2009

A Descriptive Analysis of Knowledge and Implementation of 21st Century Instructional Practices Among Elementary School Teachers Whose Administrators Participated in the 2006-2007 21st Century Leadership Institute

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Dissertation submitted to the Faculty of
Marshall University Graduate College
in partial fulfillment of the
requirements for the degree of

Doctor of Education
in
Curriculum and Instruction

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Huntington, West Virginia, 2009

Keywords: 21st century instructional practices, teachers, knowledge, implementation

ABSTRACT

A Descriptive Analysis of Knowledge and Implementation of 21st Century Instructional Practices Among Teachers Whose Administrators Participated in the 2006 – 2007 21st Century Leadership Institute

The purpose of this study was to describe levels of knowledge and implementation of 21st century instructional practices among elementary school teachers whose administrators participated in the 2006 – 2007 21st Century Leadership Institute. A researcher-developed survey was used to collect data from 242 elementary teachers from 22 West Virginia schools. Teachers reported high or moderate knowledge and indicated they were implementing a majority of the 21st century instructional practices on a daily or weekly basis. Teacher knowledge of practices was significantly different based on school SES. Teacher implementation levels were not significantly different based on the variables investigated. The principal was determined to be the most significant influence on teacher knowledge and implementation levels. Lack of time, resources, and training were the biggest challenges to successful implementation of 21st century practices.

DEDICATION

I dedicate this work to the teachers in my life. Thank you for looking into the heart and mind of a child, seeing the seeds of possibility, and gently nurturing those seeds to fruition. You have served as the inspiration for my life and have made this goal a reality.

ACKNOWLEDGMENTS

No accomplishment in life is without aid, and so it is with the completion of my dissertation. There are many people who supported and made possible the attainment of this goal in my life and to them I offer my most sincere and heartfelt thanks:

Dr. Ron Childress, the chair of my committee, who spent many hours reading and revising my work, who never accepted less than my best, and never let me think for one minute that I would not finish what seemed like an interminable task. Thank you for staying the course and helping me take the process one step at a time and keeping me from feeling overwhelmed.

Dr. Teresa Eagle, my minor chair, whose insight and mastery of APA style, ensured I would produce a quality document. Your enthusiasm and encouragement bolstered my self-belief. I look to you with the greatest admiration and respect. Thank you for being a role model and inspiration for me during these eight years.

Dr. Rudy Pauley, committee member, who, along with Dr. Childress, co-taught the first doctoral level class in which I enrolled, and who has served as a great support and guide during this entire process. Thank you for your belief and dedication to my completion of this degree.

Dr. Jennifer Sirk, committee member, whose knowledge and wisdom helped me keep a realistic vision of the process, understanding that the many twists and turns of life are unexpected. As the first female in our county school system to achieve your doctorate, you have served as a great inspiration and role model for me.

Bruce, the best friend I have ever known. Thank you for your unending support and belief. Where I faltered, you persisted, and I thank you for seeing the possibilities when I was sometimes too timid to even think of them.

My three feline friends (Liddy, Tuffy, and Trixie) and my canine companion (Joey). Thank you for your unconditional love and support during the many hours I researched, wrote, and revised.

Virginia McCormick, colleague, friend, and Excel expert. Thank you for your help in formatting my survey and the tables for my dissertation. Your expertise and refusal to accept less than perfection made this document possible.

Debbie, my mom, my first teacher, and my friend. Thank you, Mom, for always teaching me, believing in me, and encouraging me to be my best. Without the countless hours you dedicated to me throughout my childhood, I would not be here.

Last, but certainly not least, my father, Zane. You cannot be here today to enjoy this milestone in my life, but I know that it is indeed made possible because of the foundation you provided. My education was always a top priority in your life and because of your sacrifices and dedication, I have accomplished this goal.

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CHAPTER ONE: INTRODUCTION

During the evening hours of October 4, 1957, the world as Americans knew it changed forever. A reflective spark, measuring the size of a basketball, weighing slightly more than 180 pounds, and circling the earth in a little over 90 minutes, called into question the United States' dominance as a world leader in both economic and academic fields. While polls at the time related that few Americans either anticipated or understood the mysteries of the Russian satellite *Sputnik I*, it is quite clear they understood what it represented ("American Reactions to Crisis," 1958). While lawmakers, such as Texas Senator Lyndon B. Johnson worried about Americans' safety, the cry from citizens across the country was why (Guillemette, n.d.). Why had the Russians been able to best the United States in what became known as the Space Race?

To find an answer, the public turned its attention to the American education system. Were not American children receiving as good, if not better, an education than Russian children? Fearful of the answer, Congress passed the National Defense Education Act (NDEA) in August of 1958 (Finley, 2000). Through this act, the national government became involved in funding public school initiatives and seeking to strengthen the math and science curriculum and improve teacher training programs in these areas.

With the launch of *Sputnik I* came an American obsession with public education and how to make it better. New attention was paid to academically gifted students, a group whom some felt had been heretofore ignored by the education system ("The Launch of Sputnik," n.d.). By the late 1960s and early 1970s, times of political and social unrest, concerns were raised about those students performing at the lowest levels and whether a realistic curriculum existed in the American public school. In 1965, during President Lyndon B. Johnson's War on Poverty, Congress authorized the Elementary and Secondary Education Act, providing resources and funds to schools all across the country to help disadvantaged students. In the 1970 Second Annual Gallup Survey of The Public's Attitude Toward the Public Schools, 58% of the students surveyed indicated that major changes were needed in the school curriculum, noting it "needs to be changed to meet today's needs" (Gallup, 1970, p. 104). A return to the basics was demanded.

Causing greater public alarm was the 1983 report *A Nation at Risk* issued by the National Commission on Excellence in Education. The fears first felt on the night of October 4, 1957, were once again brought to the forefront as the Commission warned of America's precarious stance in the global market, noting such things as a rising illiteracy rate among Americans and an increased need for remedial courses at colleges and universities and among businesses employing new graduates (1983). Although only 28% of those participating in the 1983 Gallup Poll survey on attitudes toward public schools had even heard about the Commission's report, poor curriculum and poor standards still ranked as one of the top three major problems confronting schools (Gallup, 1983). Clearly, Americans remained concerned about the education their children were receiving.

This concern was reflected in the Governors' Education Summit held in Charlottesville in 1989. As state leaders came together to discuss "the rising mediocrity in our schools" (*A Nation at Risk*, 1983, in Finley, 2000, p. 1), it was determined that any reform of the nation's education system must involve a joint effort between state and federal governments. In his State of the Union Address given in January of 1990, President George H. W. Bush outlined six key goals for the nation's education system to attain by the year 2000. In 1994, these goals were translated into federal legislation under *Goals 2000: Educate America Act* (1994). Under this piece of legislation, standards-based education became central to the reform effort.

In May of 2001, with public education still under critical scrutiny, Congress, with the support of President George W. Bush, enacted the *No Child Left Behind Act* (NCLB), reauthorizing the Elementary and Secondary Education Act of 1965. Like Goals 2000, this federal legislation had as its primary focus standards-based curriculum underscored by high expectations and accountability measures, with the end result being success for all students (*No Child Left Behind*, 2001).

While Goals 2000 and No Child Left Behind were meant to prepare America's children for the 21st century, the corporate world was clamoring with discontent and readily pointing out how the country's education system was falling far short in preparing students for the world of work in the new millennium. Still concerned with America losing its place as an economic power in the world, in 1990, the United States Secretary of Labor formed the Secretary's Commission on Achieving Necessary Skills (SCANS) to research and identify those skills most needed by workers entering the job force and to translate these findings into the curriculum of the American school system (United States

Department of Labor, 1991). Ultimately, the panel outlined five workplace competencies most needed by graduating students and supported by three personal traits most desired in an employee. An effective and productive worker, as described in the report, would be someone knowledgeable in the areas of technology and systems within the job place, who would know how to derive, evaluate, and make the most use of information pertinent to the business, someone with the ability to make the most efficient use of resources, and with well-developed interpersonal skills. The key foundational traits of a good employee were described as having a grasp of basic skills (reading, writing, math, speaking, and listening), the ability to use critical thinking skills to problem solve and create new products, and character traits such as honesty, responsibility, self-direction, and self-esteem (United States Department of Labor, 1991). Most importantly, the panel commented on the outdated structure of the curriculum and the need for schools to put learning "in context" (United States Department of Labor, 1991.). With the publication of the SCANS Report in 1991, American business found its voice and began speaking more frequently to educators about what was missing in the curriculum.

In 2000 the 21st Century Workforce Commission released its report *A Nation of Opportunity: Building on America's 21st Century Workforce*, and spoke directly to what students of the 21st century needed: "The current and future health of America's 21st Century Economy depends directly on how broadly and deeply Americans reach a new level of literacy—'21st Century Literacy'—that includes strong academic skills, thinking, reasoning, teamwork skills, and proficiency in using technology" (Executive Summary, p. 5). Since 1997, the Business and Higher Education Forum has produced 11 reports discussing flaws in the American education system and ways to alleviate the problems

corporations experienced with employees (Business-Higher Education Forum, 2007). Much of its work echoed the sentiments expressed by the 21st Century Workforce Commission. In 2002 the Partnership for 21st Century Skills was formed, uniting leaders from both business and education. The organization supported instruction in core subjects, as proposed by the No Child Left Behind legislation, but expanded upon this to include 21st century skills, using 21st century tools for instruction, and teaching and learning within a 21st century context (Partnership for 21st Century Skills, 2004).

In 2005, North Carolina's Governor Mike Easley established the first Center for 21st Century Skills in the hope of better preparing his state's students for the future. On November 14, 2005, at the Fall School System Leadership Conference, Governor Joe Manchin announced that West Virginia would become the second state in the nation to join the Partnership for 21st Century Skills, in effect becoming a national leader in the greatest education reform effort thus far in the new century (West Virginia Department of Education, 2005). As an initial step, the West Virginia Department of Education (WVDE), under the leadership of Superintendent Dr. Steven Paine, developed the *Framework for High Performing 21st Century School Systems* (2006), further supported by the NCLB-inspired mantra "Learning for All . . . Whatever It Takes." The document provided insights into closing the achievement gap among student subgroups across the state, while also creating student competencies in the six components that comprise 21st century skills. Student success in these areas would be dependent upon implementation of high yield practices found within the instruction pillar of the West Virginia Department of Education's *Framework*.

In an effort to initiate implementation of the *Framework* in West Virginia schools, the WVDE formed the 21st Century Leadership Institute, asking county superintendents to nominate administrative participants for the first academy in July 2006. In all, 75 administrators from elementary, middle, and high schools attended the intense seven-day training at Glade Springs Resort. With the *Framework* in mind, WVDE staff educated participants on understanding the overall rationale for 21st century learning with more intense instruction offered through programmatic level groups (elementary, middle, and high). The West Virginia Department of Education's goal with regard to the first Institute was to "develop 21st century leaders who can lead 21st century schools" (Pre-Institute Packet, 2006).

By joining the Partnership for 21st Century Skills, West Virginia has become part of a national reform effort. With the creation of the 21st Century Leadership Institute, the WVDE began the process of educating its administrators with the hope they would further distribute their knowledge to their faculties. Still, the question remains how successful have elementary administrators, who comprised the largest number of participants, been in relaying information to their faculties and in changing instructional practices.

Purpose of the Study

Both the research and the actions taken by the WVDE underscore the need for leaders who are capable of educating and empowering teachers to develop student competencies in 21st century skills. The purpose of this study was to investigate the level of knowledge and implementation of 21st century instructional practices among teachers

in elementary schools whose administrators attended the 21st Century Leadership Institute in 2006- 2007.

Research Questions

This study proposed to answer the following main question: What is the level of knowledge and implementation of instructional practices among teachers in elementary schools whose administrators attended the 21st Century Leadership Institute and have remained as administrators the following year?

Sub-question #1: What is the level of knowledge of 21st century instructional practices among teachers in elementary schools whose administrators participated in the Institute?

Sub-question #2: What is the level of implementation of 21st century instructional practices among teachers in elementary schools whose administrators participated in the Institute?

Sub-question #3: What differences in knowledge of 21st century instructional practices, based on factors such as years of teaching experience, attendance at the Teacher Leadership Institute, hours of professional development completed regarding 21st century skills, school size, and student socio-economic status, exist among elementary teachers whose principals attended the 21st Century Leadership Institute?

Sub-question #4: What differences in implementation of 21st century instructional practices, based on factors such as years of teaching experience, attendance at the Teacher Leadership Institute, hours of professional development completed regarding 21st century skills, school size, and student socio-economic status, exist among elementary teachers whose principals attended the 21st Century Leadership Institute?

Sub-question #5: To what extent do the building principal, peers/colleagues, professional development, and personal research influence the level of teacher knowledge of 21st century instructional practices?

Sub-question #6: To what extent do the building principal, peers/colleagues, professional development, and personal research influence the level of teacher implementation of 21st century instructional practices?

Sub-question #7: What barriers or challenges have elementary teachers encountered regarding implementation of 21st century instructional practices within their classrooms?

Definitions

For the purposes of this study, the following definitions of terms were employed:

Elementary school – Any school in West Virginia with a grade configuration of PK – 6, and including grade 4, whose administrator participated in the 2006 - 2007 21st Century Leadership Institute.

21st century skills – Skills needed by students to be productive citizens in the 21st century world. These include such things as basic, scientific, and technological literacy; higher order thinking and sound reasoning; teaming, collaboration, and interpersonal skills; prioritizing, planning and managing for results; and effective use of real-world tools.

High yield 21st century instructional practices – Those instructional practices which are research based and help develop 21st century skills among students as defined by the West Virginia Department of Education.

Years of teaching experience – The number of years a teacher from a participating school has been employed as a teacher.

Teacher Leadership Institute – The week-long training in 21st Century skills and instructional practices offered by the West Virginia Department of Education to teachers across the state of West Virginia during the summer of 2007.

School size – The number of full-time students enrolled at a participating elementary school.

Student socio-economic status – The percentage of students receiving free or reduced lunch within a participating elementary school.

Significance of Study

Findings from this study could have far-reaching implications in the field of education. Data will reveal the 21st century instructional practices most commonly used by teachers and their perceived competence level in using each practice. Such information could help shape professional development opportunities offered to teachers by state and local education agencies, as well as by individual schools.

Just as the study could yield results that will affect professional development for teachers, it could also impact training offered to public school administrators. A large part of this study centers upon whether change occurs in teacher knowledge and implementation of instructional practices within schools where principals have attended targeted professional development. The answer to this question could greatly influence future trainings for administrators sponsored by the West Virginia Department of Education.

Colleges and universities may find results from the study useful in the development of teacher and administrator preparation programs. Results could influence coursework related to human relations and curriculum development. In addition,

programs of study might include more coursework dealing with 21st century skills and implementing related instructional practices.

Lastly, findings from this study could also influence educational policy and legislative action. As the West Virginia Department of Education continues its efforts to instruct administrators with regard to 21st century skills, it will be paramount to show successful results which could more positively influence financial support from lawmakers. Likewise, the findings will have strong implications for policies developed by the West Virginia Department of Education, which outlines expectations for administrators and teachers.

Delimitations and Limitations of Study

A primary delimitation in this study is that it focuses on the elementary level, omitting middle and high school participants. Therefore, results may not be generalizable to secondary schools. Also, the results indicated within this study may not be applicable to elementary schools in West Virginia whose principals did not attend the Institute or in elementary schools in other states, as a main focus of this study is the 21st Century Leadership Institute, a professional development opportunity developed and offered in West Virginia.

Also, there are extraneous factors which might affect teacher knowledge of 21st century instructional practices, thus constituting a study limitation. Professional development opportunities sought out by teachers, which are not connected to their individual schools or administrators, may account for teacher knowledge and implementation of 21st century instructional practices within their classrooms. In addition, the media publicity attracted by the West Virginia Department of Education due

to its membership in the Partnership for 21st Century Skills may account for some teacher knowledge.

The use of a self-report survey for data collection may also be a study limitation. There is always the chance of respondent bias in self-reporting.

CHAPTER TWO: REVIEW OF LITERATURE

The purpose of this chapter is to provide a review of significant factors related to the knowledge and successful implementation of instructional practices within a public school, as revealed by the literature. These factors include the role of the principal as an instructional leader; the four teacher traits most often positively associated with student achievement; the significance of meaningful professional development and its impact upon student achievement; the issues of school size and the overall socio-economic status of a school and their relationship to both staff and student satisfaction; the skills needed by a 21st century workforce; the initiatives being implemented by the West Virginia Department of Education in its efforts to include 21st century skills in the public school curricula; and the task of the instructional leader in dealing with and implementing change within a school.

The Principal as Instructional Leader

During the late 1970s through the 1980s, as the American education system continued to receive criticism, researchers began examining successful schools in an attempt to uncover what characteristics set them apart from their less successful counterparts (Brookover & Lezotte, 1982, as cited in Phillips, n.d.; Edmonds, 1979, as cited in Hallinger, 2003; Leithwood & Montgomery, 1986, as cited in Hallinger, 2003). Their findings indicated effective schools were headed by "strong, directive leadership focused on curriculum and instruction from the principal" (Hallinger, 2003, p. 329). Studies conducted decades later find that 99% of public school superintendents and 97% of public school principals agree that "behind every great school is a great principal" (Public Agenda, 2001, as cited in National Conference of State Legislatures, 2002). Early

studies were conducted in elementary schools and, thus, the idea of an instructional leader was attributed to elementary school principals (Public Agenda, 2001, as cited in National Conference of State Legislatures, 2002).

Further research more clearly defined the characteristics of an instructional leader. Put simply, these leaders focused primarily on instruction and curriculum and less on the managerial aspects of the principalship (Lashway, 2002; NWREL, 2005). More recent definitions have expanded upon the practices and skills associated with instructional leadership. Hallinger (2000) found most of the practices of instructional leaders can be classified into the following categories: (1) defining the school's mission; (2) managing the instructional program; and (3) promoting a positive school learning climate (Hallinger & Murphy, 1987). Such a model includes not only expressing and modeling the school's mission and supervising curriculum and instruction, but also "protecting instructional time, promoting professional development, maintaining high visibility, providing incentives for teachers and providing incentives for learning" (Leithwood, 2005, as qtd. in Northwest Regional Educational Laboratory, 2005, ¶3). Others also found that instructional leaders provide and support collaborative opportunities for staff and are knowledgeable of and can model effective instructional practices (DuFour, 2002; Phillips, n.d.). Instructional leaders today also possess the capability to analyze data and use it to drive curriculum and professional development within their schools (Lashway, 2002). Whitaker (1997, as cited in Phillips, n.d.) outlines four specific skills needed by instructional leaders:

- First they need to be a resource provider.
- Secondly, they need to be an instructional resource.

- Thirdly, they need to be good communicators.
- Finally, they need to create a visible presence.

In general, the more recent definitions of instructional leader include the ideas of learning and leading learning (DuFour, 2002; National Association of Elementary School Principals, 2001). The Interstate School Leaders Licensure Consortium (1996)outlines specific standards which guide the administrator through both managerial and curricular duties.

While currently returning to favor and used extensively in the No Child Left Behind legislation, the idea of an instructional leader has met with criticism. During the 1990s when the nation's schools were experiencing another phase of reform, the notion of a transformational leader supplanted that of an instructional leader. Those who viewed the instructional leader as controlling and too narrowly focused saw transformational leadership as more of a collaborative effort, creating changes in people versus curriculum (Hallinger, 2003; Hopkins, n.d.; Liontos, 1992).

Several other flaws have been cited by critics of instructional leadership. For some researchers it seems unlikely that principals will be able to limit their involvement in the day-to-day managerial aspects of schools (Hallinger, 2003; Phillips, n.d.). As Stronge (1988, as cited in Phillips, n.d.) relates, administrators currently report being able to allot only one tenth of their time to those duties related to instructional leadership. Also, principals report a lack of confidence in relation to curriculum and instruction. Some feel these matters are best left to teachers, especially in high schools where a broad array of disciplines is covered (Hallinger, 2003; Phillips, n.d.). Lastly, researchers report on the "impossible dream" presented by the idea of instructional leadership (Barth, 1986,

as cited in Hallinger, 2003; Cuban, 1988, as cited in Hallinger, 2003; Waters & Kingston, 2005). With the daily demands of the principalship requiring most of an administrator's attention, "the days of the lone instructional leader are over" (Lambert, 2002, as qtd. in Hallinger, 2003, p. 343). Instructional leadership will need to be shared or distributed among staff members. A more balanced approach, rather than a one-size-fits-all leadership style, is currently gaining support among researchers (Hallinger, 2003; Northwest Regional Educational Laboratory, 2005; Waters, Marzano, & McNulty, 2003). Most importantly, an administrator must lead within the context of his/her school (Hallinger, 2003).

Regardless of leadership style, the principal is ultimately held responsible for school improvement. He/she is seen as the "chief learning officer" who ensures the "success or failure of the enterprise" (Bottoms & O'Neill, 2001, as cited in Lashway, 2002, ¶7; Reese, 2004). Research indicates the principal's actions, directly or indirectly, do impact student achievement (Hallinger, 2003; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Reese, 2004; Waters, Marzano, & McNulty, 2003). Accountability measures enacted since the turn of the century have greatly influenced the role of the principal as an instructional leader. Far from simply acting as a manager, today's instructional leader must "focus on instruction; build a community of learners; share decision making; sustain the basics; leverage time; support ongoing professional development for all staff members; redirect resources to support a multifaceted school plan; and create a climate of integrity, inquiry, and continuous improvement" (Brewer, 2001, as cited in Phillips, n.d., ¶10). Both managerial and interpersonal skills are needed by today's administrator (Southwest Educational Development Laboratory, n.d.).

Teacher Traits that Affect Instruction

As President Lyndon Johnson's administration waged its War on Poverty, it delved deeply into the American education system. Enlisting the aid of sociologist James Coleman from Johns Hopkins University, the administration released the two-volume report *On Equality of Educational Opportunity*, often referred to as the Coleman Report, on July 2, 1966. Presenting data collected from 570,000 students and 60,000 teachers from across the nation, the report made a very strong statement regarding schools and their lack of impact on student achievement. Coleman concluded that family background and the primary socioeconomic status of a school's students had the greatest effects on a student's achievement level (Hanushek, n.d.).

Findings of the Coleman Report met with skepticism among educational researchers who felt schools could and did affect students' achievement in a variety of ways. In particular, these researchers investigated the impact made by those working closest with students: teachers. While researchers disagree about the significance of the following teacher traits, the characteristics consistently appear in the literature as those associated with effective teaching: content knowledge; experience; teacher training and certification; and cognitive skills. Each of these traits will be discussed within the context of related literature.

Content Knowledge

Passage of the No Child Left Behind (NCLB) legislation (2001) placed great emphasis on having "highly qualified" teachers in every classroom across the nation. In fact, a primary goal of NCLB was to ensure all teachers would meet the definition of

"highly qualified" by the 2005-2006 school year. As defined by NCLB, highly qualified means a teacher meets the following criteria: (1) has a bachelor's degree, (2) has full state certification or licensure, and (3) demonstrates knowledge of his/her subject area. For elementary teachers knowledge may be demonstrated by passing content area exams. Secondary teachers may demonstrate knowledge by obtaining a major in their content area; completing enough hours to constitute a major in their subject area; completing a graduate degree or advanced certification; passing a test created by their state; or meeting the standards outlined in the High, Objective, Uniform State Standards of Evaluation (HOUSSE) (Educational Testing Service, 2004; Grant & Gillette, 2006). At the heart of its guidelines for quality teachers is NCLB's goal of closing the achievement gap among students by 2014; however, as of 2004, 20% of elementary teachers and 25% of secondary teachers did not meet the qualifications necessary to be considered "highly qualified" (United States Department of Education, 2004, as cited in Center for Public Education, 2005, ¶6).

Like NCLB, organizations associated with the teaching profession had also begun to place emphasis on the importance of content knowledge for teachers. Both the National Board for Professional Teaching Standards (NBPTS) and the Interstate New Teacher Assessment and Support Consortium (INTASC) have developed standards requiring in-depth subject area knowledge by teachers and teacher candidates.

In their study of students and teachers of math and science, Goldhaber and Brewer (1996, as cited in Center for Public Education, 2005) found teacher content knowledge to be a reliable predictor of student achievement. Their work revealed that students in these subject areas performed at higher levels when their teachers had a major or an advanced

degree related to their subject area. Researcher Linda Darling-Hammond (1999) found traits other than content knowledge support teacher effectiveness; however, her work does reveal that teachers who do not have at least a minor in the subject(s) they teach account for a 20% variation in the scores on the National Assessment of Educational Progress (NAEP), an assessment which the United States Department of Education uses to check student progress across the nation.

Experience

The correlation of teacher experience to student achievement is another area debated by researchers. In 1986 researcher Eric Hanushek determined that of 109 studies he surveyed regarding teacher traits and student achievement, fewer than half supported any relationship between years of teaching experience and student performance, and seven of the studies actually suggested more experience was detrimental to student achievement. Nearly ten years later, the results were different for Greenwald, Hedges, and Laine (1996, as cited in Center for Public Education, 2005 & 2006), who analyzed 60 studies with regard to teacher characteristics and effectiveness. They concluded that a positive relationship existed between years of teaching and student achievement levels.

Other researchers found teacher experience to be effective to a point. Some have found teacher learning to be at its highest during the first three years in the classroom (Goldhaber & Anthony, 2003). Others have found that new teachers, defined as those with one to three years of experience, have less impact on student achievement than their more experienced peers, but that the differences are less significant after five years of teaching (Center for Public Education, 2006; Darling-Hammond, 2000; National Science Foundation, 2002b).

Training and Certification

While it has been difficult for researchers to establish a link between teachers' content knowledge or years of teaching experience with student achievement, there has been support among researchers with regard to teacher training and certification influencing student performance (Goldhaber & Brewer, 1997, 2000, as cited in United States Department of Education, 2005; Monk, 1994, as cited in United States Department of Education, 2005.).

Studies indicate that teacher certification does impact student achievement. Alexander and Fuller (2004) found higher math achievement test scores among students in Texas taught by certified teachers versus uncertified teachers. These findings echo those of Laczko-Kerr and Berliner (2002, as cited in Center for Public Education, 2006) who found new teachers with certification had a more positive effect on student achievement than new teachers lacking proper certification. Earlier work by Fetler (1999, as cited in Goldhaber & Anthony, 2003) concluded that teachers working on emergency certificates were less effective in the classroom than fully certified teachers. In general, better student results are linked with teachers who are fully certified or licensed than with new or uncertified teachers (Darling-Hammond, 1999; Fordham Foundation, as cited in National Governors Association, n.d.).

Based on the conclusions of these and other studies, state and federal initiatives have been passed in the hopes of creating more qualified, higher quality teachers. Course requirements, exams, and licensing measures have become more stringent, fueled by the notion that teachers who meet these mandates will have significantly more positive

effects on student achievement. Naysayers point out many of these efforts have not been proven to directly affect teacher quality or student achievement (Hanushek, n.d.).

Cognitive Skills

Research has shown a link between teachers' general cognitive skills and their students' achievement levels. In their analysis of teacher traits and student achievement, Greenwald, Hedges, and Laine (1996) found nine studies that clearly linked a teacher's verbal ability with his/her students' performance (as cited in Center for Public Education, 2006). Likewise, in her 50-state survey, Darling-Hammond (2000) also found teacher verbal ability positively influenced student achievement.

Various other academic measures also indicate a positive correlation between teacher ability and student achievement. These include SAT and ACT scores, grade point average, IQ, and selectivity of college attended (Center for Public Education, 2005; Wayne & Youngs, 2003). In both Texas and Alabama researchers have found a positive relationship between teacher test scores and achievement levels among students (National Governors Association, n.d.). It has also been discovered that teachers who attended very selective undergraduate colleges to complete their degrees have great influence on student performance (Ehrenberg & Brewer, 1994, as cited in Educational Testing Service, 2004; Summers & Wolfe, 1975, as cited in Darling-Hammond, 2000).

