Instructional Design

The data relating to this theme supports the idea that teaching in the 21st century

requires a revised frame of instructional design. When discussing instructional design, the

majority of participants contrasted ideas of traditional instructional design with ideas they

believe are more compatible with learning in the 21st century.

> I can walk down the halls of this school and much of what I see is a traditional
> model of teaching – usually the teacher is standing at the board or in front of the
> students talking. Even with the SmartBoards it's still teacher talk. I don't see as
> much activity as I'd like from our students. I see math and history as the most
> guilty of this kind of teaching. With science there is more inquiry. I wish we
> could get more of that into all of our classrooms. (Participant #4, First Interview
> Protocol, February 2, 2009)

This quote demonstrates instruction is currently deeply rooted in an industrial era model

– homogenized instruction that frequently does not take into account the needs and

interests of students. The majority of participants shared the idea that teaching should not

be about transmitting one right answer. Rather, effective instructional design models

inquiry around open-ended, authentic problems. One principal summarized the core of

effective instructional design, "If you could just simplify it, it is the concept that teachers

are doing less direct instruction and the students are doing more authentic learning in the classroom using resources that they hadn't used before" (Participant #3, First Interview Protocol, February 12, 2009).

One of the dilemmas shared by the school leaders is a heavy reliance on teacher manuals to inform instructional design. "We need to get away from the cookie cutter activities and cookie cutter lessons and move more toward freedom of choice in activities" (Participant #2, First Interview Protocol, February 27, 2009). This principal later reflected on an alternative to current instructional design, emphasizing the social component of learning.

> We need to get away from the idea that there is one right answer. There are multiple sources, and possibilities to consider so students should be more critical of the information they get. I see the importance of having students question more about their own learning, having them construct their own learning, having them challenge each other about the information and learning they encounter. (Participant #2, Second Interview Protocol, April 6, 2009)

Finally, a principal reflected on the challenge of a new model of instructional design that requires new skills – of both students and teachers.

> Students need a lot of literacies. They have to be technologically literate; they need to be media literate. It's hard to teach and talk the language of what you expect to see if you're not well versed in that language yourself. (Participant #6, First Interview Protocol, February 10, 2009)

The data supporting this theme demonstrates how the participants contrasted their conceptualization of 21st century pedagogy with other instructional models. To the participants, 21st century teaching is characterized by instructional design focused on the 21st century skills of inquiry, problem solving, collaboration and communication. The evidence in this section demonstrates the participants believe that effective instructional

design reflects the following characteristics: students constructing their own learning; less direct instruction; and greater authentic learning.

As with the earlier theme of real-world application, the beliefs about instructional design espoused by the participants are not the norm in their schools. Barriers to achieving effective instructional design included teacher over-reliance on instructor manuals for lesson design; and the challenge of expanded literacies for the 21st century, including technology, information and media. Over-reliance on teacher manuals reinforces the standardization of instruction, preventing creativity and differentiation in the teaching and learning process. The expansion of literacies as a result of the proliferation of technology requires the acquisition of new knowledge by students, teachers and leaders. Developing competencies in new literacies and modifying instructional design while meeting the varying needs of students has proven a difficult task for teachers according to the participants.

The theme of instructional design is important for this study because changes in pedagogy, skills and knowledge are at the core of effective teaching and learning in the 21st century. By identifying instructional design as a concept of 21st century teaching, the participants recognized a key point of change. Having identified the gap between theory and practice, the participants can more effectively move forward with the process of changing instructional design. Changes in instructional design and the accompanying learning environments can become a focus of leadership.

Technology

The data relating to this theme supports the idea that technology is an important and necessary feature of teaching and learning in the 21st century. The introduction of

technology into teaching and learning has required new skills from both teachers and students. A principal shared, "The prevalence of technology requires a different set of problem solving skills such as information literacy" (Participant #6, First Interview Protocol, February 10, 2009). While technology can provide teachers with a new challenge, principals believe it can also offer a significant affordance. The presence of technology encourages the rethinking of teaching and learning by "allowing us to give students the real-time information to change that assignment to make it more relevant to students where they are right now" (Participant #5, First Interview Protocol, February 6, 2009). Technology helps shift the instructional design process to become more authentic, connected to the real world.

The concept of using technology in the teaching process is directly connected to the earlier concepts of real-world application and instructional design. Since the effective use of technology requires a shift in instructional design, its introduction into the teaching and learning process can be viewed as intimidating by teachers comfortable with an instructionist model of pedagogy.

> In terms of fear of what their role means, I think a lot of that evolves organically. I believe a lot of that fear is misplaced. Technology isn't replacing teachers, and I think as they use it more and become more comfortable with it, they realize that fact. They come to learn that on their own. It's something I can tell them and say to them, but they need to see there's still a place for them with this. That they're part of this still, and, as students, assume more responsibility for their learning it doesn't mean that teachers don't have a role in that learning. (Participant #6, First Interview Protocol, February 10, 2009)

The concept of technology is closely connected to the concepts of real-world application and instructional design. Technology, when used effectively, can alter the way teachers teach and students learn. When technology is used effectively, teachers

change instructional design to become more sensitive to student needs. When technology

is used effectively, instruction generates stronger connections to real-world applications.

When asked to describe technology-rich lessons, the participants shared examples

of technology use that were weak as defined by the literature, demonstrating a developing

understanding of effective technology use.

> I made a lot of connections with Carol last year just going in and sitting with her students, talking with them, doing some projects and things with them. When she did this Flat Stanley project, she e-mailed me and said "Would you be willing to Skype with my class? I need to be able to have the kids be not so rammy when they get on Skype so that when we do it with the other classrooms the newness will have worn off." I said, "No problem." And so that's what we did. I went down and met her class, introduced myself, and went down a couple other times so they could get used to seeing me. Then she started to Skype me and then we started to have conversations back and forth. I was really being used so that the kids wouldn't think that this was a novelty anymore. It was just normal. (Participant #9, First Interview Protocol, February 16, 2009)

The participants also shared barriers associated with using technology more

effectively to meet student needs, create real-world applications and change instructional

design. In particular, principals shared how teachers are reluctant to change instructional

practice. In the majority of classrooms, the use of technology becomes a task within an

instructionist model of learning, not a transformative tool that helps move teaching and

learning toward social constructivism. The literature positions technology as a key

element of a 21st century learning ecology. The participants have acknowledged the

importance of technology within their conceptualization. By also acknowledging the

current level of technology integration along with its barriers, the participants have

created their own argument on which to take action as leaders.

Teacher as Learner

The data relating to this theme supports the idea that new skills, literacies and a changing, technology-rich landscape require teachers to be learners with their students and colleagues. Across the data set, the participants shared stories of teaching and learning that represented the work of ten teachers District-wide. The building walkthrough data reinforced this finding by referencing nine of the ten teachers in observations coded for meaningful learning. The participants shared stories associated with specific teachers who model the espoused qualities of teaching in the 21st century. Of these teachers, one thing is clear: they are all learners. As one principal described it, "They are not afraid of learning and not afraid of trial and error and not afraid of the time and energy it takes to put those things together" (Participant #6, Second Interview Protocol, April 16, 2009). Model teachers have a disposition for learning new things related to the practice of teaching. "I think it comes from the teacher wanting to improve their instruction, and wanting to change" (Participant #6, First Interview Protocol, February 10, 2009).

Four of the participants described teachers as fostering individual learning in two ways: (1) immersing themselves in the real world and using those experiences to motivate their students; and (2) engaging in professional reading about teaching and learning in the 21st century.

In this example, a principal shared how teachers who immerse themselves in the use of various technology tools, both personally and professionally, bring those experiences into their work with students. Teachers have knowledge *about* learning with the tools, not just knowledge *of* the tools.

I think the IP project is one of those ideas that I see as integrating a lot of the teaching and learning skills we're talking about, particularly as it's evolving this year. This definitely includes collaboration, and the students are using Google Docs and using it effectively. They used to have to meet all together physically at someone's home to work on things, and they've really eliminated a lot of that. The students are collaborating with Google Docs with close to real time updates. They are using it as a really nice management tool as well. I think they hone their communication skills very effectively both in terms of how to communicate with one another on an interpersonal level and the broader communication of presentation and their expanding repertoire of media that they're using to do that. They're moving from stage presentations in acting to actual filming. To some degree, it focuses on teaching some creativity and the use of inquiry-based learning. They generate their own project; it's something they want to learn about and they want to know about. It's about as authentic an assessment as you're going to get of a student's learning I think. They're becoming more and more well-versed with different media and with different technological skills, programs and literacies across the board – thanks to what their teachers are doing. (Participant #6, First Interview Protocol, February 10, 2009)

While teachers and leaders are engaging in professional reading, the structure of

this reading is important. Reading for the sake of reading does not result in change. A

clear purpose accompanied by probing questions can enhance the learning of educators.

I don't think teachers fully realize there's a school of thought out there about 21st century learning. They're reading articles all the time, but I think there needs to be a process of defining this thinking about using new technologies for education and the way students learn in different ways. (Participant #4, First Interview Protocol, February 2, 2009)

Through these examples and the data presented above, it is clear a small number

of teachers District-wide embrace 21st century teaching and learning as the participants

conceptualized it. When speaking about early adopters, the participants described the

teachers as risk-takers. The early adopter teachers have little fear of failure and are

internally motivated to learn about new skills, new pedagogy, and new technology. They

are described as savvy with knowledge of real-world authentic experiences and savvy

with the latest literature on teaching and learning. The early adopter teachers are learners

with their students and learners with their colleagues who think similarly. One of the

ways teachers engage with colleagues is through professional reading.

During the data collection process, a majority of the participants recognized the

efforts of the early adopters. This group of teachers has the potential to be developed into

the "opinion leadership" (Rogers, 2003) within the District, modeling and encouraging

colleagues to pursue their own learning and development. It is significant the participants

recognize teacher learning as a core value of 21st century teaching. In order for teaching

for meaningful learning to become the norm in schools, the participants will have to

develop strategies to effectively engage all teaching staff in professional learning. When

the teachers and administrators learn together, the organization is primed for change.

Professional Collaboration

The data relating to this theme supports the idea that professional collaboration

among colleagues is important in developing 21st teaching beliefs and values. While

individual teacher learning is important in the 21st century, learning socially with

professional colleagues is equally important. The kind of learning teachers engage in is

both face-to-face and, less often, virtual. In the 21st century, changing and improving

teaching practice is no longer an isolated endeavor. Teachers learn best through

collaborating with other teachers. Professional collaboration provides the intellectual

stimulation to help understand changes in teaching and learning.

A central office administrator reflected on the value of teachers improving their

practice through professional collaboration.

> I would like to write a book called "No Teacher has an Island" instead of "No
> Man is an Island." Teaching should not be about what you do with your door
> closed. If it is not about what you're learning from each other, bringing to the

table, taking back and trying, bringing back to the table, if you're not doing that and having different people come in and share, you're not demonstrating what goes on in real life. (Participant #7, Second Interview Protocol, April 7, 2009)

Another principal shared, "Teachers need to have direct discussions about what these things [21st century skills] are" (Participant #3, Principal Focus Group Protocol, June 22, 2009). The principals as a group agreed they and the District provide many opportunities for teachers to physically and virtually interact with one another during the school day. Professional development days are an opportunity for teachers to share strategies, activities and technology knowledge with their colleagues. Learning is extended through technological resources such as wikis that allow teachers to access other shared resources once the professional development is completed. Despite a significant number of professional growth opportunities being offered throughout the year, the participants would like to see more teachers take advantage of professional development. "I've noticed how many more opportunities teachers have for professional growth than in my previous district. They don't seem to be taking advantage of that, though. I need to work on understanding that" (Participant #4, First Interview Protocol, February 2, 2009).

The data shared in this section demonstrates the participants value professional collaboration as an extension of teacher learning. The participants shared the belief that collaboration with peers is important for teachers to acquire new ideas about 21st century teaching and learning. The participants shared ways in which they provide opportunities for teachers to learn from each other: Act 80 professional development days, release time to observe or work with other teachers; and regular professional development days.

Professional collaboration has its barriers as well. Participants shared the belief that it is challenging to influence teachers to participate in various activities, despite offering sufficient opportunities. As with other concepts of 21st century teaching, professional collaboration as envisioned by the participants is more the exception than the norm. The theme of professional collaboration is important to this study since the participants acknowledged the importance of developing people through professional collaboration in an effort to change and redesign the organization.

Shifting Roles

The data relating to this theme supports the idea that larger systemic change occurs when teachers focus on instructional design with real-world application and technology. The participants understand the potential for the roles of teacher and student to change, largely because of the introduction of technology into instructional practice. Technology personalizes learning, moving the locus of control from the teacher to the student. The participants believe when roles change, teachers expect students to take more responsibility for their learning and to learn collaboratively from their peers. A District leader shared, "I see the teacher as more of a guide on the side working with students to help them reach full potential" (Participant #8, Central Office Focus Group Protocol, June 17, 2009). This data also reflects shifting instructional design as echoed by a principal.

> I also see some very specific teaching strategies in the classroom that provide a more student-centered classroom as opposed to a teacher-directed classroom. The classroom is much less lecture format and whole group format. It is becoming much more small group, individualized, and much more active. (Participant #4, Second Interview Protocol, April 28, 2009)

The focus has to be on students taking ownership and actually doing the work in class – students actually taking ownership and working together to come out with a final result. (Participant #1, First Interview Protocol, February 20, 2009)

This theme, in many ways, serves as a bridge between other 21st century teaching themes. When teachers begin to incorporate effective instructional design that reflects real-world applications and effective technology use, the role of teacher changes to architect and guide. As a result of shifting instructional practice, students become more responsible for their own learning. Recognizing a shift in teacher and student roles is important to this study because the concept provides the participants with a concrete outcome to measure progress toward changing teaching and learning. As with the other themes addressed above, identifying this outcome has important implications for leadership, providing a reference point for change.

In summary, the participants offer a conceptualization of teaching in the 21st century in alignment with the literature. A focus on meaningful learning through instructional design, real-world application and technology integration are at the core of the participants' conceptualization. Supporting this core are concepts of teacher learning and professional collaboration.

While these themes are the focus of their thinking, the participants identify gaps between teaching beliefs and the actual teaching practices in their schools. According to the participants, these gaps exist because of the existence of certain barriers. However, it is unclear from the data what the participants are doing through leadership to overcome the barriers and make their espoused concepts of teaching a reality in every classroom.