Summary

As summarized by Haycock (1998), the research reinforces the belief that high quality teachers can close achievement gaps among various student groups. The difference a good teacher can make in a child's life is undeniable. As one study states, "Teacher quality more heavily influences differences in student performance than does

race, class, or school of the student" ("Why Teachers Matter," 2006, p. 58). Students with high quality teachers in consecutive years fare best (Jordan, Mendro, & Weerasinghe, 1997, as cited in Center for Public Education, 2005; Sanders & Rivers, 1996, as cited in Center for Public Education, 2005).

Each new policy or education initiative issued demonstrates the keen understanding of the significance of the teacher and, more importantly, the quality of the teacher, in the classroom. The National Commission on Teaching and America's Future focused its attention on teachers and the important role they play in school reform in its report *What Matters Most: Teaching for America's Future* (1996). It proposed "three simple premises" for effective reform:

(1) What teachers know and can do is the most important influence on what students learn.

(2) Recruiting, preparing, and retaining good teachers is the central strategy for improving our schools.

(3) School reform cannot succeed unless it focuses on creating the conditions under which teachers can teach and teach well (as qtd. in Center for Public Education, 2006, ¶4).

The Role of Professional Development

As the aforementioned research indicates, teacher knowledge is closely linked with student performance. More and more emphasis is being placed on developing teacher knowledge and skills by not only the federal government but also the general public. When asked in a recent survey conducted by Recruiting New Teachers what had the greatest effect on student learning, more than half the respondents (55%) remarked on

the quality of the classroom teacher (as cited in Sparks & Hirsh, 2000). Likewise, teachers also report positively on the effects of professional development. According to the National Center on Education Statistics (NCES), 85% of teachers who have participated in professional development say it provided them with new ideas, while 65 percent say it actually brought about changes in their instructional practices (1998, as cited in Sparks & Hirsh, 2000). Bauer and Berg (2001, as cited in Polk, 2006) found that teachers also rated professional development as key to their success in the classroom.

After the release of *A Nation at Risk* (1983), concern arose regarding the state of the American education system. President George H. W. Bush outlined a series of goals for the nation's schools to achieve by the year 2000. Of these goals, the fourth states: "By the year 2000, the nation's teaching force will have access to programs for the continuous improvement of their professional skills and the opportunity to acquire knowledge and skills needed to instruct all American students for the next century" (as qtd. in Peixotto & Fager, 1998, ¶6). Continuing to focus on teacher knowledge as a catalyst for student achievement, the United States Department of Education's Professional Development Team established a list of 10 indicators for meaningful professional development. Such development:

1. Focuses on teachers as central to student learning, yet includes all other members of the school community.
2. Focuses on individual, collegial, and organizational improvement.
3. Respects and nurtures the intellectual and leadership capacity of teachers, principals, and others in the school community.
4. Reflects best available research and practice in teaching, learning, and leadership.

5. Enables teachers to develop further experience in subject content, teaching strategies, uses of technologies, and other essential elements in teaching to high standards.
6. Promotes continuous inquiry and improvement embedded in the daily life of schools.
7. Is planned collaboratively by those who will participate in and facilitate that development.
8. Requires substantial time and other resources.
9. Is driven by a coherent long-term plan.
10. Is evaluated ultimately on the basis of its impact on teacher effectiveness and student learning; and this assessment guides subsequent professional development efforts (in Peixotto & Fager, 1998, ¶7).

The national government followed suit by increasing monies spent on supporting and developing teacher knowledge. With the reauthorization of the Elementary and Secondary Education Act (2001), the federal government allocated $3 billion each year for the professional development of teachers (Whitehurst, 2002). States too sensed the importance of professional development for teachers and some even set requirements for a certain number of professional development hours to be completed annually by teachers (Maldonado, 2002).

While the state and federal governments create mandates relative to professional development for teachers, evidence suggests individual school districts are failing to meet these mandates to the best of their ability. Although many districts allocate approximately 90% of their budgets to personnel, it is mostly in the form of salaries, and a mere 1% is

reserved for developing the skills and knowledge of their employees (Sparks & Hirsh, 2000). Surveys of teachers provide disappointing data also. The NCES found that only 47% of teachers reported being provided release time by their districts for professional development and 23% reported they did not receive any time, credit, or support for professional development (1998, as cited in Sparks & Hirsh, 2000).

Professional development experiences are often ineffective in changing teachers' instructional practices and, thereby, improving student achievement levels. Researchers surveying math and science teachers across the nation found several flaws in the professional development offered by school districts. Some of these included professional development too short in duration, little focus on content, limited contact hours, and little use of active learning strategies (Garet et al., 2001; Snow-Renner & Lauer, 2005).

As indicated by the Professional Development Team of the United States Department of Education, research supports the following as characteristics of effective professional development: sustained, job-embedded and supported; a collaborative effort involving teachers; active and hands-on; and content driven and relative to classroom practice. Each of these characteristics will be discussed within the context of related research below.

Duration of Professional Development

The effectiveness of professional development is judged by its duration. Gone are the days of "one-shot workshops" (Fullan & Stieglebauer, 1991; Maldonado, 2002; Peixotto & Fager, 1998). Researchers tend to agree that the more time spent introducing new concepts and providing training on their incorporation into the classroom, the more likely teachers are to make changes in their instructional practices (Darling-Hammond &

McLaughlin, 1995; Garet et al, 2001; Maldonado, 2002; Peixotto & Fager, 1998; Snow-Renner & Lauer, 2005, Sparks & Hirsh, 2000).

Studies indicate various lengths of time are necessary to affect teacher practice. Supovitz and Turner (as cited in Snow-Renner & Lauer, 2005) found at least 80 contact hours were necessary for science teachers to implement inquiry-based learning in their classrooms; the Southwest Educational Development Laboratory found 13-14 months of sustained professional development were needed to impact teaching methods (as cited in Peixotto & Fager, 1998). Showers, Joyce, and Bennett (1987) found teachers needed to try a concept at least 25 times before feeling comfortable enough to fully incorporate it as part of their instructional methods.

Collaboration and Professional Development

Research shows that professional development is most effective when it involves those individuals responsible for making the greatest changes: teachers. Professional development that is planned by teachers to meet their needs and allows them to assume a leadership position has been shown to produce positive results (Fullan & Stieglebauer, 1991; Sparks & Loucks-Horsley, 1989, as cited in Peixotto & Fager, 1998). When teachers who share commonalities—grade level, subject/discipline, school—participate in professional development together, the more likely they are to share ideas, support one another, and form true learning communities (Darling-Hammond & McLaughlin, 1995; Garet et al., 2001; Hawley & Valli, 1999, as cited in Maldonado, 2002; Mitchell, Hoyle, & Martin, 1993, as cited in Maldonado, 2002; Porter et al, 2003; Maldonado, 2002; Snow-Renner & Lauer, 2005; Thompson & Zeuli, 1999, as cited in Maldonado, 2002).

Active Learning and Professional Development

Just as educational research has revealed the effectiveness of constructivist practices in relation to student learning, it has also found teachers are more likely to remember and try instructional practices in which they actually have an opportunity to participate during professional development (Garet et al., 2001; Garet et al., 1999, as cited in Maldonado, 2002; Lewis, 2002, as cited in Maldonado, 2002; Loucks-Horsley, et al., 1998, as cited in Maldonado, 2002; Porter et al., 2003; Snow-Renner & Lauer, 2005). It is also important that teachers be allowed to revisit concepts through on-going professional development that focuses on a variety of learning styles and is presented using different methods (Sparks & Loucks-Horsley, 1989, as cited in Peixotto & Fager, 1998). Key to causing teachers to change instructional practices is providing them with the opportunity to try new methods without fear of failure and with continued support, along with time to reflect upon and adjust teaching methods (Darling-Hammond & McLaughlin, 1995; Sparks & Loucks-Horsley, 1989, as cited in Peixotto & Fager, 1998).

Relevancy and Professional Development

Joyce and Showers (1996, as cited in Peixotto & Fager, 1998) report that professional development in the 1970s was ineffectual, with a mere 10% of participants claiming to implement newly learned strategies. Among other flaws, participants felt professional development opportunities were not relevant to "real" classrooms and reflective only of a current fad in education. Research indicates that for professional development to be effective teachers must sense its direct application to their content (Cohen & Hill, 2000, as cited in Snow-Renner & Lauer, 2005; Darling-Hammond & McLaughlin, 1995; Maldonado, 2002; Porter et al., 2000, as cited in Maldonado, 2002;

Porter et al., 2003; Sparks & Hirsh, 2007). Along with a focus on strategies for teaching content, effective professional development also helps teachers uncover how students best learn that content (Borko & Putnam, 1998, as cited in Maldonado, 2002; Kennedy, 1998, as cited in Maldonado, 2002; Loucks-Horsley et al., 1998, as cited in Maldonado, 2002; Porter et al., 2003).

Student Achievement and Professional Development

"The ultimate goal of all professional development is improved student achievement" (Mundry & Loucks-Horsley, 1999, as qtd. in Maldonado, 2002, p. 1). Training is provided to teachers in the hopes that new knowledge will lead to new methods that will improve student performance on standardized exams. According to Little (1997), the "test of effective professional development is whether teachers and other educators come to know more about their subjects, their students, and their practice, and to make informed use of what they know" (Peixotto & Fager, 1998, ¶2). Clearly, the expectations of professional development go beyond acquiring mandatory training hours.

Despite the desire for professional development to increase student performance, the research indicates mixed results (Snow-Renner & Lauer, 2005). Various factors can influence whether professional development actually affects student achievement. First and foremost is the actual structuring of the training. As noted earlier, whether the professional development meets the criteria of what is considered effective makes a difference in what teachers take back to the classroom (Hawley & Valli, 1999, as cited in Maldonado, 2002). In the 1960s researchers focused on such issues as classroom management to explain the connection between instructional practice and student achievement; more recent research indicates that student achievement is more positively

affected when professional development focuses on three criteria: (1) how students learn particular subject matter, (2) instructional practices that are specifically related to the subject matter and how students understand it, and (3) strengthening teachers' knowledge of specific subject-matter content ("Teaching Teachers," 2005, p. 2).

Research also indicates that the number of teachers participating in professional development and whether the support they receive is continuous or not can affect student achievement. Corcoran et al (2003, as cited in Snow-Renner & Lauer, 2005) found in one study that 78% of teachers within a school needed to participate in professional development before the link to student achievement could be made. Other researchers have found that teachers feel much more strongly they can positively impact student achievement when they are provided professional development and given continuous support by their administration and/or district (Ashton, 1984, as cited in Maldonado, 2002). Making such an investment has proven worthwhile. In his study of 900 school districts in Texas, Harvard researcher Ronald Ferguson found "every dollar spent on more highly qualified teachers produced greater increases in student achievement than a dollar spent on any other single program" (1991, as qtd. in Sparks & Hirsh, 2007, ¶8). The effects of sustained, meaningful professional development are long lasting, too. Teachers who are given adequate time and support to learn new practices and how to implement them effectively are more likely to maintain these strategies (Supovitz, Mayer, & Kahle, 2000, as cited in Snow-Renner & Lauer, 2005).

Summary

While researchers debate whether student achievement can be linked with professional development experiences of teachers, the literature supports the idea that the

federal government, school districts, and the public in general place great faith in teacher knowledge and its significance in the classroom. It logically follows that more funding is being appropriated to provide training for the nation's teachers; however, as the literature above indicates, for professional development to be effective, it must be meaningful to teachers and transferable to the classroom.

The Significance of School Size

As mentioned in the Introduction, the Soviet launch of the satellite *Sputnik* in 1957 placed great pressure on the U.S. education system to produce scientists. In order to do this in vast numbers, a push was made to build large schools, which many felt could offer a more challenging curriculum with greater variety (Abbott, Joireman, & Stroh, 2002; Cotton, 1996). Books written by educational researcher James Bryant Conant during the late 1950s and 1960s touted this advantage of the large high schools, along with the added benefit of being more cost efficient (Cotton, 1996; Irmsher, 1997).

With these benefits in mind, the fifty-year span from 1940 to 1990 saw the number of schools actually decline in the United States due to consolidation, while the population continued to increase (Cotton, 1996; Ehrich, 2007). Since the 1990s and the advent of No Child Left Behind, which mandates academic success for *all* students, educational researchers have called into question the benefits of large schools. In many cases these researchers have become advocates of small schools, readily citing what they consider to be the rewards offered to students attending such schools. Review of the research indicates that a "small" elementary school is one with 300 – 400 students, while a "small" high school is enrolls 400 – 800 students (Cotton, 1996; Howley & Bickel, 2000; Irmsher, 1997; McRobbie & Villegas, 2001).

With the 1959 publication of *The American High School Today*, James Bryant Conant set forth the argument that no graduating class should be smaller than 100 students and that large schools were more cost efficient and capable of offering greater variety in course work (cited in Cotton, 1996). In sum, Conant demanded the end of small schools, which he felt were detrimental to the advancement of student achievement; however, recent research indicates there are several benefits of students attending what is defined as a small school. In particular, the advantages seem to be greatest for minority and students of low-socioeconomic status (Ehrich, 2007; McRobbie & Villegas, 2001).

According to the literature, because of their size, small schools enable students to better know one another, as well as their teachers. Interpersonal skills are developed and a sense of community pervades these schools (Ehrich, 2007; Irmsher, 1997; McRobbie & Villegas, 2001). This sense of community extends to the parents of students and, therefore, there tends to be greater parent involvement in small schools (Abbott, Joireman, & Stroh, 2002; Ehrich, 2007; McRobbie & Villegas, 2001; Irmsher, 1997).

Students in small schools also report having a greater sense of belonging than those in larger schools. They participate in more school activities and express greater satisfaction from this participation (Cotton, 1996; Ehrich, 2007). Small schools provide a feeling of security and have high attendance rates, as well as low incidents of violence (Abbott, Joireman, & Stroh, 2002; Cotton, 1996; Irmsher, 1997; McRobbie & Villegas, 2001).

Research reports there are benefits to teaching in a small school as well. These teachers express greater job satisfaction than their peers in larger schools (Abbott, Joireman, & Stroh, 2002; McRobbie & Villegas, 2001). They tend to be more familiar

with their students and their abilities, encouraging greater accountability (McRobbie & Villegas, 2001). Smallness also seems to affect teacher instruction in a positive manner. Because of familiarity and, therefore, a greater sense of comfortability among faculty members, there is more cooperation and collaboration in implementing instructional practices (Cotton, 1996). Instructional practices of teachers from small schools are also more likely to incorporate alternative assessments and lessons based in a relevant, real world context (Cotton, 1996).

The Significance of School Socioeconomic Status

With its publication in 1966, the Coleman Report provided insight into the state of the American education system and its impact on the nation's children. One striking statement issued in the report and cited frequently by researchers has caused re-examination of how school climate affects student achievement. Just as size does appear to matter in this regard, so apparently does the social make-up of the school. According to Coleman et al (1966, qtd. in Rumberger & Palardy, 2005; Kahlenberg, 2001): "The social composition of the student body is more related to achievement, independent of the student's own social background, than is any school factor." Therefore, a student's performance may be greatly influenced by the prevailing socioeconomic status of his/her peers, regardless of his/her own social standing.

Whether a school is comprised primarily of high or low socioeconomic status students has been shown to directly affect that schools environment:

> ". . . schools with greater portions of low income children were more likely to have lower per pupil expenditures, lower teacher quality, less rigorous curriculum, lower expectations for academic performance and fewer demands to

enroll in rigorous course work, and lower parent involvement . . .” (Barton, 2003; Carey, 2002; Evans, 2004; Solomon, et al., 1996).

Overall, schools with high proportions of low socio-economic students demonstrate low achievement schoolwide (Konstantopoulos, 2006). These schools also tend to have more discipline problems and greater safety risks than schools predominated by students of high socioeconomic status (Escarce, 2003; Evans, 2004). As Coleman reported, in schools with large amounts of low socioeconomic students, the prevailing climate is “antischool” (qtd. in Kahlenberg, 2001, ¶16).

Concerns Regarding Students’ Academic Performance in America

> “Each generation of Americans has outstripped its parents in education, in literacy, and in economic attainment. For the first time in the history of our country, the educational skills of one generation will not surpass, will not equal, will not even approach, those of their parents” (*A Nation at Risk*, 1983, ¶14).

The concern first expressed following the launch of the Soviet satellite *Sputnik* in the late 1950s was reiterated in the report *A Nation at Risk* issued by the federal government in 1983: The nation’s youth were falling behind the rest of the world, academically. In fact, the report indicated that the country’s students were exiting high schools and colleges underprepared for the work world, noting only 40% of 17-year-olds could read and draw inferences from that material and even fewer could solve a multi-step math problem (1983, ¶11). Although findings presented in the report were meant to incite greater interest in educational reform, the U.S. Department of Labor (1991) found

in its own research that few gains had been made in student achievement nearly a decade after the report's issuance.

Displeasure in student ability has been expressed at various levels. Both employers and institutions of higher learning have found fault with the results of the American education system. In a survey of the country's college instructors, conducted in 2004-2005 by Peter D. Hart Research Associates for Achieve, Inc., these instructors indicated they felt 42% of incoming college freshmen were underprepared for the demands of a college curriculum. In the same study, employers reported that 39% of high school graduates enter the work force without the necessary skills. Research conducted by the Partnership for 21st Century Skills found that employers who hired high school graduates felt 81% of them lacked skills in written communication and 70% of them were deficient in critical thinking and problem solving skills ("Developing a Framework for 21st Century Learning," 2007). Both employers and colleges have developed training and lower level courses to develop these skills. The five-year span between 1975 and 1980 alone saw a 72% increase in remedial course offerings by colleges across the country (*A Nation at Risk,*1983, ¶11).

Student scores on both national and international measures of academic achievement have been average to below average. Achievement gains among elementary and secondary students on the National Assessment of Educational Progress (NAEP) during the past 30 years have been few if any ("Globalization is Forcing U.S. Schools," 2006). Performance on international exams, in which the United States has participated during the last four decades, has also shown mediocre results.

Both the Programme for International Assessment (PISA), sponsored by the Organisation for Economic Co-operation and Development (OECD), and the Trends in International Mathematics and Science Study (TIMSS) measure application and analytical ability in mathematics among high school age students. The United States has consistently fallen below countries it once surpassed on these assessments. Results rendered in recent years have found the United States scoring at least 17 points below average and placing as low as 27 out of 39 participating countries (Crone, 2004; Hanushek, 2004; Shuster, 2005). Some researchers use these results as a predictor of the country's future economic success and see a low quality labor pool as a cause for concern (Hanushek, 2004). Others warn of a "quiet crisis" casting its shadow across the nation, as fewer and fewer youth seek careers in math and science and the government fiscally supports issues other than education (Friedman, 2005). These researchers warn of the priority other industrialized, as well as developing nations, are placing upon education and the fact that their students are receiving not only more years of schooling, but also higher quality education (Hanushek, 2004; Houlihan, 2005).

Skills Needed for the 21st Century

Following the publication of *A Nation at Risk* (1983), the unpreparedness of America's students became glaringly clear. In response to the outcry from the nation's employers, the U.S. Department of Labor developed a commission to research and report on the skills needed by those graduating and entering the work force. The Secretary's Commission of Achieving Necessary Skills (SCANS) issued the results of its efforts in 1991, speaking directly to schools on behalf of the country's business leaders. The report outlined three foundation skills and five competencies needed by employable youth.

Among these were basic literacy and critical thinking skills, inter- and intra-personal skills, as well as proficiency in technology use and management skills (United States Department of Labor, 1991). Furthermore, the authors encouraged educators to provide skill acquisition "in context" rather than through abstract, irrelevant activities (United States Department of Labor, 1991, Executive Summary, p. viii).

Over a decade later, the Partnership for 21st Century Skills was formed among leaders in business, government, and education. The organization, in response to concerns about the country's future competitiveness in the global market, set as its goal the reformation of the American education system and the insurance that all students would be equipped with the skills needed to be a successful citizen and productive worker in the 21st Century and beyond (Partnership for 21st Century Skills, 2004). The Partnership encouraged incorporation of 21st Century themes within core subjects. Such themes included global awareness; financial, economic, business and entrepreneurial literacy; civic literacy; and health literacy (Partnership for 21st Century Skills, 2004).

Along with changes in subject matter, the Partnership also aspired to change delivery of the content. Content, according to the organization, should be relevant and rigorous, with important concepts covered in-depth. Teachers, too, should practice more meaningful assessment of student work, providing useful feedback and including formative, as well as summative, assessment in evaluating student efforts (Partnership for 21st Century Skills, 2004).

West Virginia and 21st Century Learning

On November 14, 2005, at the Fall School System Leadership Conference, Governor Joe Manchin announced that West Virginia would become the second state in

the nation to join the Partnership for 21st Century Skills in its national education reform effort (West Virginia Department of Education, 2005). Since this announcement, state education leaders have instigated seven measures to ensure the incorporation of 21st Century learning in the state's schools.

As an initial step, the West Virginia Department of Education (WVDE), under the leadership of Superintendent Dr. Steven Paine, developed the *Framework for High Performing 21st Century School Systems*, supported by the NCLB-inspired mantra "Learning for All . . . Whatever It Takes." The document provides insights into closing the achievement gap among student sub-groups across the state, while also creating competencies within students, by incorporating the six components that comprise 21st Century learning. The original *Framework* has been further delineated based upon school and classroom level (elementary, middle, and high).

In an effort to initiate implementation of the *Framework* in West Virginia schools, the WVDE formed the 21st Century Leadership Institute, asking county superintendents to nominate administrative participants for the first institute in July 2006. Administrators from elementary, middle, and high schools attended the seven-day training at Glade Springs Resort. With the *Framework* in mind, the WVDE staff, aided by national and international education analysts and business leaders, educated participants on understanding the overall rationale for 21st Century learning, with more intense instruction offered through programmatic levels (elementary, middle, and high). Two more three-day follow-up trainings were scheduled in the fall and spring for the initial participants. Participants were also involved in web-based and face-to-face professional development and were asked to develop an electronic portfolio, reflecting upon the

learning experiences provided by the Institute and their application within the administrator's given school.

In addition to development of the 21st Century Leadership Institute, the WVDE has revised the state's Content Standards and Objectives (CSOs), which guide classroom instruction, to include 21st Century learning components. Curriculum standards have also been developed to provide further guidance on 21st Century instructional practices.

In order to provide support to classroom teachers in the implementation of 21st Century skills, the WVDE established a Teacher Leadership Institute in the summer of 2007, similar in layout to the one offered to administrators. Also, the Department has worked with master instructors to develop sample lessons incorporating 21st Century skills, which are accessible through the WVDE website. Lastly, a program for certification of technology integration specialists (TIS) has been developed by the WVDE. These specialists work closely with classroom teachers for purposeful incorporation of technology. The WVDE staff, Regional Education Service Agency (RESA) staff, and members from institutions of higher education have also undergone professional development to better understand the components of 21st Century learning and their role in its successful implementation.

Instructional Leadership and Change

Instructional leadership has been defined in a variety of ways and has been described as entailing numerous tasks. From managerial matters to curriculum design, the eventual objective of a school leader is school improvement. Ultimately, the key to school improvement is change. An effective instructional leader must be familiar with the

change process and be prepared to deal with each phase in order to positively affect his/her school for years to come (Patterson & Rolheiser, 2004).

While principals understand the necessity of change, they often cite resistance to change as a major obstacle to their school improvement efforts (Barth, 2002; Wright, 1991). Many times they fail to see change from the perspective of their staff members. The change process has been likened to aspects of the grieving process ("Understanding Change Theory," 2006). At first staff may be resentful of change initiatives and refuse to cooperate with them before finally reaching acceptance and attempting change. The lesson to be learned by administrators is change takes time and a sense of ownership by those involved with the change in order to be truly effective.

In his book *Leading in a Culture of Change* (1997), educational change researcher and consultant Michael Fullan presents six guidelines for any educational leader ready to embark on the change process. Among Fullan's suggestions is that leaders must accept that change is fraught with difficulty and must evolve over time. Also key is the notion that change can only be successfully implemented where there is not only collaboration among the group, but there is also opportunity to build individual meaning by each person involved (Frost, 2000; Fullan, 1997; Miles, 1998). Without this ownership, resistance to change will only continue.

As Fullan (1992) explained, change is not about single ideas or innovations; it is about examining and affecting the actual culture of the school. Change extends much deeper than the fad of the moment. School culture has been defined as "a complex pattern of norms, attitudes, beliefs, behaviors, values, ceremonies, traditions, and myths that are deeply ingrained in the very core of the organization" (Barth, 2002, p. 6). For others, it is

a "system of meaning [that] often shapes what people think and how they act" (Stolp, 1994, p. 23). Ultimately, the leader of a school cannot simply pay lip-service to the idea of change; he/she must be willing to make personal changes and model the willingness to accept change (Reeves, 2006/2007).

Clearly, school culture can impact change efforts. Those schools with positive cultures tend to have a greater capacity for change (Oberg, 2003). These schools have a climate fostered by such traits as collegiality, trust, shared decision making, recognition, and high expectations, as well as a shared vision, communication, innovation, and collaboration (Goldring, 2002; Patterson, 2000). Research indicates there is a significant positive relationship between school culture and student achievement, as well as teacher job satisfaction. Such evidence makes clear the power culture can have within a school. (Goldring, 2002; Stolp, 1996).

When leaders consider change, they need to fully understand all that it entails. Change involves more than a single initiative and is about more than one person's vision of how things should be (Fullan, 1992; Fullan & Stiegelbauer, 1991). Effective and lasting change involves reculturation. This reculturation can only occur when all stakeholders share the vision for the future and model the values and behaviors needed to attain that vision (Alkire, 1995). The principal who strives for effective change builds capacity for change by providing opportunities for collaboration among staff and by providing the resources necessary for implementation (Fullan, 2002). He/she also maintains a realistic view of change, understanding it will not happen quickly, and it will not take place easily. Instead, he/she plans for the months and years ahead and sees

opportunity within all the challenges presented by various people and situations (Fullan, 1999).

Professional Development for Principals

The role of school principal has changed greatly since its inception in the early 20th century. The evolution has witnessed a transformation from head teacher responsible for upholding the community's values while ensuring students mastered the basic skills to an instructional leader capable of completing managerial tasks while collaborating with all stakeholders to best meet the social, emotional, intellectual, and physical needs of students (Grogan & Andrews, 2002).

The duties associated with the principalship are growing and more demanding than ever before. A changing world with new demands, as well as an ever-changing student body require more each year from the public school principal. In order to be prepared to deal with these challenges, it is important for administrators to build their knowledge and their skills. In fact, research indicates there are many benefits to administrator participation in professional development. Not only does the knowledge gained through professional development activities help principals meet school improvement goals, but it also reinforces the image of administrator as instructional leader and learner, setting a positive example for students and staff (Fenwick & Pierce, 2002; Grogan & Andrews, 2002; Rodriguez-Campos, Rincones-Gomez, & Shen, 2005).

Regardless of the benefits of participating in professional development, there are a variety of reasons why many administrators are reluctant to do so. For some, it s the problem of time—finding time to participate and finding time to enact the new knowledge and skills learned following participation. For others, participation in

professional development does not match a personally-defined vision of administrative responsibility. For these individuals, an administrator oversees the learning of others but does not selfishly indulge in learning for himself/herself (Barth, 1985). In general, however, the greatest obstacle to administrator participation in professional development is the lack of quality offerings. Some refer to professional development opportunities for administrators as a "wasteland" (qtd. in Barth, 1985, p. 156).

A variety of professional development opportunities *are* available to administrators. Many of these are conventions and conferences sponsored by national and state organizations and filled with innumerable sessions regarding education-related topics (Peterson, 2002). Others are programs or institutes designed by state departments of education often in collaboration with universities. Still others are one-day trainings planned and presented through the local district office.

While having choices is ideal, here are several flaws with the current professional development system for administrators. In all the aforementioned scenarios, in many instances, there is a lack of continuity or follow up. Concepts are presented once and never revisited (Peterson, 2002). Rarely is professional development individualized to address the specific needs of principals; more importantly, professional development offerings are unlikely to address the various learning styles of participating principals (Barth, 1985). Many are not interactive experiences and, instead, turn attendees into a passive audience (Richardson, 2000).