Learning in the 21st Century

Three themes emerged through conversations with the participants about learning

in the 21st century. <u>Learning in the 21st century:</u>

1. Is connected with real-world tasks outside of the classroom

2. Requires new and redefined skills

3. Is personalized through the use of technology

A deeper analysis of the themes reveals patterns that offer a more detailed story

about how the participants think about learning in the 21st century. First, the participants

conceptualize learning in ways similar to teaching. They embrace the ideal that all

learning should be personally meaningful and relevant for real-world application. The

theme of real-world application also emerged as part of the teaching data. In their

conceptualization of teaching, the participants placed value on real-world application in

preparation for future work. Similar importance was articulated when the participants

spoke about student learning. Second, as with the teaching data, the participants shared

the belief that learning as they conceptualize it is not the norm in their schools. Finally,

the participants shared, across all themes, the view that technology is a necessary and

important component of the 21st century learning ecology. In the following sections, the

individual themes will be explored, highlighting the patterns outlined with specific data.

Real-world Application

The data pertaining to this theme supports the ideal that students engage in

learning connected closely to real world applications, particularly those associated with

college, work and careers. Each of the nine participants spoke about the need for

authentic learning experiences in the classroom – relevant experiences that prepare

students for the world of college and career. One participant communicated the ideal of

authentic learning in this way:

> Real world means different things for different students depending on their level
> and depending on where they're headed. If a student is college bound then real
> world will become multiple text and media they will be reading in college. It
> might be college level books. It might be sophisticated Internet sources. It might
> be using multi-media presentations and being able to deliver those kinds of things
> just as they do in college. (Participant #7, First Interview Protocol, February 3,
> 2009)

In describing a vision for what learning should look like in the 21st century, all of

the participants repeatedly connected real-world, authentic learning experiences to the

world of work and careers. "I think it really means students being able to take what we

teach them and being able to apply it, for example, in the work place" (Participant #9,

First Interview Protocol, February 16, 2009).

> I think the concept of 21st century learning has a lot to do with new thinking about
> using the tools, new learning experiences that are now being generated, and
> getting students to be prepared for those. These things include a much more
> collaborative approach to learning, sharing of information with people you may
> not personally know. Having students be more architects of information, being
> more individualized about their approach, being more creative with information. I
> think the necessity of being able to produce this type of information and this
> quality of work is becoming very apparent through people who are currently
> employed. (Participant #3, Second Interview Protocol, April 30, 2009)

Additionally, product-based assessments are associated with the concept of real-

world learning experiences. Participants shared the belief that if educators are to connect

learning to careers and the world of work, students will need to be assessed on the new

products they produce, not on traditional tests. While most of the participants associated

alternate assessments with actual products, a few noted that assessments, particularly

formative assessments, focus on the knowledge product – the thinking shared through

verbal or written communication. "…for us, evidence is, can the child tell us and show us

and elaborate on why?" (Participant #5, Second Interview Protocol, April 13, 2009)

However, most participants focused on assessment as resulting in a product.

> More than anything, for me it means a real product. I'm a product person, so the kind of things that we're putting out in our classrooms, that the students are producing, for me, need to echo the magnitude and the quality that the real world is producing commercially and industrially. (Participant #5, First Interview Protocol, February 6, 2009)

As with their conceptualization of teaching, all of the participants contrasted their

ideals for authentic, real-world learning with the kind of learning they observe in school

today. The manner in which the participants conceptualized learning is not the norm in

their schools. According to the participants, the learning they observe typically values the

rituals of content delivery, memorization and testing over meaningful learning.

> I think part of it is, much of it, has to do with applicability. If you're able to memorize something and pass a test – I'll use history because that's a good place where that's traditionally happened a lot – you're able to memorize the facts, you're able to write a cohesive essay, then you are able to pass the test, and you do well on it. But what have you actually learned that's going to have any application outside the walls around you? When you step outside of the building, how do you use anything you've learned aside from going on Jeopardy? What's the applicability of that, the real world context of it? (Participant #6, Second Interview Protocol, April 16, 2009)

The data in this section demonstrates that learning in the 21st century is

characterized by authentic connections to real-world applications, a theme the

participants addressed throughout the data set on teaching. The participants particularly

emphasized the importance of real-world connections that will prove relevant to students

later in college and future work. Assessment of student learning is connected to the kinds

of products and knowledge outcomes demonstrated by workers in the 21st century.

Outcomes include both product-based and knowledge-based assessments. The creation of

products and new knowledge involves the use of technology to access and evaluate

information. Having articulated an understanding of authentic learning, the participants contrasted their ideal with what they currently observe in schools. The participants highlighted the gap between what they espouse and real-world connections found in student learning. This gap and the theme of real-world application in learning is relevant to this study because it articulates an area that can be addressed through leadership and an expanded frame of what it means to learn.

Redefined Skills

The data relating to this theme supports the idea that learning involves redefining traditional skills largely due to the emergence of technology in society and schools. Redefined skills for the 21st century include problem solving, critical thinking, collaboration, communication and technology. Within their conceptualization of teaching, the participants described the importance of meaningful learning and its relationship to inquiry, problem solving and critical thinking. These same skills are mentioned as part of this learning theme and demonstrate the strong connection the participants made between teaching and learning. In their conceptualization, the participants differentiated between two kinds of technology skill. One kind of skill refers to the ability to use technology in a mechanical way. For example, students need to know and understand how to operate computers and different types of software. Students also need to learn how to apply technical skills to the broader skills of critical thinking and problem solving.

> Yes, we need to teach our students how to use computers. But we also need them to value computers for learning, thinking and problem solving. It's not good enough for them to know how to manipulate the computer, but how to use it for something useful. (Participant #4, First Interview Protocol, February 2, 2009)

Technology is a skill for learners to develop, but its use in the learning

environment helps to redefine skills of communication, collaboration, problem solving

and critical thinking. As shown earlier, when speaking about the redefinition of skills, the

participants shared few stories of these ideas in action. This finding, confirmed by

building walkthrough data, supports the thinking that new ways of problem solving,

thinking critically, collaborating and using technology are not yet the norm in schools.

Students today should be collaborative problem solvers. Technology has helped

expand the definition of collaboration to include both face-to-face communication and

virtual communication.

> To me, it is all about problem solving and being able to do something with what
> you learn. It is the higher-level part of school that is what we should all be
> reaching toward. If you look at the multiple lists of 21st century skills, problem
> solving is in every one. There is always a social aspect to it – being able to
> understand the nuances of conversation, reciprocity of ideas, cooperative kinds of
> work. That seems to be in everybody's version of what 21st century skills look
> like. And the aspect that is 21st century is the technology component. Social
> interaction can now be virtual in addition to someone being right next to you.
> Technology adds a whole new dimension and whole new set of skills. (Participant
> #5, First Interview Protocol, February 6, 2009)

With vast amounts of information and ideas available through the Internet,

learners are required to approach their work with a critical eye. Technology can aid in

developing critical thinking skills by providing access to practically limitless amounts of

information. Through a focus on critical thinking, students learn to ask questions about

the information they encounter. By asking good questions, they develop critical thinking

skills through the use of technology.

> I think students need to critically think and analyze more than ever before because
> of all the information that is available. Students can think critically about any
> subject and use technology to help them do that. They can be very analytical
> about what they are seeing, doing or hearing; to use technology and research to

further their understanding of things so they don't have a biased opinion about things. They have to be able to sort out what is valid. That is a different set of skills that students didn't have 25-30 years ago. But it is very real in the world today. (Participant #2, Second Interview Protocol, April 6, 2009)

The prevalence of technology has created a complex web of collaboration and communication. Learners are still expected to develop face-to-face collaboration and communication skills. However, the presence of technology requires learners to develop the ability to collaborate and communicate with others outside the classroom, synchronously and asynchronously.

I see 21st century learning as having students actually learning those communication, social skills with their partners, either face-to-face or even virtually. Being able to communicate effectively, ask the right questions and pull from each other and all the resources out there on the web. Work together to find out about the overall goal of what you're asking them to find, whatever that may be. (Participant #4, First Interview Protocol, February 2, 2009)

Technology is a common thread that runs through the redefined skills of problem solving, critical thinking, collaboration and communication. Technology tools offer learners new ways to develop and demonstrate traditional skills. Through the amplification of networks that embody the skills outlined above, technology provides democratic access to information.

I think what impeded the use of technology before were networks. If you were better educated or well spoken, you had more access to networks than those who were economically disadvantaged. But now with the communication explosion, new tools are more widespread – new tools that provide everyone with the opportunity to understand and access real-time information. Anybody who knows what they're doing can access that information. So I think now it's more about how do I sift through all the information – good and bad – that's out there to get to the real-time valuable information? (Participant #5, Second Interview Protocol, April 13, 2009)

The data in this section demonstrates the participants recognize how skills such as collaboration, communication, problem solving and critical thinking are redefined by

technology. While many in schools have valued these skills for decades, the frameworks and literature on meaningful learning redefine these skills through the presence of technology. For example, students can now communicate virtually, in synchronous and asynchronous ways. The ideas shared by the participants related to the redefining skills theme connect with their ideas of teaching and instructional design. If students are to develop redefined skills, teachers must understand the redefined skills and incorporate them in the instructional design process. The theme of redefined skills is important for this study because it serves as an area in which school leaders must expand their knowledge. In order to ensure students acquire updated skills, leaders must support and develop teachers in defining, redefining and understanding how skills apply to the instructional process.

Personalized Learning

The data relating to this theme supports the idea that technology can create a powerful, personalized learning experience. While the participants shared a limited number of stories of learning in their schools, several of these stories offer a glimpse into the power of technology to create a personalized learning experience. The shared stories demonstrate how learning in a technology-rich environment no longer needs to be driven by the confining structures of a textbook lesson that engages students learning the same content, in the same manner, and at the same time.

This story demonstrates how a learning experience became very personal when technology was utilized. Technology allowed the learner to engage in ways not previously possible.

I have an autistic boy, Brad, that lovely student with autism, with sensory problems. He can't go to his music class because when he sits in music class the activity just agitates him after a while. So I suggested we Skype into the class. Then there was the concern about getting Skype on the computer, and the student having to touch the teacher's computer. What if he breaks it? So I said, "Then he breaks it. We have insurance. We'll buy a new one. Let's get him to Skype into class." He loves it. He is Skyping into class! Every once in a while the teacher would come over and look to see if he was still there. The students in the class would look up. Brad was sitting there. He got up, put the computer down and said, "I want the recorder." This was a student who wouldn't do anything that made noise because it's so painful for him. There he is, participating through Skype. Is that amazing or what? Broke my heart. I've also used Skype to call Brad and another student in the classroom to remind them about their behavior, the rules, the things I need to go over with them. Sometimes I try to have them voice mail me but if I can't, we try to do it by Skype. It's awesome. (Participant #7, First Interview Protocol, February 3, 2009)

Examples of how the participants envision learning becoming more personalized through the presence of technology were more common in the data set than actual stories of personalized learning. From a theoretical perspective, the participants view technology as a catalyst, transforming traditional classrooms into personalized learning centers that engage learners in meaningful learning organized around themes and over-arching questions.

Teachers are going to differentiate learning experiences. The classroom will hopefully look more like learning centers with technology in the classroom. There will be stations students will go to. There will be more opportunity for students to pick and choose some of their interests for that subject matter. There won't be such prescribed curriculum. The curriculum will be more open ended. It will be more thematic and unit based. It will be more connected with themes as opposed to terms and dates like is often the case in social studies. It's going to be themes like war and peace and conflict, government and ideas that are much bigger. (Participant #3, Second Interview Protocol, April 30, 2009)

The data in this section show how the participants think about personalized learning through the lens of technology. Technology helps teachers to differentiate classroom learning, making it more meaningful and relevant to learners. Because the

participants shared a limited number of actual stories of personalized learning with technology, it can be concluded that personalized learning with technology is not yet the norm in classrooms. The theme of personalization is important to this study because it serves as an area where the participants must expand their knowledge and understanding. The conceptualization of learning in the 21st century moves learning away from standardization and toward personalization. To understand how technology aids in achieving this outcome is important for bringing about change. With the understanding of how technology can personalize learning, the participants can more clearly identify any gaps and develop plans to bridge espoused beliefs and actual practice.

In summary, the participants offer a conceptualization of learning in the 21st century in alignment with the literature. A focus on meaningful learning through real-world applications, redefining skills and personalized learning are at the core of the participants' conceptualization.

While these themes are a focus of their thinking about learning, the participants identify gaps between learning beliefs and the actual practices in their schools. Throughout the data set, a limited number of actual learning stories are shared that represent the participants' conceptualization. A preponderance of data represents theoretical, espoused discussions rather than actual examples of 21st century learning. As a result, it can be concluded participants are developing their conceptualization of 21st century learning.

Teaching and Learning in the 21st Century – Cross-theme Analysis

Through the analysis of teaching and learning data, broad answers to the research question were revealed. Through deeper analysis across themes, a rich set of additional

themes emerged, providing a glimpse into the intersection between the participants'

conceptualization and their leadership. The themes explored in this section serve to

connect the participants' conceptualization of teaching and learning with their leadership.

This section will share findings across the teaching and learning themes outlined

above. The five themes to be discussed include:

1. Conceptual Clarification

2. Frequency of Conceptual Understanding In-use

3. Examples of Technology Integration

4. Positioning of the Leader

5. Change

Conceptual Clarification

Throughout the data set, the participants voiced their frustration and confusion

about understanding concepts of 21st century teaching and learning. Each participant

shared at least one experience when they felt confused about the meaning of new ideas.

Sharing was often followed by an expressed desire to learn more. A principal reflected on

the confusion within the administrative team, focusing on the concept of collaboration in

actual use as opposed to espoused (what she calls theoretical).

> As individuals on the team, we don't have a collective team reference yet. And
> just when I think that we do, someone will ask something in a meeting or say
> something like, "Well, you know 21st century skills like collaboration, we
> collaborate. Our teachers are doing this." I'm thinking that's not what we're
> talking about when it's 21st century collaboration. And when we were talking
> about the learning communities, that conversation went the same place. I think as
> individuals on the team we still have very different understandings of not
> necessarily what it is theoretically but what it looks like. (Participant #6, Principal
> Focus Group Protocol, June 22, 2009)

Another participant shared her perception that others on the leadership team also have a confused understanding of certain concepts.

> I think there are people on the team who think they have a clear understanding of 21st century skills, but their actions and their comments indicate that they don't at all. That's where there's a disconnect …I don't know how you correct that. To some degree I think there needs to be some personal responsibility when there's a district initiative and you don't know a lot about it. Shouldn't we do what we need to do to learn about it? (Participant #6, Second Interview Protocol, April 6, 2009)

Conceptual confusion manifested itself during individual interviews and focus groups with a high frequency of 21st century educational jargon, particularly the terms collaboration and communication. It was unclear the meaning participants were intending, as in this excerpt.

> Keywords for 21st century education are collaboration, communication. I'll say social networking, but that's a very broad thing. I really mean focusing on social interactions for the learning process in the classroom. Communication means incorporating communication in those social networks, but also communicating through researching, through collaboration, through finding out not just what's in the learning environment but bringing the outside world into that environment through communication. (Participant #9, First Interview Protocol, February 16, 2009)

All of the participants used terminology associated with teaching and learning in the 21st century, but five participants directly shared the need to gain a clearer understanding of the vocabulary they were using. Throughout the data, it was unclear whether the participants understood the meaning of the terms being used. The theme of conceptual clarification is important for this study because it offers a possible explanation for the earlier finding where the participants spoke in theoretical terms rather than through actual practices occurring in the school setting. If a majority of the participants are unsure how terms are defined, it can be challenging to locate examples within practice.

Frequency of Conceptual Understanding In-use

The manner in which the participants described teaching and learning in the 21st century is at the conceptual level. All of the participants spoke mostly theoretically, less frequently sharing actual stories. The manner in which the participants conceptualize teaching and learning is not yet the norm in classrooms, as shared in an earlier finding. During interviews, three participants were forthright. One principal shared, "We do have, I would say that maybe 5 of our 40 teachers, a little bit over 10% who are really applying these ideas in their teaching" (Participant #4, Second Interview Protocol, April 28, 2009). Another principal eluded to the leadership challenges she encountered scaling up the initiative.

> It is much harder to get teachers to understand, "Stop playing school, start teaching skills, and don't just teach reading for the sake of reading. Teach reading for the sake of becoming literate and functional in all the real world tools that are out there." It is so hard to get that message across. I think we're starting to make a dent, and I think a few teachers "have it" so to speak, but on the whole, they don't. (Participant #2, Second Interview Protocol, April 6, 2009)

Additionally, the same ten names of teachers were referred to throughout the interview and building walkthrough data. The participants perceived a small number of teachers implementing a 21st century conceptualization of teaching and learning. This is a relatively small number out of one hundred forty-six teachers district-wide translating espoused beliefs into actions in the classroom. Building walkthroughs confirmed the finding of small-scale, isolated implementation. The teachers referenced during interviews and focus groups were the same teachers demonstrating the ideals and beliefs for 21st century teaching and learning during building walkthroughs.

When conceptualizing teaching and learning, all of the participants shared the belief that technology should be a natural part of the learning ecology, especially when teachers and students are engaging in meaningful learning focused on inquiry and problem solving. This finding regarding limited implementation was analyzed more deeply for technology integration.

Examples of Technology Integration

The examples of technology use shared by the participants represented more "technologized" tasks than problem solving. In this example, technology changed the final product of the activity, but was not used to solve a rich, real-world problem. Instead of completing the book report in a traditional paper/pencil manner, the students used digital media. The focus of technology was on product rather than deep thinking.

> I don't remember the name of it. It's the one where they put the videos in Animoto. They put together a video of different shots along with music about a book that they read. It became the assessment of what they had read. I was sitting there in awe. "Oh my gosh!" I would have never imagined they would have been able to put all that together. (Participant #8, First Interview Protocol, February 23, 2009)

This example provides a similar focus. While the instruction is student-centered, technology was used to create a final product, a video, rather than being used to learn about Newton's Law of Motion.

> Traditionally, with Jay's Newton's law of motion lesson, it would have been like this: Here are the three laws of motion. Write down the three laws of motion. Study the three laws of motion. You're going to have a test on it. This is a very traditional way of teaching. Jay is taking that and putting a twist on it – actually making it hands-on with a partner, discussing what it actually looks like, what it means, what each law means, doing a skit, and videotaping it. He highlights presentation and social skills with what he is doing with his students. The students just really own it. There's ownership on the student's part that really wasn't there before. The students had reason to really want to learn about the laws of motion. He takes his students and now does an activity with them in teams. He has them

create their own skit to demonstrate their understanding of the laws of motion. Today I walked over to the cafeteria and it's the same kind of thing. I saw a student with a Nerf gun. She's firing off Nerf shots, and other students are videotaping. They have the laptop set up. They're using the camera from the laptop. It's set up on a chair, and they're videotaping their skits. The students are absolutely loving it and are into it. (Participant #4, First Interview Protocol, February 2, 2009)

The examples of technology use shared by a majority of the participants focused on using technology to develop products rather than for more complex problem solving. While these examples have qualities of social constructivist learning, they lack a coherent inquiry-based problem focus. The instructional design integrates technology to create a final product representing an alternative assessment. The examples of technology use shared by the participants are incongruent with their espoused beliefs about teaching and learning.

Positioning of the Leader

Further analysis of the teaching and learning data reveals eight of the nine participants consistently positioned themselves as observers of teaching and learning – often distant from the practices they espoused. When sharing teaching and learning practices, the participants were frequently removed from the practices. This excerpt, describing a poetry activity, represents positioning from the principal's perspective.

I'll give you an example of one thing I observed related to a podcasting activity. This is an example of students being architects of their own learning. It represents what I said earlier about constructing, meshing student creativity with technology so they can express themselves. We do a unit on poetry that's not a very traditional paper and pencil type poetry activity. Students certainly had to do some of that in the planning stages, but they got a chance to record their poetry in a podcast and add music – to become an architect, to add some individuality to what they're doing. (Participant #3, Second Interview Protocol, April 30, 2009)

The participant described a lesson activity that embodies qualities of technology

use, communication, creativity and communication. This school leader endorsed the

teaching and learning behaviors that he observed. However, as a leader, he was an

observer, not a participant in the learning.

An additional story, shared by a principal, demonstrates how the leader was on a

quest to observe and learn about new ways of collaboration. Once she observed the

behavior, she continued to remain an observer.

> For some people it comes down to really seeing the ideas in action. I tend toward
> the very concrete in terms of my thought processes. They're pretty linear and
> pretty concrete. I need to see these ideas in action, and because I've had the
> opportunity to see them in some venues I think I have a pretty good understanding
> of them. But someone who hasn't had that same opportunity and thinks the same
> way I think won't know. You know, "My staff collaborates because my teachers
> are teaching students how to collaborate because they work in groups all the
> time." That's not what 21st century collaboration means. So what does it mean?
> Show me what it means so that I can help get them there. I know that Ruby had
> the opportunity to visit SLA last year and came back seeing things differently. I
> think we don't necessarily know what all of this looks like, and we need to.
> (Participant #5, Second Interview Protocol, April 13, 2009)

Examples such as these demonstrate that observation of teachers' practice and the

espoused concepts of teaching and learning have moved these leaders to the

"liking" stage. These examples demonstrate how they are developing their knowledge

about the skills through their positioning as observer. However, the participants have yet

to position themselves to be knowledgeable *of* the skills by immersing themselves in the

teaching and learning.

In contrast, this example demonstrates how a leader is embedded in the observed

experience, bridging the gap between knowing *about* and knowing *of*.

> I was in Sharon's room. She's the master of both literacy and technology. As the
> students were filtering into the classroom and she was assigning them things to do
> in their multiple small groups, she told them as they were finished they were
> allowed to go and work on the whiteboard project they were doing on Ben

Franklin. I had really never seen the whiteboard in action. I went over to the students and said "Show me what you're doing." These students were fighting over who's using the keyboard to put ideas up on the whiteboard. But it was interesting how it stopped being about the technology and started to be about the conversation they were having with each other. It was almost like they forgot I was there. They handed me the keyboard and asked me to type. I was typing and they were showing me. One student was showing me where to move things using the infrared keyboard. They were talking to each other and clarifying with each other about what Ben Franklin had done. They were telling each other what to write, and then dictating it back to me. They were clarifying each other's ideas; they were generating their own thoughts. They were being creative. They were reinforcing their own learning all by themselves without an adult facilitating. That was the coolest thing! And to be able to move from direct instruction to facilitating guided practice is a thing that teachers often struggle with. This was happening so naturally, and there wasn't even a teacher facilitating. It was awesome. That, to me, was the most pure example of how learning is supposed to happen. I guess the students had all read different things and had been to different sites on Ben Franklin. What they were coming up with and reminding each other about was rich. The whole experience was an impromptu kind of activity – the students were all reviewing aloud and going through all these neat things about Ben Franklin. Very excited. Very energetic. It wasn't about the technology anymore. It was about what they remembered and they were just all so excited to share. They were clarifying each other's thinking; they were reminding each other. It was a neat social experience for these students. (Participant #7, First Interview Protocol, February 3, 2009)

In this example, the participant shared a rich learning experience. Rather than simply describing the observed behavior, the participant engaged in the learning situation by interacting with the learners in conversations about what she observed. This leader positioned herself to experience the concepts of collaboration, communication and technology use. She gained knowledge *of* the concepts through her actual experiences.

Supporting the argument of leader positionality, it is worth sharing that the writing prompt data source was returned by one-third of the participants. The writing prompt data reinforced the finding that leaders position themselves as observers. In response to the questions, *What evidence can you provide that literacy, technology and*

curriculum are being integrated? What does the integration of these areas look like in the

classroom?, a principal responded in this manner,

> Student work shows integration of the three areas;
> Language arts – students are collaborating on Keynote presentations of books that
> they read;
> ESL – students are creating talking storybooks. (Participant #2, Writing Prompt,
> March 3, 2009)

In this example, it is clear the participant observed technology use. However, the

writing is void of context. In conversation with the principal, she shared the projects were

observed in the context of a walkthrough. When asked to elaborate whether further

actions such as teacher collaboration, professional development, and conversations

regarding instructional practice were initiated as a response to the observation, the answer

was negative. The participant observed the behavior and then recorded it in the writing

prompt. There was no follow-up conversation or immersion in the teaching and learning.

The participants almost always positioned themselves as observers in the teaching

and learning process. When sharing stories, they referenced their conceptual

understanding to identify the kinds of 21st century behaviors they like and that matched

their beliefs. The data demonstrates the participants are acquiring knowledge *about* rather

than knowledge *of* 21st century skills by virtue of their positioning as leaders. By

immersing themselves in actual teaching, learning and conversations about teaching and

learning the earlier theme of conceptual clarification can be addressed.

Change

Throughout the data set, the participants wove a conceptualization of a new

paradigm for teaching and learning. Their conceptualization was not described in terms

of maintaining the status quo, but rather challenging the status quo. Also, the changes

they described embody significant reframing of the teaching and learning process. The participants espouse beliefs that require significant changes in the way teachers teach and students learn.

Their conceptualization was communicated in their desire for both teaching and learning to be connected to real-world, authentic experiences. The participants described learning as often void of relevancy and reinforced by scripted, stand-and-deliver textbook lessons. To move from an instructionist model to one with less direct teacher instruction and more authentic learning experiences will require significant change and action on the part of the participants.

In summary, one of the patterns that consistently appeared throughout the teaching and learning data was a conceptualization of teaching and learning that focused on theoretical concepts more than actual experiences. When invited to make real their conceptualization of teaching and learning through examples in their practice in interviews, focus groups and writing prompts, the participants offered a limited number of stories. The building walkthrough data source revealed meaningful learning largely in classrooms of teachers reported as early adopters. The data revealed most instruction in the classroom was characterized by instructionism.

As a result of a cross-theme analysis of the teaching and learning data sets, several themes emerged: challenges with understanding terminology associated with 21st century teaching and learning; low frequency of conceptual understanding in-use; weak examples of technology integration; and positioning of the leader as observer. These themes connect directly to the participants and their roles as leaders of teaching and learning. The findings of the cross-theme analysis are important for this study because

they convey an in-depth story helping to frame the participants' actions pertaining to

implementing the District's vision for 21st century learning.

Leading in the 21st Century

To review, the primary research questions of this study encompass the concepts of

teaching, learning and leading.

How do school leaders conceptualize teaching and learning for the 21st century?

How do they act upon their understandings in the school setting?

The previous sections of this chapter presented findings that provide an answer to the first

research question focused on teaching and learning. In the previous sections, the analysis

demonstrated the participants are developing their conceptualization of 21st century

teaching and learning. The analysis also demonstrated the participants' conceptualization

was largely grounded in theory rather than experience. The following section will extend

the story of the participants by examining and analyzing the leadership data, focusing on

change leadership responsibilities and theories of action.

As outlined in Chapter 3, the leadership data were coded using the 21

responsibilities of the school leader articulated by Marzano, et al. (2005). In addition,

theories of action (espoused theory/theory-in-use) as defined by Argyris and Schon

(1974) were used to further understand how the participants act in the school setting.

Occurrences of each responsibility, accompanied by further detail related to theory of

action, were tallied and are presented in Table 4.1.

The table presents the 21 responsibilities of first-order change in rank order, as

outlined by Marzano, et al. (2005). Also included in the table are the number of

occurrences that reflect actual behavior of the participants (labeled "theory in-use"), the

number of occurrences not specifically associated with an actual behavior (labeled

"espoused theory") and the total number of occurrences of both theory-in-use and

espoused theory stories.

Table 4.1

21 Responsibilities Coded for Theory-in-use and Espoused Theory

21 Responsibilities (ranked in relationship to first-order change)	Theory In-use	Espoused Theory	Total
Monitoring/Evaluation	7	0	7
Culture	22	16	38
Ideals/Beliefs	30	28	58
Knowledge of Curriculum, Instruction and Assessment	16	34	50
Involvement in Curriculum, Instruction and Assessment	11	3	13
Focus	29	3	32
Order	11	1	12
Affirmation (a tie in rank order)	14	1	15
Intellectual Stimulation (a tie in rank order)	15	2	17
Communication	48	11	59
Input	28	10	38
Relationships	12	5	17
Optimizer	8	4	12
Flexibility	23	15	38
Resources	29	2	31
Contingent Rewards	5	0	5
Situational Awareness	29	1	30
Outreach	12	10	22
Visibility	11	1	12
Discipline	5	0	5
Change Agent	26	44	70

In the following sections, findings from the leadership data will be presented in two parts. First, findings using the framework of first-order and second-order change will be presented. Second, findings focused on several responsibilities of second-order change using the theories of action framework will be presented.

First-order and Second-order Change

A focus on the total occurrences of both theory-in-use and espoused examples of leadership, as presented in Table 4.1, provides an incomplete story of the study participants and their leadership actions related to leading changes in teaching and learning. To focus the findings, it is useful to separate the data associated with second-order change. This is necessary as a finding of cross-theme analysis associated the participants' conceptualization of teaching and learning in the 21st century with second-order change. As the research of Marzano, et al. (2005) reminds us, all 21 responsibilities, "define the standard operating procedures in a school" (p. 70). However, only seven of the 21 responsibilities are associated with second-order change. For comparison purposes, the top seven responsibilities with the highest number of theory-in-use occurrences were extracted to produce Table 4.2. Presenting the top seven responsibilities of the participants by theory-in-use frequency allows for an easier comparison to the seven responsibilities of second-order change.

Table 4.2

Highest Frequency Responsibilities Exhibited by Participants and Coded for Theory-in-use

Responsibility	Theory-In-Use Occurrences Only
Communication	48
Ideals/Beliefs	30
Focus	29
Resources	29
Situational Awareness	29
Input	28
Change Agent	26

The data in Table 4.2 provides a clearer picture of how the participants acted in leading changes in teaching and learning because only theory-in-use occurrences are included. Since the research question asks how the leaders acted upon their conceptualization of teaching and learning, theory-in-use behaviors are more valid indicators than espoused theory for purposes of analysis.