Quality professional development for principals is characterized by traits similar to those found in quality professional development for teachers. It is relevant and sustained. It occurs within the school or school district, addresses specific areas of

concern, and allows for collaboration among peers (Peterson, 2002; Richardson, 2000; Rodriguez-Campos, Rincones-Gomez, & Shen, 2005). The most meaningful professional development establishes supportive relationships among administrators, their peers, and their faculties, where new ideas are discussed, attempted, and reflected and improved upon (Fenwick & Pierce, 2002; Peterson, 2002).

CHAPTER THREE: RESEARCH METHODS

Methodology

The purpose of this study was to investigate and describe knowledge and implementation levels of 21st century instructional practices among elementary teachers whose principals participated in the 2006 – 07 21st Century Leadership Institute. The purpose of this chapter was to describe the research design employed, the population and sample selected for participation, instrument development and validation, methods of data collection used, and the statistical analyses conducted.

Research Design

The research was a descriptive study that used a cross-sectional design to examine teacher knowledge and implementation levels related to 21st century instructional practices among elementary teachers whose administrators attended the 2006 – 07 21st Century Leadership Institute. According to Fink (2006), cross-sectional designs "result in portraits of one or many groups at one point in time" (p. 52). This study examined teachers' knowledge and implementation of 21st century instructional practices following their administrators' participation in sustained professional development regarding 21st century skills the previous year. The study also examined the difference in knowledge and implementation levels related to 21st century instructional practices based on years of teaching experience; age; hours of professional development completed; school size; and school socio-economic status.

Population and Sample

For the purposes of this study, those elementary teachers employed at schools where the administrators had participated in the 2006 – 2007 21st Century Leadership

Institute sponsored by the West Virginia Department of Education and had remained as administrators for the 2007 – 2008 school year were the targeted population. Eighty-one schools were represented at the 21st Century Leadership Institute in July of 2006 – 2007. Of these 81, 43 were placed within the elementary programmatic level during the training. For the purposes of this study, elementary schools were defined as schools having grade configurations consisting of preschool through grade six. Twenty-seven of these schools consisted of some configuration of grades preschool through six. Calls to these schools in the fall of 2007 found that two schools no longer had the same administrators. These schools were removed from the study. Another administrator had failed to complete all three follow-up training sessions of the 2006 – 2007 21st Century Leadership Institute, and this school was also eliminated from the study.

In February of 2008 calls were made to the 24 individual schools to describe the purpose of the study and to request each school's participation. Two other schools were removed from the study when one administrator declined to participate in the study and another was absent from his assignment for an extended period of time due to illness. All 506 teachers at the 22 remaining schools were surveyed regarding their knowledge and implementation levels of 21st century instructional practices.

Instrumentation

Research for this study was conducted via the researcher-developed instrument *High-Yield Practices of the 21st Century Classroom Survey*. This instrument consisted of three parts (See Appendix A) and was derived primarily from the *Framework for High Performing Elementary Classrooms*, a policy document published by the West Virginia Department of Education (2006). The first section of the instrument (Part A) consisted of

six open-ended questions, asking teachers to detail their current teaching position, grade level assignment, whether or not they participated in the 21st Century Teacher Leadership Institute sponsored by the WVDE, years of teaching experience, age, and the number of hours of professional development regarding 21st century skills in which they had participated.

The second section (Part B) of the instrument consisted of 28 instructional practices associated with the 21st century elementary classroom, as defined by the West Virginia Department of Education. Teachers were asked to rate their knowledge and use of each of the 28 practices using a Likert-scale ranging from one to five. The descriptors none (1), minimal (2), average (3), moderate (4), and high (5) were used by respondents to rate their knowledge of 21st century instructional practices. The descriptors not at all (1), less than monthly (2), monthly (3), weekly (4), and daily (5) were used by respondents to describe their level of implementation of 21st century instructional practices within their classrooms.

The third section of the survey (Part C) sought to derive information from respondents regarding five factors which have influenced their knowledge and use of 21st century instructional practices, as well as any factors they viewed as obstacles to successful implementation of such practices. Influential factors were rated by respondents using a Likert-scale ranging from one to five. The descriptors used for factors influencing both knowledge and use were none (1), minimal (2), average (3), moderate (4), and high (5). Lastly, respondents were asked to list any barriers or challenges they have encountered regarding their efforts to implement 21st century instructional practices.

Instrument Validation

The survey used for data collection was validated for content and format by a twelve-member expert panel, as well as recommendations from various graduate students enrolled in C&I 703 (Survey Design). Members of the West Virginia Department of Education closely associated with the design and implementation of the 21st Century Leadership Institute read the survey and provided recommendations. Also, evaluators of the Institute from Marshall University Graduate College (MUGC) helped validate the instrument. The survey was also reviewed by an assistant superintendent from Kanawha County, a curriculum specialist from Cabell County, a principal from Wayne County who also served as an elementary programmatic leader at the 2006 21st Century Leadership Institute, and the Director of Instruction from Wayne County Schools. A complete list of the members of the expert panel is included in Appendix B.

Changes were made to the instrument based upon the recommendations of these three groups. Recommendations included various formatting issues, such as providing headings above rating scales, expanding page margins, bolding key words in directions and in the statements to which participants would respond. Also, it was recommended that information in Part A follow Part B. Statements regarding factors of influence on participant knowledge and use of 21st century instructional practices were used to create a Part C, as recommended by members of the panel.

Data Collection Procedures

Following validation, the survey was duplicated and mailed, along with a cover letter, to administrators of all participating schools. The cover letter explained the purpose of the study and requested that administrators please distribute the enclosed

surveys to teachers for completion (See Appendices C and D). Attached to each survey was a letter addressed to participating elementary teachers and an envelope in which to enclose completed surveys for return to their administrators (See Appendices C and D). Completed surveys were collected by building principals and returned to the researcher using the self-addressed, stamped envelope provided.

Data Analysis Procedures

For the purposes of this study, data were sorted and categorized based upon participants' responses. The data were analyzed to determine if there were any differences among respondents based on years of teaching experience, age, hours of professional development completed with regard to 21st century skills, attendance at the Teacher Leadership Institute, school size, and school socio-economic status. Chi-square analysis was used to determine the statistical significance of participant responses in relation to their knowledge and implementation levels of 21st century instructional strategies, as well as the degree of influence respondents reported that their building principal, peers/colleagues, school, district, and state-sponsored professional development, and personal reading/research had on their knowledge and implementation of 21st century instructional practices. Mean scores were derived with regard to survey responses. Mean ranks were derived using Kruskal-Wallis testing, which compared differences in responses among the teachers from the participating schools (Salkind, 2004). Chi-square analysis was also conducted to determine statistical significance of teacher responses.

Summary

The procedures described in this chapter were designed to determine what, if any, influence administrator participation in the July 2006 21st Century Leadership Institute had on elementary teacher knowledge and implementation of 21st century instructional practices. A group comprised of teachers whose principals participated in the Institute was surveyed regarding school demographics, such as school size and student SES, as well as their position and years teaching. They were also surveyed with regard to classroom instructional practices. Appropriate descriptive statistics were employed to describe results of the survey and to determine any significant differences among responses.

CHAPTER FOUR: PRESENTATION AND ANALYSIS OF DATA

Introduction

The purpose of this study was to investigate the level of knowledge and implementation of 21st century instructional practices among teachers in elementary schools whose administrators attended the West Virginia Department of Education sponsored 21st Century Leadership Institute in 2006 - 2007. Another purpose of this study was to determine if demographic factors such as age, years of experience, hours of professional development, school size and socio-economic status made any difference in teacher knowledge and implementation of 21st century instructional practices in these same schools. Also of interest were factors which might influence teacher knowledge and use of 21st century instructional practices, such as building administrators, colleagues/peers, state and district-sponsored professional development, and personal research. In addition, the study considered those factors which teachers perceived as being barriers to their implementation of 21st century instructional practices.

This chapter presents the data collected for this study and provides a statistical analysis of those data. This chapter is divided into the following sections: (a) data collection procedures, (b) respondent and school characteristics, (c) major findings for each of the seven research questions addressed by the study, (d) ancillary findings, and (e) a summary of the chapter.

Data Collection Procedures

Surveys were mailed to the participating schools the second week of April 2008. Using data from the West Virginia Department of Education website, as well as numbers provided by each of the 22 participating schools' administrators, the number of surveys

mailed to each school was correlated to the number of classroom teachers employed at each participating school. A total of 509 surveys were mailed to the teachers in the 22 participating schools. A cover letter was included to the administrator, instructing that the surveys be distributed among the teaching staff and to collect and use the self-addressed, stamped envelope in which to return them by the end of April (See Appendix C). A separate cover letter explaining the purpose of the study and return envelope were attached to each teacher survey (See Appendix D).

By the second week of May 2008, 16 schools had returned 199 completed surveys. An additional 43 surveys were returned by the second week of June 2008. In an effort to ensure a higher return rate, individual administrators were contacted via e-mail and telephone. Special allowances were made on the return date to compensate for administration of the state standardized exam (WESTEST). By June 2008, 242 surveys had been returned, accounting for a 48% return rate. Teachers from each of the 22 schools returned completed surveys.

Respondent and School Characteristics

Part A of the survey requested respondents to respond to six open-ended questions. When asked whether or not they had participated in the 21st Century Teacher Leadership Institute offered by the West Virginia Department of Education in the summer of 2007, 234 teachers responded to the question. Thirty-three (14.1%) responded yes, while 201 (85.9%) indicated they had not participated in the Institute.

Years of teaching experience reported by respondents ranged from less than one year to 41 years. The following quartiles were devised to categorize years of teaching experience reported by participants: (1) 0 – 8 years, (2) 9 – 21 years, (3) 22 – 29 years,

and (4) 30 – 41 years. Those with 0 – 8 years of teaching experienced comprised 27.2% of the respondents, while those with 9 – 21 years equaled 24.4% of the participants. Those with 22 – 29 years of experience comprised 24.8% of the participants, and those with 30 – 41 years of experience equaled 23.5% of all respondents. The mean for years of teaching experience was 18.9 (SD = 11.4).

Respondents' ages ranged from 23 to 69. Quartiles devised to categorize respondents ages were as follows: (1) 0 – 38 years, (2) 39 – 48 years, (3) 49 – 55 years, and (4) 56 – 69 years. The youngest teachers, 38 years and younger, equaled 26.2% of all the respondents. The fewest number of respondents came from the group ages 39 – 48 (21.4%). The largest group (29.3%) consisted of those teachers between 49 – 55 years of age. Respondents between the ages of 56 – 69 comprised 23.0% of the study participants. The mean age for those study participants responding to this question was 46.2 years (SD = 11.1).

One hundred and sixty-five participants provided the number of professional development hours related to 21st century skills they had completed. Responses ranged from zero to 100 hours. The following quartiles were devised to categorize the hours of professional development reported by participants: (1) 0 – 3 hours, (2) 4 – 9 hours, (3) 10 – 20 hours, and (4) 21+ hours. Those respondents with 10 – 20 hours of professional development comprised the largest group of participants (32.2%). Those with 0 – 3 hours of professional development made up the next largest group (26.6%). Those with 4 – 9 hours equaled 24.8%, while those with 21 or more hours of professional development in 21st century skills comprised 16.2% of all respondents. The mean number of hours of professional development among those responding was 13.9 hours (SD = 16.6).

For the 22 schools participating in the study, school size or student enrollment ranged from 124 to 627 for the 2007 – 2008 school year. The following quartiles were devised to categorize the participating schools: (1) 0 – 252, (2) 253 – 339, (3) 340 – 518, and (4) 519 – 627. The largest category of respondents (28.9%) reported working in schools with 340 – 518 students. Slightly fewer respondents (26.0%) reported working in schools with 253 – 339 students. Participants from smaller schools (0 – 252 students) comprised 25.3% of respondents, and those teachers from the largest schools (519 – 627) made up 19.9% of those responding. The mean size for participating schools was 378 (SD = 149.2).

School socio-economic status (SES) was also determined for each of the participating schools using information provided by the West Virginia Department of Education's website. The percentage of students receiving free and reduced lunch ranged from 25% to 89% in the schools participating in the study. The following quartiles were devised to categorize the participating schools: (1) 0 – 42%, (2); 43 – 56%, (3) 57 – 63%, and (4) 64 – 89%. Teachers from schools with the lowest percentages of students receiving free and reduced lunch made up the largest group of respondents (29.8%). Those with 43% – 56% of low SES students made up the next largest group (24.1%). The last two quartiles were similar, with 23.2% of respondents coming from schools with 57% – 63% receiving discounted meals and 23.1% of respondents working in schools with 64% – 89% low SES students. The average percentage of students receiving free and/or reduced lunch at participating schools was 54.2% (SD = 14.5).

Major Findings

The following section presents the major findings from the study. These findings are organized around each of the seven research questions investigated.

Level of Knowledge of 21st Century Instructional Practices

Part B of the survey was comprised of 28 statements regarding 21st century instructional practices for the elementary classroom. Respondents were asked to rate their level of knowledge regarding these practices using the following Likert scale descriptors: 1 = None, 2 = Minimal, 3 = Average, 4 = Moderate, and 5 = High. Frequencies, as well as valid and cumulative percentages, were calculated for each response. Chi-square values were also derived for each statement. Data related to participant knowledge may be found in Table 1.

Questions one through three of Part B dealt with participant knowledge levels associated with the utilization of teaching and learning approaches that are developmentally responsive, socially equitable, and culturally responsive. More than 75% of the respondents indicated they had either a moderate (41.5%) or high (34.4%) knowledge of using teaching and learning approaches that are developmentally responsive. A chi-square analysis determined that these results were statistically significant, χ^2 (4, N = 242) = 163.9, $p < .000$. With regard to utilizing teaching and learning approaches that are socially equitable, nearly 77% responded positively, with 43.1% indicating they had moderate knowledge of such practices and another 33.5% reporting high knowledge of such practices. A chi-square test revealed that teacher responses were statistically significant, χ^2 (4, N = 242) = 160.6, $p < .000$. More than six of ten (61.2%) respondents indicated they had moderate (34.6%) or average (26.6%)

knowledge with regard to using culturally responsive teaching and learning approaches. Another 27.4% reported they had high knowledge, while 10.1% noted they had only minimal knowledge. Chi-square analysis revealed that these responses were statistically significant, χ^2 (4, N = 242) = 90.1, $p < .000$.

Questions four through six of Part B presented statements regarding the use of modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences, positive social/personal skills, and ethical behavior. Nearly 60% of the respondents reported high knowledge of instructional practices to help students experience and develop respect for individual differences. Another 30% reported having moderate knowledge of such practices. Chi-square analysis revealed that these responses were statistically significant, χ^2 (4, N = 242) = 198.2, $p < .000$. In rating knowledge of instructional practices that help create a classroom climate where students experience and develop positive social/personal skills, 61.2% of the participants reported having high knowledge. An additional 30.2% indicated they had moderate knowledge of such practices. Chi-square analysis of these responses revealed statistical significance, χ^2 (4, N = 242) = 218.2, $p < .000$. When asked to rate their knowledge of instructional practices that help create a classroom climate where students experience and develop ethical behavior, 56% of respondents reported having high knowledge, while 25.7% indicated they had moderate knowledge in this area. Chi-square analysis of these responses revealed statistical significance, χ^2 (4, N = 242) = 243.2, $p < .000$.

Questions seven and eight related to lesson and unit plans. Teachers were asked to indicate whether their lessons and units aligned with the West Virginia Content

Standards and Objectives (WV CSOs), and if their lessons were standards-based ones that identified specific goals and focused on core concepts and essential questions. More than two-thirds (68.2%) of respondents reported high knowledge of aligning lessons and units with the WV CSOs. Another 23.4% indicated having moderate knowledge of this instructional practice. Chi-square analysis of these responses was statistically significant, χ^2 (4, N = 242) = 387.4, $p < .000$. Respondents reported having high (56.5%) or moderate (30.5%) knowledge of using standards-based lessons that identified special goals and focused on core concepts and essential questions. A chi-square analysis of these responses was statistically significant, χ^2 (4, N = 242) = 266.3, $p < .000$.

Questions nine, ten, and eleven on the instrument asked teachers to indicate their level of knowledge with incorporating 21st century technology tools and learning skills that challenge all students as well as accommodate students with special needs. Approximately one in four (26.1%) participants responded they had high knowledge of how to incorporate 21st century technology tools that challenge all students, while 36.1% reported having moderate knowledge. Another 29.8% considered themselves as having average knowledge. These results were statistically significant, χ^2 (4, N = 242) = 109.1, $p < .000$. With regard to knowledge of incorporating 21st century learning skills that challenge all students, the greatest percentage of respondents indicated having moderate (42.9%) or high knowledge (34%) levels. Another 17.6% reported having average knowledge of this practice. Chi-square analysis of these responses was statistically significant, χ^2 (4, N = 242) = 157.3, $p < .000$. When questioned regarding their knowledge of incorporating 21st century technology tools and learning skills that accommodate students with special needs, participants reported knowledge levels as

moderate (32.4%), average (29.8%), and high (26.1%), respectively. A chi-square analysis found these responses to be statistically significant, χ^2 (4, N = 242) = 81.45, p < .000.

Teachers were also asked to rate their level of knowledge regarding design and implementation of instructional practices that are developmentally appropriate and support students' natural inquisitiveness. Nearly 62 % indicated high knowledge for designing and implementing lessons that are developmentally appropriate for their students, and another 29.2% reported having a moderate knowledge of this practice. Results from a chi-square analysis yielded significant findings, χ^2 (4, N = 242) = 325.3, p < .000. More than four in ten (40.6%) respondents reported high knowledge of designing and using instructional practices that support students' natural inquisitiveness, while 42.3% reported having moderate knowledge of this instructional practice. A chi-square analysis yielded significant results, χ^2 (4, N = 242) = 193.1, p < .000.

Respondents were next asked to rank their knowledge of using instructional practices to better meet the needs of various learners within their classrooms. Teachers reported a high (63.1%) or moderate (27.0%) knowledge of differentiated instruction, a high (64.4%) or moderate (25.5%) knowledge of using grouping strategies, a high (48.8%) or moderate (37.1%) knowledge of research-based strategies, and a high (48.1%) or moderate (35.7%) knowledge of using standards-based lessons or units to better meet the needs of learners in their classrooms. Chi-square analyses of these responses were statistically significant at the specified level, χ^2 (4, N = 242) = 335.2, p < .000; χ^2 (4, N = 242) = 343.5, p < .000; χ^2 (4, N = 242) = 223.4, p < .000; and χ^2 (4, N = 242) = 207.8, p < .000, respectively.

Respondents reported moderate (30.5%) or high (28.8%) knowledge of the use of a writing process supported by 21st century skills and technology tools. Another 26.7% reported they had average knowledge of this practice. Chi square analysis found these results significant, χ^2 (4, N = 242) = 68.7, $p < .000$.

When asked about their knowledge of using rubrics to guide student work, greater numbers of teachers reported having moderate (35.7%) or average knowledge (26.4%) than high knowledge (21.3%). The results were found to be statistically significant, χ^2 (4, N = 242) = 72.9, $p < .000$. Knowledge related to the use of rubrics to assess student work yielded similar findings. Respondents rated their knowledge of the practice as moderate (36.6%), average (26.0%), or high (22.1%). These results were statistically significant, χ^2 (4, N = 242) = 76.3, $p < .000$. When asked about their knowledge in allowing student input in the development of rubrics to be used in assessing their work, 30.8% of the respondents reported average knowledge, 19.2% reported moderate knowledge, and 18.4% reported minimal knowledge. Only 13.2% of the respondents reported a high knowledge of this practice. These results were found to be statistically significant at the specified level, χ^2 (4, N = 242) = 19.6, $p < .000$. Similar results were found regarding teachers' knowledge of using technology resources (by themselves or their students) to develop rubrics. Approximately one in four respondents (26.8%) indicated average knowledge, while slightly more than one in five indicated moderate (22.1%) or minimal knowledge (20.4%), while 19.1% felt they had high knowledge of this instructional practice. The remaining 11.5% reported having no knowledge of this practice. These results were found to be statistically significant, χ^2 (4, N = 242) = 14.6, $p < .000$.

Teachers were asked to rate their knowledge of instructional practices that help promote self-directed learners: portfolios, work stations/centers, self-assessments, rubrics, drawings, and journals. More participants remarked they had high (38.8%) or moderate knowledge (31.2%) of this practice than did those who indicated average (18.6%), minimal (7.2%), or no knowledge (4.2%). Chi-square analysis revealed statistical significance, χ^2 (4, N = 242) = 106.1, $p < .000$.

Study participants were asked to rate their knowledge of using data from assessments to adjust instruction, such as pacing, interventions, accelerations, remediation, and instructional decisions. Higher numbers of respondents reported having high (44.9%) or moderate knowledge (30.9%) compared to those claiming average (18.2%), minimal (3.4%), or no knowledge (2.5%). Chi-square analysis indicated these findings were statistically significant, χ^2 (4, N = 242) = 156.2, $p < .000$.

In describing their knowledge of using instructional practices that develop 21st century information and communication skills in students, the largest number of respondents reported having moderate knowledge (38.7%). Slightly fewer claimed high knowledge (30.2%), and another 20.4% indicated they had average knowledge of such practices. Chi-square testing found the differences between observed and expected results to be significant, χ^2 (4, N = 242) = 104.2, $p < .000$.

The last three statements of Part B of the instrument asked teachers to rate their knowledge with regard to using instructional practices that make content relevant to students' lives; allowing students the opportunity to plan and manage projects; and allowing students to interact with their peers, other teachers, or knowledgeable adults in authentic experiences. Slightly more than half of the respondents indicated they had high

knowledge (50.2%) of using instructional practices that make content relevant to students' lives. More than one-third (36.7%) of the respondents reported having moderate knowledge, while 11.0% reported average knowledge. These results were found to be significant, χ^2 (4, N = 242) = 236.0, $p < .000$. Less than one-fourth (24.4%) of respondents indicated they had high knowledge of using instructional practices that allow students to plan and manage projects, while 29.8% indicated they had average knowledge of how to do so. Another 27.3% teachers reported a moderate knowledge level. Chi-square analysis indicated these results were significant, χ^2 (4, N = 242) = 49.73, $p < .000$. More than one-third of the participants indicated they had moderate (36.8%) or high knowledge (34.7%) of creating opportunities for students to interact with their peers, other teachers, and knowledgeable adults in authentic experiences. Another 20.5% indicated they had average knowledge. Chi-square testing revealed these results to be statistically significant, χ^2 (4, N = 242) = 122.4, $p < .000$.

Table 1.
Teacher Perceived Current Levels of Knowledge of 21st Century Classroom Instructional Practices

	Level of Knowledge										
	None		Minimal		Average		Moderate		High		
Instructional Practice	n	%	n	%	n	%	n	%	n	%	$\chi(4)$
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	4	1.7	3	1.2	51	21.2	100	41.5	83	34.3	163.9***
2. Utilize multiple teaching and learning approaches that are socially equitable.	4	1.7	7	2.9	45	18.8	103	43.1	80	33.5	160.6*
3. Utilize multiple teaching and learning approaches that are culturally responsive.	3	1.3	24	10.1	63	26.6	82	34.6	65	27.4	90.1*
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	2	0.8	0	0	22	9.1	72	30.1	143	59.8	198.2*
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	2	0.8	0	0	16	6.7	75	31.2	147	61.2	218.2*
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	3	1.2	6	2.5	35	14.5	62	25.7	135	56.0	243.2*

Table 1.
Teacher Perceived Current Levels of Knowledge of 21st Century Classroom Instructional Practices *(continued)*

	Level of Knowledge										
	None		Minimal		Average		Moderate		High		
Instructional Practice	n	%	n	%	n	%	n	%	n	%	$\chi(4)$
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	2	0.8	3	1.3	15	6.3	56	23.4	163	68.2	387.4*
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	3	1.2	4	1.7	24	10.0	73	30.5	135	56.5	266.3*
9. Incorporate 21st century technology tools that challenge all students.	4	1.7	2	15	71	29.8	86	36.1	62	26.1	109.1*
10. Incorporate 21st century learning skills that challenge all students.	6	2.5	7	2.9	42	17.6	102	42.9	81	34.0	157.25*
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	14	5.9	14	5.9	71	29.8	77	32.4	62	26.1	81.45*
12. Design and use instructional practices that are developmentally appropriate.	2	0.8	2	0.8	18	7.5	70	29.2	148	61.7	325.3*
13. Design and use instructional practices that support students' natural inquisitiveness.	1	0.4	9	3.8	31	13.0	101	42.3	97	40.6	193.1*
14. Differentiate instruction to meet the needs of all learners.	1	0.4	2	0.8	21	8.7	65	27.0	152	63.1	335.2*

Table 1.
Teacher Perceived Current Levels of Knowledge of 21st Century Classroom Instructional Practices *(continued)*

	Level of Knowledge										
	None		Minimal		Average		Moderate		High		
Instructional Practice	n	%	n	%	n	%	n	%	n	%	$\chi(4)$
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	2	0.8	2	0.8	20	8.4	61	25.5	154	64.4	343.5*
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	3	1.2	7	2.9	24	10.0	89	37.1	117	48.8	223.4*
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	4	1.7	3	1.3	31	13.2	84	35.7	113	46.7	207.8*
18. Use a writing process supported by 21st century skills and technology tools.	11	4.7	22	9.3	63	26.7	72	30.5	68	28.8	68.7*
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	7	3.0	32	13.6	62	26.4	84	35.7	50	21.3	72.9*
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	9	3.8	27	11.5	61	26.0	86	36.6	52	22.1	76.3*

Table 1.
Teacher Perceived Current Levels of Knowledge of 21st Century Classroom Instructional Practices *(continued)*

	Level of Knowledge										
	None		Minimal		Average		Moderate		High		
Instructional Practice	n	%	n	%	n	%	n	%	n	%	$\chi(4)$
21. Allow student input in the development of rubrics used to assess their work.	43	18.4	43	18.4	72	30.8	45	19.2	31	13.2	19.6*
22. Use technology resources to develop rubrics (by either teachers and/or students).	27	11.5	48	20.4	63	26.8	52	22.1	45	19.1	14.6***
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	10	4.2	17	7.2	44	18.6	74	31.2	92	38.8	106.1*
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	6	2.5	8	3.4	43	18.2	73	30.9	106	44.9	156.2*
25. Use instructional practices that develop 21st century information and communication skills in students.	14	6.0	11	4.7	48	20.4	91	38.7	71	30.2	104.2*
26. Use instructional practices that make content relevant to students' lives.	3	1.3	2	0.8	26	11.0	87	36.7	119	50.2	236.0*
27. Use instructional practices that create opportunities for students to plan and manage projects.	15	6.3	29	12.2	71	29.8	65	27.3	58	24.4	49.7*

Table 1.
Teacher Perceived Current Levels of Knowledge of 21st Century Classroom Instructional Practices *(continued)*

	Level of Knowledge										
	None		Minimal		Average		Moderate		High		
Instructional Practice	n	%	n	%	n	%	n	%	n	%	$\chi(4)$
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	4	1.7	15	6.3	49	20.5	88	36.8	83	34.7	122.4*

* p<.05

***p<.000

Level of Implementation of 21st Century Instructional Practices

Teachers who participated in this study were also asked to rate their level of classroom use for each of the 28 instructional practices listed in Part B of the instrument. Again, teachers used a Likert scale to rate their level of use. The following five descriptors were used to indicate level of use: 1 = Not at All, 2= Less than Monthly, 3 = Monthly, 4 = Weekly, and 5 = Daily. Response frequencies, valid percentages, and chi-square were calculated for each of the 28 statements to which participants responded. Data regarding teacher implementation of 21st century instructional practices may be found in Table 2.

The first three statements asked teachers to rate their level of use of instructional practices that are developmentally appropriate, socially equitable, and culturally responsive. With regard to developmentally appropriate instructional practices, 60.1% of teachers indicated they did so daily, 34% did so weekly, and 4.6% did so monthly. When these results were analyzed using a chi-square test, they were found to be statistically significant, χ^2 (4, N = 242) = 332.1, $p < .000$. Teachers indicated they implemented socially equitable practices as follows: 54.9% daily; 35.3% weekly; 7.7% monthly; 1.3% less than monthly, and 0.9% not at all. Analysis of these results using the chi-square test, found these results to be statistically significant, χ^2 (4, N = 242) = 272.8, $p < .000$. With regard to using instructional practices that are culturally responsive, 39.1% of those surveyed indicated they did so on a daily basis. More than one in four reported weekly (27.7%) and monthly practice (26.8%). Chi-square analysis found these results to be statistically significant, χ^2 (4, N = 242) = 122.1, $p < .000$.