As shared earlier, the participants conceptualize 21st century teaching and learning in ways that significantly challenge the status quo – a characteristic of second-order change. The research of Marzano, et al. (2005) associates seven of the 21 responsibilities with second-order change, in rank order:

1. Knowledge of Curriculum, Instruction and Assessment

2. Optimizer

3. Intellectual Stimulation

4. Change Agent

5. Monitoring/Evaluating

6. Flexibility

7. Ideals/Beliefs

Comparing Table 4.2 with the seven responsibilities of second-order change, the participants regularly demonstrated actions associated with two of the seven responsibilities of second-order change – Ideals/Beliefs and Change Agent. This finding is based upon the number of actual theory-in-use leadership stories shared during the study and observed during the building walkthroughs. When the total occurrences of espoused theory and theory-in-use are combined, the participants embodied four of the seven second-order change responsibilities – Knowledge of Curriculum, Instruction and

Assessment; Change Agent; Flexibility and Ideals/Beliefs. This finding is significant because it indicates the participants espouse four of the seven responsibilities, but only act upon two of the seven necessary for second-order change.

In summary, the participants demonstrated strength in two of the seven areas of second-order change – Ideals/Beliefs and Change Agent – when considering only theory-in-use stories. When examining total occurrences, the participants were strong in four of the seven areas of second-order change – Ideals/beliefs, Change Agent, Knowledge of Curriculum, Instruction and Assessment and Flexibility. These findings indicate that their "espoused theory" stories match a majority (four in total) of the seven responsibilities required for second-order change while their "theories-in-use" stories match a minority (two in total) of the seven responsibilities. These findings are significant because they reinforce the cross-theme analysis, extending the participants' story to include second-order change.

The next section will examine specific responsibilities of second-order change – Ideals/Beliefs, Change Agent and Knowledge of Curriculum, Instruction and Assessment – through the lens of theories of action. Additionally, data regarding challenges will be presented.

Theories of Action – Espoused and In-use

The results outlined in the previous section suggest theories of action play an important role in answering the research question: How do school leaders act upon their understanding in the school setting? To understand the role of theories of action more clearly, the analysis of the following codes will be shared:

- Change Agent

- Ideals/Beliefs

- Knowledge of Curriculum, Instruction and Assessment

The three responsibilities were chosen for several reasons. First, all three responsibilities are critical to the implementation of second-order change, the kind of change espoused by the participants. Second, each of the selected behaviors stood out in some way in the data set. For example, the number of occurrences for Ideals/Beliefs ranked close – 30 for theory-in-use and 28 for espoused theory. The close proximity of occurrences warranted a closer examination of the Ideal/Belief responsibility. The Change Agent and Knowledge of Curriculum, Instruction and Assessment behaviors produced a large number of total occurrences, a large spread between theory-in-use and espoused theory, and a large number of espoused theory occurrences.

In addition to a deeper analysis of these three responsibilities, the data set was coded for challenges. Throughout the data set, the participants frequently identified challenges for leaders, teachers and students. To help in answering the research question pertaining to leadership, an analysis of challenges was warranted since leadership is focused on actions. The following sections will analyze the responsibilities of Change Agent; Ideals/Beliefs; Knowledge of Curriculum, Instruction and Assessment; and the area of challenges in more detail.

Change Agent

Marzano et al. (2005) defines the change agent responsibility as follows: "Is willing to challenge and actively challenges the status quo" (p. 42). The researchers further describe behaviors associated with the responsibility of Change Agent:

- Consciously challenging the status quo

- Being willing to lead change initiatives with uncertain outcomes

- Systematically considering new and better ways of doing things

- Consistently attempting to operate at the edge versus the center of the school's competence (Marzano, et al., 2005, p. 45)

Using the behaviors described in the research, the data set was coded for theory-in-use and espoused theories of action. The findings of this data analysis revealed a preponderance of data describing espoused theory. This finding is in agreement with the low frequency of "conceptual understanding in-use" finding of the cross-theme analysis.

In this story, a principal described a theory of action in-use, an example of consciously challenging the status quo.

> You know you have heard me this year with, "We're in warning!" So my experience having been in warning and trying to dig out of that has forced us to do things differently. Things I ordinarily might have laid back a little bit on, it is now, " Do it!" Here is an example. In kindergarten we were having a very difficult time with Patricia and Kid Writing. She just didn't get it. She has her idea of what should be in kindergarten, and she doesn't like change. So we had Nancy and Fran work with her in the classroom with center, and we created a power hour. Well, Patricia complained. You have to be ready for that. Nancy and Fran continued to provide that support to her in the classroom. Then they pulled out. They'd stop in, and they said, "It's not happening." So at the next team meeting I said, "OK, I'm going to put this right out in front. You have to incorporate Kid Writing every day for 15 minutes." (Participant #2, Second Interview Protocol, April 6, 2009)

The sharing of a specific example is what characterizes this story and others as theory-in-use stories. The principal did not simply describe challenging the status quo in general, theoretical terms. Rather, she shared a specific example of how she reinforced an expectation to change a specific component of the organization. This story provides detail about the principal's actions.

In contrast, examples of espoused theory are general in nature and do not communicate a level of specificity or story that reveals the actions of leadership. Data coded as espoused theory does not specifically communicate the leaders actions, only their espoused beliefs as in this example about change and comfort level.

> Most of those who are resistors teach very high-level students. These students tend to be very good at learning the old way. They are very successful by all terms, getting into great colleges. The teachers see no need to change. Why would I need to change? I think it's my job as a leader to create dissatisfaction there. I see their dissatisfaction with what they're doing, or my dissatisfaction with them to the point where they start to feel uncomfortable. Right now, I think they feel comfortable. And if you feel comfortable, you don't want to change. (Participant #5, Second Interview Protocol, April 13, 2009)

While this leader described their role as a change agent challenging the status quo and creating "dissatisfaction," a specific story describing actions is missing. Therefore, this is an example of espoused theory of action. This leader espoused being a change agent, yet did not share evidence to turn that espoused theory into in-use theory.

While the participants exhibited both theory-in-use and espoused theories connected to the second-order change responsibility Change Agent, a preponderance of data was coded as espoused theory. Coupled with an earlier finding that the participants' conceptualization of teaching and learning was based in theory, not practice, this analysis supports the argument that the participants' leadership falls short of the requirements for second-order change.

Ideals/Beliefs

Marzano, et al. (2005) describes the Ideals/Beliefs responsibility as follows: "communicates and operates from strong ideals and beliefs about schooling" (p. 42). The researchers further describe behaviors associated with the responsibility of Ideals/Beliefs:

- Possessing well-defined beliefs about schools, teaching and learning

- Sharing beliefs about school, teaching, and learning with the staff

- Demonstrating behaviors that are consistent with beliefs

Using the behaviors described in the research, the data set was coded for theory-in-use and espoused theories of action. The results of the Ideals/Beliefs data analysis revealed a majority of shared examples as theories-in-use. However, espoused theories for Ideals/Beliefs were represented by a high number of occurrences. A high rate of occurrence of theories-in-use supports the finding that the participants are developing their conceptualization of teaching and learning and understanding of second-order change. A high rate of espoused instances supports the finding that the participants' conceptualization of teaching and learning is grounded in theory rather than practice. In short, the participants are thinking about 21st century teaching and learning more than they are acting.

In this example, a principal shared a theory-in-use story about working with teachers to better integrate technology into instruction. The participant shared how he took action based on his belief – he engaged in a reflective conversation with a math teacher. By sharing a detailed story, he uncovered his theory of action as theory-in-use.

> I have used the SmartBoard before. I worked with that technology and can give them some ideas on how to use it in math class. That's where I fit in right now. I have been sitting down with the math department and seeing how we can improve things. That's a huge goal to be honest with you, because I don't see a whole lot of technology being used in math classes. But it is, it's working. For example, I have, I had a conversation with this teacher the other day about using technology, and she does a pretty good job of it in her classroom – to the point now where I think she feels comfortable enough inviting me in. She invited me in for the use of the laptops because I was talking to her about how I don't see many teachers in the math department using the SmartBoard. It's an easy one to implement into the math curriculum. But I don't see a lot of them using the laptops or taking

advantage of the laptops. I asked, "What kind of things can we do with the laptops? What have you been doing using your lessons?" She invited me in with the graphing program. It was amazing just seeing how that saves so much time not having the students actually have to graph parabolas and see the change, and graphing circles and see the change. (Participant #4, Second Interview Protocol, April 28, 2009)

In contrast, this example reflects an espoused belief about what a participant would like for her teachers.

I see that I really would like the teachers to have a little more understanding of 21st century learning. I think the concepts that are involved in 21st century learning, the communication, the collaboration…having them understand what that means in the typical classroom. (Participant #3, Second Interview Protocol, April 30, 2009)

This is an example of espoused theory of Ideals/Beliefs. The participant believes teachers should have a developed understanding of communication and collaboration in the 21st century. However, she stopped short of explaining how she acts upon her belief. Until she describes the actions she is pursuing to address the need or the actions she is taking to help teachers better their understanding, her story is espoused theory.

The participants shared both theories-in-use and espoused theories connected to the second-order change responsibility Ideals/Beliefs. While the majority of shared stories were coded as theory-in-use, a significant number of espoused occurrences were also noted. Using the preponderance of theories-in-use stories as a guide, the participants' leadership pertaining to ideals/beliefs technically aligns with the requirements of second-order change. However, a significant number of espoused stories throughout the data set provides just cause to question that assertion since there is almost an equal number in each theory of action category.

Knowledge of Curriculum, Instruction and Assessment

Marzano, et al. (2005) describes the Knowledge of Curriculum, Instruction and

Assessment responsibility as follows: "is knowledgeable about current curriculum,

instruction and assessment practices" (p. 42). The researchers further describe behaviors

associated with the responsibility of Knowledge of Curriculum, Instruction and

Assessment:

- Possessing extensive knowledge about effective instructional practices

- Possessing extensive knowledge about effective curricular practices

- Possessing extensive knowledge about effective assessment practices

- Providing conceptual guidance regarding effective classroom practices

Using the behavior as described in the research, the data set was coded for theory-

in-use and espoused theories of action. As with the Change Agent data, the results of the

Knowledge of Curriculum, Instruction and Assessment data analysis conveyed a

preponderance of espoused theories. The data also confirmed the previous finding that

the participants do not have a consistently clear understanding of teaching and learning in

the 21st century.

Across the data set, the leadership team was critical of their collective

understanding of teaching and learning in the 21st century. The feeling of underdeveloped

knowledge was communicated in ways such as this:

> I think we need to be more open and honest in our professional development
> about not understanding these things. It's not so much that I don't understand. I
> don't think that sometimes what I understand is what other people understand.
> What I thought is not at all what other people thought...what other people left the
> session thinking. I think that I need to do a better job during meetings expressing
> myself to the point where I say, "Yes, I don't think I understand that, so could you

go back and explain that again." I think others feel that way, too. (Participant #8, Second Interview Protocol, April 24, 2009)

While the feeling of underdeveloped knowledge was a theme, the sharing of actionable stories to remedy the deficiency was largely absent. The participants did not share specific actions explaining what they intended to do to address their perceived lack of knowledge. Based on the analysis of the data supporting the responsibility of Knowledge of Curriculum, Instruction and Assessment, espoused theory of action was predominant.

The participants exhibited both theories-in-use and espoused theories connected to the second-order change responsibility Knowledge of Curriculum, Instruction and Assessment. A preponderance of the data was coded as espoused theories. Coupled with the previous finding that the participants' conceptualization of teaching and learning was based in theory, not practice, this analysis supports the argument that the participants' leadership does not match the requirements of second-order change.

Challenges

During data analysis, the theme of challenges emerged. Since challenges are easily connected to theories of action, it was important to investigate this theme further. The individual interview and focus group transcripts were coded for challenges (leadership, teaching and learning) using the following scheme:

- A - Leader described a personal action to address the challenge – past or present.

- AS - Leader suggested a personal action to address the challenge – future.

- NA - Leader described the challenge. A personal action was not shared.

Leadership challenges were coded using the second-order change leadership

responsibilities outlined by Marzano, et al. (2005). In addition, challenges were coded as

either teaching challenges or learning challenges based on the conceptualization of the

participants. It was hypothesized the analysis would confirm the theory that the

participants were leading from espoused theory rather than theory-in-use when acting

upon their conceptualization of teaching and learning. The results of the analysis of

challenges appear in Tables 4.3 – 4.5.

Table 4.3

Occurrences of Leadership Challenges Coded by Responsibility and Level of Action

Leadership Challenges (Second-order change)	**Action Shared (Past or Present)**	**Action Shared (Future)**	**Action Not Shared**
Affirmation	0	0	1
Change Agent	4	4	34
Contingent Rewards	0	0	2
Communication	0	0	2
Culture	0	0	14
Discipline	0	1	1
Flexibility	2	2	8
Focus	0	2	11
Ideals/Beliefs	2	2	7
Input	0	3	2
Intellectual Stimulation	0	0	1
Involvement in Curriculum/Instruction/Assessment	0	0	0
Knowledge of Curriculum/Instruction/Assessment	11	8	26
Monitoring/Evaluation	0	0	4
Optimizer	0	0	0
Order	2	2	2
Outreach	1	0	6
Relationships	0	0	2
Resources	2	3	1
Situational Awareness	0	2	4
Visibility	0	1	1

Table 4.4

Occurrences of Teaching Challenges Coded by 21st Century Teaching Concept and Level of Action

Teaching Challenges	Action Shared (Past or Present)	Action Shared (Future)	Action Not Shared
Real-world Application	1	0	13
Instructional Design	0	1	9
Technology Integration	2	0	3
Teacher as Learner	2	2	12
Professional Collaboration	0	0	1
Shifting Roles	3	0	4

Table 4.5

Occurrences of Learning Challenges Coded by 21st Century Learning Concept and Level of Action

Learning Challenges	Action Shared (Past or Present)	Action Shared (Future)	Action Not Shared
Real-world Application	0	0	7
Redefined Skills	0	0	3
Personalized Learning	0	0	0

The data displays show a significant majority of described challenges lacked accompanying stories describing how the participants addressed the challenges. These challenges were coded as NA representing no associated action was shared. This leadership challenge example was coded as NA in the leadership responsibility category of Knowledge of Curriculum, Instruction and Assessment.

> When you think about it, effective oral and written communication is practically a universal thing that teachers can be aware of for teaching in their classrooms. But things like initiative and entrepreneurship, critical thinking, problem solving, curiosity and imagination, those are harder. We need to help them understand those better. (Participant #6, Second Interview Protocol, April 16, 2009)

In this example, the participant described the challenge of helping teachers understand the elusive concepts of initiative, entrepreneurship, critical thinking, problem solving, curiosity and imagination. It is clear the leader espoused the belief that these skills are important for teachers to understand and for students to develop. However, the story is absent action – past, present or future. The participant shared this story from an espoused theory rather than a theory-in-use perspective.

Likewise for challenges related to teaching and learning, the participants stopped sharing at the level of espoused theory, as in this learning challenge example coded as NA in the Redefined Skills category.

> I think that we've seen it more with the gifted students that are used to high level, and not that this isn't high level, It's not high level in the same way - lecture, regurgitation. They've learned to play the game very well, and they've learned to be successful. Now the game is changing, so I think it's semi-frustrating for certain students just because they have learned to play the game and they've learned to meet the teacher expectations. That's what they needed to do to be successful and this has gotten them to the point where they are today. Now the game is changing a little bit, and I don't know that they like it. They aren't sure of the answer or what the expectation is or how to be successful. (Participant #8, First Interview Protocol, February 23, 2009)

Additionally, it is important to note in the leadership challenges data, the participants described challenges related to two of the seven qualities of second-order change to a high degree: Knowledge of Curriculum and Instruction and Change Agent. The accompanying stories were predominantly espoused.

The challenges articulated by the participants were predominantly espoused theory absent associated actions to address the challenges. This finding applies to leadership, teaching and learning challenges. In addition, the analysis of leadership challenges demonstrated a preponderance of occurrences in two responsibilities

associated with second-order change: Knowledge of Curriculum, Instruction and Assessment and Change Agent.

The analysis of leadership data helps to develop the earlier story that emerged from the teaching and learning data analysis. As a result of the teaching and learning data analysis, it became clear that the participants were developing a conceptualization of teaching and learning in the 21st century. Their conceptualization was primarily based on theory, not practice. This argument is supported by the small number of actual stories about teaching and learning from experience. A cross-theme analysis revealed that the participants were often confused by 21st century education terminology. Other themes that emerged included a low frequency of the participants' conceptual understanding in-use, weak examples of technology use and positioning themselves as observers in the teaching and learning process. The leadership data further develops the story by introducing the elements of second-order change and theories of action. The analysis revealed that the participants' leadership actions taken in whole do not match those required for second-order change. The analysis also revealed that the participants operated during interviews and focus groups more often from espoused theories of action related to 21st century teaching and learning than theories-in-use.

Chapter Summary

The findings for this study tell a story about how the participants conceptualize teaching and learning for the 21st century and how they act upon that understanding in the school setting. The key findings are summarized here.

1. The participants are developing their understanding of key concepts related to 21st century teaching and learning. While the participants shared the belief that their

knowledge was limited, they were able to locate some examples of teaching and learning in the classroom that align with their vision.

2. The teaching and learning processes conceptualized by the participants requires significant changes in the routine of school. These changes include authentic learning experiences, student-centered instructional design, use of technology for problem solving and meaningful learning, the development and redefinition of skill sets, and greater personalization of learning. Changes of this magnitude reflect what the literature describes as second-order change.

3. A new vision of teaching and learning requires a shift in emphasis of leadership responsibilities. The participants are in the process of understanding and implementing the necessary change. Of the seven responsibilities of school leadership, the participants communicated a high number of *theory-in-use* occurrences in two areas – Change Agent and Ideals/Beliefs. A significant number of *espoused theory* occurrences in Change Agent and Knowledge of Curriculum, Instruction and Assessment indicate the participants are developing an understanding of second-order change leadership. The participants' leadership does not match the full requirements of second-order change.

4. Data analysis revealed a preponderance of espoused beliefs and theories of teaching, learning and leadership as opposed to in-use examples of the teaching and learning the participants were attempting to define.

CHAPTER 5: RECOMMENDATIONS AND DISCUSSION

This research study was grounded in the argument that in order to effectively lead schools for the technology-rich, networked world of the 21st century, leaders must embrace an expanded epistemic frame of leadership. The available literature focuses on the development of new skills for students and pedagogical shifts for teachers. However, research specific to the accompanying changes in leadership is not as detailed. If leadership is a key driver in changing school cultures, mindsets and practices, then a more clearly developed epistemic frame for educational leadership in the 21st century is necessary to translate theory into practice.

To better understand an expanded epistemic frame, two research questions were developed to uncover the relationship between 21st century education and leadership as conceptualized by a group of school leaders. First, how do school leaders conceptualize 21st century teaching and learning? Second, how do school leaders act on their understandings?

As was explained in Chapter 3, this study utilized a qualitative research design that included interviews, building walkthroughs, writing prompts, focus groups, analytic memos and journal writing. As a result of the data analysis process, a story of teaching, learning and leading in the 21st century emerged, specific to the study participants. Some key features of the data and the emerging story indicated:

1. The participants are developing their understanding of key concepts related to 21st century teaching and learning. While the participants shared the belief that their knowledge was limited, they were able to locate some examples of teaching and learning in the classroom that align with their vision.

2. The teaching and learning processes conceptualized by the participants requires significant changes in the routine of school. These changes include authentic learning experiences, student-centered instructional design, use of technology for problem solving and meaningful learning, the development and redefinition of skill sets, and greater personalization of learning. Changes of this magnitude reflect what the literature describes as second-order change.

3. A new vision of teaching and learning requires a shift in emphasis of leadership responsibilities. The participants are in the process of understanding and implementing the necessary change. Of the seven responsibilities of school leadership, the participants communicated a high number of *theory-in-use* occurrences in two areas – Change Agent and Ideals/Beliefs. A significant number of *espoused theory* occurrences in Change Agent and Knowledge of Curriculum, Instruction and Assessment indicate the participants are developing an understanding of second-order change leadership. The participants' leadership does not match the full requirements of second-order change.

4. Data analysis revealed a preponderance of espoused beliefs and theories of teaching, learning and leadership as opposed to in-use examples of the teaching and learning the participants were attempting to define.

Through an integration of the findings and the literature, specific recommendations are provided in the next section. It is hoped the participants will implement the recommendations with the intent to develop an expanded epistemic frame for school leadership in the 21st century specific to their own leadership context.

Recommendations and Discussion

The recommendations focus on the development of second-order change responsibilities as outlined by Marzano, et al. (2005). By applying theories of change (Marzano, et al., 2005; Argyris and Schon, 1974; Heifetz, 1994), the findings propose the changes in teaching and learning described in the literature and espoused by the study participants are of the second-order. This conclusion is important because without leadership responsibilities that match the specific kind of change required, innovation will likely fail (Marzano, et al. 2005). Therefore, the development of second-order change responsibilities is essential for the participants to succeed with their efforts to bring about the change they envision. Because of the nature of change, the recommendations do not detail specific steps for implementation. It is suggested the recommendations be discussed and applied within the context of each leader's story. While some may seek detailed action steps, it is important to reiterate there is no blueprint for addressing the challenges of reinventing education.

Table 5.1 reviews data associated with high occurrences of the seven responsibilities of second-order change, espoused and in-use.

Table 5.1

High Occurrences of Second-order Change Responsibilities

Second-Order Change Responsibility	High Occurrences of Espoused Theory of Action	High Occurrences of In-use Theory of Action
Knowledge of Curriculum, Instruction and Assessment	x	
Optimizer		
Intellectual Stimulation		
Change Agent	x	x
Monitoring/Evaluation		
Flexibility	x	
Ideals/Beliefs	x	x

The participants regularly demonstrated actions associated with two of the seven

responsibilities of second-order change – Ideals/Beliefs and Change Agent. This finding

is based upon the number of actual theory-in-use stories shared during the study. When

the total occurrences of espoused theory and theory-in-use are combined, the participants

embodied four of the seven second-order change responsibilities – Knowledge of

Curriculum, Instruction and Assessment; Change Agent; Flexibility and Ideals/Beliefs.

This finding is significant because it indicates while the participants strongly espouse

four of the seven responsibilities, they strongly act upon two of the seven responsibilities

necessary for second-order change.

In his July 2009 TED talk, *Lead Like the Great Conductors*, Israeli conductor Itay

Talgam likens leadership to building a rollercoaster. "You have the plan in your head.

You know what to do, and you become a partner, building the rollercoaster…as you

actually take the ride" (Talgam, 2009, online video). Leading 21st century educational

change of the second-order fits this metaphor of building a rollercoaster. Since the world

is changing rapidly, detailed instructions for controlling change are not possible. It is

impossible for all the pieces of change to be in place before the work begins. However, it is the force of the process – a leader with a vision, the skills to develop people and a thirst for redesigning the organization – that keeps change on the path to progress. In the creation process, there will be moments of thrilling success such as feeling gravity at work as a rollercoaster winds around a curve with great speed. There will be moments of fear such as slowly climbing a steep hill and then ferociously racing to the bottom. Leaders with a mission and passion for challenging the status quo cannot avoid these moments. For efforts at change to be successful, leaders can only embrace thrill and fear. Once the ride has begun, it cannot be stopped.

Using the rollercoaster metaphor, the recommendations will be presented within the framework outlined in the educational leadership literature. The framework includes setting direction, developing people, and redesigning the organization (Leithwood, et al., 2003). Recommendations are shared and associated with the seven responsibilities of second-order change leadership.

Setting Direction

If leadership is akin to building a rollercoaster as you take the ride, it is necessary to have a vision for what the rollercoaster ride should look and feel like. The participants are making progress toward developing a vision based on a rich knowledge of 21st century curriculum, instruction and assessment practices. The data represent a conceptual understanding of what education in the 21st century could be as outlined in the literature. During interviews and focus groups, the participants eschewed talk of standardized testing, *No Child Left Behind*, Keystone Exams and other aspects of traditional school reform models. Instead of focusing on the bureaucracy of schooling, the participants

focused their conversations on learning rooted in the learning sciences, and teaching as the art of developing rich learning experiences. However, the participants often shared their confusion about concepts in the 21st century literature. They frequently shared the desire to see examples of these concepts in action.

To further develop a vision grounded in an understanding of curriculum, instruction and assessment, it is recommended that the participants focus on three areas:

- Careers and the future landscape of work

- Digital media and learning in the knowledge age

- Meaningful learning that reflects the learning sciences

As a significant focus of the 21st century skills frameworks (Burkhardt, et al., 2003; Partnership for 21st Century Skills, 2007; Wagner, 2008a) is work and careers, it will be valuable for the participants to understand emerging careers and the future landscape of work. Equally important is the preparation to navigate a workforce that is changing (Levy & Murnane, 2004; Bureau of Labor Statistics, 2006), collaborative and autonomous. If one of the primary functions of schooling is to prepare students to be productive workers, and if statistics from the Bureau of Labor hold true that workers will experience many different jobs throughout their working lives (Bureau of Labor Statistics, 2006), educators will need to know, as best they can, the nature of the careers students will choose to define their future. Throughout the data set, the concept of real world, authentic application was repeatedly discussed. Expanding personal knowledge of the future landscape of work will inform a vision of schooling that will more closely resemble real world application and how people work. That vision involves preparing

students for knowledge-age careers that require creativity and innovation rather than industrial age careers focused on compliance and standardization.

Throughout the data, the participants communicated a comfort level with technology tools. While the participants are comfortable using technology primarily for personal productivity, developing a vision for 21st century learning will require discovery of how new tools aid in the learning process. This understanding will require the participants to engage in immersive learning with digital media. Johansen (2009) describes this as the "ability to immerse yourself in unfamiliar environments, to learn from them in a first-person way" (p. 56). Technology is a natural component of the learning culture – both formal and informal (Ito, et al, 2008; Spires, et al., 2008) – and it must be viewed as natural for meaningful learning (Jonassen, et al., 2008) to occur.

Experiencing how students use technology in their informal learning will help leaders reframe how technology is used in school. Rather than using technology simply as the means to produce a final product, technology must be integrated throughout the process of learning (Sawyer, 2006). While the participants are experiencing the full range of learning with traditional and emerging Web 2.0 technologies, it is recommended they work with each other and teacher leaders to develop new ways technology can become a more natural part of the learning ecology. Because of technology, learning has shifted dramatically in the out-of-school world of students, yet schools have ignored the need to alter instructional practices. If the world operates through an epistemology of digital, participatory learning, schools and leaders must understand the affordances and constraints of digital media in order to replicate digital, participatory learning.

Meaningful learning, with or without technology tools, is associated with a learning environment commonly referred to as social constructivist. While the participants occasionally shared examples of effective learning environments in their schools, it is more the exception than the norm. Without a shift in learning environments, it will continue to be challenging for students to acquire deep conceptual understanding of content. It is suggested the participants visit and have conversations with teachers who embrace effective pedagogies and have created meaningful learning environments. The participants should work with these teachers (Leithwood, et al., 2003) to better understand how they teach and how they can work collaboratively with other teachers to grow classroom innovations throughout the school. The participants must expand their understanding of meaningful learning. In order for meaningful learning to be the new norm throughout the District, it will be critical for the participants to think systemically and develop a mechanism for sharing exemplars more broadly, moving meaningful learning practices beyond the confines of isolated classrooms and schools. If pedagogical practices are to be improved systemically, the participants will need to set parameters, determining the kinds of learning environments that will be non-negotiable. A decision to set clearer expectations for pedagogical practice will require decisive action from school leadership (Marzano, et al. 2005).

In summary, it is recommended the participants continue to develop their vision for teaching and learning in the 21st century. To acquire a deeper understanding of the skills outlined in frameworks and standards, participants should seek opportunities to learn more about careers and the future landscape of work, immerse themselves in digital media and learning in the digital age, and seek opportunities within their current setting

to better understand meaningful learning for the 21st century and the accompanying instructional practices. The actions outlined in this section address the second-order change responsibilities of Knowledge of Curriculum, Instruction and Assessment; Ideals/Beliefs; and Flexibility (Marzano, et al., 2005). By engaging these recommendations, participants will be able to more clearly define their beliefs about schools, teaching and learning and use their ideals to provide guidance to teachers on effective instructional practices.

Developing People

Once the plan for building the rollercoaster has been set, others will need to be influenced to come along for the ride. A single person cannot develop the vision, implement the vision, and manage the complex tasks and knowledge necessary to make the endeavor successful (Fullan, 2005). Leaders must inspire and support the people who will help with the work (Leithwood, et al. 2003). As Talgam (2009) suggests, the leader must make space for others to share their story. There must be a respect for what others bring to the effort, reflecting emotional intelligence (Goleman, 2005). It is the interaction and collaboration of many people and their stories that makes for the most thrilling work.

To further influence and develop people to achieve a vision for education in the 21st century, it is recommended the participants focus on two areas:

- Collaboration with others and engagement in reflection to further develop the vision
- Development of leadership in teachers and others who have embraced meaningful learning as defined in the literature

Currently, the participants meet regularly as a team to focus on District initiatives and issues of curriculum, instruction, technology and 21st century skills. Continuation of this professional learning opportunity will provide the forum to continue the collaborative development of a vision for 21st century teaching and learning. As shared in Chapter 1, the District has developed a mission, vision and core set of beliefs that represent education in the 21st century (Salisbury Township School District, 2008). As with many vision, mission and belief statements, terminology is utilized that can be interpreted in many different ways by individual stakeholders. The leadership team will benefit from working to define more clearly terms that cause confusion. Reaching a consensus on the District's terminology for 21st century education through discussion and debate will serve to lead the way to invite teachers, students, parents and community to join the conversation.