The next three statements asked teachers how often they use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences, positive social/personal skills, and ethical behavior. Nearly three-fourths of the participants (74.5%) indicated they did use modeling, practice, and reinforcement daily to help students experience and develop respect for individual differences. Another 20.9% reported they did so weekly, and 3.8% indicated monthly use. Chi-square analysis of these results revealed them to be significant, χ^2 (4, N = 242) = 477.9, $p < .000$. Eighty-two percent of the respondents reported they did use modeling, practice, and reinforcement daily to help students experience and develop positive social/personal skills, while 15.5% reported weekly use and 2.1% claimed monthly use. Chi-square analysis found these results to be statistically significant, χ^2 (4, N = 242) = 427.3, $p < .000$. When asked if they used instructional practices that would help students experience and develop ethical behavior, 69.3% of teachers indicated they did use such instructional practices daily, 20.6% teachers indicated weekly use of such practices, and 6.7% reported monthly use. A chi-square analysis of these results found them to be statistically significant, χ^2 (4, N = 242) = 390.5, $p < .000$.

Statements #7 and #8 required teachers to rate their level of use of research-based lesson plans and units that are aligned with the West Virginia Content Standards and Objectives (WV CSOs) and that have specific goals and focus on essential questions. Over 80% (80.9%) of the participants indicated daily use of lessons and units that are research-based and correlate with the WV CSOs, 11.4% indicated weekly use of such plans and units, and 4.2% reported monthly use. A chi-square analysis found these results to be statistically significant, χ^2 (4, N = 242) = 555.2, $p < .000$. Over two-thirds (69.9%)

of the respondents indicated the lesson and unit format they used incorporated goals and focused on essential questions or core concepts on a daily basis, while slightly less than 20% reported using such a lesson and unit format on a weekly basis. Another 7.2% claimed monthly use of such plans. Chi-square testing revealed these results to be statistically significant, χ^2 (4, N = 242) = 392.8, $p < .000$.

The next three statements requested teachers to rate their level of use of 21st century technology tools and learning skills to challenge all students and to accommodate students with special needs. Teachers reported daily (36.2%), weekly (38.3%), or monthly (16.6%) use of technology tools to challenge all students. A chi-square analysis conducted on these results revealed statistical significance, χ^2 (4, N = 242) = 129.4, $p <$ .000. Respondents reported daily (48.1%), weekly (35.3%), and monthly (10.6%) use of learning skills that challenge all students. Chi-square analysis of these results found them to be statistically significant, χ^2 (4, N = 242) = 198.6, $p < .000$. Four out of every ten teachers (40.5%) reported daily use of technology tools and learning skills to accommodate students with special needs. Another 31.5% indicated they made weekly use of this instructional practice, and 12.5% reported monthly use. Chi-square analysis of these results found them to be significant, χ^2 (4, N = 242) = 105.5, $p < .000$.

The following two statements asked participants to rate their implementation level for designing and using instructional practices that are developmentally appropriate and support students' natural inquisitiveness. Respondents indicated they did design and use practices that are developmentally appropriate on a daily (80.8%), weekly (13.8%), or monthly (4.2%) basis. Chi-square analysis of these results found them to be statistically significant, χ^2 (4, N = 242) = 565.2, $p < .000$. Slightly more than half (52.5%) of the

respondents reported daily use of lessons that supported students' natural inquisitiveness. Slightly less than one third (32.6%) of the participants claimed weekly use of such lessons, and monthly use was reported by 11.4% of the respondents. Chi-square testing found these results to be statistically significant, χ^2 (4, N = 242) = 231.9, $p < .000$.

The following three statements presented instructional practices teachers might use to reach all types of learners within their classrooms. Study participants indicated daily (78.6%), weekly (16.4%), and monthly (2.5%) use of such instruction. Chi-square testing revealed these results were statistically significant, χ^2 (4, N = 242) = 529.9, $p <$ .000. Teachers also indicated daily (71.2%), weekly (21.6%), and monthly (4.7%) use of various grouping strategies to benefit all learners. Chi-square analysis indicated these results were statistically significant, χ^2 (4, N = 242) = 420.1, $p < .000$. Over half (56.7%) of the respondents indicated daily use of research-based instructional strategies such as systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers. An additional 29.0% of respondents reported weekly use of such strategies and 9.2% of participating teachers indicated monthly use. Chi-square analysis of these findings indicated they were statistically significant, χ^2 (4, N = 242) = 257.0, $p < .000$.

When asked if they used standards-based lessons and units that integrate concepts across disciplines, 58.6% of the respondents reported they did so on a daily basis. Half of that amount (29.3%) indicated they did so on a weekly basis, and an additional 8.6% reported monthly use of this instructional practice. A small percentage (2.2%) noted less than monthly use. When these results were analyzed using chi-square testing, they were found to be statistically significant, χ^2 (4, N = 242) = 275.6, $p < .000$.

When asked to rate their use of a writing process supported by 21st century skills and technology tools, 27.9% of the respondents indicated they did so on a daily basis, while 39.7% reported weekly use. Another 16.6% of the responding teachers noted monthly use of such a writing process. Chi-square analysis of these results revealed they were statistically significant, χ^2 (4, N = 242) = 88.5, $p < .000$.

The next four statements on Part B of the instrument dealt with the design and use of rubrics within the classroom. When asked if they used a variety of rubrics to guide student work, teachers responded they did so on a daily (16.3%), weekly (33.5%), and monthly (25.8%) basis. An analysis of these results via chi-square testing revealed them to be statistically significant, χ^2 (4, N = 242) = 43.1, $p < .000$. Study participants also noted they used rubrics on a daily (15.5%), weekly (35.8%), and monthly basis (26.7%) to assess student work. Chi-square testing determined these results were statistically significant, χ^2 (4, N = 242) = 56.1, $p < .000$. Additionally, teachers reported they give students the opportunity daily (8.3%), weekly (11.7%), and monthly (22.6%) to help devise rubrics that will be used to assess their class work. Chi-square analysis of these results found them to be statistically significant, χ^2 (4, N = 242) = 49.2, $p < .000$. When asked if they and/or their students use technology tools to develop rubrics, teachers reported doing so daily (11.3%), weekly (18.6%), and monthly (23.8%). Chi-square analysis of these results were statistically significant at the specified level, χ^2 (4, N = 242) = 13.9, $p < .000$.

In response to whether they were using instructional practices that encourage students to become self-directed learners, 38.3% of the participants indicated they were doing so on a daily basis. An additional 31.1% noted they used these strategies on a

weekly basis, while 13.2% reported monthly use. A chi-square analysis of these results revealed they were statistically significant, χ^2 (4, N = 242) = 89.l, $p < .000$.

When asked to rate their use of data from assessments to make instructional decisions and adjustments, 47% of the participating teachers noted they did so on a daily basis. Another 32.5% reported doing so on a weekly basis, and 12.8% indicated monthly use. Chi-square testing of these results revealed their statistical significance, χ^2 (4, N = 242) = 170.7, $p < .000$.

With regard to using instructional practices to develop 21st century information and communication skills in students, 32.2% of teachers reported they did so daily, 38.3% indicated they used this practice weekly, and 19.1% reported using the strategy monthly. Chi-square analysis of these results revealed they were statistically significant, χ^2 (4, N = 242) = 105.8, $p < .000$.

The final three statements on Part B of the instrument asked teachers to rate their use of instructional practices that make content relevant to students' lives, allow students to plan and manage projects, and allow students to interact with their peers, other teachers, and knowledgeable adults in authentic experiences. Slightly fewer than two-thirds (63%) of the respondents reported they did use instructional practices that make content relevant to students' lives on a daily basis, while an additional 30.2% responded they do so weekly. Chi-square analysis of these results revealed they were statistically significant, χ^2 (4, N = 242) = 342.0, $p < .000$. When asked if they use instructional practices that allow students to plan and manage projects, more than one in five teachers reported they did so daily (21.3%) or weekly (21.3%). Monthly use of such practices was reported by 26.8% of the respondents. Chi-square testing of these results revealed their

statistical significance, χ^2 (4, N = 242) = 16.1, $p < .000$. Finally, when asked if they provide their students with the opportunity to interact with their peers, other teachers, or knowledgeable adults in authentic experiences, participating teachers reported they did so on a daily (36.9%), weekly (32.2%), or monthly (19.1%). basis. Chi-square analysis of these results revealed their statistical significance, χ^2 (4, N = 242) = 100.0, $p < .000$.

Table 2.
Teacher Perceived Current Levels of Implementation of 21st Century Classroom Instructional Practices

	Level of Implementation										
	Not at All		Less than Monthly		Monthly		Weekly		Daily		
Instructional Practice	n	%	n	%	n	%	n	%	n	%	χ^2
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	2	0.8	1	0.4	11	4.6	81	34.0	143	60.1	332.1***
2. Utilize multiple teaching and learning approaches that are socially equitable.	2	0.9	3	1.3	18	7.7	83	35.3	129	54.9	272.8*
3. Utilize multiple teaching and learning approaches that are culturally responsive.	5	2.1	10	4.3	63	26.8	65	27.7	92	39.1	122.1*
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	1	0.4	1	0.4	9	3.8	50	20.9	178	74.5	477.9*
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	1	0.4	0	0	5	2.1	37	15.5	196	82.0	427.3*
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	3	1.3	5	2.1	16	6.7	49	20.6	165	69.3	390.5*

Table 2.
Teacher Perceived Current Levels of Implementation of 21st Century Classroom Instructional Practices *(continued)*

	Level of Implementation										
	Not at All		Less than Monthly		Monthly		Weekly		Daily		
Instructional Practice	n	%	n	%	n	%	n	%	n	%	χ^2
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	5	2.1	3	1.3	10	4.2	27	11.4	191	80.9	555.2*
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	7	3.0	1	0.4	17	7.2	46	19.5	165	69.9	392.8*
9. Incorporate 21st century technology tools that challenge all students.	5	2.1	16	6.8	39	16.6	90	38.3	85	36.2	129.4*
10. Incorporate 21st century learning skills that challenge all students.	7	3.0	7	3.0	25	10.6	83	35.3	113	48.1	198.6*
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	20	8.6	16	6.9	29	12.5	73	31.5	94	40.5	105.5*
12. Design and use instructional practices that are developmentally appropriate.	2	0.8	1	0.4	10	4.2	33	13.8	193	80.8	565.2*
13. Design and use instructional practices that support students' natural inquisitiveness.	1	0.4	7	3.0	27	11.4	77	32.6	124	52.5	231.9*

Table 2.
Teacher Perceived Current Levels of Implementation of 21st Century Classroom Instructional Practices *(continued)*

Instructional Practice	Level of Implementation: Not at All n	%	Less than Monthly n	%	Monthly n	%	Weekly n	%	Daily n	%	χ^2
14. Differentiate instruction to meet the needs of all learners.	1	0.4	5	2.1	6	2.5	39	16.4	187	78.6	529.9*
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	2	0.8	4	1.7	11	4.7	51	21.6	168	71.2	420.1*
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	3	1.3	9	3.8	22	9.2	69	29.0	135	56.7	257.0*
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	3	1.3	5	2.2	20	8.6	68	29.3	136	58.6	275.6*
18. Use a writing process supported by 21st century skills and technology tools.	12	5.2	24	10.5	38	16.6	91	39.7	64	27.9	88.5*
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	21	9.0	36	15.5	60	25.8	78	33.5	38	16.3	43.1*

Table 2.
Teacher Perceived Current Levels of Implementation of 21st Century Classroom Instructional Practices *(continued)*

	Level of Implementation										
	Not at All		Less than Monthly		Monthly		Weekly		Daily		
Instructional Practice	n	%	n	%	n	%	n	%	n	%	χ^2
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	21	9.1	30	12.9	62	26.7	83	35.8	36	15.5	56.1*
21. Allow student input in the development of rubrics used to assess their work.	79	34.3	53	23.0	52	22.6	27	11.7	19	8.3	49.2*
22. Use technology resources to develop rubrics (by either teachers and/or students).	58	25.1	49	21.2	55	23.8	43	18.6	26	11.3	13.9*
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	19	8.1	22	9.4	31	13.2	73	31.1	90	38.3	89.1*
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	8	3.4	10	4.3	30	12.8	76	32.5	110	45.5	170.7*
25. Use instructional practices that develop 21st century information and communication skills in students.	13	5.7	11	4.8	44	19.1	88	38.3	74	32.2	105.8*
26. Use instructional practices that make content relevant to students' lives.	2	0.9	1	0.4	13	5.5	71	30.2	148	63.0	342.0*

Table 2.
Teacher Perceived Current Levels of Implementation of 21st Century Classroom Instructional Practices *(continued)*

	Level of Implementation										
	Not at All		Less than Monthly		Monthly		Weekly		Daily		
Instructional Practice	n	%	n	%	n	%	n	%	n	%	χ^2
27. Use instructional practices that create opportunities for students to plan and manage projects.	25	10.6	47	20.0	63	26.8	50	21.3	50	21.3	16.1*
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	7	3.0	21	8.9	45	19.1	76	32.2	87	36.9	100.0*

*p<.05
***p<.000

Factors Related to Teacher Knowledge of 21st Century Instructional Practices

Professional Development. Teacher knowledge of 21st century instructional practices was also analyzed based upon the number of professional development hours each respondent reported having completed in this area. Based on figures reported by the study participants, quartiles were devised as follows: 0-3 hours, 4-9 hours, 10-20 hours, and 21+ hours. Kruskal-Wallis testing was conducted for each of the instructional practices.

Chi-square values derived from Kruskal-Wallis analysis indicated there was a significant relationship between teacher knowledge and the number of professional development hours completed in relation to five 21st century instructional practices (See Table 3). Teachers with 21 or more hours of professional development received the highest mean rank regarding their knowledge of 21st century learning skills that challenge all students, χ^2 (3, N = 27) = 14.56, $p < .000$, and their knowledge of developing 21st century information and communication skills in students, χ^2 (3, N = 26) = 19.99, $p < .000$. Teachers with 10 – 20 hours of professional development received the highest mean rank with regard to their knowledge of using a writing process supported by 21st century skills and technology tools, χ^2 (3, N = 51) = 13.93, $p < .000$, and their knowledge of allowing student input in the development of rubrics used to assess their work, χ^2 (3, N = 51) = 10.11, $p < .000$. Teachers with 4 – 9 hours of professional development received the highest mean rank in their knowledge of using grouping strategies to promote higher levels of student engagement, χ^2 (3, N = 40) = 11.01, $p < .000$. A complete listing of mean ranks for teacher knowledge based on hours of professional development is provided in Appendix E.

Table 3.
Hours of Professional Development as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
10. Incorporate 21st century learning skills that challenge all students.	42	65.31	40	73.46	53	90.44	27	101.04	14.56***
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	44	69.59	40	95.55	52	76.72	27	92.31	11.01***
18. Use a writing process supported by 21st century skills and technology tools.	43	65.12	41	72.32	51	96.06	26	91.42	13.93***
21. Allow student input in the development of rubrics used to assess their work.	43	70.83	41	69.29	51	95.03	25	85.88	10.11***
25. Use instructional practices that develop 21st century information and communication skills in students.	43	55.24	39	84.77	52	91.75	26	93.37	19.99***

***p<.000

Age. Teacher knowledge of 21st century instructional practices was analyzed based upon the age reported by each participant. Based on figures reported by the study participants, quartiles were devised as follows: 0 – 38 years, 39 – 48 years, 49 – 55 years, and 56 – 69 years. Kruskal-Wallis testing was conducted for each of the instructional practices. Results of this testing provided mean ranks for each instructional practice in relation to the ages reported by the study participants, as well as chi-square values.

Kruskal-Wallis testing yielded chi-square values, which established that there was a statistically significant relationship between the age of the respondents and their knowledge of three 21st century instructional practices (See Table 4). Teachers 56 – 69 years of age reported the highest mean rank for their knowledge of how to design and use instructional practices that support students' natural inquisitiveness, χ^2 (3, N = 52) = 8.62, $p < .000$. Teachers aged 0 – 38 years received the highest mean rank for their knowledge level regarding use of standards-based lessons and units that integrate the understanding of concepts across disciplines, χ^2 (3, N = 57) = 8.37, $p < .000$, and their knowledge level in relation to using technology resources to develop rubrics by either themselves or their students, χ^2 (3, N = 56) = 9.19, $p < .000$. A complete listing of mean ranks for teacher knowledge based on age is included in Appendix F.

Table 4.
Age as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices

	Years of Age								
	0 - 38		39 - 48		49 - 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
13. Design and use instructional practices that support students' natural inquisitiveness.	58	111.10	48	87.92	59	115.22	52	119.06	8.62***
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	58	97.66	47	95.85	57	123.45	51	109.52	8.37***
22. Use technology resources to develop rubrics (by either teachers and/or students).	56	125.46	48	99.06	56	106.88	52	92.54	9.19***

***p<.000

Years of Experience. In Part A of the data collection instrument, participants were asked to list their years of full-time teaching experience. Following analysis of these responses, quartiles were devised to establish categories for teacher responses. The quartiles devised are as follows: 0 – 8 years, 9 – 21 years, 22 – 29 years, and 30 – 41 years. Kruskal-Wallis testing was conducted for each of the instructional practices. Results of this testing provided mean ranks for each instructional practice in relation to participants' reported years of teaching experience, as well as chi-square values. Chi-square values yielded by Kruskal-Wallis analysis revealed no statistical significance was established between the respondents' years of teaching experience and their knowledge of the 28 instructional practices listed on the survey. A complete listing of the mean ranks for teacher knowledge based on years of experience is included in Appendix G.

School Size. Student enrollment numbers were obtained for each of the participating schools from information maintained by the West Virginia Department of Education website. Enrollment data for the 2007 – 2008 academic year were used. Using these data, quartiles for school size were devised for the participating schools as follows: 0 – 252 students, 253 – 339 students, 340 – 518 students, and 519 – 627 students. Responses were then analyzed based upon these quartiles. Kruskal-Wallis testing was conducted for each of the instructional practices.

The Kruskal-Wallis analysis resulted in statistical significance in three instances (See Table 5). Teachers from schools with 253 – 339 students received the highest mean rank for their knowledge of using a variety of rubrics to assess student work (e.g., products, performances, demonstrations), χ^2 (3, N = 59) = 10.69, $p < .000$, and for their knowledge of allowing student input in the development of rubrics used to assess their

work, χ^2 (3, N = 59) = 9.43, $p < .000$. Teachers at schools with enrollment between 340 and 518 received the highest mean rank (142.03) with regard to their knowledge of using instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences, χ^2 (3, N = 70) = 12.92, $p < .000$. A complete listing of the mean ranks for teacher knowledge based on school size is included in Appendix H.

Table 5.
School Size as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices

	School Size								
	0 - 252		253 – 339		340 - 518		519 - 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	59	110.46	60	135.11	69	124.27	47	96.43	10.69***
21. Allow student input in the development of rubrics used to assess their work.	59	114.97	60	133.44	69	121.17	46	94.45	9.43***
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	59	101.97	62	114.19	70	142.03	48	117.55	12.92***

***p<.000

School Socio-Economic Status. Using information reported on the West Virginia Department of Education website, the percentage of students receiving free and reduced lunch was obtained for each of the participating schools. Based on this information, quartiles were devised in order to categorize schools (See Table 3.5). These quartiles are as follows: 0 – 42%, 43 – 56%, 57 – 63%, and 64 – 89%. Kruskal-Wallis testing was conducted for each of the instructional practices.

Chi-square values derived from Kruskal-Wallis analysis indicated there was a significant relationship between teacher knowledge of 21st century instructional practices and the percentage of students receiving free and reduced lunch in 22 instances. Teachers working within schools where 64 – 89% of the students receive free and reduced lunch received the highest mean rank for their knowledge of utilizing multiple teaching and learning approaches that are developmentally responsive, χ^2 (3, N = 55) = 9.85, $p < .000$. These same teachers provided statistically significant responses with regard to their knowledge of using modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences and where students experience and develop ethical behavior, χ^2 (3, N = 56) = 13.27, $p < .000$ and χ^2 (3, N = 56) = 8.25, $p < .000$.

Teachers from schools with the highest free and reduced lunch rate among students also received the highest mean rank for their knowledge of using a standards-based lesson and unit format aligned with the West Virginia CSOs, χ^2 (3, N = 56) = 9.23, $p < .000$, and a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts, χ^2 (3, N = 56) = 14.00, $p < .000$.

Respondents who work within schools where 64 – 89% of the students receive free and reduced lunch also indicated high knowledge levels with regard to the incorporation of 21st century technology tools and learning skills. These teachers received the highest mean rank for their knowledge levels of incorporating 21st century technology tools that challenge all students, χ^2 (3, N = 56) = 14.25, $p < .000$; incorporating 21st century learning skills that challenge all students, χ^2 (3, N = 55) = 9.40, $p < .000$; and incorporating 21st century learning skills and technology tools that accommodate students with special needs, χ^2 (3, N = 55) = 12.12, $p < .000$.

These teachers were also more likely to indicate having knowledge of the design and use of lessons that support students' natural inquisitiveness, as well as use of grouping strategies and research-based instructional strategies to increase instructional effectiveness. Survey responses from these teachers with regard to design and use of lessons that support students' natural inquisitiveness received the highest mean rank, χ^2 (3, N = 56) = 10.91, $p < .000$. High scores were also reported for these teachers' knowledge levels regarding use of various grouping strategies, χ^2 (3, N = 56) = 10.46, $p < .000$, and research-based instructional strategies, χ^2 (3, N = 56) = 12.48, $p < .000$.

Teachers from schools where 64 to 89% of the students receive free and reduced lunch received the highest mean rank for their knowledge of using a writing process supported by 21st century skills and technology tools, χ^2 (3, N = 56) = 15.26, $p < .000$.

Four statements on the survey asked teachers to rate their knowledge of using rubrics in a variety of instructional practices. Teachers within schools where 64 to 89% of students received free and reduced lunch received the highest mean rank for their knowledge in relation to each of the four statements. These teachers indicated having

significant knowledge of using rubrics to guide student work, χ^2 (3, N = 54) = 19.20, p < .000, and to assess student work, χ^2 (3, N = 55) = 19.01, p < .000, as well as in allowing students to aid in the development of the rubrics used to assess their work, χ^2 (3, N = 56) = 18.02, p < .000, and in using technology to develop rubrics, χ^2 (3, N = 56) = 16.07, p < .000.

Teachers whose schools fell within the highest quartile (64 - 89%) reported having the highest knowledge levels regarding instructional practices that help develop self-directed learners and in using data to make instructional decisions. Kruskal-Wallis testing assigned the highest mean rank to these teachers' responses regarding their knowledge of using portfolios, work stations/centers, self-assessments, rubrics, drawings, and journals, χ^2 (3, N = 56) = 20.41, p < .000, and their knowledge of using data from on-going assessments to make instructional adjustments χ^2 (3, N = 55) = 10.35, p < .000.

Teachers were asked to indicate their knowledge level regarding use of instructional practices that develop 21st century information and communication skills in students. Again, responses from teachers who work within schools where 64 – 89 percent of the students receive free and reduced lunch received the highest mean rank, χ^2 (3, N = 55) = 10.65, p < .000.

The final three statements on the data collection instrument involved use of instructional practices that are relevant to students' lives and allow for authentic learning experiences. Those teachers from schools where 64 to 89% of the students receive free and reduced lunch received the highest mean rank for their knowledge regarding making content relevant to students' lives, χ^2 (3, N = 55) = 9.87, p < .000; their knowledge of creating opportunities for students to plan and manage projects, χ^2 (3, N = 56) = 8.55, p <

.000; and their knowledge of creating opportunities for students to interact with peers, with other teachers and with knowledgeable adults in authentic experiences, χ^2 (3, N = 56) = 11.97, $p < .000$. A complete listing of means for teacher knowledge based on school SES is included in Appendix I.

Table 6.
School SES as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 – 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	72	120.10	58	121.70	55	101.60	55	140.48	9.85***
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	71	117.94	57	104.88	55	113.76	56	144.12	13.27***
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	72	114.93	58	117.41	55	111.65	56	141.71	8.25***
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	72	108.18	56	117.95	55	118.73	56	138.50	9.23***
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	72	101.32	56	120.93	55	120.88	56	142.22	14.00***
9. Incorporate 21st century technology tools that challenge all students.	72	119.74	56	99.12	54	113.89	56	144.98	14.25***
10. Incorporate 21st century learning skills that challenge all students.	72	110.92	56	112.92	55	114.17	55	142.76	9.40***

Table 6.
School SES as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 – 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	72	113.28	56	113.63	55	106.84	55	146.27	12.12***
13. Design and use instructional practices that support students' natural inquisitiveness.	70	110.76	58	123.09	55	106.02	56	142.09	10.91***
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	71	108.36	57	116.79	55	116.84	56	141.13	10.46***
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	72	106.77	57	107.68	55	133.89	56	138.05	12.48***
18. Use a writing process supported by 21st century skills and technology tools.	72	100.26	53	112.54	55	120.99	56	145.15	15.26***
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	72	98.77	55	108.39	54	123.40	54	148.03	19.20***

Table 6.
School SES as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 – 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	71	99.54	55	105.88	54	125.21	55	146.87	19.01***
21. Allow student input in the development of rubrics used to assess their work.	70	95.84	55	111.80	53	123.04	56	144.93	18.02***
22. Use technology resources to develop rubrics (by either teachers and/or students).	71	101.76	54	111.91	54	114.64	56	147.71	16.07***
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	72	99.07	55	106.70	54	128.83	56	147.22	20.41***
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	71	101.77	56	113.13	54	130.36	55	133.92	10.35***
25. Use instructional practices that develop 21st century information and communication skills in students.	71	110.89	56	108.76	53	111.50	55	142.85	10.65***
26. Use instructional practices that make content relevant to students' lives.	71	103.08	57	123.37	54	116.52	55	137.46	9.87***

Table 6.
School SES as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 – 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
27. Use instructional practices that create opportunities for students to plan and manage projects.	72	116.69	57	106.81	53	113.96	56	141.28	8.55***
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	71	106.63	58	122.30	54	109.93	56	144.28	11.97***

***p<.000

Factors Related to Teacher Implementation of 21st Century Instructional Practices Professional Development.

Teacher implementation of 21st century instructional practices was also analyzed based upon the number of professional development hours each respondent reported having completed in this area. Based on figures reported by the study participants, quartiles were devised as follows: 0-3 hours, 4-9 hours, 10-20 hours, and 21+ hours. Kruskal-Wallis testing was conducted for each of the instructional practices.

Chi-square values derived from Kruskal-Wallis analysis indicated there was a statistically significant relationship between teacher implementation and the number of professional development hours completed in relation to eleven 21st century instructional practices (See Table 7). Teachers with 10 - 20 hours of professional development received the highest mean rank regarding allowing student input in the development of rubrics used to assess their work, χ^2 (3, N = 51) = 12.12, $p < .000$.

Teachers with 21 or more hours of professional development in 21st century instructional practices received the highest mean rank in relation to ten other statements regarding the level of use of 21st century instructional practices. Teachers with 21 or more hours of professional development received the highest mean rank for using modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills, χ^2 (3, N = 27) = 9.97, $p < .000$, and for using modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior, χ^2 (3, N = 27) = 7.91, $p < .000$.

This same group of teachers received the highest mean rank for incorporating 21st century technology tools that challenge all students, χ^2 (3, N = 27) = 12.31, $p < .000$, and

for incorporating 21st century learning skills that challenge all students, χ^2 (3, N = 27) = 10.48, $p < .000$. These teachers also received the highest mean rank for using research-based instructional strategies, such as systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers, χ^2 (3, N = 27) = 10.71, $p < .000$.

Kruskal-Wallis testing assigned the highest mean rank to teachers with 21 or more hours of professional development in 21st century instructional practices with regard to their implementation of a variety of rubrics to guide student work, χ^2 (3, N = 27) = 15.34, $p < .000$, and their use of a variety of rubrics to assess student work, χ^2 (3, N = 27) = 10.20, $p < .000$. Teachers with 21 or more hours of professional development also received the highest mean rank for personally using or allowing their students to use technology resources to develop rubrics, χ^2 (3, N = 27) = 9.60, $p < .000$.