Working with others at all levels of the educational system is an important factor in change efforts. Fullan (2008) proposes the need to develop leadership both vertically and horizontally throughout the organization. The professional development meetings of the leadership team may be the forum to invite other leaders such as instructional coaches, department chairs and innovative teachers to further grow the understanding and vision for 21st century education. School leaders alone cannot develop, define and implement the vision. The participants need to work with others to bring meaningful learning to scale.

Whether collaborating with peers or developing teacher leaders, school leaders must engage in analysis and reflection. Reflection is a critical component in every practitioner's work (Schon, 1983), especially those engaging in second-order change.

Organizations learn and grow through the quality of reflection generated across all levels.

As innovation develops, it is important for stakeholders to think and converse about

current and past practices and actions. The reflective process is the behavior of

monitoring and evaluating in action (Marzano, et al., 2005). If reflection does not occur,

aspects of the initiative will go unattended and the work will likely become derailed.

During interviews, several participants discussed their hesitation to share thoughts, ideas

and reflections with colleagues during professional development meetings. For the

reflective process to work effectively, all participants must embrace reflection and the

responsibility of change agent, pushing the team and organization to think differently on

multiple levels. Second-order change leaders do not wait for others to propose actions

that challenge the status quo (Marzano, et al. 2005). Every participant must own the

responsibility. The reflective practitioner embraces vulnerability, willingly discussing

actions that have been less than successful and attempting to bring about different

outcomes (Leithwood, et al. 2003). Reflective conversations are challenging. Throughout

these challenging conversations, it is the leader's responsibility to act as the optimizer –

to inspire teachers and other leaders to accomplish things not believed possible and to

provide a positive attitude about the probability of success (Marzano, et al., 2005).

Whether working with leaders, teachers, students or others, the participants will need to

"ratchet up idealism, energy and enthusiasm" (Marzano, et al., 2005, p. 75) to maintain

progress toward goals.

  In summary, it is recommended the participants work with colleagues, teachers

and others to develop and implement a vision for 21st century teaching and learning. This

will require the participants to honestly reflect with their colleagues in order to evaluate

and monitor progress. The actions outlined in this section address the second-order

change responsibilities of Intellectual Stimulation, Optimizer, and Monitoring/Evaluation

(Marzano, et al. 2005). By engaging these recommendations, the participants will be able

to effectively advance their work through influencing others.

Redesigning the Organization

It is possible to dialogue at length about building the rollercoaster. Until leaders

take action based upon their ideals and beliefs, the educational system envisioned will

never actually be put in motion, and the traditional instructionist model of schooling will

continue unchanged. Once the vision reaches a point of design and others in the

organization are on board, it is time to move to implementation. Questions will most

certainly remain. That is to be expected with the complicated task of redesigning

education in complex times. Effective leadership provides guidance and support so

teachers and staff can learn from the implementation, refocus and bring the vision to

reality. There will be climbs, descents, and loops along the way. The process of effective

leadership will ensure everyone remains committed to the vision throughout the

implementation. Moving *espoused theory* to *theory-in-use* will ensure the scalability of

the work (Argyris & Schon, 1974; Dede, et al. 2005). Scale is a challenge faced by the

participants. This is represented in the data with a relatively small number of teachers

embracing changes in teaching and learning. Additionally, the participants shared a

preponderance of weak examples of technology integration. Developing a clear picture of

technology's potential and leading change through action is absolutely necessary for

bringing about the desired changes.

To ensure efforts to redesign the organization, it is recommended the participants focus on two areas:

- Translation of espoused theories into theories-in-use

- Development of annual goals that address second-order change responsibilities

Action is one of the greatest challenges of leadership (Argyris & Schon, 1974). Leaders often find themselves influencing others in areas they themselves feel uncertain. With external policy mandates and internal initiatives, education can seem like a moving target requiring one reactive behavior after another. It is a rare leader who does not feel the stress of being a change agent challenging the status quo in an environment that is perpetually shifting. Change agents often lead followers toward uncertain outcomes while advocating new ways of doing, operating on the boundary between chaos and calm. The data demonstrated the participants inconsistently translated espoused theories of teaching and learning into theories-in-use. This is arguably the most important finding and recommendation of the study because change is brought about only through action. Without action, change cannot occur. Without action, even the most compelling vision remains dormant and unfulfilled. Conceptualizing the vision is important, but the key to success is action and implementation. The participants must place greater effort on translating espoused theories of education into theories-in-use. This will require emphasizing the seven responsibilities associated with second-order change (Marzano, et al. 2005).

To provide a focus and incorporate accountability into the leadership process, it is recommended the participants develop annual goals focused on the second-order change responsibilities most appropriate for the leadership context. Second-order change goals

will foster second-order change leadership. Second-order change leadership will in turn pave the way for the espoused changes in teaching and learning.

In summary, the participants must move to match espoused beliefs with action. A strong conceptualization of 21st century teaching and learning is not sufficient. Translating the vision into reality requires the guidance, support and action of leadership. Establishing annual goals focused on second-order change will assist in developing a deeper understanding of the leadership required to bring about change.

Embracing these recommendations will result in an expanded epistemic frame (Shaffer, 2005) of leadership for the participants. The primary responsibilities of school leadership are to envision and enact the future (Leithwood, et al. 2003). School leaders in general have not done this well. Instead, they have taken a reactive stance to bureaucratic mandates. Significant changes in the teaching and learning process require school leaders to embrace an expanded epistemic frame of leadership grounded in setting direction, developing people and redesigning the organization. To do this, school leaders must understand leadership frames from the past and present while expanding upon those frameworks to create the future.

The transformation of education for the 21st century is a challenge in which the problem and the solution are deeply contextualized and not clearly defined. A lack of definition in problem and solution creates great angst in leaders. Leaders want solutions – as do teachers, students, school boards and other stakeholders. The leader's instinct has been to "manage" the process by applying a defined solution to a complex problem. This has been ineffective because the leadership does not match the type of organizational challenge (Marzano, et al. 2005). Leaders may experience resistance to the idea of

collaboratively developing solutions during the process of change – building the rollercoaster while taking the ride. This is the painful part of leadership. While leaders espouse certain ideals and beliefs, when the time comes to act, many are driven by the need to provide a solution and fend off challenges from constituents. Leaders must resist this temptation and stay grounded in their beliefs and act upon their espoused theories.

The idea of an expanded epistemic frame for leadership in the 21st century is based upon the belief that school leaders "don't know what they don't know." An expanded epistemic frame suggests school leaders make a concerted effort to expand their knowledge about what it means to lead in the 21st century. This includes understanding real-world skills, careers, meaningful learning and real-world technology use. Leaders who lead only with a traditional frame of leadership do not have a deep understanding of the concepts proposed here. School leaders have been acculturated into a profession that has embraced a consistent leadership frame for decades. The world in the 21st century is changing too rapidly to maintain a traditional frame. This research suggests school leaders lead from an expanded frame if they are to be effective at realizing the changes necessary for effective education in the 21st century.

School leaders who embrace an expanded frame will feel they are working outside of their expertise. This is to be expected. In his edited collection about expertise out of context, Hoffman (2007) asks the question, "What happens when domain practitioners are forced, for one reason or another, to work outside of their comfort zone?" Leading education in the 21st century has evolved into a complex task that extends past a traditional frame. The practitioner's "ability to engage in 'recognition-primed decision making' is short-circuited" (Hoffman, 2009, p. 4-5). Hoffman's question

and answer are relevant to educational leadership in the sense that ideas about education in the 21st century are placing stress on leaders to acquire new dispositions, skills and knowledge. In effect, today's school leaders are being required to lead in many ways outside of their comfort zone. School leaders are being required to think systemically, rethink instructional design to provide for real-world experiences, acquire new knowledge of real-world applications and new skills with ever-evolving technologies and their affordances for learning. These ideas can pull leaders from their comfort zone and into a context of messiness, making leading in the 21st century more challenging than ever.

Suggestions for Further Research

This research was limited to proposing an expanded epistemic frame for school leadership in the 21st century for a specific population. Logical further research should include testing the proposed expanded frame with a larger population. Further research should involve positive longitudinal case research of school leaders who are specifically implementing a vision of education as outlined in the literature. The challenge of case research is generalizability. Education contexts are varying such that what works for one leader in one context may be too challenging to execute in another. Leithwood, et al. (2004) suggests three contextual factors that impact leadership: (1) organizational context; (2) student population; and (3) the policy context. The leader in a small school district with a high achieving population may approach leadership challenges differently than leaders in large urban districts constantly challenged by pressure from state and federal mandates. A case study of school leaders, with consideration to differing contextual factors, would begin to test the ideas put forth in this research.

This research focused on answering specific research questions using the participant group as the unit of analysis. Further research should consider the individual leader as the unit of analysis, offering a more significant contribution to the field of research. A potential outcome of future research would be a continuum of leadership readiness used to move individual leaders toward a greater theory-in-use stance. The findings of this kind of research study would provide those responsible for developing leaders with a framework to move leaders across a continuum of leadership growth for the 21st century.

Future research should also be focused on leadership programs in higher education. Leadership programs focus on leading traditional reform models. How is the research on educational change incorporated into programs so that new school leaders acquire the necessary knowledge, skills and attitudes for an expanded epistemic frame of leadership? From my own experience, educational leadership programs aim to develop knowledge, skills and attitudes, assisting leaders in coping with an existing, traditional paradigm of education. While the traditional paradigm represents reality, as leaders, we should constantly be challenging the existing paradigm when it no longer is effective. With an expanded epistemic frame of educational leadership, higher education programs will make reinventing education a valuable component of programs. Future research will help understand higher education leadership programs and how they prepare leaders for change.

Researcher Reflection

Erickson (1973) encourages qualitative researchers to seek to make the strange familiar and the familiar strange. Throughout the dissertation process, I have repeatedly

asked myself questions about why data was leading my thinking in one direction and not another. Why were the participants not sharing richer stories of 21st century learning? Why were the espoused theories of 21st century education different from what appeared to be in-use? Constant inquiry allowed me to experience the process of qualitative research first hand. I embarked on this process expecting the data to paint a clear vision for education and a group of leaders enacting that vision. This was not the case. I discovered there were deeper leadership issues involving change and theories of action. While I was able to answer the research questions through the data analysis process, it was not sufficient to stop there. It was necessary to ask further questions in order to arrive at the richness of this work. Throughout the research process I have honed my questioning and research skills. I began this process feeling familiar with my understanding of the leadership team and its professional development activities. My constant questioning made the familiar seem unfamiliar so I could view the problem from different angles and draw useful conclusions. My challenge now is to bring the process full circle by making the unfamiliar once again familiar.

As I worked to complete this research, I found myself asking two related questions. Am I certain this research is not just saying what I think it should say? How can I be certain the findings are valid? With all research, some level of researcher bias is inevitable. Continually keeping potential bias in check was important. I have worked with the study participants for four years, and the study participants view me as a voice in the push toward rethinking education in Salisbury. I have made my thinking known and attempted to ask questions of my colleagues. It is now time for me to put *my* espoused theory of action as a school leader into use (Anderson, Herr & Nihlen, 2007).

I see myself playing a significant role in successfully implementing the recommendations of this study. Through this research, findings and recommendations have emerged. The research does not end here, however. My next step is to work with the participants to enact the recommendations. Together, the participants and I will build the rollercoaster – while riding it. The future story that emerges as a result of our work together will define the value and validity of this study. I look forward to embarking on the next stage of our rollercoaster ride of leadership and change. The ride will undoubtedly be thrilling.

APPENDIX A

THE 21 LEADERSHIP RESPONSIBILITIES DEFINED

(Marzano, et al., 2005, p. 71)

RESPONSIBILITY	DEFINITION
Monitoring/Evaluating	Establishing an effective monitoring system to provide feedback on the effectiveness of the school's curriculum, instruction, and assessment practices and their effect on student achievement.
Culture	Building and maintaining a culture in which a common language is employed, ideas are shared, and staff members operate within the norms of cooperation.
Ideals/Beliefs	Operating from a well-articulated and visible set of ideals and beliefs regarding schooling, teaching, and learning.
Knowledge of Curriculum, Instruction, and Assessment	Seeking out and keeping abreast of research and theory on effective practices in curriculum, instruction, and assessment.
Involvement in Curriculum, Instruction, and Assessment	Actively helping teachers with issues regarding curriculum, instruction, and assessment in their classrooms.
Focus	Establishing concrete goals relative to student achievement as well as curriculum, instruction, and assessment practices in the school, and keeping these prominent in the day-to-day life of the school.
Order	Establishing procedures and routines that give staff and students a sense of order and predictability.
Affirmation	Recognizing and celebrating the legitimate successes of individuals within the school as well as the school as a whole; also recognizing and acknowledging failures when appropriate.
Intellectual Stimulation	Fostering knowledge of research and theory on best practices among the staff through reading and discussion.
Communication	Establishing and fostering clear lines of communication to and from the staff as well as within the staff.

Input	Establishing and fostering procedures that ensure that staff members have input into key decisions and policies
Relationships	Attending to and fostering personal relationships with staff
Optimizer	Providing an optimistic view of what the school is doing and what the school can accomplish in the future.
Flexibility	Inviting and honoring the expression of a variety of opinions regarding the running of the school and adapting one's leadership style to the demands of the current situation.
Resources	Ensuring that the staff members have the necessary resources, support, and professional development to effectively execute the teaching and learning process.
Contingent Rewards	Expecting and recognizing superior performance from the staff.
Situational Awareness	Being keenly aware of the mechanisms and dynamics that define the day-to-day functioning of the school and using that awareness to forecast potential problems.
Outreach	Being an advocate of the school to all relevant constituents and ensuring that the school complies with all important regulations and requirements.
Visibility	Being highly visible to teachers, students, and parents through frequent visits to classrooms.
Discipline	Protecting staff members from undue interruptions and controversies that might distract them from the teaching and learning process.
Change Agent	Being willing to challenge school practices that have been in place for a long time and promoting the value of working at the edge of one's competence.

APPENDIX B

INITIAL INTERVIEW PROTOCOL

I am conducting research focused on how school leaders in the Salisbury Township School District conceptualize 21st century teaching, learning and school leadership. This first round of data collection will be used to begin identifying an emerging 21st century framework for educational leadership. Other data gathering methods I will use in this work include: building walkthroughs, writing prompts, an additional interview as well as focus group interviews where I will interview principals and central office personnel separately, These questions are designed to elicit your ideas of 21st century teaching and learning and how you lead within that framework. The result will be a synthesis of all participants' thinking. You will not be identified in the dissertation, and your responses to these questions will be kept confidential.

21st Century Teaching and Learning - Concepts
1. As a leader, what do you understand as teaching and learning for the 21st century?
2. What do you see as the most important concepts of 21st century teaching and learning?
3. What makes those concepts new – how are they different from a more traditional model of education we saw five or ten years ago?

21st Century Teaching and Learning - Exemplars
4. Can you describe a particular example of teaching and learning that you have recently observed that represents your understanding of 21st century teaching and learning and the integration of literacy and technology?
5. What concepts of 21st century teaching and learning do you think were embodied in this example?
6. Can you describe how you see the lesson as a shift/change in both teaching and learning?
7. How common do you think this kind of teaching and learning is in your building/throughout the district?
8. Why do you think it is this way (wide spread, isolated or somewhere between the two)?
9. Would you like to briefly describe other teaching and learning that you have recently observed or experienced?

Leadership – Helping others understand concepts of 21st century teaching and learning
10. To what degree do you help teachers understand what 21st century teaching and learning look like in the classroom?
11. How do you help teachers understand what 21st century teaching and learning look like in the classroom

Leadership – Fostering change in your school/district
    12. To what degree do you foster shifts to 21st century teaching and learning in your role as a school/district leader?
    13. How do you foster these shifts in teaching and learning in your role as a school/district leader?
    14. To what degree do you promote collaboration among teachers?
    15. How do you promote collaboration among teachers?
    16. To what degree does your work develop teacher leaders?
    17. How do you develop teacher leaders in your building/district/outside the district?

Modeling
    18. Can you describe your personal use of technology?
    19. In what ways do you model the use of technology in your school/district?
    20. How have teachers and students seen you model a new use of technology for teaching and learning and then tried it themselves?
    21. In what ways do you use technology for communication with teachers, parents and/or the community?

Challenges
    22. What do you see as your greatest challenges to *understanding* 21st century teaching and learning? Teachers' understanding? Students' understanding?
    23. What do you see as the greatest challenges to *leading* 21st century teaching and learning?

Professional Development
    24. To what extent do you organize or provide professional development for teachers?
    25. In what ways do you provide support for teachers with professional development outside of regularly scheduled district professional development days?

Vision
    26. Focusing particularly on your role as a leader, how do you see your school/district progressing toward your vision of 21st century teaching and learning in the next three years? Five years?
    27. What is your sense of teacher attitudes toward 21st century teaching and learning?

Other
    28. Is there anything else you'd like to share that you think would help me understand your thinking?

For answers that reveal particular dispositions, knowledge or skills:
- *What brought you to that thinking?*
- *How did you learn to do that?*

APPENDIX C

REFLECTIVE WRITING PROMPT

As part of the data collection process for my dissertation, I would like to ask you to spend some time over the course of this month reflecting on and recording your responses to the evaluation questions that we, as a team, developed during our first two administrative professional development meetings this year. You may answer these questions in whatever way is best for you. The more detailed your responses and *the greater a connection you can make to your own leadership*, the more valuable the data you will be providing for this research.

You may use this word document to record your thoughts, or you may use another format that is more suitable for you. I have placed each series of questions at the top of a new page. Writing style and format are unimportant. What is most important is detailed responses that reflect a connection to your actions as a leader.

Please complete your responses to the questions and return them to me no later than **Friday, April 30, 2009**. As always, thanks for your willingness to participate in my research.

Randy Ziegenfuss

Question #1:

What evidence can you provide that literacy, technology and curriculum are being integrated? What does the integration of these areas look like in the classroom?

Question #2:

What evidence can you provide that student achievement is being impacted positively? What does increased student achievement look like? What are demonstrations of improved student learning?

Question #3:

What evidence can you provide that teaching methods are responsive to individual student needs? What is different? How is it different? What improvements in student learning are occurring as a result of the differentiated teaching methods?

APPENDIX D

PRINCIPAL AND CENTRAL OFFICE FOCUS GROUP PROTOCOL

1. I would like to start by spending some time reflecting on the evaluation questions that we, as a team, developed during our first two administrative professional development meetings this year. I am particularly interested in *how we connect specific examples of 21st century teaching and learning to our own leadership.* Here are the evaluation questions for reference:

- *What evidence do we have that literacy, technology and curriculum are being integrated? What does the integration of these areas look like in the classroom?*
- *What evidence do we have that student achievement is being impacted positively? What does increased student achievement look like? What are demonstrations of improved student learning?*
- *What evidence do we have that teaching methods are responsive to individual student's needs? What is different? How is it different? What improvements in student learning are occurring as a result of the differentiated teaching methods?*

---

2. Two 21st century themes that emerged during the individual interviews were collaboration and communication. Let's look at the concept of collaboration. We often hear that, "All of us are smarter than any one of us." Collaboration in the 21st century can be one-to-one, one-to-a-few or one-to-many. As an administrative team, how would you describe the manner in which we collaborate? In what scenarios are we the most successful (the most honest, the most open, the best listeners)? In what scenarios do we encounter the greatest challenges (what are they, what do they look like, and what do we do about these challenges)? What are the challenges created by one-to-many collaboration in the 21st century? In what ways do you/we act to harness the collective intelligence of the administrative team? Of the teaching staff? How do you see yourself playing a role in developing our collective intelligence – as an administrative team and as a school district?

3. We are completing our first year working under a new vision for teaching and learning in Salisbury.

Salisbury Township School District empowers students to become innovative, critical thinkers who develop and apply skills to solve real-world problems. We challenge all students with a curriculum that stimulates personal growth and life-long learning. We embrace the importance of caring relationships and a safe learning environment to ensure a sense of belonging and respect for every individual.

Using the following as a guide, how would you describe the administrative team's commitment to this vision and the vision for a 21st century education? How about

the faculty and staff? What evidence do you see? Does the collective response of this focus group fit with where you see yourself as an individual? What do you see as your role in influencing the administrative team and the staff toward the highest level – commitment – if you think it does not already exist?

Commitment – Wants it. Will make it happen. Creates whatever structures are needed.

Genuine Compliance - Sees the benefits of the vision. Does everything expected and more. Follows the "letter of the law." "Good soldier."

Formal Compliance – On the whole, sees the benefits of the vision. Does what's expected and no more. "Pretty good soldier."

Grudging Compliance – Does not see the benefits of the vision. Does enough of what's expected because he/she has to, but also lets it be known that he/she is not really in agreement with the vision.

Noncompliance – Does not see the benefits of the vision and will not do what's expected.

Apathy – Neither for nor against vision. No interest. No energy. "Is it 2:45 yet?"

APPENDIX E

TEACHING AND LEARNING CONTENT ANALYSIS CODING LEGEND

Code	Description
Teaching Story – Real World Application – Espoused **(TSRWAE)**	Description of teaching grounded in a theoretical understanding of the importance of teacher-created environments that connect to or replicate authentic work in the world outside of school. There is no evidence of the teaching story grounded in the school leader's actual practice.
Teaching Story – Real World Application – Actual **(TSRWAA)**	Description of teaching grounded in both a theoretical understanding of the importance of teacher-created environments that connect to or replicate authentic work in the world outside of school as well as the school leader's practice. This is an actual example of real world application as seen through the lens of the leader's own understanding.
Teaching Story – Instructional Design – Espoused **(TSIDE)**	Description of teaching grounded in a theoretical understanding of student-centered, meaningful learning. There is no evidence of the teaching story grounded in the school leader's actual practice.
Teaching Story – Instructional Design – Actual **(TSIDA)**	Description of teaching grounded in both a theoretical understanding of student-centered, meaningful learning as well as the school leader's practice. This is an actual example of instructional design as seen through the lens of the leader's own understanding.
Teaching Story – Technology – Espoused **(TSTE)**	Description of teaching grounded in a theoretical understanding of technology use in the development of learning environments. There is no evidence of the teaching story grounded in the school leader's actual practice.
Teaching Story – Technology – Actual **(TSTA)**	Description of teaching grounded in both a theoretical understanding of technology use in the development of learning environments as well as the school leader's practice. This is an actual example of technology use in the development of learning environments as seen through the lens of the leader's own understanding.
Teaching Story – Teacher as Learner – Espoused **(TSTLE)**	Description of teaching grounded in a theoretical understanding of the teacher as a learning professional. There is no evidence of the teaching story grounded in the school leader's actual practice.
Teaching Story – Teacher as Learner – Actual **(TSTLA)**	Description of teaching grounded in both a theoretical understanding of the teacher as a learning professional as well as the school leader's practice. This is an actual example of teachers as learners as seen through the lens of the leader's own understanding.

Teaching Story – Professional Collaboration – Espoused **(TSPCE)**	Description of teaching grounded in a theoretical understanding of teacher learning as social. There is no evidence of the teaching story grounded in the school leader's actual practice.
Teaching Story – Professional Collaboration – Actual **(TSPCA)**	Description of teaching grounded in both a theoretical understanding of teacher learning as social as well as the school leader's practice. This is an actual example of social teacher learning as seen through the lens of the leader's own understanding.
Teaching Story – Shifting Role – Espoused **(TSPCE)**	Description of teaching grounded in a theoretical understanding of the shifting roles of teacher and student. There is no evidence of the teaching story grounded in the school leader's actual practice.
Teaching Story – Shifting Role – Espoused **(TSPCA)**	Description of teaching grounded in both a theoretical understanding of the shifting roles of teacher and student as well as the school leader's practice. This is an actual example of shifting teacher roles as seen through the lens of the leader's own understanding.
Learning Story – Real World Application – Espoused **(LSRWAE)**	Description of learning grounded in a theoretical understanding of the importance of student-centered environments that connect to or replicate authentic work in the world outside of school. There is no evidence of the teaching story grounded in the school leader's actual practice.
Learning Story – Real World Application – Actual **(LSRWAA)**	Description of learning grounded in both a theoretical understanding of the importance of student-centered environments that connect to or replicate authentic work in the world outside of school as well as the school leader's practice. This is an actual example of real world application as seen through the lens of the leader's own understanding.
Learning Story – Redefined Skills – Espoused **(LSRSE)**	Description of learning grounded in a theoretical understanding of redefining skills such as problem solving, critical thinking, collaboration, communication and technology. There is no evidence of the learning story grounded in the school leader's actual practice.
Learning Story – Redefined Skills – Actual **(LSRSA)**	Description of learning grounded in both a theoretical understanding of redefining skills such as problem solving, critical thinking, collaboration, communication and technology as well as the school leader's practice. This is an actual example of redefined skills as seen through the lens of the leader's own understanding.
Learning Story – Personalized Learning – Espoused **(LSRSE)**	Description of learning grounded in a theoretical understanding of the ability for technology to promote personalized learning. There is no evidence of the learning story grounded in the school leader's actual practice.

Learning Story – Personalized Learning – Actual **(LSRSA)**	Description of learning grounded in both a theoretical understanding of the ability for technology to promote personalized learning as well as the school leader's practice. This is an actual example of technology use for personalized learning as seen through the lens of the leader's own understanding.

REFERENCES

American Association of School Librarians. (2007). *Standards for the 21ˢᵗ century learner*. Retrieved from http://aasl.org/ala/mgrps/divs/aasl/aaslproftools/learningstandards/AASL_LearningStandards.pdf

Anderson, G. L., Herr, K., & Nihlen, A. S. (2007). *Studying your own school: An educator's guide to qualitative practitioner research*. Thousand Oaks, CA: Corwin Press, Inc.

Anderson, J. R., Corbett, A. T., Koedinger, K.R., & Pelletier, R. (1995). Cognitive tutors: Lessons learned. *The Journal of the Learning Sciences, 4*(2), 167-207.

Anderson, P. (2007). What is Web 2.0? ideas, technologies and implications for education. *JISC Technology and Standards Watch* Retrieved 15th September, 2007, from http://www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf

Anderson, R. E., & Ronnkvist, A. (1999). *The presence of computers in American schools*. Irvine, CA: Center for Research on Information Technology and Organizations, University of California, Irvine.

Argyris, C. & Schon, D. (1974). *Theory in practice.* San Francisco: Jossey-Bass.

Ash, K. (December 7, 2009). *21ˢᵗ century skills: Education reform or marketing ploy?* Retrieved from http://blogs.edweek.org/edweek/DigitalEducation/2009/12/21st-century_skills_education.html

Bass, B. M. & Avolio, B.J. (1993). Transformational leadership and organizational culture. *Public Administration Quarterly, 17*, 112-121.

Beckett, K. L., & Shaffer, D. W. (2005). Augmented by reality: The pedagogical praxis of urban planning as a pathway to ecological thinking. *Journal of Educational Computing Research, 33*(1), 31-52.

Bereiter, C. (2002). *Education and mind in the knowledge age.* Mahwah, NJ: Lawrence Erlbaum Associates.

Bronson, E. (2007). Helping CTE students learn to their potential. *Techniques: Connecting education and careers. 82*(7), 30-31.

Bureau of Labor Statistics (2006). *Number of jobs held, labor market activity, and earnings growth among the youngest baby boomers: results from a longitudinal survey.* Retrieved from http://www.bls.gov/news.release/pdf/nlsoy.pdf

Burkhardt, G., Monsour, M., Valdez, G., Gunn, C., Dawson, M., Lemke, C., et al. (2003). *enGauge 21st century skills: Literacy in the digital age.* Naperville, IL: North Central Regional Educational Laboratory.

Carnegie Learning. (2009). Geometry: Pythagorean theorem [software]. Available from http://www.carnegielearning.com/launch_demoproblem.cfm?curr=demo4

Casner-Lotto, J., & Barrington, L. (2006). *Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century U.S. workforce.* New York: The Conference Board. Retrieved from http://www.conference-board.org/pdf_free/BED-06-Workforce.pdf

Caswell, B., & Bielaczyc, K. (2001). Knowledge Forum: Altering the relationship between students and scientific knowledge. *Education, Communication & Information, 1*, 281-305.

Collins, A., & Halverson, R. (2009). *Rethinking education in the age of technology.* New York: Teachers College Press.

Committee of Ten (1894). *Report of the Committee of Ten on secondary social studies.* New York: American Book Company.

Council of Chief State School Officers. (1996). *Interstate school leaders licensure consortium (ISLLC) standards for school leaders.* Washington, DC: Author. Retrieved from http://www.ccsso.org/content/pdfs/isllcst.pdf

Council of Chief State School Officers. (2008). *Educational leadership policy standards: ISLLC 2008.* Washington, DC: Author. Retrieved from http://www.ccsso.org/content/pdfs/elps_isllc2008.pdf

Cuban, Larry (2003). *Oversold and underused.* Boston: Harvard University Press.

Darling-Hammond, L., Baron, B., Pearson, P. D., Schoenfeld, A. H., Stage, E. K., Zimmerman, T.D., et al. (2008). *Powerful learning: What we know about teaching for understanding.* San Francisco: Jossey-Bass.