Teachers with 21 or more hours of professional development received the highest mean rank for establishing pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments, χ^2 (3, N = 27) = 9.56, $p < .000$. Kruskal-Wallis testing also assigned the highest mean rank to these teachers with regard to their implementation of instructional practices that develop 21st century information and communication skills in students, χ^2 (3, N = 27) = 10.65, $p < .000$. A complete listing of mean ranks for teacher implementation based on hours of professional development is provided in Appendix J.

Table 7.
Hours of Professional Development Related to Teacher Implementation of 21st Century Instructional Practices

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	44	84.77	41	71.04	53	83.91	27	96.50	9.97***
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	44	88.24	40	83.56	53	71.44	27	93.26	7.91***
9. Incorporate 21st century technology tools that challenge all students.	43	76.14	41	64.60	51	92.30	27	95.30	12.31***
10. Incorporate 21st century learning skills that challenge all students.	41	82.85	40	62.82	53	86.92	27	93.50	10.48***
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	44	86.39	41	64.24	52	87.59	27	94.09	10.71***
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	42	67.76	41	68.55	51	90.03	27	103.44	15.34***

Table 7.
Hours of Professional Development Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	41	69.83	41	69.44	51	89.89	27	95.76	10.20***
21. Allow student input in the development of rubrics used to assess their work.	42	71.54	41	68.45	51	97.51	26	80.62	12.12***
22. Use technology resources to develop rubrics (by either teachers and/or students).	41	65.99	41	74.23	51	91.25	27	91.76	9.60***
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	44	86.14	40	62.72	51	86.25	26	90.13	9.56***
25. Use instructional practices that develop 21st century information and communication skills in students.	40	61.75	38	76.82	52	87.83	27	90.63	10.65***

***p<.000

Age. Teacher implementation of 21st century instructional practices was analyzed based upon the age each reported by each participant. Based on figures reported by the study participants, quartiles were devised as follows: 0 – 38 years, 39 – 48 years, 49 – 55 years, and 56 – 69 years. Kruskal-Wallis testing was conducted for each of the instructional practices.

Kruskal-Wallis testing yielded chi-square values, which established that there was a statistically significant relationship between the age of the respondents and their knowledge of 21st century instructional practices in two instances (See Table 8). Teachers 39 - 48 years of age reported the highest mean rank for incorporating 21st century learning skills and technology tools that accommodate students with special needs, χ^2 (3, N = 48) = 10.21, $p < .000$. Teachers aged 49 – 55 years received the highest mean rank for using a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts, χ^2 (3, N = 58) = 9.22, $p < .000$. A complete listing of mean ranks for teacher implementation is provided in Appendix K.

Table 8.
Age as Related to Teacher Implementation of 21st Century Instructional Practices

	Years of Age								
	0 – 38		39 - 48		49 - 55		55 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	57	92.30	48	114.16	58	118.92	51	105.24	9.22***
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	56	87.26	48	123.11	55	107.66	50	104.55	10.21***

***p<.000

Years of Experience. In Part A of the data collection instrument, participants were asked to list their years of full-time teaching experience. Following analysis of these responses, quartiles were devised to establish ranges for teacher responses. The quartiles devised are as follows: 0 – 8 years, 9 – 21 years, 22 – 29 years, and 30 – 41 years. Kruskal-Wallis testing was conducted for each of the instructional practices.

Chi-square values yielded by Kruskal-Wallis analysis revealed statistical significance between the respondents' years of teaching experience and their implementation of three 21st century instructional practices (See Table 9). Teachers with 9 – 21 years of teaching experience received the highest mean rank for using a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts, χ^2 (3, N = 57) = 9.39, $p < .000$, and for differentiating instruction to meet the needs of all learners, χ^2 (3, N = 58) = 8.32, $p < .000$. Teachers with 9 – 21 years of teaching experience also received the highest mean rank for using a writing process supported by 21st century skills and technology tools, χ^2 (3, N = 57) = 8.83, $p < .000$. A complete listing of mean ranks for teacher implementation based on years of experience is provided in Appendix L.

Table 9.
Years of Experience as Related to Teacher Implementation of 21st Century Instructional Practices

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	63	101.83	57	131.48	56	113.89	56	120.36	9.39***
14. Differentiate instruction to meet the needs of all learners.	63	124.67	58	126.53	57	114.26	56	103.38	8.32***
18. Use a writing process supported by 21st century skills and technology tools.	59	103.12	57	126.58	55	98.73	54	124.00	8.83***

***p<.000

School Size. Student enrollment numbers were researched for each of the participating schools via information maintained by the West Virginia Department of Education on its website. Based upon the figures revealed through this research, quartiles for school size were devised for the participating schools as follows: 0 – 252 students; 253 – 339 students; 340 – 518 students; and 519 – 627 students. Responses were then analyzed based upon these quartiles. Kruskal-Wallis testing was conducted for each of the instructional practices.

Kruskal-Wallis analysis was conducted upon responses in all quartiles, which resulted in chi-square values. These values suggested statistical significance in 12 instances (See Table 10). Teachers from schools with 519 to 627 students received the highest mean rank for incorporating 21st century technology tools that challenge all students, χ^2 (3, N = 48) = 17.42, $p < .000$. Teachers from schools with 253 to 339 students received the highest mean rank for incorporating 21st century learning skills that challenge all students, χ^2 (3, N = 61) = 13.74, $p < .000$, and for differentiating instruction to meet the needs of all learners, χ^2 (3, N = 63) = 20.89, $p < .000$.

Teachers from schools with 340 to 518 students received the highest mean rank in nine instances. They received the highest mean rank for utilizing multiple teaching and learning approaches that are socially equitable, χ^2 (3, N = 69) = 10.97, $p < .000$, and for utilizing multiple teaching and learning approaches that are culturally responsive, χ^2 (3, N = 67) = 7.89, $p < .000$.

Teachers from schools of this size also received the highest mean rank for designing and using instructional practices that support students' natural inquisitiveness, χ^2 (3, N = 69) = 15.33, $p < .000$. Kruskal-Wallis testing also assigned the highest mean

rank to these teachers for using grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement, χ^2 (3, N = 69) = 13.13, $p < .000$.

With regard to designing and using rubrics in the classroom, teachers from schools with 340 – 518 students also rated the highest mean ranks. Kruskal-Wallis testing established statistical significance to their use of a variety of rubrics to guide student work, χ^2 (3, N = 67) = 15.96, $p < .000$, and to assess student work, χ^2 (3, N = 68) = 16.85, $p < .000$. These teachers were also more likely to allow student input in the development of rubrics used to assess their work, χ^2 (3, N = 67) = 14.90, $p < .000$, and to use technology resources personally or to allow their students to use technology resources to develop rubrics, χ^2 (3, N = 68) = 10.84, $p < .000$. Additionally, these teachers received the highest mean rank for using instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences, χ^2 (3, N = 69) = 11.55, $p < .000$. A complete listing of mean ranks for teacher implementation based on school size is provided in Appendix M.

Table 10.
School Size as Related to Teacher Implementation of 21st Century Instructional Practices

	School Size								
	0 – 252		253 – 339		340 – 518		519 – 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
2. Utilize multiple teaching and learning approaches that are socially equitable.	58	96.97	61	118.20	69	131.67	47	123.64	10.97***
3. Utilize multiple teaching and learning approaches that are culturally responsive.	58	97.58	62	124.23	67	126.99	48	122.07	7.89***
9. Incorporate 21st century technology tools that challenge all students.	59	95.14	59	115.55	69	119.43	48	147.04	17.42***
10. Incorporate 21st century learning skills that challenge all students.	59	92.97	61	131.90	67	120.55	48	127.54	13.74***
13. Design and use instructional practices that support students' natural inquisitiveness.	58	92.54	63	119.77	69	133.97	46	126.28	15.33***
14. Differentiate instruction to meet the needs of all learners.	58	93.83	63	128.06	69	127.64	48	127.58	20.89**
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	58	98.57	62	122.24	69	132.99	47	116.89	13.13***

Table 10.
School Size as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	School Size								
	0 – 252		253 – 339		340 – 518		519 – 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	58	91.02	60	119.94	67	137.51	48	116.08	15.96***
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	57	90.28	60	122.45	68	136.77	47	111.37	16.85***
21. Allow student input in the development of rubrics used to assess their work.	58	102.13	59	123.61	67	134.95	46	93.63	14.90***
22. Use technology resources to develop rubrics (by either teachers and/or students).	58	94.81	58	119.60	68	132.74	47	113.48	10.84***
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	57	99.04	62	110.30	69	134.48	48	129.24	11.55***

***p<.000

School Socio-Economic Status. Using information reported on the West Virginia Department of Education's website, the percentage of students receiving free and reduced lunch was obtained for each of the participating schools. Based on this information, quartiles were devised in order to categorize schools. These quartiles are as follows: 0 – 42%, 43 – 56%, 57 – 63%, and 64 – 89%. Kruskal-Wallis testing was conducted for each of the instructional practices.

Chi-square values derived from Kruskal-Wallis analysis indicated there was a significant relationship between teacher implementation of thirteen 21st century instructional practices and the percentage of students receiving free and reduced lunch (See Table 11). Teachers from schools where 64 to 89% of the student body receive free and reduced lunch received the highest mean rank for utilizing multiple teaching and learning approaches that are culturally responsive, χ^2 (3, N = 52) = 11.45, $p < .000$, and for using a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts, χ^2 (3, N = 54) = 8.07, $p < .000$.

Teachers from schools with the largest numbers of students receiving free and reduced lunch also received the highest mean rank for incorporating 21st century learning skills and technology tools that accommodate students with special needs, χ^2 (3, N = 52) = 9.56, $p < .000$, and for designing and using instructional practices that support students' natural inquisitiveness, χ^2 (3, N = 54) = 8.82, $p < .000$. Kruskal-Wallis testing also established their use of a writing process supported by 21st century skills and technology tools was statistically significant, χ^2 (3, N = 52) = 11.28, $p < .000$.

Chi-square values derived from Kruskal-Wallis analysis also indicated responses regarding the design and use of rubrics from teachers where 64 to 89% of the students

receive free and reduced lunch were statistically significant. These teachers received the highest mean rank for using a variety of rubrics to guide student work, χ^2 (3, N = 53) = 9.49, $p < .000$, and to assess student work, χ^2 (3, N = 53) = 8.15, $p < .000$. They also received the highest mean rank for allowing student input in the development of rubrics used to assess their work, χ^2 (3, N = 53) = 15.21, $p < .000$, and in personally using or allow their students to use technology resources to develop rubrics, χ^2 (3, N = 54) = 11.67, $p < .000$.

In two additional instances teachers from schools where 64 to 89% of the study body receives free and reduced lunch rated the highest mean rank. Kruskal-Wallis testing indicated statistical significance regarding their use of pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments, χ^2 (3, N = 52) = 10.23, $p < .000$, and for their use of portfolios, work stations/centers, self-assessments, rubrics, drawings, and journals to develop self-directed learners, χ^2 (3, N = 54) = 11.67, $p < .000$, as well as for using instructional practices that develop 21st century information and communication skills in students, χ^2 (3, N = 53) = 11.45, $p < .000$. A complete listing of mean ranks for teacher implementation based on school SES is provided in Appendix N.

Table 11.
School SES as Related to Teacher Implementation of 21st Century Instructional Practices

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 – 56		57 – 63		64 – 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
3. Utilize multiple teaching and learning approaches that are culturally responsive.	72	106.74	57	128.68	54	102.96	52	137.49	11.45***
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	71	104.85	56	121.97	55	118.86	54	132.47	8.07***
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	71	116.23	54	115.66	55	98.63	52	138.65	9.56***
13. Design and use instructional practices that support students' natural inquisitiveness.	70	116.57	58	128.97	54	98.93	54	129.32	8.82***
18. Use a writing process supported by 21st century skills and technology tools.	70	98.34	54	118.31	53	112.28	52	136.76	11.28***
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	71	106.09	56	117.03	53	108.55	53	140.04	9.49***
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	70	107.54	56	114.01	53	109.14	53	138.32	8.15***

Table 11.
School SES as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 – 56		57 – 63		64 – 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	69	94.37	56	114.93	52	119.41	53	139.77	15.21***
22. Use technology resources to develop rubrics (by either teachers and/or students).	70	105.21	54	108.40	53	116.95	54	136.65	8.07***
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	71	99.84	57	116.39	54	125.96	52	134.04	10.23***
25. Use instructional practices that develop 21st century information and communication skills in students.	68	107.84	56	108.03	53	107.44	53	141.28	11.45***

***p<.000

Factors Influencing the Level of Teacher Knowledge of 21st Century Instructional Practices

Part C of the survey included five statements regarding factors that might influence teachers' understanding of 21st century instructional practices. Respondents were asked to rate the degree to which each of these factors influenced their level of knowledge regarding these practices using the following Likert scale descriptors: 1 = None, 2 = Minimal, 3 = Average, 4 = Moderate, and 5 = High. Chi-square values were derived for each statement. Data related to the five factors and their degree of influence on participant knowledge are found in Table 12.

Table 12.
Influences on Teacher Knowledge of 21st Century Classroom Instructional Practices

	Level of Influence										
	None		Minimal		Average		Moderate		High		
Influences	n	%	n	%	n	%	n	%	n	%	X(4)
1. My building principal	9	3.8	21	8.8	42	17.5	66	27.5	102	42.5	115.1***
2. Peers/colleagues	7	2.9	9	3.7	63	26.1	86	35.7	76	31.5	117.3***
3. School or district-sponsored professional development	6	2.5	23	9.5	56	23.2	89	36.9	67	27.8	93.3***
4. State-sponsored professional development (through the WVDE or CPD)	22	9.4	30	12.8	58	24.7	83	35.3	42	17.9	50.1***
5. Personal reading/research	11	4.6	23	9.6	65	27.2	80	33.5	60	25.1	72.2***

***p<.000

Respondents were asked to what degree their building principal influenced their understanding of 21st century instructional practices. Participants indicated their building principal had had either high (42.5%) or moderate (27.5%) influence on their level of understanding. Another 17.5% reported average influence by their administrator. Smaller numbers reported minimal (8.8%) or no (3.8%) influence by their building principal. Chi-square analysis of these findings indicated they were statistically significant when compared to the expected results, χ^2 (4, N = 240) = 115.1, $p < .000$.

More than 35% of the respondents (35.7%) indicated that their peers or colleagues exerted a moderate degree of influence on their understanding of 21st century instructional practices. Another 31.5% reported these individuals had a high degree of influence on their knowledge. A slightly smaller number (26.1%) rated the influence of their peers and colleagues as average. Fewer participants claimed these individuals had minimal (3.7%) or no (2.9%) influence on their knowledge levels. Chi-square analysis of these results were statistically significant when compared to the expected results, χ^2 (4, N = 241) = 117.3, $p < .000$.

Respondents were next asked to rate the degree of influence school or district-sponsored professional development had on their understanding of 21st century instructional practices. More than one-third of the respondents (36.9%) reported that these trainings had moderate influence on their knowledge. Slightly fewer respondents (27.8%) claimed such professional development had a high degree of influence on their understanding. Similarly, 23.2% of the study's participants responded that attendance at these offerings had an average influence on their knowledge. Fewer teachers reported that school or district-sponsored professional development had a minimal (9.5%) or no (2.5%) influence on their understanding of 21st century instructional practices. Chi-

square testing indicated that these results were statistically significant when compared to those expected, χ^2 (4, N = 241) = 93.3, $p < .000$.

Similarly, study participants were asked to rate the degree of influence state-sponsored professional development has had on their understanding of 21st century instructional practices. This professional development would include offerings sponsored by the West Virginia Department of Education (WVDE) and the Center for Professional Development (CPD). More than one-third of the participants (35.3%) claimed offerings by these agencies had a moderate degree of influence on their understanding. Slightly fewer (24.7%) reported an average influence. Another 17.9% indicated a high influence, while smaller numbers of respondents reported minimal (12.8%) or no (9.4%) influence on their levels of knowledge. Chi-square analysis of these findings concluded they were statistically significant when compared to the expected results, χ^2 (4, N = 235) = 50.1, $p < .000$.

Finally, respondents were asked to rate the degree of influence personal reading and research had on their knowledge of 21st century instructional practices. Approximately one third (33.5%) reported a moderate influence, and another 27.2% indicated an average influence. Slightly fewer (25.1%) claimed personal efforts had a high influence, while smaller numbers reported minimal (9.6%) or no (4.6%) influence. Chi-square testing found these results to be statistically significant when compared to the expected results, χ^2 (4, N = 239) = 72.2, $p < .000$.

Factors Influencing the Level of Teacher Use of 21st Century Instructional Practices

Part C of the survey was comprised of five statements regarding factors that might influence teachers' use of 21st century instructional practices. Respondents were asked to rate the degree to which each of these factors influenced their implementation of these practices using

the following Likert scale descriptors: 1 = None, 2 = Minimal, 3 = Average, 4 = Moderate; and 5 = High. Chi-square values were also derived for each statement. Data related to the five factors and their degree of influence on participant use may be found in Table 13.

Table 13.
Influences on Teacher Implementation of 21st Century Classroom Instructional Practices

	Level of Influence										
	None		Minimal		Average		Moderate		High		
Influences	n	%	n	%	n	%	n	%	n	%	X(4)
1. My building principal	12	5.1	20	8.5	40	17.1	69	29.5	93	39.7	98.4***
2. Peers/colleagues	10	4.3	10	4.3	59	25.3	88	37.8	66	28.3	105.6***
3. School or district-sponsored professional development	9	3.8	23	9.8	54	23.1	96	41.0	52	22.2	96.0***
4. State-sponsored professional development (through the WVDE or CPD)	20	8.7	33	14.4	63	27.5	81	35.4	32	14.0	55.8***
5. Personal reading/research	11	4.7	19	8.2	67	28.8	73	31.3	63	27.0	73.2***

***p<.000

The largest number (39.7%) of respondents reported that their building principal had a high degree of influence on their implementation of 21st century instructional practices. A moderate degree of influence by the building principal was reported by 29.5% of the respondents, while 17.1% reported their building principal had an average influence on their implementation of such practices. Chi-square analysis of these results found they were statistically significant when compared to the expected results, χ^2 (4, N = 234) = 98.4, $p < .000$.

Participants were also asked to rate the degree of influence their peers or colleagues had on their use of 21st century instructional practices. Most teachers (37.8%) reported these individuals had a moderate influence on their classroom implementation. Another 28.3% reported a high degree of influence, while slightly fewer (25.3%) felt their peers and colleagues had an average degree of influence on their use of these practices. Smaller numbers of participants reported minimal (4.3%) or no (4.3%) influence by these individuals. Chi-square testing indicated the statistical significance of these results when they were compared to those expected, χ^2 (4, N = 233) = 105.6, $p < .000$.

The following two statements asked participants to rate the degree to which various types of professional development influenced their implementation of 21st century instructional practices in the classroom. First, respondents were asked to rate the degree of influence of school or district-sponsored professional development. Moderate influence was reported by 41.0% of teachers. Similar numbers indicated average (23.1%) and high (22.2%) levels of influence, while fewer participants reported minimal (9.8%) or no (3.8%) influence at all. Chi-square analysis of these results concluded they were

statistically significant when compared to the expected results, χ^2 (4, N = 234) = 96.0, p < .000.

Regarding state-sponsored professional development, such as offerings by the West Virginia Department of Education and the Center for Professional Development, most respondents (35.4%) indicated a moderate degree of influence. Slightly fewer participants (27.5%) reported an average influence. Similar numbers indicated minimal (14.4%) or high (14.0%) levels of influence. Analysis of these results via chi-square testing concluded they were statistically significant when compared to expected results, χ^2 (4, N = 229) = 55.8, p < .000.

Lastly, teachers were asked to rate the degree of influence personal reading and research had on their implementation of 21st century instructional practices. Moderate influence was reported by 31.3% of the respondents, while similar numbers were reported by teachers indicating average influence (28.8%) and high influence (27.0%). The smallest number of participants reported that personal reading and research had minimal (8.2%) or no (4.7%) influence at all. Chi-square analysis established the statistical significance of these results when they were compared to the expected results, χ^2 (4, N = 233) = 73.2, p < .000.

Ancillary Findings

Hours of Professional Development as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

Chi-square values derived from Kruskal-Wallis analysis indicated there was a significant relationship between the degree of influence teachers reported and the number of professional development hours they had completed in relation to 21st century instructional practices in three instances (See Appendix P). Teachers with 21 or more

hours of professional development received the highest mean rank in reporting that school or district-sponsored professional development had the greatest influence on their knowledge of 21st century instructional practices, χ^2 (3, N = 27) = 16.49, $p < .000$, as well as state-sponsored professional development, χ^2 (3, N = 27) = 20.43, $p < .000$. Teachers from this same group were also most likely to report personal reading and research influenced their understanding of 21st century instructional practices, χ^2 (3, N = 27) = 8.08, $p < .000$.

Chi-square values derived from Kruskal-Wallis analysis indicated there was a significant relationship between the number of professional development hours completed by teachers in relation to their implementation of two 21st century instructional practices (See Appendix P). Teachers with 21 or more hours of professional development received the highest mean rank in reporting that school or district-sponsored professional development had the greatest influence on their use of 21st century instructional practices, χ^2 (3, N = 27) = 11.42, $p < .000$, as well as in reporting high rates of influence for state-sponsored professional development offerings, χ^2 (3, N = 27) = 20.39, $p < .000$.

Age as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

Influences on teacher knowledge of 21st century instructional practices were analyzed based upon the age reported by each participant. Kruskal-Wallis testing was conducted for each of the quartiles. Results of this testing provided mean ranks for each instructional practice in relation to the ages reported by the study participants, as well as chi-square values. These values indicated that there were no statistically significant differences between the participants' ages and the five factors that might influence their understanding of 21st century instructional practices (See Appendix Q).

Influences on teacher use of 21st century instructional practices were analyzed based upon the age reported by each participant. Results of this testing provided mean ranks for each instructional practice in relation to the ages reported by the study participants, as well as chi-square values. These values indicated that there was no statistical significance between the participants' ages and the five factors that might influence their use of 21st century instructional practices (See Appendix Q).

Years of Experience as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

Influences on teacher knowledge of 21st century instructional practices were analyzed based upon the years of experience reported by each participant. Kruskal-Wallis testing was conducted for each of the quartiles. These values indicated that there was no statistical significance between the reported years of experience and the five factors that might influence their understanding of 21st century instructional practices (See Appendix R).

Influences on teacher use of 21st century instructional practices were analyzed based upon the years of experience reported by each participant. Results of this testing provided mean ranks for each of the five influences in relation to the years of classroom experience reported by the study participants, as well as chi-square values. These values indicated that there was no statistical significance between the reported years of experience and the five factors that might influence their use of 21st century instructional practices (See Appendix R).

School Size as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

Influences on teacher knowledge of 21st century instructional practices were analyzed based on school size. Kruskal-Wallis analysis was conducted upon responses in all quartiles, which resulted in chi-square values. These values suggested statistical significance in one instance (See Appendix S). Teachers from schools with 519 - 627 students received the highest mean rank in reporting that their building principal had the greatest influence on their understanding of 21st century instructional practices, χ^2 (3, N = 48) = 12.49, $p < .000$.

Influences on teacher implementation of 21st century instructional practices were analyzed based on school size. Based upon the figures revealed through this research, quartiles for school size were devised for the participating schools. Responses were then analyzed based upon these quartiles. Kruskal-Wallis testing was conducted for each of the quartiles. Results of this testing provided mean ranks for each of the five influences in relation to the number of students enrolled at each participating school, as well as chi-square values.

Kruskal-Wallis analysis was conducted upon responses in all quartiles, which resulted in chi-square values. These values suggested statistical significance in one instance (See Appendix S). Teachers from schools with 519 - 627 students received the highest mean rank in reporting that their building principal had the greatest influence on their understanding of 21st century instructional practices, χ^2 (3, N = 48) = 11.37, $p <$ .000.

School SES as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

Influences on teacher knowledge of 21st century instructional practices were analyzed based on school socio-economic status. Chi-square values derived from Kruskal-Wallis analysis indicated there was statistical significance in two instances (See Appendix T). Teachers working within schools where 64 – 89% of the students receive free and reduced lunch received the highest mean rank for reporting that school or district-sponsored professional development had a high degree of influence on their understanding of 21st century instructional practices, χ^2 (3, N = 56) = 9.98, $p < .000$, as well as a high degree of influence for personal reading and research, χ^2 (3, N = 55) = 10.43, $p < .000$.

Influences on teacher implementation of 21st century instructional practices were analyzed based upon school socio-economic status. Kruskal-Wallis testing was conducted for each of the quartiles. Results of this testing provided mean ranks for each of the five influences in relation to the percentage of students receiving free and reduced lunch at each school, as well as chi-square values.

Chi-square values derived from Kruskal-Wallis analysis indicated there was statistical significance in three instances (See Appendix T). Teachers working within schools where 64 – 89% of the students receive free and reduced lunch received the highest mean rank for reporting that school or district-sponsored professional development had a significant influence on their use of 21st century instructional practices, χ^2 (3, N = 53) = 9.75, $p < .000$, as well as for reporting a significant influence for state-sponsored professional development, χ^2 (3, N = 52) = 7.86, $p < .000$. These

teachers also reported personal reading and research had an influence on their use of 21st century instructional practices, χ^2 (3, N = 53) = 10.99, $p < .000$.

Barriers/Challenges to Implementation of 21st Century Instructional Practices

In Part C of the data collection instrument, participants were asked an open-ended question which asked them to list any barriers or challenges they had encountered regarding implementation of 21st century instructional practices within their classrooms. Ninety-seven participants responded to this question. Analysis of these responses revealed that teachers reported three major barriers or challenges: time, resources, and training. In some instances responses spanned more than one category (See Appendix O).

The largest number of responses (40%) related to the issue of time. Teachers reported not having enough time to learn about these new practices or implement them correctly. They reported frustration at having to find time to teach all the state's content standards, while also being asked to incorporate 21st century instructional practices. Others felt that curricular changes, such as recently implemented math and reading programs, demanded too much of their time. Some stressed the need for time to collaborate with their peers about best practices for implementation of the 21st century instructional practices, or the need for time to do research and develop lessons that could incorporate these strategies.

Slightly fewer responses (39%) dealt with resources and the impact they make on teacher implementation of 21st century instructional practices. Teachers reported they did not have the necessary resources needed for successful implementation. In many instances they reported not having access to resources in their buildings, such as a classroom of their own or technology (computers). Some expressed frustration at having

only outdated technologies available or at the difficulty in having technological repairs made within their building. Some reported they received trainings on use of certain technologies (whiteboards, digital cameras) but never received any of these materials to actually use in their classrooms. For others, technological equipment was available but not in adequate numbers to service all students.

Thirty percent of teacher responses dealt with the issue of training. Many simply felt they had not had much or any training on 21st century instructional practices and how they should be implemented. Others reported trainings they had attended were too general and not specific enough for their particular grade level and did not provide practical ideas for classroom implementation. Some teachers reported they needed more training specifically on how to use different types of technology and needed more time using this equipment in order to feel comfortable implementing it in their classrooms.

A small percentage of response (7%) fell into the category of other. These responses often dealt with topics teachers felt the need to address. They expressed their opinions regarding recently adopted math and reading programs, as well as the lack of skills students seem to have which might impede implementation of 21st century instructional practices. They remarked on personality conflicts and also how their roles as disciplinarians have been restricted in the classroom.

Summary

The purpose of this chapter was to present and analyze data gathered through a survey mailed to 506 teachers at 22 elementary schools across the State of West Virginia where administrators participated in the 2006 – 2007 21st Century Leadership Institute sponsored by the West Virginia Department of Education (WVDE). The data collection

instrument was modeled after the instructional practices of the 21st century elementary classroom developed by the WVDE. Respondents were asked to rate their knowledge and implementation level in relation to 28 21st century instructional practices. They were also asked to rate five factors which might influence their understanding and use of these practices. Lastly, respondents were asked to list any barriers or obstacles to implementing 21st century instructional practices within their classrooms.

Analysis of the demographic data related to the respondents and their schools established the following information. The majority of respondents had twenty-one years or less of teaching experience, while the mean age for participants was 46.2 years. In reporting the hours of professional development they had completed in relation to 21st century instructional practices, the mean number of hours for those responding was 13.9. A large percentage of the participating teachers indicated they had not participated in the 2007 – 2008 21st Century Teacher Leadership Institute. Most of the participants work in schools with 339 or fewer students. Similarly, most of the respondents work in schools where 55% or fewer of the student body receive free and discounted lunch.

Responses to the High-Yield Practices of the 21st Century Classroom Survey were used to investigate the seven research questions which guided this study. Chi-square analysis determined statistical significance at an alpha level of .05 or greater between actual frequencies and expected frequencies in all of the comparisons.

CHAPTER FIVE: CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Introduction

This chapter reviews the purpose of the study, the methodology, and the demographic data. Summaries of the study findings are then presented. This chapter ends with a presentation of study conclusions, discussion, and recommendations for further research.

Purpose of the Study

The purpose of this study was to investigate the level of knowledge and implementation of 21st century instructional practices among teachers in elementary schools whose administrators attended the 21st Century Leadership Institute in 2006-2007. Specifically, the study investigated the differences in knowledge and implementation of 21st century instructional practices among teachers based upon such factors as hours of professional development completed in the area of 21st century skills, age, years of teaching experience, participation in 21st Century Teacher Leadership Institute, school size, and school socio-economic status (SES). In addition, the degree to which building administrators, peers/colleagues, state-sponsored professional development, school and district-sponsored professional development, and personal research influenced teacher knowledge and implementation of 21st century instructional practices was investigated. Teachers were also asked to list any barriers or challenges they faced regarding implementation of 21st century instructional practices. The following research questions guided the study.

1. What is the level of knowledge of 21st century instructional practices among teachers in elementary schools where administrators participated in the Institute?
2. What is the level of implementation of 21st century instructional practices among teachers in elementary schools where administrators participated in the Institute?
3. What differences in knowledge of 21st century instructional practices, based on factors such as years of teaching experience, attendance at the Teacher Leadership Institute, hours of professional development completed regarding 21st century skills, school size, and student socio-economic status, exist among elementary teachers whose principals attended the 21st Century Leadership Institute?
4. What differences in implementation of 21st century instructional practices, based on factors such as years of teaching experience, attendance at the Teacher Leadership Institute, hours of professional development completed regarding 21st century skills, school size, and student socio-economic status, exist among elementary teachers whose principals attended the 21st Century Leadership Institute?
5. To what extent do the building principal, peers/colleagues, professional development, and personal research influence the level of teacher knowledge of 21st century instructional practices?

6. To what extent do the building principal, peers/colleagues, professional development, and personal research influence the level of teacher implementation of 21st century instructional practices?
7. What barriers or challenges have elementary teachers encountered regarding implementation of 21st century instructional practices within their classrooms?

Methodology

This study was a non-experimental quantitative study of a population sampling of elementary teachers across the State of West Virginia whose principals participated in the 2006 – 2007 21st Century Leadership Institute sponsored by the West Virginia Department of Education. This was a descriptive research study, which used a researcher-developed survey instrument.

For the purposes of this study, those elementary teachers employed at schools where the administrators had participated in the 2006 – 2007 21st Century Leadership Institute sponsored by the West Virginia Department of Education and had remained as administrators for the 2007 – 2008 school year were the targeted population. Eighty-one schools were represented at the 21st Century Leadership Institute in July of 2006 – 2007. Of these 81, 43 were placed within the elementary programmatic level during the training. Twenty-seven of these schools consisted of some configuration of grades preschool through six. Five schools were eventually removed from the study for various reasons. Teachers in the 22 remaining schools constituted the study population.

Research for this study was conducted via the instrument *High-Yield Practices of the 21st Century Classroom Survey*, which consisted of three parts. This instrument was derived primarily from literature entitled *High Yield Practices of the 21st Century*

Elementary Classroom published by the West Virginia Department of Education (2006). The first section of the instrument (Part A) consisted of six open-ended questions, asking teachers to detail their current teaching positions, grade level assignments, whether or not they participated in the 21st Century Teacher Leadership Institute sponsored by the WVDE, years of teaching experience, age, and the number of hours of professional development regarding 21st century skills in which they had participated. The second section (Part B) of the instrument consisted of 28 instructional practices associated with the 21st century elementary classroom, as defined by the West Virginia Department of Education. Teachers were asked to rate their knowledge and use of each of the 28 practices. The third section of the survey (Part C) sought to derive information from respondents regarding five factors which have influenced their knowledge and use of 21st century instructional practices, as well as any factors they have viewed as obstacles to successful implementation of such practices.

The *High-Yield Practices of the 21st Century Classroom Survey* was validated for content and format by an expert panel consisting of 12 specific members, as well as recommendations from various graduate students currently enrolled in Marshall University's CI 703 (Survey Design). Members of the West Virginia Department of Education closely associated with the design and implementation of the 21st Century Leadership Institute read the survey and provided recommendations. In addition, evaluators of the Institute from Marshall University Graduate College (MUGC) helped validate the instrument. The survey was also reviewed by an assistant superintendent from Kanawha County (WV), a curriculum specialist from Cabell County (WV), a principal from Wayne County (WV) who also served as an elementary programmatic

leader at the 2006 21st Century Leadership Institute, and the Director of Instruction from Wayne County Schools. Changes were made to the survey based upon recommendations from members of this expert panel.

One mailing of the survey instrument produced a response rate of 48% (n = 242). Additionally, phone calls were made and e-mails were sent to participating administrators to encourage return of the surveys. Data from the returned surveys were recorded into a database and analyzed using SPSS 16.0. Chi square testing and Kruskal-Wallis analysis were used to determine if the differences in knowledge and implementation among survey participants were statistically significant. A confidence interval was established at the .05 significance level.

Demographics

Demographic data collected by the *High-Yield Practices of the 21st Century Classroom Survey* consisted of data describing the teacher's age, years of teaching experience, participation in the 21st Century Teacher Leadership Institute, and hours of professional development completed in 21st century skills. Additionally, information regarding school size (number of students enrolled) and school socio-economic status (percentage of students received free and reduced lunch) was obtained for each participating school via the West Virginia Department of Education website.

When asked whether or not they had participated in the 21st Century Teacher Leadership Institute offered by the West Virginia Department of Education in the summer of 2007, 234 teachers responded to the question. Thirty-three (14.1%) responded yes, while 201 (85.9%) indicated they had not.

Years of teaching experience reported by respondents ranged from less than one year to 41 years. The mean for years of teaching experience was 18.9 with a standard deviation of 11.4.

When asked to state their age, 225 study participants chose to do so. Ages ranged from 23 years to 69 years among respondents. Of the 225 respondents, 50.2% were 49 years old or younger. The mean age for those study participants responding to this question was 46.2 years, while the standard deviation was 11.1.

Participants were asked to list the number of professional development hours they had completed with regard to 21st century skills. A total of 165 participants responded to this question. Responses ranged from zero to 100 hours. The mean number of hours of professional development among those responding was 13.9 hours, with a standard deviation of 16.6.

For the 22 schools participating in the study, school size or student enrollment ranged from 124 to 627 for the 2007 – 2008 school year. Teachers working in schools with 339 or fewer students accounted for 124 (51.2%) of the responses, while 118 respondents (48.8%) indicated they worked in schools with 388 or more students. The mean size for participating schools was 377.5, with a standard deviation of 149.2.

School socio-economic status (SES) was also researched for each of the participating schools via information provided by the West Virginia Department of Education's website. Data were collected regarding the percentage of students receiving free or reduced lunch at each of the schools. This information revealed that between 25% and 89% of the student body within the 22 schools was receiving discounted meals. The

average percentage of students receiving free and/or reduced lunch at participating schools was 54.2%, with a standard deviation of 14.5.

Summary of Findings

Participants were asked to rate their knowledge of 21st century instructional practices. Twenty-eight such practices, derived from *High-Yield Practices of the Elementary Class* published by the West Virginia Department of Education, were listed on the data collection instrument, and participants rated their knowledge as (1) none, (2) minimal, (3) average, (4) moderate, or (5) high. Use of chi-square analysis determined participants' responses were statistically significant in relation to all 28 statements.

Such analysis was also conducted regarding the level of implementation of 21st century instructional practices by participants. Participants were asked to rate their implementation level of the 28 listed practices as follows: (1) not at all, (2) less than monthly, (3) monthly, (4) weekly, or (5) daily. Use of chi-square analysis determined participants' responses were statistically significant in relation to all 28 practices.

Demographic data yielded information regarding teachers' ages, years of classroom experience, hours of professional development in the area of 21st century skills, school size, and the socio-economic status of the participating schools. Kruskal-Wallis analyses were conducted to determine the significance, if any, of these factors upon teachers' levels of knowledge of 21st century instructional practices. With regard to teachers' responses to the 28 practices listed on the survey, it was determined that the number of hours of professional development completed by participants was significant in relation to five statements. Age was found to be a significant factor in only three instances. There was no statistical significance found between years of teaching

experience and knowledge of 21st century instructional practices. Analysis of school size determined teacher responses were significant in relation to three statements. Findings regarding school socio-economic status found that there was a significant relationship between teacher knowledge in relation to 22 statements and the percentage of enrolled students receiving free and reduced lunch.

Kruskal-Wallis analyses were also conducted to determine the significance, if any, of the aforementioned demographic factors upon teachers' levels of implementation of 21st century instructional practices. Results determined that there was a significant relationship between teachers' reported levels of implementation and completed hours of professional development with regard to 11 of the 28 statements listed on the survey. In two instances statistical significance was revealed between respondents' ages and their reported levels of classroom implementation. Statistical significance was found in three instances between years of classroom experience and levels of implementation. Analysis of school size revealed statistical significance between the number of students enrolled and teachers' reported levels of implementation in 12 instances. It was also revealed that there was statistical significance in 13 instances between teachers' reported levels of implementation and the percentage of enrolled students receiving free and reduced lunch.

A third section of the data collection instrument asked teachers to rate the degree of influence their building administrator(s), peers/colleagues, school or district-sponsored professional development, state-sponsored professional development, and personal reading/research might have upon their understanding and use of 21st century skills. The rating scale consisted of the following descriptors: (1) none, (2) minimal, (3) average, (4) moderate, and (5) high. Chi-square analysis indicated that there was a statistically

significant relationship between teachers' understanding of 21st century skills and all five of the listed influences. Results were duplicated with regard to teachers' use of 21st century skills and the five listed influences.

Demographic information (i.e., hours of professional development, age, years of teaching experience, school size, and school socio-economic status) was analyzed with regard to the five factors possibly influencing teachers' understanding and use of 21st century skills. Chi-square analysis indicated that there was a significant relationship between the hours of professional development completed by teachers and three of the influences upon teachers' knowledge. No statistical significant was found between teachers' ages and the five influences upon teachers' knowledge. Likewise, no statistical significance was established between years of teaching experience and the five possible influences on teachers' knowledge. In one instance was statistical significance established between school size and factors influencing teacher knowledge. In two instances there was statistical significance between the percentage of students receiving free and reduced lunch and the factors possibly influencing teachers' knowledge.

Analyses were also conducted regarding this demographic data and the factors teachers rated regarding influence upon classroom use. A statistically significant relationship was established between two influencing factors and the number of completed professional development hours reported by teachers. No statistical relationship was found between participants' ages and the five possible influences upon classroom use. Similarly, there was no statistically significant relationship between the years of teaching experience reported by participants and the five listed influences upon classroom use. Statistical significance was established with regard to school size and one

of the influences upon classroom use. Chi-square analysis revealed there was a statistically significant relationship between three of the listed influencing factors and the percentage of students receiving free and reduced lunch at the participating schools.

The final question on the data collection instrument was an open-ended statement requesting that participants list any barriers or challenges they had encountered in implementing 21st century instructional practices within their classrooms. Ninety-seven responses total were given. Analysis of these responses found that teachers most often reported four types of barriers: (1) time, (2) resources, (3) training, or (4) other.

Conclusions

The analysis of the data collected for this study provided sufficient evidence to support the following conclusions. Conclusions will be discussed for each research question investigated.

RQ1. What is the level of knowledge of 21st century instructional practices among teachers in elementary schools where administrators participated in the Institute?

Using 28 descriptors of 21st century instructional practices, the data collection instrument allowed respondents to rate their knowledge level of these practices on a scale of 1 to 5 (1 = none, 2 = minimal, 3 = average, 4 = moderate, and 5 = high). Results from the survey completed by respondents indicated knowledge levels of average and higher. The majority of participants scored their knowledge as high for 13 of 28 instructional practices. Moderate knowledge levels were indicated by most participants for 12 of the 28 practices, and a rating of average was reported by the majority of participants in three instances. Therefore, it can be concluded that the knowledge level of 21st century instructional practices among the majority of teachers in elementary schools where

administrators participated in the 21st Century Leadership Institute is moderate or high. Chi-square analysis of participant responses revealed them to be statistically significant in relation to all 28 practices listed.

RQ2. What is the level of implementation of 21st century instructional practices among teachers in elementary schools where administrators participated in the Institute?

Using the same 28 descriptors of 21st century instructional practices, respondents were also asked to rate their level of implementation of 21st century instructional practices within their classrooms on a scale of 1 to 5 (1 = not at all, 2 = less than monthly, 3 = monthly, 4 = weekly, and 5 = daily). Results from the survey indicated that in 20 instances the majority of teachers indicated an implementation level of daily. With regard to five statements the majority of teachers indicated weekly use. A majority of respondents ranked an additional statement as monthly and in two other instances most participants indicated they did not implement the practices at all. The conclusion based upon this information is that the majority of the 21st century instructional practices listed are being implemented by participants on a daily or weekly basis. Chi-square analysis of participant responses revealed them to be statistically significant in relation to all 28 practices listed.

RQ3. What differences in knowledge of 21st century instructional practices, based on factors such as years of teaching experience, attendance at the Teacher Leadership Institute, hours of professional development completed regarding 21st century skills, school size, and student socio-economic status, exist among elementary teachers whose principals attended the 21st Century Leadership Institute?

Professional Development. Teachers participating in this survey reported having completed between 0 and 100 hours of professional development related to 21st century skills, with the mean number of hours being 13.9. Those responses of participating teachers who had completed 21 or more hours of professional development with regard to 21st century skills received the highest mean rank in 18 instances. In only two of those instances was statistical significance proven. Those who completed 10 – 20 hours of professional development received the highest mean rank with regard to five statements, and statistical significance was established in relation to two of those statements. Those with 4 – 9 hours of professional development rated the highest mean rank in relation to 4 statements, with statistical significance established in relation to one statement. In only one instance did the responses of those respondents with 3 – 0 hours receive the highest mean rank, and no statistical significance was established for this statement. The conclusion based on these findings is that there is no difference in teacher knowledge of 21st century instructional practices based upon hours of professional development.

Age. Ages of respondents varied from 23 to 69, with 46.2 years being the mean age of participants. Responses from teachers ages 49 – 55 years received the highest mean rank in relation to 13 of 28 practices. Those ages 0 – 38 years received the highest mean rank in nine instances, and those ages 56 – 69 received the highest mean rank for their responses in four instances. Teachers ages 39 – 48 years received the highest mean rank for their responses in only two instances. There were only three instances of statistical significance proven through chi-square analysis. One statement each for teachers ages 56 – 69, 49 – 55, and 0 -38 years was shown to be statistically significant. It would appear that teachers ages 49 – 55 seemed to have the greatest knowledge of 21st

century instructional practices; however, no significance can be attached to this due to the fact that only one statement related to this age group was found to be statistically significant. Therefore, the conclusion can be made that there is no difference in teacher knowledge of 21st century skills based on age.

Years of Experience. Teachers who participated in this study indicated a range of years of experience from two to 41, with the mean being 18.9 years. Those teachers with 30 – 41 years of experience received the highest mean rank for their responses in 10 instances. Those with 22 – 29 years of experience rated the highest mean rank in relation to eight statements. Those with 9 – 21 years of experience received the highest mean rank in 4 instances, and those with 0 – 8 years of experience did so in 6 instances. Conclusions relate that those teachers with 29 years of experience or more tend to claim the most knowledge of 21st century instructional practices. However, no responses were found to be statistically significant and, therefore, no significance can be attached to these findings. Consequently, no differences in teacher knowledge of 21st century skills were found based on years of teaching experience.

School Size. Teachers from 21 different schools across the state participated in the study. These schools ranged in enrollment from 124 students to 627 students, with the mean enrollment being 377.5 students. When teacher knowledge of 21st century skills was analyzed in relation to school size, the following was determined. Responses from teachers of schools with 340 – 518 students received the highest mean rank in relation to 15 instructional practices. Teachers from schools with 253 to 339 students received the highest mean rank for their responses to 10 survey items. Twice teachers from schools with smallest enrollments (0 – 252) received the highest mean rank for their responses,

and only once did teachers from the largest schools (519 – 627) receive the highest mean rank for their knowledge levels of 21st century instructional practices. Of all responses, only three were considered statistically significant. Twice this was true for responses from teachers at schools with 253 – 339 students, and once it was true for teachers at schools with 340 – 518 students. Consequently, no differences in teacher knowledge of 21st century skills were found based on school size.

School SES. Socio-economic status for schools was determined by the percentage of students receiving free and reduced lunch. The range for participating schools was 25 – 89%, with the mean percentage being 54.2%. Those teachers where the percentage of students receiving free and reduced lunch was greatest (64 – 89%) received the highest mean rank for their responses in relation to all 28 items listed on the survey. In 22 of these instances, chi-square analysis determined there was statistical significance. Based upon these results, it can be concluded that there are differences in teacher knowledge of 21st century skills based on school socio-economic status. As this study revealed, the higher the percentage of low socio-economic students in attendance, the higher the knowledge level indicated by teachers from those schools.

RQ4. What differences in implementation of 21st century instructional practices, based on factors such as years of teaching experience, attendance at the Teacher Leadership Institute, hours of professional development completed regarding 21st century skills, school size, and student socio-economic status, exist among elementary whose principals attended the 21st Century Leadership Institute?

Professional Development. As related previously, teachers participating in this study indicated they had completed between 0 and 100 hours of professional

development with regard to 21st century skills. Responses regarding implementation of the 28 practices listed on the survey were analyzed using mean ranks derived from Kruskal-Wallis testing and further evaluated for statistical significance using chi-square testing with regard to the number of hours of professional development reported by teachers. In relation to 16 practices, teachers with 21 or more hours of professional development reported the most frequent implementation and received the highest mean rank. In ten of these instances, statistical significance was proven through chi-square testing. In relation to six practices, teachers with 10 – 20 hours of professional development received the highest mean rank and in one instance statistical significance was determined. Three statements each received the highest mean rank for both teachers with 4 - 9 hours of professional development and those with 0 – 3 hours. In total, teachers' responses to 11 statements were determined to be statistically significant. Based on these results, it can be concluded that there are no differences in teacher implementation of 21st century skills based on hours of professional development.

Age. Years of age reported by respondents ranged from 23 to 69. Responses regarding implementation of 21st century instructional practices were analyzed regarding ages reported by the participants. Participants ages 55 – 69 received the highest mean rank for their responses to six statements, as did participants ages 39 – 48. Those ages 49 – 55 received the highest mean rank for their responses to 13 statements. Responses from teachers ages 23 – 38 received the highest mean rank in three instances. In only two instances did chi-square testing establish statistical significance, once for responses from those respondents who were 49 – 55 and once for responses from teachers ages 39 – 48.

Consequently, no differences in teacher implementation of 21st century skills were found based on teacher age.

School Size. Teachers from 21 different schools across the state participated in the study. These schools ranged in enrollment from 124 students to 627 students, with the mean enrollment being 377.5 students. When teacher implementation of 21st century skills was analyzed in relation to school size, the following was determined. Teachers from the largest schools (519 – 627) received the highest mean rank for their responses regarding implementation in five instances. Responses from those working in schools with 340 – 518 students received the highest mean rank relative to 13 instructional practices, and teachers working in schools with 253 – 339 students received the highest mean rank for their responses to eight survey items. Twelve items were found to be statistically significant. This was true once for responses given by teachers at schools with 519 – 627 students and twice for responses from teachers working in schools with 253 – 339 students. In nine instances statistical significance was shown in responses from teachers working in schools with 340 – 518 students. Based on these results, it can be concluded that there are no differences in teacher implementation of 21st century skills based on school size.

School SES. Teacher responses regarding implementation of 21st century instructional practices were also analyzed in relation to the percentage of students receiving free and reduced lunch at each school. In 24 of 28 instances, responses from teachers at schools with 64 – 89% of students receiving discounted food services received the highest mean ranks. Half of these responses (12) were proven to be statistically significant. Teachers from schools where 43 – 56% of the students receive free and

reduced lunch received the highest mean ranks for their responses in relation to four survey items. Based on these results, it can be concluded that that are no differences in teacher implementation of 21st century skills and school socio-economic status.

RQ5. To what extent do the building principal, peers/colleagues, professional development, and personal research influence the level of teacher knowledge of 21st century instructional practices?

Study participants were asked to rate the degree of influence their building principal(s), peers/colleagues, school or district-sponsored professional development, state-sponsored professional development, and personal reading/research had on their knowledge of 21st century instructional practices. Ratings were based on the following scale: (1) none, (2) minimal, (3) average, (4) moderate, and (5) high. Most respondents reported that their building principal(s) had a high degree of influence on their knowledge; the remaining four factors were rated as having a moderate level of influence. School or district-sponsored professional development was reported as being the next greatest influence on knowledge, followed by peers/colleagues, state-sponsored professional development, and personal reading/research, respectively. Chi-square analysis of these findings determined they were all statistically significant, indicating these are factors which do play a significant role in teachers' understanding of 21st century instructional practices.

RQ6. To what extent do the building principal, peers/colleagues, professional development, and personal research influence the level of teacher implementation of 21st century instructional practices?

Study participants were also asked to rate the degree of influence their building principal(s), peers/colleagues, school or district-sponsored professional development, state-sponsored professional development, and personal reading/research had on their use of 21st century instructional practices. Ratings were based on the following scale: (1) none, (2) minimal, (3) average, (4) moderate, and (5) high. Similar to previous findings, participants again indicated that the building principal had a high degree of influence on their use of 21st century instructional strategies, while peers/colleagues, school or district-sponsored and state-sponsored professional development, and personal reading/research had moderate influences. Chi-square analysis of these results determined they were all statistically significant, indicating the building principal is the primary influence on teachers' use of 21st century instructional practices within their classrooms. Forty-one percent of the respondents indicated school or district-sponsored professional development had a moderate degree of influence on their implementation. Slightly fewer respondents indicated peers/colleagues, state-sponsored professional development, and personal reading/research influenced their knowledge, respectively.

RQ7. What barriers or challenges have elementary teachers encountered regarding implementation of 21st century instructional practices within their classrooms?

The final question on the data collection instrument asked teachers to list any barriers or challenges they had encountered regarding implementation of 21st century instructional practices within their classrooms. In total, 97 responses were given. Forty percent of the responses mentioned time as an obstacle to successful implementation of the practices. Thirty-nine percent remarked on the lack of appropriate resources as a barrier, and 30% of the responses noted that lack of training in the area of 21st century

instructional practices was an important issue with regard to implementation. A small percentage (7%) discussed unrelated issues, such as personal opinions regarding newly adopted curricula and students' skills.

Discussion and Implications

The majority of participating teachers indicated their knowledge of 21st century instructional practices was moderate or high. This suggests that the participating elementary teachers felt confident in their knowledge base. The average scores, which were the lowest, were received for allowing student input in development of rubrics used to assess their work, using technology resources to develop rubrics (by the teacher and/or students), and use instructional practices that create opportunities for students to plan and manage projects. Based on these results, it would seem teachers may need additional professional development in these areas; however, it also supports the conclusion that administrators from these schools have effectively disseminated the knowledge gained from their participation in the 21st Century Institute, acting as instructional leaders within their schools as defined by Blasé and Blasé (2000, as cited in Hallinger, 2003; DuFour, 2002).

Similarly, participating teachers reported frequent implementation of 21st century practices, claiming daily or weekly use for a majority of the practices. They reported monthly use of instructional practices that create opportunities for students to plan and manage projects and no use of allowing student input in the development of rubrics used to assess their work and use of technology resources to develop rubrics (by the teachers and/or students). These were the same low-ranking areas with regard to knowledge, as discussed previously. Again, this suggests that perhaps further professional development

is needed for teachers in these areas. More time spent developing knowledge in these areas could lead to increased implementation. The more time spent introducing concepts and providing training, the more likely teachers are to make changes in instructional practices (Darling-Hammond & McLaughlin, 1995; Garet et al., 2001; Maldonado, 2002; Peixotto & Fager, 1998; Sparks & Hirsh, 2007). Participating teachers may also feel these are skills that are difficult to implement in the elementary classroom with younger students.

The reviewed literature revealed that increased time spent on professional development leads to increased knowledge. According to the National Center on Education Statistics (1998), 85% of teachers polled who participated in professional development said it gave them new ideas. Those teachers who completed 21 or more hours of professional development with regard to 21st century skills scored the highest mean rank relative to 18 of the 28 practices listed on the survey. While these results were not statistically significant, they do indicate a trend of more professional development leading to more knowledge among teachers, as suggested by the literature.

Age made a statistically significant difference in teacher knowledge of 21st century skills in only three instances. The oldest respondents, ages 56 – 69 years, reported the highest mean rank for designing and using instructional practices that support students' natural inquisitiveness. Chi-square analysis determined this was statistically significant. Teachers ages 49 – 55 years reported the highest mean rank for using standards-based lessons and units that integrate the understanding of concepts across disciplines, and chi-square analysis also determined this was statistically significant. The youngest respondents, ages 0 – 38 years, reported the highest mean rank

for using technology resources to develop rubrics (by either teachers and/or students). Again, chi-square analysis revealed these responses to be statistically significant. While these results do not support the conclusion that age makes a statistically significant difference in teacher knowledge of 21st century skills, the data did indicate some trends.

Teachers ages 49 – 55 reported the highest mean rank more often with regard to knowledge of 21st century instructional practices; however, teachers ages 23 – 48 were ranked closely in reported knowledge. One would typically expect those most recently graduated from teacher education programs to be knowledgeable of new education initiatives. Those teachers who were younger reported greater knowledge of research-based instructional strategies, using rubrics to guide student work and to assess student work. They were also more likely to have knowledge of using technology resources to develop rubrics and in allowing student input in the development of rubrics used to assess their work. These teachers also reported having the most knowledge of using portfolios, work stations/centers, self-assessments, journals, drawings, and rubrics to develop self-directed learners. The youngest teachers were more likely to report knowledge of instructional practices that develop 21st century information and communication skills in students, as well as using instructional practices that allow students to plan and manage projects and to interact with their peers and other knowledgeable adults in authentic learning experiences. These are areas that have received emphasis under the recent 21st century initiative, which supports a rigorous and relevant curriculum that develops self-directed learners.

Just as the reviewed research suggests there is no way to link teachers' years of experience with student achievement, there is no way to correlate years of experience

with teacher knowledge of 21st century skills (Hanushek, 1986). Kruskal-Wallis testing revealed the following spread of mean ranks: 10 of the highest for those with 30 – 41 years of experience, 8 of the highest for those with 22 – 29 years of experience, 4 of the highest for those with 9 – 21 years of experience, and 6 of the highest for those with 0 – 8 years of experience. These findings reveal a trend that is supported by the literature, which suggests that differences between less experienced and veteran teachers decrease after five years of teaching (Darling-Hammond, 2000; Laczko-Kerr & Berliner, 2002, as cited in Center for Public Education, 2006; Rivkin, Hanushek, & Kain, 1998, as cited in Center for Public Education, 2006). However, analyses determined no statistical significance could be attached to these findings. Few differences can be seen among participating teachers' knowledge based upon their years of teaching experience.