Davis, S., Darling-Hammond, L.; LaPointe, M. & Meyerson, D. (2005). *School leadership study: Developing successful principals.* Stanford, CA: Stanford Educational Leadership Institute.

Deal, T. E. & Peterson, K. D. (1999). *Shaping school culture: The heart of leadership.* San Francisco, CA: Jossey-Bass.

Dede, C. & Honan, J. (2005). Scaling up success: A synthesis of themes and insights. In C. Dede, J. Honan, & L. Peters (Eds.), *Scaling up success: Lessons learned from technology-based educational improvement* (pp. 227-239). New York: Jossey-Bass.

Dede, C. & Nelson, R. (2005). Technology as proteus. In C. Dede, J. Honan, & L. Peters (Eds.), *Scaling up success: Lessons learned from technology-based educational improvement* (pp. 110-132). New York: Jossey-Bass.

Dede, C., Honan, J. P., & Peters, L.C. (Eds.). (2005). *Scaling up success: Lessons from technology-based educational improvement.* San Francisco: Jossey-Bass.

DeGennaro, D. (2008). Learning designs: An analysis of youth-initiated technology use. *Journal of Research on Technology in Education, 41*(1), 1-20.

Dewey, J. (1916). *Democracy and Education.* New York: The Free Press.

Donovan, M. S. & Bransford, J. D. (Eds.). (2005). *How students learn: History, mathematics and science in the classroom.* Washington, DC: National Academy Press.

Erickson, F. (1973). What makes school ethnography 'ethnographic'? *Council on Anthropology and Education Newsletter. 4*(2), 10-19.

Fishman, B., Best, S., Foster, J. & Marx, R. (2000). *Fostering teacher learning in systemic reform: A design proposal for professional development.* Paper presented at NARST 2000, New Orleans, LA.

Fullan, M. (2001). *Leading in a culture of change.* San Francisco, CA: Jossey-Bass

Fullan, M. (2005). *Leadership & sustainability: System thinkers in action.* Thousand Oaks, CA: Corwin Press.

Fullan, M. (2008). *The six secrets of change: What the best leaders do to help their organizations survive and thrive.* San Francisco: Jossey-Bass

Gee, J. P. (2007) *What video games have to teach us about learning and literacy.* (2nd Ed.). New York: Macmillan.

Gilbert, J. (2005). *Creating the knowledge wave?: The knowledge society and the future of education.* Wellington, NZ: Nzcer Press.

Glesne, C. (2005). *Becoming qualitative researchers: An introduction.* New York: Longman.

Godin, S (2008). *Tribes: We need you to lead us.* New York: Penguin Group.

Goleman, D. *Emotional intelligence: Why it can matter more than IQ*. New York: Bantam Dell.

Greenhow, C. (2007). What teacher education needs to know about Web 2.0: Preparing new teachers in the 21st century. In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2007* (pp. 1989-1992). Chesapeake, VA: American Association for the Advancement of Computers in Education.

Greenhow, C. (2008). Connecting informal and formal learning experiences in the age of participatory media: Commentary on Bull et al. (2008). *Contemporary Issues in Technology and Teacher Education*, *8*(2). Retrieved from http://www.citejournal.org/vol8/iss3/editorial/article1.cfm

Halverson, R. (2005). What can K-12 school leaders learn from video games and gaming? *Innovate, 1*(6).

Halverson, R., Shaffer, D., Squire, K., & Steinkuehler, C. (2006). *Theorizing games in/and education.* Paper presented at the 7th international conference on Learning Sciences, Bloomington, IN.

Heifetz, R. A. (1994) *Leadership without easy answers*. Cambridge, MA: Belknap/ Harvard University Press.

Hoffman, R. R. (2007) Introduction: A context for "out of context". In R. R. Hoffman (Ed.) *Expertise out of context: Proceedings of the sixth international conference on naturalistic decision making* (pp. 3-6). New York: Lawrence Erlbaum Associates.

International Association for the Evaluation of Educational Achievement. (2006). *Second information technology in education study 2006.* Retrieved from http://www.sites2006.net/exponent/files/resourcesmodule/@random47cfaf3bbf18a/1204793285_SITES_2006_Executive_Summary.doc

International Society for Technology in Education (2009). *The ISTE national educational technology standards (NETS) and performance indicators for administrators.* Retrieved from http://www.iste.org/Content/NavigationMenu/NETS/ForAdministrators/2009Standards/NETS-A_2009.pdf

International Society for Technology in Education (2007). *The ISTE national educational technology standards (NETS) and performance indicators for students.* Retrieved from http://www.iste.org/Content/NavigationMenu/NETS/ForStudents/2007Standards/NETS_for_Students_2007_Standards.pdf

International Society for Technology in Education (2008). *The ISTE national educational technology standards (NETS) and performance indicators for teachers.* Retrieved September 22, 2008, from http://www.iste.org/Content/NavigationMenu/NETS/ForTeachers/2008Standards/NETS_T_Standards_Final.pdf

Ito, M., Horst, H., Bittanti, M., Body, D., Herr-Stephenson, B., Lange, et al. (2008) *Living and learning with new media: Summary of findings from the Digital Youth Project.* Chicago: The John D. and Catherine T. MacArthur Foundation.

Johansen, R. (2009) *Leaders make the future: Ten new leadership skills for an uncertain world*. San Francisco, CA: Barrett-Koehler Publishers, Inc.

Jonassen, D., Howland, J., Marra, R. M., & Crismond, D. (2008). *Meaningful learning with technology.* Upper Saddle Creek, NJ: Pearson.

Jorgenson, O. & Vanosdall, R. (2002). The death of science? What we risk in our rush towards standardized testing and the three r's. *Phi Delta Kappan*, *93*(8), 601-605.

Kay, K. & Honey, M. (2006). Establishing the R&D agenda for 21st century learning. *New Directions for Youth Development, 110,* 63-80.

Kotter, J. P. (1996). *Leading change.* Boston, MA: Harvard Business School Press.

Kouzes, J.M. & Posner, B. Z. (2003). *The five practices of exemplary leadership*. San Francisco, CA: Pfeiffer.

Lankshear, C. & Knobel, M. (2003). *New literacies: Changing knowledge and classroom learning.* Philadelphia: Open University Press.

Law, N., Pelgrum, W. J. & Plomp, T. (2008). *Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 study.* Hong Kong: Springer.

Leithwood, K. & Riehl, C. (2003) *What do we already know about successful school leadership?* Paper prepared for the AERA Division A Task Force on Developing Research in Educational Leadership , March, 2003.

Leithwood, K., Seashore-Louis, K., Anderson S., & Wahlstrom, K. (2004). *How leadership influences student learning.* University of Minnesota, Center for Applied Research and Educational Improvement and University of Toronto, Ontario Institute for Studies in Education.

Lenhart, A., Madden, M. Smith, A & Macgill, A. (2007). *Teens and social media*. Washington, DC: Pew Internet & American Life Project. Retrieved from http://www.pewinternet.org/pdfs/PIP_Teens_Social_Media_Final.pdf

Levin, D. & Arafeh, S. (2002). *The digital disconnect: the widening gap between Internet-savvy students and their schools*. Washington, DC: Pew Internet & American Life Project. Retrieved from http://www.pewinternet.org/report_display.asp?r=67

Levy, F. & Murnane, R. J. (2004). *The new division of labor: How computers are creating the next job market.* Princeton: Princeton University Press.

Linn, M. (2006). WISE teachers: Using technology and inquiry for science instruction. In E. A. Ashburn & R. E. Floden (Eds.), *Meaningful learning using technology: What educators need to know and do* (pp. 45-69). New York: Teachers College Press.

Lytle, J. H. (1996). The inquiring manager. *Phi Delta Kappan*, *77* (10), 666-670.

Marshall, C. & Rossman, G. B. (2006). *Designing qualitative research*. Thousand Oaks, CA: Sage Publications.

Marx, R. W., Blumenfeld, P. C., Krajcik, J. S., Fishman, B., Soloway, E., Geier, R. & Revital, T. T. (2004). Inquiry-based science in the middle grades: Assessment of learning in urban systemic reform. *Journal of Research in Science Teaching, 41*(10), 1063-1080.

Maxwell, J. A. (2005) *Qualitative research design*. (2nd Ed.). Thousand Oaks, CA: Sage Publications.

Marzano, R.J., Waters, T., & McNulty, B.A. (2005). *School leadership that works: From research to results*. Alexandria, VA: ASCD. Aurora, CO: MCREL

McColl-Kennedy, J. R. & Anderson, R. D. (2002). Impact of leadership style and emotion on subordinate performance. *The Leadership Quarterly. 13*(5), 545-559.

Miles, M.B., & Huberman, M. (1994). *Qualitative data analysis: An expanded sourcebook.* Thousand Oaks, CA: Sage Publications.

Morgan, G. (2006). *Images of organization.* Thousand Oaks, CA: Sage Publications.

National Center on Education and the Economy. (2006). *Tough choices or tough times: The report of the new commission on the skills of the American workforce*. Washington, DC: Author. Retrieved from http://www.skillscommission.org

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform*. Washington, DC: United States Department of Education.

National Council for the Social Studies. (2006). *Technology position statement and guidelines: A position statement of National Council for the Social Studies.* Retrieved from http://www.socialstudies.org/positions/technology

National Council of Teachers of English. (2009a). *21st century curriculum and assessment framework.* Retrieved from http://www.ncte.org/positions/statements/21stcentframework

National Council of Teachers of English. (2009b). *The NCTE definition of 21st century literacies.* Retrieved from http://www.ncte.org/positions/statements/21stcentdefinition

National Council of Teachers of English. (2009c). *Pathways for 21st century literacies.* Retrieved from http://www.ncte.org/pathways/21stcentury

National Council of Teachers of Mathematics. (2008). *The role of technology in the teaching and learning of mathematics.* Retrieved from http://www.nctm.org/about/content.aspx?id=14233

National Science Teachers Association. (2008). *The role of e-learning in science education*. Retrieved from http://www.nsta.org/about/positions/e-learning.aspx

Papert, S. (1993). *Mindstorms: Children, computers, and powerful ideas*. New York: Basic Books.

Partnership for 21st Century Skills. (2002). *Learning for the 21st century.* Retrieved from http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=29&Itemid=185

Partnership for 21st Century Skills. (2007). *Framework for 21st century learning*. Retrieved from http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=254&Iemid= 120

Petrosino, A. J. (1998). *The use of reflection and revision in hands-on experimental activities by at-risk children.* Unpublished doctoral dissertation, Vanderbilt University, Nashville.

Pittsburgh Advanced Cognitive Tutor Center. (2003). *PACT center @ Carnegie Mellon.* Retrieved from http://pact.cs.cmu.edu/

Portin, B., Schneider, P., DeArmond, M., & Grundlach, L. (2003). *Making sense of leading schools: A study of the principalship*. Seattle, WA: Center on Reinventing Public Education.

Ritter, S., Anderson, J., Koedinger, K., & Corbett, A. (2007). Cognitive Tutor: Applied research in mathematics education. *Psychonomic Bulletin & Review, 14*(2), 249-255.

Rogers, E. M. (2003) *Diffusion of innovation.* New York: Free Press.

Salisbury, D. (1996). *Five technologies for educational change: Systems thinking, systems design, quality science, change management, instructional technology.* Englewood Cliffs, NJ: Educational Technology Publications.

Salisbury Township School District (2008). *Strategic plan.* Retrieved from http://www.stsd.org/about.cfm?subpage=40399

Sawyer, K. (2006). Introduction: The new science of learning. In K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (pp. 1-18). New York: Cambridge University Press.

Scardamalia, M. (2004). CSILE/Knowledge Forum. In *Education and technology: An encyclopedia* (pp. 183-192). Santa Barbara, CA: ABC-CLIO.

Scardamalia, M., Bereiter, C., & Lamon, M. (1994). The CSILE project: Trying to bring the classroom into world 3. In K. McGilley (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 201-228). Cambridge, MA: MIT Press.

Schwartz, D. L. & Martin, T. (2004). Inventing to prepare for future learning: The hidden efficiency of encouraging original student production in statistics instruction. *Cognition and Instruction*, *22*(2), 129-184.

Shaffer, D. W. (2004). Pedagogical praxis: The professions as models for postindustrial education. *Teachers College Record, 106*(7), 1401-1421.

Shaffer, D. W. (2005). Epistemic games. *Innovate, 1*(6). Retrieved from http://www.innovateonline.info/index.php?view=article&id=79

Slotta, J. D. (2004). The Web-based Science Inquiry Environment (WISE): Scaffolding knowledge integration in the science classroom. In M. C. Linn, E. A. Davis & P. Bell (Eds.), *Internet environments for science education* (pp. 203 -232). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Spires, H. A., Lee, J. K., Turner, K. A., & Johnson, J. (2008). Having our say: Middle grade student perspectives on school, technologies, and academic engagement. *Journal of Research on Technology in Education, 40*(4), 497-515.

Talgam, Itay. (2009). *Lead like the great conductors*. Retrieved from
       http://www.ted.com/talks/itay_talgam_lead_like_the_great_conductors.html

U.S. Department of Labor, The Secretary's Commission on Achieving Necessary Skills
       (1991). *What work requires of schools: A SCANS report for America 2000.*
       Washington, DC: Author.

U.S. Department of Education Institute of Education Sciences. (2009). *What works
       clearinghouse.* Retrieved from http://ies.ed.gov/ncee/wwc/

Vygotsky, L. (1978). *Mind in society: The development of higher psychological
       processes* (M. Cole, V. John-Steiner, S. Scribner, & E Souberman, Eds.)
       Cambridge, MA: Harvard University Press.

Wagner, T. (2003). *Making the grade: Reinventing America's schools*. New York:
       Routledge.

Wagner, T. (2008a). *The global achievement gap: Why even the best schools don't teach
       the new survival skills our children need – and what we can do about it.* New
       York: Basic Books.

Wagner, T. (2008b). Rigor redefined. *Educational Leadership, 66* (2), 25-30.

Waters, J.T. & Marzano, R.J. (2006). *School district leadership that works: The effect of
       superintendent leadership on student achievement.* A Working Paper. Denver,
       Co: MCREL.

Wenglinsky, H. (2005). *Using technology wisely: The keys to success in schools*. New
       York: Teachers College Press.

Wenk, E. (1986) *Tradeoffs: Imperatives of Choice in a high-tech world.* Baltimore:
       The John Hopkins University Press.

Willingham, D. (March 2, 2009). *Flawed assumptions undergird the program at the
       Partnership for 21st Century Skills.* Retrieved from
       http://www.britannica.com/blogs/2009/03/flawed-assumptions-undergird-the-
       partnership-for-21st-century-skills-movement-in-education/

Wortham, S. (2007). Theories of learning: The sociocultural approach. Retrieved from
       http://www.learning2007.com

Zeni, J. (2001). *Ethical issues in practitioner research.* New York: Teachers College
       Press.