According to the literature, a small elementary school is described as one with a student enrollment of 300 – 400 students; these schools are also more likely to have an established sense of community, with a spirit of collaboration and cooperation among teachers (Cotton, 1996; Irmsher, 1997; McRobbie & Villegas, 2001). Results of this study indicate that knowledge levels of three 21st century practices were highest among teachers at schools with 253 – 518 students. Teachers at schools with 253 – 339 students reported more knowledge of using a variety of rubrics to assess student work and allowing student input in the development of rubrics used to assess their work. Teachers at schools with 340 – 518 students reported the most knowledge of using instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences. Perhaps, as the literature suggests, these are schools where teachers have established learning communities or other methods

for sharing information. However, responses from these two groups of teachers were significant in relation to only three practices out of the listed 28. Clearly, this is not enough to label them as overwhelmingly significant.

The 21st century instructional practices tout a rigorous and relevant curriculum. The literature reports that schools with high numbers of low socio-economic status students are less likely to have quality teachers and a rigorous curriculum (National Governors Association, n.d.). Findings from this study contradict the literature in this regard. Kruskal-Wallis testing produced the highest mean rank in relation to knowledge levels of teachers in schools where 64 – 89% of students are considered to be of low-socioeconomic status, and chi-square analysis yielded significant results for 22 of the 28 instructional practices for teacher knowledge levels from these same size schools.

Differences in teacher implementation of 21st century skills based upon hours of professional development was determined to be statistically significant in relation to eleven skills. Although not enough to clearly conclude that hours of completed professional development affects teacher implementation levels, the data do reveal certain trends supported by the literature. As the National Center on Education Statistics (1998) reports, of those teachers polled who participated in professional development, 65% said it brought about instructional changes in their classrooms. Clearly, the more professional development teachers completed with regard to 21st century skills, the more likely they were to implement them in their classrooms. This study found that those teachers who completed 21 or more hours of professional development in relation to 21st century skills were most likely to report higher implementation levels.

Results regarding the effect of age upon teacher implementation levels yielded only two statistically significant findings. Teachers ages 49 – 55 reported the highest mean rank for using a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts, while those ages 39 – 48 received the highest mean rank for incorporating 21st century learning skills and technology tools that accommodate students with special needs. While chi-square testing yielded only two statistically significant results based on age, the trend suggested by the data indicates that older teachers are more likely to report frequent implementation of 21st century instructional practices. Teachers ages 49 – 55 scored the highest mean rank for 13 of the 28 instructional practices.

Kruskal-Wallis testing revealed those teachers with 9 – 21 years of experience received the highest mean score for implementation of 15 of 28 practices. In three of these instances, chi-square analysis established statistical significance. Teachers with 30 – 41 years of experience scored the highest mean rank in seven instances. No definite relationship could clearly be established between teachers' years of experience and their implementation levels of 21st century instructional practices.

Teachers from schools with 340 – 518 students reported higher implementation levels than their peers in 15 of 28 instances, nine of which chi-square analysis revealed were statistically significant. Responses from teachers at schools with 253 – 339 students received the highest mean rank in eight of 28 instances, two of which were determined to be statistically significant. The research suggests that schools with 300 – 400 students have more rigorous curricula and greater cooperation and collaboration among teachers. While chi-square testing could not definitely link school size with teachers' levels of

implementation, findings do suggest that teachers from schools with 253 – 518 students were likely to have more frequent implementation of 21st century instructional practices.

Results regarding school socio-economic status and teacher implementation of 21st century skills ran contrary to findings reported in the related literature. The literature states that schools with high proportions of low socio-economic status tend to have lower expectations, less demanding curricula, and less qualified teachers. Findings in this study revealed that teachers from schools with the highest percentages of students receiving free and reduced lunch scored the highest mean rank for 24 of 28 instructional practices, 12 of which chi-square testing revealed were statistically significant. The 21st century practices are rigorous and establish the high expectation of students to take more control of their own learning.

When asked to rate the degree of influence various factors had on their knowledge, 42.5% of the respondents indicated their building principal had a high degree of influence. This is indicative of the research stating that the principal's role has evolved into that of instructional leader (Hallinger, 2003). This information would suggest that principals who participated in the 2006 – 2007 21st Century Instructional Leadership Institute are informing their teachers about 21st century instructional practices. It also suggests that activities such as the Institute are a valuable tool for the West Virginia Department of Education in disseminating information. The majority of respondents rated the remaining factors (peers/colleagues; school, district, and state-sponsored professional development, and personal reading/research) as having moderate influence on their knowledge level. This suggests that teachers are sharing information with one another and attending various types of professional development to build their knowledge base

regarding 21st century skills. Chi-square analysis established statistical significance with regard to teacher responses for all five factors.

Similarly, the majority of study participants rated the influence of their building principal on their implementation of 21st century skills as high. This too supports the view of the principal as instructional leader, as someone knowledgeable in instructional practices and capable of modeling them (Blasé & Blasé, 2000, as cited in Hallinger, 2003; DuFour, 2002). Again, most participants reported other factors (peers/colleagues, school, district, and state-sponsored professional development, and personal reading and research) had a moderate influence on their level of implementation. Statistical significance was established for all five factors. These findings imply that several factors are in place to aid in teacher implementation of 21st century skills, and teachers are making use of them.

Kruskal-Wallis testing and chi-square analyses were conducted regarding the effects of age, years of experience, professional development, and school size and socio-economic status upon the factors that might influence participants' knowledge and implementation of 21st century instructional practices. While neither age nor years of experience were found to have any statistically significant effect, hours of professional development was found to be important. Those teachers who completed 21 or more hours were more likely to report that school, district, or state-sponsored professional development influenced their knowledge base. These teachers also reported that personal reading and research made a significant influence on their knowledge. This speaks strongly to the importance of professional development at all levels and the impact it can make.

Similarly, teachers from schools with the highest number of low socio-economic students were more likely to report that school or district-sponsored professional development and personal reading/research were the biggest influences upon their knowledge. Teachers from schools with the largest student enrollment were more likely to report that their building principal as being a significant influence, underscoring the importance of the principal as instructional leader.

Similar results were revealed when statistical analyses were conducted with regard to implementation. Again, age and years of experience were not statistically significant relative to influences upon teachers' classroom implementation of 21st century instructional practices. Those teachers who completed 21 or more hours of professional development in 21st century skills were most likely to report that school, district, and state-sponsored professional development influenced their implementation, making it clear that professional development at all levels is vital to changing classroom practices. As stated previously, teachers from schools with high numbers of low socio-economic status students also reported upon the significant influence of school, district, and state-sponsored professional development, as well as personal/reading and research. Teachers from the largest schools again remarked on the significant influences of their building principal. These findings make clear the role that professional development and instructional leadership can play in bringing about changes in the classroom.

When teachers were asked to list barriers or challenges to implementation of 21st century instructional practices in their classrooms, their responses indicated three significant obstacles: time, resources, and training. Frustration was expressed at having too little time to comprehend, research, develop lessons for, and implement 21st century

practices. These findings stress the importance of schools/districts finding ways to provide teachers with the time needed to collaborate and plan appropriate lessons. As well, teachers noted difficulty in finding the time to implement the skills when other significant curricular changes had been made which required a great deal of their attention.

Teachers also reported problems related to technology. The issues discussed suggest the need for updated technologies in some schools and better access for all teachers and students in schools where technologies are available. The number of comments regarding technology make evident that for many teachers 21st century learning skills are synonymous with computers; however, as shown in the 28 practices derived from the WVDE publication and used in Part B of the data collection instrument, technology is but a part of 21st century learning skills. Perhaps clarification is needed for teachers regarding what actually constitutes 21st century instruction.

Finally, training was an issue of concern for teachers. As the research indicates, professional development is most effective which is sustained and hands-on, with practical application for participants (Peixotto & Fager, 1998). Teachers noted they felt ill-prepared to implement 21st century instructional practices due to lack of training or lack of grade/subject-specific training. Others noted they needed more active, hands-on training with the technology-related practices. These comments should have great influence on future professional development offerings by schools, districts, and state agencies who seek successful classroom implementation of these practices.

Recommendations for Further Research

This study investigated and provided insight into teachers' levels of knowledge and implementation of 21st century instructional practices, as well as information regarding which factors they felt influenced their knowledge and level most. Teachers also provided information regarding those issues which seem to create challenges or barriers to successful implementation of the practices. Other questions raised by the findings of this study may be answered only by further research. These may be summarized as follows:

1. This study focused solely on teachers from the elementary level. Additional studies could provide insight into the knowledge and implementation levels among middle school and high school teachers. This might provide for comparisons among the various grade levels.
2. Findings from the study provided interesting results for schools with the highest percentages of students classified as low socio-economic status. Further study could provide information regarding how these schools versus those with lower numbers of such students are preparing and supporting their teachers with regard to 21st century instructional practices.
3. Additional study could also provide insight into the preparation novice teachers or those recently graduated have received in their undergraduate programs regarding 21st century instructional practices.
4. Findings in this study revealed that those teachers who completed 21 or more hours of professional development had higher knowledge and implementation levels than their peers who had completed fewer hours. Additional study could

investigate and provide insight into whether these teachers are completing the bulk of their learning at the school, district, or state level and which they find most valuable.

5. This study focused on the knowledge and implementation levels of teachers at schools where administrators had attended the 2006 – 2007 21st Century Leadership Institute. Further research could focus on the administrators from these schools and their knowledge and implementation of the 21st century practices

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APPENDICES

APPENDIX A

High-Yield Practices of the 21st Century Classroom Survey

Part A. **Please provide the following information.**

1. Position _____
2. Grade level(s) currently teaching _____
3. Did you participate in the WVDE 21st Century Teacher Leadership Institute (Summer 2007)? _____ Yes _____ No
4. Years of full-time teaching experience ____
5. Age _____
6. Hours of professional development regarding 21st century skills in which you have participated _____

Part B. **Following is a list of classroom instructional practices. Using the scale provided in Column A, please rate each of the high yield 21st century practices in terms of your current level of knowledge. Using the scale provided in Column B, please rate each of the high yield 21st century practices in terms of your current level of use in your classroom.**

Column A Level of Knowledge		
1	**=**	**None**
2	**=**	**Minimal**
3	**=**	**Average**
4	**=**	**Moderate**
5	**=**	**High**

Column B Level of Classroom Use		
1	**=**	**Not at all**
2	**=**	**Less than monthly**
3	**=**	**Monthly**
4	**=**	**Weekly**
5	**=**	**Daily**

Instructional Practices		None	Minimal	Average	Moderate	High		Not at all	Less than monthly	Monthly	Weekly	Daily
1.	Utilize multiple teaching and learning approaches that are **developmentally responsive**.	1	2	3	4	5		1	2	3	4	5

(continued)

	Instructional Practices	None	Minimal	Average	Moderate	High		Not at all	Less than monthly	Monthly	Weekly	Daily
2.	Utilize multiple teaching and learning approaches that are **socially equitable**.	1	2	3	4	5		1	2	3	4	5
3.	Utilize multiple teaching and learning approaches that are **culturally responsive**.	1	2	3	4	5		1	2	3	4	5
4.	**Use modeling, practice, and reinforcement** to create a classroom environment where students experience and develop **respect for individual differences**.	1	2	3	4	5		1	2	3	4	5
5.	**Use modeling, practice, and reinforcement** to create a classroom climate where students experience and develop **positive social/personal skills**.	1	2	3	4	5		1	2	3	4	5
6.	**Use modeling, practice, and reinforcement** to create a classroom climate where students experience and develop **ethical behavior**.	1	2	3	4	5		1	2	3	4	5
7.	**Use a standards-based lesson and unit format** aligned with the WV CSOs.	1	2	3	4	5		1	2	3	4	5
8.	**Use a standards-based lesson and unit format** that identifies goals and focuses on essential questions and core concepts.	1	2	3	4	5		1	2	3	4	5
9.	Incorporate 21st century **technology tools** that challenge all students.	1	2	3	4	5		1	2	3	4	5
10.	Incorporate 21st century **learning skills** that challenge all students.	1	2	3	4	5		1	2	3	4	5

(continued)

	Instructional Practices	None	Minimal	Average	Moderate	High		Not at all	Less than monthly	Monthly	Weekly	Daily
11.	Incorporate 21st century learning skills and technology tools that accommodate **students with special needs**.	1	2	3	4	5		1	2	3	4	5
12.	Design and use instructional practices that are **developmentally appropriate**.	1	2	3	4	5		1	2	3	4	5
13.	Design and use instructional practices that **support students' natural inquisitiveness**.	1	2	3	4	5		1	2	3	4	5
14.	**Differentiate instruction** to meet the needs of **all** learners.	1	2	3	4	5		1	2	3	4	5
15.	**Use grouping strategies** (cooperative learning, flexible whole, small and/or individual grouping) to promote high levels of student engagement.	1	2	3	4	5		1	2	3	4	5
16.	**Use research-based instructional strategies** (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	1	2	3	4	5		1	2	3	4	5
17.	**Use standards-based lessons and units** that integrate the understanding of concepts across disciplines.	1	2	3	4	5		1	2	3	4	5
18.	**Use a writing process** supported by 21st century skills and technology tools.	1	2	3	4	5		1	2	3	4	5
19.	Use a variety of rubrics **to guide student work** (e.g., products, performances, demonstrations).	1	2	3	4	5		1	2	3	4	5

(continued)

Instructional Practices		None	Minimal	Average	Moderate	High		Not at all	Less than monthly	Monthly	Weekly	Daily
20.	Use a variety of rubrics **to assess student work** (e.g., products, performances, demonstrations).	1	2	3	4	5		1	2	3	4	5
21.	**Allow student input** in the development of rubrics used to assess their work.	1	2	3	4	5		1	2	3	4	5
22.	**Use technology resources** to develop rubrics (by either teachers and/or students).	1	2	3	4	5		1	2	3	4	5
23.	Use **portfolios, work stations/centers, self-assessments, rubrics, drawings and journals** to develop self-directed learners.	1	2	3	4	5		1	2	3	4	5
24.	Establish **pacing, interventions, accelerations, remediation, and instructional decisions** from data based on a variety of on-going assessments.	1	2	3	4	5		1	2	3	4	5
25.	Use instructional practices that develop 21st century **information and communication skills** in students.	1	2	3	4	5		1	2	3	4	5
26.	Use instructional practices that **make content relevant** to students' lives.	1	2	3	4	5		1	2	3	4	5
27.	Use instructional practices that create opportunities for students to **plan and manage projects**.	1	2	3	4	5		1	2	3	4	5
28.	Use instructional practices that create opportunities for **student interaction with peers, with other teachers, or with knowledgeable adults** in authentic experiences.	1	2	3	4	5		1	2	3	4	5

Part C. **Following is a list of factors which may have influenced your <u>understanding</u> and <u>use</u> of 21st century skills within your classroom. Using the scale provided in Column A, please rate the degree of influence each has had on your <u>understanding</u> of 21st century skills. Using the scale in Column B, please rate the degree of influence each has had on your <u>use</u> of 21st century skills in your classroom.**

Column A Degree of Influence on Understanding	Column B Degree of Influence on Classroom Use
1 = None **2 = Minimal** **3 = Average** **4 = Moderate** **5 = High**	**1 = None** **2 = Minimal** **3 = Average** **4 = Moderate** **5 = High**

Influences		Column A: None	Minimal	Average	Moderate	High	Column B: None	Minimal	Average	Moderate	High
1.	(a) My building principal	1	2	3	4	5	1	2	3	4	5
	(b) Peers/colleagues	1	2	3	4	5	1	2	3	4	5
	(c) School or district-sponsored professional development	1	2	3	4	5	1	2	3	4	5
	(d) State-sponsored professional development (through the WVDE or CPD)	1	2	3	4	5	1	2	3	4	5
	(e) Personal reading/research	1	2	3	4	5	1	2	3	4	5

2. Please list any barriers or challenges you have encountered regarding implementation of 21st century instructional practices within your classroom.

_____

_____

_____

Thank you for your time. Please return this completed survey to your building principal.

APPENDIX B

Members of Expert Panel

Dr. Michael Cunningham
Marshall University Graduate College

C. Carter Chambers
Regional Program Coordinator – AMSP-MU

Dr. Lisa Heaton
Marshall University Graduate College

Charles K. Heinlein
WV Dept. of Education

Lynn Hurt
Director of Middle School Testing/Guidance Coordinator
Wayne County Schools

Lydia McCue
Special Assistant to the State Superintendent of Schools
West Virginia Department of Education

Dr. Jane McKee
Professor Emeritus
Marshall University

Dr. Bobbi Nicholson
Marshall University Graduate College

Lenora Richardson
Curriculum Supervisor
Cabell County Schools

Jane Roberts
Assistant Superintendent
Kanawha County Schools

Deborah A. Russell
Principal
Wayne Elementary School

Kenneth Tanner
Assistant Superintendent
Clay County Schools

APPENDIX C

MARSHALL UNIVERSITY
www.marshall.edu

Office of Research Integrity
Institutional Review Board

Friday, March 07, 2008

Ronald Childress, Ed.D.
Dean MU Graduate School
MU Graduate College
100 Angus E. Peyton Dr.
South Charleston, WV. 25303-1600

RE: IRB Study # EX08-0092 **At:** Marshall IRB 2

Dear Dr. Childress:

Protocol Title:
A Descriptive Analysis of Knowledge and Implementation of 21st Century Instructional Practices Among Elementary School Teachers Whose Administrators Participated in the 2006-2007 21st Century Leadership Institute

Expiration Date:	3/6/2009
Our Internal #:	4544
Type of Change:	(Other) Exempted
Expedited ?:	☐
Date of Change:	3/5/2008
Date Received:	3/5/2008
On Meeting Date:	
Description:	In accordance with 45CFR46.101(b)(2), the above study and informed consent were granted Exempted approval today by the Marshall University IRB#2 Chair for the period of 12 months. The approval will expire 3/6/09. A continuing review request for this study must be submitted no later than 30 days prior to the expiration date. This study is for student Michelle Samples. The purpose of this anonymous survey study is to investigate the level of knowledge and implementation of 21st century instructional practices among teachers in elementary schools whose administrators attended the 21st Century Leadership Institute in 2006-2007.

Respectfully yours,

Stephen D. Cooper, Ph.D.
Marshall University IRB #2 Chairperson

Dear Elementary Principal:

Due to your participation in the 2006 – 2007 21st Century Leadership Institute sponsored by the West Virginia Department of Education, teachers in your school have been selected to participate in a study regarding knowledge and implementation of 21st century skills among elementary teachers. I am conducting this study as part of the research for my doctoral dissertation in Curriculum and Instruction through Marshall University. As well as being vital to the completion of my research, the data provided through this survey may help influence future professional development offered for administrators and teachers by the WVDE.

Being an administrator myself, I truly understand how busy your days are. However, I would greatly appreciate it if you could find time to administer the enclosed brief survey to the teaching members of your staff and return the completed forms to me in the self-addressed, stamped envelope provided by April 30, 2008.

Your help with data collection for this study is greatly appreciated. Please know that you, your school, and your staff members and their responses will remain anonymous in subsequent reports. I will gladly provide you with a copy of the results of my study when it is complete.

Again, thank you for your cooperation and assistance with this study.

Sincerely,

E. Michelle Samples

/ems
Enclosures

Dear Fellow Educator:

I am currently a doctoral student at Marshall University, and I am seeking your help in the completion of my dissertation. In 2005 the West Virginia Department of Education (WVDE) joined the Partnership for 21st Century Skills. As a member of this organization, the WVDE has concentrated on preparing the state's educators to develop 21st century classrooms. My study seeks to investigate teacher knowledge and implementation of 21st century instructional strategies, as defined by the WVDE. It is my hope the findings from this study can be used to inform the professional development efforts of the WVDE which, in turn, will help better meet the needs of the state's classroom teachers.

I would greatly appreciate it if you would take a few minutes of your time to complete the survey which your administrator has provided to you and place it in the attached envelope. Then please return your sealed envelope with the completed survey enclosed to your administrator. He/she will be returning these surveys to me by April 30, 2008. If there are any questions or statements to which you do not feel comfortable responding, please leave those blank. Also, please know that surveys will be anonymous, so your confidentiality is protected.

As a fellow educator, I understand the demands placed on your time; therefore, I am truly appreciative of your taking the time necessary to complete this survey. It is my hope your responses and those of your colleagues across the state will help shape the professional development offerings provided by the WVDE.

Thank you for your participation. I will share the findings of this study with you when it is complete.

I look forward to receiving your responses.

Sincerely,

E. Michelle Samples

APPENDIX D

MARSHALL UNIVERSITY
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Office of Research Integrity
Institutional Review Board

Wednesday, April 02, 2008

Ronald Childress, Ed.D.
Dean MU Graduate School
MU Graduate College
100 Angus E. Peyton Dr.
South Charleston, WV. 25303-1600

RE: IRB Study # EX08-0092 **At:** Marshall IRB 2

Dear Dr. Childress:

Protocol Title:
A Descriptive Analysis of Knowledge and Implementation of 21st Century Instructional Practices Among Elementary School Teachers Whose Administrators Participated in the 2006-2007 21st Century Leadership Institute

Expiration Date:	3/6/2009	
Our Internal #:	4672	
Type of Change:	Amendment	Approved
Expedited ?:	☐	
Date of Change:	4/1/2008	
Date Received:	4/1/2008	
On Meeting Date:		
Description:	Amendment #1 to the above listed study was granted approval today. This amendment is the approval of an updated survey and consent. This study is for student Michelle Samples.	

Respectfully yours,

Christopher W. LeGrow

Christopher LeGrow, Ph.D.
Marshall University IRB #2 Vice Chair

Dear Elementary Principal:

Due to your participation in the 2006 – 2007 21st Century Leadership Institute sponsored by the West Virginia Department of Education, teachers in your school have been selected to participate in a study regarding knowledge and implementation of 21st century skills among elementary teachers. I am conducting this study as part of the research for my doctoral dissertation in Curriculum and Instruction through Marshall University. As well as being vital to the completion of my research, the data provided through this survey may help influence future professional development offerings for administrators and teachers in West Virginia.

Being an administrator myself, I truly understand how busy your days are. However, I would greatly appreciate it if you could find time to administer the enclosed brief survey to the teaching members of your staff and return the completed forms to me in the self-addressed, stamped envelope provided by April 30, 2008.

Your help with data collection for this study is greatly appreciated. Please know that you, your school, and your staff members and their responses will remain anonymous in any subsequent reports. I will gladly provide you with a copy of the results of my study when it is complete.

Again, thank you for your cooperation and assistance with this study.

Sincerely,

E. Michelle Samples

Enclosures

Dear Fellow Educator:

I am currently a doctoral student at Marshall University, and I am seeking your help in the completion of my dissertation. In 2005 the West Virginia Department of Education (WVDE) joined the Partnership for 21st Century Skills. As a member of this organization, the WVDE has concentrated on preparing the state's educators to develop 21st century classrooms. My study seeks to investigate teacher knowledge and implementation of 21st century instructional strategies, as defined by the WVDE.

I would greatly appreciate it if you would take a few minutes of your time to complete the survey which your administrator has provided. Please place the completed survey in the attached envelope and return your sealed envelope to your administrator. He/she will be returning these surveys to me by April 30, 2008. If there are any questions or statements to which you do not feel comfortable responding, please leave those blank. Also, please know that your responses will be anonymous, so your confidentiality is protected.

For questions concerning this study, you may contact Dr. Ron Childress at (304) 746-1904 or Michelle Samples at (304) 587-4738. For questions regarding your rights as a research participant, you can contact Dr. Stephen Cooper, IRB #2 Chairperson, at (304) 696-4303.

As a fellow educator, I understand the demands placed on your time; therefore, I am truly appreciative of your willingness to complete this survey. Thank you for your participation. I will share the findings of this study with you when it is complete.

I look forward to receiving your responses.

Sincerely,

E. Michelle Samples

APPENDIX E

Hours of Professional Development as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	44	84.23	41	71.59	53	83.67	27	97.02	5.28
2. Utilize multiple teaching and learning approaches that are socially equitable.	43	77.70	41	84.40	53	82.39	27	87.48	0.90
3. Utilize multiple teaching and learning approaches that are culturally responsive.	44	78.69	41	86.11	53	81.64	27	87.96	0.94
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	42	81.62	41	88.59	53	76.43	27	83.52	2.01
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	43	81.73	41	91.70	53	72.71	27	88.98	5.74
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	44	83.85	41	89.80	53	71.71	27	93.44	6.26

Hours of Professional Development as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	43	74.14	41	85.06	52	80.52	27	92.72	4.13
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	43	80.17	41	81.21	52	82.01	27	86.09	0.35
9. Incorporate 21st century technology tools that challenge all students.	43	71.66	41	76.35	51	85.15	27	98.09	6.66
10. Incorporate 21st century learning skills that challenge all students.	42	65.31	40	73.46	53	90.44	27	101.04	14.56***
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	43	71.31	40	80.26	52	88.01	27	87.02	3.74
12. Design and use instructional practices that are developmentally appropriate.	44	79.68	41	83.27	53	83.68	27	86.67	0.49
13. Design and use instructional practices that support students' natural inquisitiveness.	44	69.81	41	83.94	53	87.39	26	91.75	5.46
14. Differentiate instruction to meet the needs of all learners.	44	75.68	41	92.90	53	75.46	27	94.69	7.38

Hours of Professional Development as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	44	69.59	40	95.55	52	76.72	27	92.31	11.01***
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	44	78.72	41	71.95	52	85.45	27	99.00	6.83
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	43	76.40	40	76.39	51	85.68	25	80.40	1.50
18. Use a writing process supported by 21st century skills and technology tools.	43	65.12	41	72.32	51	96.06	26	91.42	13.93***
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	43	70.03	40	74.25	51	86.90	26	94.87	6.87
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	42	68.92	41	77.30	51	85.30	26	94.83	6.34

Hours of Professional Development as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	43	70.83	41	69.29	51	95.03	25	85.88	10.11***
22. Use technology resources to develop rubrics (by either teachers and/or students).	42	72.33	41	75.21	51	86.75	26	89.79	4.01
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	43	80.48	41	76.10	51	86.37	26	79.06	1.29
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	44	81.74	40	70.20	51	82.96	25	89.78	3.56
25. Use instructional practices that develop 21st century information and communication skills in students.	43	55.24	39	84.77	52	91.75	26	93.37	19.99***
26. Use instructional practices that make content relevant to students' lives.	44	82.88	40	79.71	51	81.44	26	78.94	0.19
27. Use instructional practices that create opportunities for students to plan and manage projects.	44	79.33	41	75.80	51	86.11	27	88.00	1.78

Hours of Professional Development as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices (continued)

	Hours of Professional Development								
	0 – 3		4 – 9		10 - 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	44	79.99	40	87.61	52	81.77	27	77.41	1.00

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APPENDIX F

Age as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices

	Years of Age								
	0 – 38		39 - 48		49 – 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	59	100.10	48	109.19	59	111.66	52	118.00	2.65
2. Utilize multiple teaching and learning approaches that are socially equitable.	57	102.78	48	99.01	59	117.96	52	112.80	3.61
3. Utilize multiple teaching and learning approaches that are culturally responsive.	59	102.41	47	98.88	59	120.60	50	108.30	4.25
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	59	106.11	47	102.78	58	112.40	52	112.04	1.13
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	59	107.46	48	98.44	58	117.53	52	110.98	3.40
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	59	102.08	48	99.57	59	120.22	52	114.91	5.11

Age as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Years of Age								
	0 – 38		39 - 48		49 – 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	58	98.11	48	101.60	58	116.86	52	117.12	6.28
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	58	101.52	48	97.72	58	121.78	52	111.43	6.18
9. Incorporate 21st century technology tools that challenge all students.	58	105.53	48	113.54	57	105.57	52	108.31	0.62
10. Incorporate 21st century learning skills that challenge all students.	59	112.92	48	99.07	58	107.54	52	115.34	2.29
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	59	103.91	48	107.25	56	112.57	52	108.41	0.62
12. Design and use instructional practices that are developmentally appropriate.	59	104.02	47	99.74	59	117.74	52	113.11	3.73
13. Design and use instructional practices that support students' natural inquisitiveness.	58	111.10	48	87.92	59	115.22	52	119.06	8.62***
14. Differentiate instruction to meet the needs of all learners.	59	115.64	48	93.79	59	119.63	52	105.54	7.02

Age as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Years of Age								
	0 – 38		39 - 48		49 – 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	59	110.78	48	103.26	58	118.38	52	101.82	3.37
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	59	111.71	48	109.57	58	110.33	52	103.91	0.58
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	58	97.66	47	95.85	57	123.45	51	109.52	8.37***
18. Use a writing process supported by 21st century skills and technology tools.	58	101.62	47	110.38	56	107.24	52	109.68	0.74
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	56	113.44	48	99.65	57	109.19	51	102.32	1.80
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	55	115.41	48	99.17	57	105.70	52	104.72	2.16

Age as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Years of Age								
	0 – 38		39 - 48		49 – 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	54	113.20	48	103.58	57	111.35	52	94.88	3.16
22. Use technology resources to develop rubrics (by either teachers and/or students).	56	125.46	48	99.06	56	106.88	52	92.54	9.19***
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	57	124.75	48	103.72	57	101.95	52	98.17	6.85
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	56	103.11	48	103.69	57	119.42	52	100.63	3.70
25. Use instructional practices that develop 21st century information and communication skills in students.	57	111.10	48	105.34	57	109.00	51	101.75	0.79
26. Use instructional practices that make content relevant to students' lives.	57	106.67	48	96.10	58	114.66	51	111.02	3.12
27. Use instructional practices that create opportunities for students to plan and manage projects.	57	112.71	48	99.17	58	109.80	52	108.98	1.45

Age as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Years of Age								
	0 – 38		39 - 48		49 – 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	58	112.60	48	101.96	59	111.42	51	106.62	1.06

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APPENDIX G

Years of Experience as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	65	110.83	58	106.65	58	136.72	56	122.93	7.80
2. Utilize multiple teaching and learning approaches that are socially equitable.	63	111.87	58	112.34	58	127.90	56	120.51	2.53
3. Utilize multiple teaching and learning approaches that are culturally responsive.	64	114.72	57	109.56	57	116.85	55	127.52	2.29
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	65	117.35	58	108.52	56	130.51	56	116.07	4.06
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	65	118.28	58	110.96	57	126.46	56	118.47	2.01
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	65	109.74	58	118.03	58	122.50	56	127.13	2.66

Years of Experience as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	65	113.85	57	110.62	57	121.52	56	126.75	3.02
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	65	110.29	57	116.11	57	120.44	56	126.38	2.29
9. Incorporate 21st century technology tools that challenge all students.	65	120.05	57	108.37	57	128.05	55	113.02	3.03
10. Incorporate 21st century learning skills that challenge all students.	64	123.12	57	108.76	58	118.06	55	119.43	1.65
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	65	120.87	58	105.24	58	123.09	53	120.67	2.79
12. Design and use instructional practices that are developmentally appropriate.	65	111.13	58	108.67	57	126.69	56	128.89	5.52
13. Design and use instructional practices that support students' natural inquisitiveness.	64	117.72	58	110.90	58	116.52	55	127.38	2.00
14. Differentiate instruction to meet the needs of all learners.	65	123.03	58	118.21	58	118.21	56	115.96	0.48

Years of Experience as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	65	122.27	58	119.55	56	111.28	56	118.16	1.16
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	65	116.20	58	125.75	57	118.24	56	113.93	1.18
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	65	107.77	56	113.43	55	118.40	55	125.95	2.80
18. Use a writing process supported by 21st century skills and technology tools.	64	107.57	57	132.58	57	104.98	54	122.27	6.98
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	63	113.38	57	118.50	56	120.90	55	111.42	0.80
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	62	115.30	57	117.73	57	119.91	55	110.95	0.60

Years of Experience as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	61	122.04	57	118.10	57	115.47	55	105.58	2.00
22. Use technology resources to develop rubrics (by either teachers and/or students).	63	128.95	57	112.51	57	114.05	54	106.63	3.81
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	64	128.61	57	124.45	57	108.50	55	104.58	5.92
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	62	106.95	58	123.64	57	117.96	55	118.23	2.26
25. Use instructional practices that develop 21st century information and communication skills in students.	63	110.09	57	124.68	57	109.03	54	121.09	2.64
26. Use instructional practices that make content relevant to students' lives.	63	108.94	58	119.26	57	113.88	55	127.09	2.82
27. Use instructional practices that create opportunities for students to plan and manage projects.	63	118.63	58	111.21	57	119.80	56	120.41	0.73

Years of Experience as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	64	120.93	58	110.85	57	117.69	56	122.37	1.10

APPENDIX H

School Size as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices

	School Size								
	0 – 252		253 - 339		339 – 518		519 - 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	60	110.52	63	116.54	70	133.49	48	121.74	4.40
2. Utilize multiple teaching and learning approaches that are socially equitable.	59	105.14	63	115.67	70	135.95	47	120.69	7.65
3. Utilize multiple teaching and learning approaches that are culturally responsive.	59	109.03	62	113.41	69	130.38	47	122.19	3.99
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	60	123.88	62	112.78	70	125.58	47	116.26	1.93
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	60	125.45	63	115.85	70	124.76	47	114.07	1.70
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	60	121.25	63	109.46	70	133.47	48	117.65	5.07

School Size as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	School Size								
	0 – 252		253 - 339		339 – 518		519 - 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	60	127.32	61	120.65	70	120.04	48	109.97	2.52
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	60	121.56	61	118.18	70	127.78	48	109.02	2.75
9. Incorporate 21st century technology tools that challenge all students.	60	118.63	60	112.28	70	121.09	48	127.28	1.45
10. Incorporate 21st century learning skills that challenge all students.	60	108.24	61	126.79	69	122.43	48	120.09	2.76
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	60	120.19	61	116.91	69	120.64	48	120.28	0.13
12. Design and use instructional practices that are developmentally appropriate.	60	126.33	63	117.82	70	128.17	47	105.22	4.93
13. Design and use instructional practices that support students' natural inquisitiveness.	60	110.13	63	116.84	70	136.79	46	111.65	7.19
14. Differentiate instruction to meet the needs of all learners.	60	112.52	63	130.02	70	126.49	48	111.76	4.41

School Size as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	School Size								
	0 – 252		253 - 339		339 – 518		519 - 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	59	115.15	62	120.65	70	133.54	48	105.38	7.17
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	60	123.73	62	127.21	70	120.96	48	107.12	3.00
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	59	115.48	61	113.51	68	127.09	47	113.84	2.07
18. Use a writing process supported by 21st century skills and technology tools.	60	115.53	60	123.87	68	130.26	48	98.83	6.99
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	59	110.66	60	128.33	68	127.12	48	101.18	6.75
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	59	110.46	60	135.11	69	124.27	47	96.43	10.69***

School Size as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	School Size								
	0 – 252		253 - 339		339 – 518		519 - 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	59	114.97	60	133.44	69	121.17	46	94.45	9.43***
22. Use technology resources to develop rubrics (by either teachers and/or students).	60	107.02	59	126.06	69	129.01	47	105.73	6.02
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	60	114.95	60	133.86	69	116.70	48	108.80	4.61
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	60	111.98	60	131.51	69	120.46	47	107.34	4.62
25. Use instructional practices that develop 21st century information and communication skills in students.	58	100.47	61	128.25	68	122.68	48	119.53	6.17
26. Use instructional practices that make content relevant to students' lives.	58	114.28	62	119.79	69	131.05	48	106.35	4.92
27. Use instructional practices that create opportunities for students to plan and manage projects.	59	114.04	61	118.23	70	124.09	48	121.14	0.78

School Size as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	School Size								
	0 – 252		253 - 339		339 – 518		519 - 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	59	101.97	62	114.19	70	142.03	48	117.55	12.92***

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APPENDIX I

School SES as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	72	120.10	58	121.70	55	101.60	55	140.48	9.85***
2. Utilize multiple teaching and learning approaches that are socially equitable.	71	116.52	58	123.69	54	105.04	56	135.02	6.30
3. Utilize multiple teaching and learning approaches that are culturally responsive.	71	111.11	57	124.46	55	107.50	54	135.32	6.44
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	71	117.94	57	104.88	55	113.76	56	144.12	13.27***
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	71	118.18	58	112.57	55	113.24	56	138.79	7.20
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	72	114.93	58	117.41	55	111.65	56	141.71	8.25***

School SES as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	72	108.18	56	117.95	55	118.73	56	138.50	9.23***
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	72	101.32	56	120.93	55	120.88	56	142.22	14.00***
9. Incorporate 21st century technology tools that challenge all students.	72	119.74	56	99.12	54	113.89	56	144.98	14.25***
10. Incorporate 21st century learning skills that challenge all students.	72	110.92	56	112.92	55	114.17	55	142.76	9.40***
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	72	113.28	56	113.63	55	106.84	55	146.27	12.12***
12. Design and use instructional practices that are developmentally appropriate.	71	112.89	58	119.47	55	118.68	56	133.00	3.67
13. Design and use instructional practices that support students' natural inquisitiveness.	70	110.76	58	123.09	55	106.02	56	142.09	10.91***
14. Differentiate instruction to meet the needs of all learners.	72	108.89	58	118.38	55	127.44	56	132.96	6.00

School SES as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	71	108.36	57	116.79	55	116.84	56	141.13	10.46***
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	72	106.77	57	107.68	55	133.89	56	138.05	12.48***
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	70	110.62	55	118.23	55	115.42	55	129.75	3.03
18. Use a writing process supported by 21st century skills and technology tools.	72	100.26	53	112.54	55	120.99	56	145.15	15.26***
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	72	98.77	55	108.39	54	123.40	54	148.03	19.20***
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	71	99.54	55	105.88	54	125.21	55	146.87	19.01***

School SES as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	70	95.84	55	111.80	53	123.04	56	144.93	18.02***
22. Use technology resources to develop rubrics (by either teachers and/or students).	71	101.76	54	111.91	54	114.64	56	147.71	16.07***
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	72	99.07	55	106.70	54	128.83	56	147.22	20.41***
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	71	101.77	56	113.13	54	130.36	55	133.92	10.35***
25. Use instructional practices that develop 21st century information and communication skills in students.	71	110.89	56	108.76	53	111.50	55	142.85	10.65***
26. Use instructional practices that make content relevant to students' lives.	71	103.08	57	123.37	54	116.52	55	137.46	9.87***
27. Use instructional practices that create opportunities for students to plan and manage projects.	72	116.69	57	106.81	53	113.96	56	141.28	8.55***

School SES as Related to Teacher Perceived Knowledge of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	71	106.63	58	122.30	54	109.93	56	144.28	11.97***

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APPENDIX J

Hours of Professional Development as Related to Teacher Implementation of 21st Century Instructional Practices

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	43	91.81	41	73.33	53	78.34	27	89.76	5.57
2. Utilize multiple teaching and learning approaches that are socially equitable.	42	80.92	41	77.29	53	82.37	27	90.11	1.53
3. Utilize multiple teaching and learning approaches that are culturally responsive.	44	83.01	41	78.35	53	81.94	27	92.11	1.55
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	44	75.94	41	81.12	53	89.62	27	84.35	3.65
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	44	84.77	41	71.04	53	83.91	27	96.50	9.97***
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	44	88.24	40	83.56	53	71.44	27	93.26	7.91***

Hours of Professional Development as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	42	76.56	41	79.39	52	80.04	27	95.20	5.90
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	43	84.97	40	76.39	52	79.22	27	87.94	2.03
9. Incorporate 21st century technology tools that challenge all students.	43	76.14	41	64.60	51	92.30	27	95.30	12.31***
10. Incorporate 21st century learning skills that challenge all students.	41	82.85	40	62.82	53	86.92	27	93.50	10.48***
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	42	74.67	39	73.78	52	87.55	27	85.70	3.35
12. Design and use instructional practices that are developmentally appropriate.	44	89.14	41	80.30	53	81.94	27	79.17	1.96
13. Design and use instructional practices that support students' natural inquisitiveness.	44	79.77	41	77.50	53	86.70	26	86.44	1.42
14. Differentiate instruction to meet the needs of all learners.	44	78.94	41	83.29	53	79.39	26	93.62	3.40

Hours of Professional Development as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	44	76.50	39	90.77	52	74.71	27	89.33	5.96
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	44	86.39	41	64.24	52	87.59	27	94.09	10.71***
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	43	80.07	39	81.15	51	78.79	26	80.52	0.08
18. Use a writing process supported by 21st century skills and technology tools.	41	68.79	40	71.59	50	90.62	27	86.89	7.73
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	42	67.76	41	68.55	51	90.03	27	103.44	15.34***
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	41	69.83	41	69.44	51	89.89	27	95.76	10.20***

Hours of Professional Development as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

Instructional Practice	Hours of Professional Development: 0 – 3 n	0 – 3 Mean Rank	4 – 9 n	4 – 9 Mean Rank	10 – 20 n	10 – 20 Mean Rank	21+ n	21+ Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	42	71.54	41	68.45	51	97.51	26	80.62	12.12***
22. Use technology resources to develop rubrics (by either teachers and/or students).	41	65.99	41	74.23	51	91.25	27	91.76	9.60***
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	42	73.71	41	81.33	51	85.03	27	84.22	1.66
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	44	86.14	40	62.72	51	86.25	26	90.13	9.56***
25. Use instructional practices that develop 21st century information and communication skills in students.	40	61.75	38	76.82	52	87.83	27	90.63	10.65***
26. Use instructional practices that make content relevant to students' lives.	44	90.99	39	75.06	51	78.38	27	78.24	3.81
27. Use instructional practices that create opportunities for students to plan and manage projects.	44	71.76	40	83.22	51	83.66	27	90.74	3.27

Hours of Professional Development as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Hours of Professional Development								
	0 – 3		4 – 9		10 – 20		21+		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	44	79.26	39	91.49	52	78.93	27	75.67	2.66

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APPENDIX K

Age as Related to Teacher Implementation of 21st Century Instructional Practices

	Years of Age								
	0 – 38		39 - 48		49 – 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	57	102.14	48	114.17	59	107.97	51	108.78	1.32
2. Utilize multiple teaching and learning approaches that are socially equitable.	56	102.97	47	106.66	59	111.33	50	104.60	0.76
3. Utilize multiple teaching and learning approaches that are culturally responsive.	57	99.25	48	103.04	59	112.97	48	110.62	2.02
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	58	105.55	48	111.66	59	110.94	51	106.06	0.72
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	58	106.53	48	111.73	59	112.84	51	102.68	2.09
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	58	108.37	48	99.49	59	117.15	51	107.12	3.45

Age as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

Instructional Practice	Years of Age: 0 – 38 n	0 – 38 Mean Rank	39 - 48 n	39 - 48 Mean Rank	49 – 55 n	49 – 55 Mean Rank	56 - 69 n	56 - 69 Mean Rank	X(3)
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	56	103.81	48	107.50	58	110.03	51	106.59	0.64
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	57	92.30	48	114.16	58	118.92	51	105.24	9.22***
9. Incorporate 21st century technology tools that challenge all students.	57	93.89	47	106.34	57	110.54	51	116.23	4.44
10. Incorporate 21st century learning skills that challenge all students.	58	105.06	48	103.22	57	108.25	51	113.47	0.95
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	56	87.26	48	123.11	55	107.66	50	104.55	10.21***
12. Design and use instructional practices that are developmentally appropriate.	58	107.38	48	109.84	59	109.97	51	106.80	0.25
13. Design and use instructional practices that support students' natural inquisitiveness.	56	109.72	48	101.15	59	104.52	51	114.49	1.65
14. Differentiate instruction to meet the needs of all learners.	58	113.33	48	112.44	59	106.07	50	99.84	3.02

Age as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Years of Age								
	0 – 38		39 - 48		49 – 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	58	107.21	47	122.52	58	104.14	51	97.81	6.71
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	58	103.24	48	117.06	58	106.13	51	107.01	1.80
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	56	100.99	46	93.45	58	114.06	50	111.71	4.91
18. Use a writing process supported by 21st century skills and technology tools.	54	98.23	47	102.05	55	106.99	50	106.71	0.86
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	54	99.41	48	107.33	57	112.68	51	102.96	1.42
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	53	102.82	48	103.30	57	112.68	51	100.28	1.45

Age as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Years of Age								
	0 – 38		39 - 48		49 – 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	53	104.08	48	100.33	56	107.31	50	103.72	0.38
22. Use technology resources to develop rubrics (by either teachers and/or students).	54	107.93	48	105.14	56	111.25	51	94.91	2.25
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	56	117.14	48	115.15	58	100.81	51	95.24	5.23
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	55	98.70	48	110.48	58	108.72	50	106.57	1.36
25. Use instructional practices that develop 21st century information and communication skills in students.	55	106.27	47	102.09	57	100.39	50	111.59	1.17
26. Use instructional practices that make content relevant to students' lives.	56	111.67	48	100.34	59	102.14	50	113.89	2.62
27. Use instructional practices that create opportunities for students to plan and manage projects.	56	114.77	48	100.11	58	104.78	51	107.47	1.65

Age as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Years of Age								
	0 – 38		39 - 48		49 – 55		56 - 69		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	57	111.86	48	107.94	59	98.50	50	112.73	2.08

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APPENDIX L

Years of Experience as Related to Teacher Implementation of 21st Century Instructional Practices

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	62	112.81	58	117.04	58	115.84	56	124.50	1.25
2. Utilize multiple teaching and learning approaches that are socially equitable.	61	109.08	57	124.20	57	108.82	56	122.49	3.41
3. Utilize multiple teaching and learning approaches that are culturally responsive.	62	112.48	57	114.13	58	105.75	54	133.03	5.66
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	63	113.62	58	125.76	58	119.97	56	112.86	2.40
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	63	114.40	58	125.18	58	116.58	56	116.09	2.02
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	63	114.50	58	120.15	57	117.48	56	118.15	0.34

Years of Experience as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	62	116.17	57	120.54	57	111.61	56	117.73	1.14
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	63	101.83	57	131.48	56	113.89	56	120.36	9.39***
9. Incorporate 21st century technology tools that challenge all students.	63	105.34	56	118.03	57	119.69	55	122.32	2.60
10. Incorporate 21st century learning skills that challenge all students.	62	115.56	57	118.08	57	111.04	55	119.49	0.62
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	61	107.34	57	117.90	57	118.98	53	114.25	1.26
12. Design and use instructional practices that are developmentally appropriate.	63	116.60	58	120.16	58	124.10	56	111.03	2.44
13. Design and use instructional practices that support students' natural inquisitiveness.	61	118.34	58	111.15	58	118.97	55	117.49	0.62
14. Differentiate instruction to meet the needs of all learners.	63	124.67	58	126.53	57	114.26	56	103.38	8.32***

Years of Experience as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	63	124.02	57	123.06	56	110.12	56	107.73	4.44
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	63	108.94	58	127.72	57	118.19	56	115.85	2.99
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	62	102.26	55	118.84	55	120.60	56	117.80	3.85
18. Use a writing process supported by 21st century skills and technology tools.	59	103.12	57	126.58	55	98.73	54	124.00	8.83***
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	60	106.34	57	121.92	56	112.43	56	119.80	2.17
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	59	112.48	57	118.46	56	107.77	56	119.80	1.24

Years of Experience as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	59	115.40	57	117.97	55	108.08	55	112.25	0.77
22. Use technology resources to develop rubrics (by either teachers and/or students).	60	113.31	57	119.23	55	111.55	55	111.79	0.53
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	61	124.80	57	128.71	57	104.21	56	105.47	6.89
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	60	108.21	58	119.23	57	114.96	55	120.08	1.36
25. Use instructional practices that develop 21st century information and communication skills in students.	60	104.36	57	118.81	54	112.61	55	118.85	2.13
26. Use instructional practices that make content relevant to students' lives.	61	111.75	58	121.02	56	111.88	56	119.55	1.31
27. Use instructional practices that create opportunities for students to plan and manage projects.	61	120.27	58	113.03	56	114.03	56	113.96	1.30

Years of Experience as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Years of Experience								
	0 – 8		9 - 21		22 - 29		30 - 41		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	63	109.61	58	127.05	58	110.84	56	125.48	1.25

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APPENDIX M

School Size as Related to Teacher Implementation of 21st Century Instructional Practices

	School Size								
	0 – 252		253 - 339		339 – 518		519 - 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	59	103.58	63	118.27	69	128.51	47	127.89	6.80
2. Utilize multiple teaching and learning approaches that are socially equitable.	58	96.97	61	118.20	69	131.67	47	123.64	10.97***
3. Utilize multiple teaching and learning approaches that are culturally responsive.	58	97.58	62	124.23	67	126.99	48	122.07	7.89***
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	59	108.82	63	125.57	69	117.83	48	129.55	5.08
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	59	108.79	63	126.37	69	118.94	48	126.94	5.82
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	58	112.91	63	121.94	69	125.67	48	115.40	2.03

School Size as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

Instructional Practice	School Size: 0 – 252 n	0 – 252 Mean Rank	253 - 339 n	253 - 339 Mean Rank	339 – 518 n	339 – 518 Mean Rank	519 - 627 n	519 - 627 Mean Rank	X(3)
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	59	113.31	61	119.96	68	119.98	48	120.94	0.99
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	58	104.78	61	124.57	69	120.79	48	124.07	4.95
9. Incorporate 21st century technology tools that challenge all students.	59	95.14	59	115.55	69	119.43	48	147.04	17.42***
10. Incorporate 21st century learning skills that challenge all students.	59	92.97	61	131.90	67	120.55	48	127.54	13.74***
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	59	102.91	59	116.76	66	122.98	48	123.97	4.04
12. Design and use instructional practices that are developmentally appropriate.	59	110.42	63	119.23	69	127.95	48	121.36	4.40
13. Design and use instructional practices that support students' natural inquisitiveness.	58	92.54	63	119.77	69	133.97	46	126.28	15.33***
14. Differentiate instruction to meet the needs of all learners.	58	93.83	63	128.06	69	127.64	48	127.58	20.89***

School Size as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	School Size								
	0 – 252		253 - 339		339 – 518		519 - 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	58	98.57	62	122.24	69	132.99	47	116.89	13.13***
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	59	102.22	62	128.41	69	125.46	48	120.67	6.67
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	57	104.86	61	122.96	68	117.79	46	120.46	3.19
18. Use a writing process supported by 21st century skills and technology tools.	58	102.67	59	118.14	65	130.59	47	104.70	7.56
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	58	91.02	60	119.94	67	137.51	48	116.08	15.96***
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	57	90.28	60	122.45	68	136.77	47	111.37	16.85***

School Size as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

Instructional Practice	School Size: 0 – 252 n	0 – 252 Mean Rank	253 - 339 n	253 - 339 Mean Rank	339 – 518 n	339 – 518 Mean Rank	519 - 627 n	519 - 627 Mean Rank	X(3)
21. Allow student input in the development of rubrics used to assess their work.	58	102.13	59	123.61	67	134.95	46	93.63	14.90***
22. Use technology resources to develop rubrics (by either teachers and/or students).	58	94.81	58	119.60	68	132.74	47	113.48	10.84***
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	59	99.19	59	130.37	69	119.52	48	123.73	7.52
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	59	109.42	60	130.28	68	117.00	47	112.05	3.83
25. Use instructional practices that develop 21st century information and communication skills in students.	56	97.21	60	129.49	67	118.66	47	114.93	7.79
26. Use instructional practices that make content relevant to students' lives.	56	112.62	62	116.15	69	124.76	48	116.94	1.51
27. Use instructional practices that create opportunities for students to plan and manage projects.	57	108.56	61	116.74	69	123.86	48	122.39	1.92

School Size as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	School Size								
	0 – 252		253 - 339		339 – 518		519 - 627		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	57	99.04	62	110.30	69	134.48	48	129.24	11.55***

***p < .000

APPENDIX N

School SES as Related to Teacher Implementation of 21st Century Instructional Practices

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. Utilize multiple teaching and learning approaches that are developmentally responsive.	71	115.58	58	127.59	55	106.53	54	129.19	5.45
2. Utilize multiple teaching and learning approaches that are socially equitable.	71	117.74	56	122.96	54	105.56	54	125.65	3.53
3. Utilize multiple teaching and learning approaches that are culturally responsive.	72	106.74	57	128.68	54	102.96	52	137.49	11.45***
4. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop respect for individual differences.	72	123.03	58	111.54	55	113.65	54	131.50	5.13
5. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop positive social/personal skills.	72	119.55	58	118.68	55	119.94	54	122.08	0.17

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
6. Use modeling, practice, and reinforcement to create a classroom climate where students experience and develop ethical behavior.	71	107.77	58	129.34	55	121.73	54	122.08	5.14
7. Use a standards-based lesson and unit format aligned with the WV CSOs.	71	110.30	56	121.64	55	119.98	54	124.51	3.39
8. Use a standards-based lesson and unit format that identifies goals and focuses on essential questions and core concepts.	71	104.85	56	121.97	55	118.86	54	132.47	8.07***
9. Incorporate 21st century technology tools that challenge all students.	72	119.12	56	122.86	53	110.00	54	119.31	1.19
10. Incorporate 21st century learning skills that challenge all students.	71	108.72	56	120.46	55	118.16	53	127.66	2.93
11. Incorporate 21st century learning skills and technology tools that accommodate students with special needs.	71	116.23	54	115.66	55	98.63	52	138.65	9.56***
12. Design and use instructional practices that are developmentally appropriate.	72	121.60	58	122.68	55	115.48	54	119.58	0.77
13. Design and use instructional practices that support students' natural inquisitiveness.	70	116.57	58	128.97	54	98.93	54	129.32	8.82***

School SES as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
14. Differentiate instruction to meet the needs of all learners.	72	118.83	58	125.82	54	111.12	54	121.98	2.67
15. Use grouping strategies (cooperative learning, flexible whole, small and/or individual grouping) to promote higher levels of student engagement.	70	109.31	57	123.30	55	113.01	54	130.94	5.88
16. Use research-based instructional strategies (systematic explicit instruction, scaffolding instruction, inquiry, similarities and differences, summarizing/note taking, and graphic organizers).	72	110.96	57	114.50	55	125.70	54	129.85	3.88
17. Use standards-based lessons and units that integrate the understanding of concepts across disciplines.	69	108.08	56	118.78	54	118.82	53	122.69	2.16
18. Use a writing process supported by 21st century skills and technology tools.	70	98.34	54	118.31	53	112.28	52	136.76	11.28***
19. Use a variety of rubrics to guide student work (e.g., products, performances, demonstrations).	71	106.09	56	117.03	53	108.55	53	140.04	9.49***

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
20. Use a variety of rubrics to assess student work (e.g., products, performances, demonstrations).	70	107.54	56	114.01	53	109.14	53	138.32	8.15***
21. Allow student input in the development of rubrics used to assess their work.	69	94.37	56	114.93	52	119.41	53	139.77	15.21***
22. Use technology resources to develop rubrics (by either teachers and/or students).	70	105.21	54	108.40	53	116.95	54	136.65	8.07***
23. Use portfolios, work stations/centers, self-assessments, rubrics, drawings and journals to develop self-directed learners.	72	108.50	55	113.15	54	109.34	54	144.27	11.67
24. Establish pacing, interventions, accelerations, remediation, and instructional decisions from data based on a variety of on-going assessments.	71	99.84	57	116.39	54	125.96	52	134.04	10.23***
25. Use instructional practices that develop 21st century information and communication skills in students.	68	107.84	56	108.03	53	107.44	53	141.28	11.45***
26. Use instructional practices that make content relevant to students' lives.	70	109.29	58	119.56	54	115.65	53	130.20	4.09

School SES as Related to Teacher Implementation of 21st Century Instructional Practices *(continued)*

	Percentage of Students Receiving Free and Reduced Lunch								
	0 – 42		43 - 56		57 – 63		64 - 89		
Instructional Practice	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
27. Use instructional practices that create opportunities for students to plan and manage projects.	71	118.71	57	108.33	53	107.30	54	137.77	7.39
28. Use instructional practices that create opportunities for student interaction with peers, with other teachers, or with knowledgeable adults in authentic experiences.	70	114.18	58	122.34	54	105.04	54	133.44	5.67

***p < .000

APPENDIX O

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants

Time	Resources	Training	Other
Availability of resources and/or money Time management	Lack of funding	I must be very creative in order to implement some of the practices due to Policy 2525 and Creative Curriculum for Prekindergarten classrooms.	Digital camera has been used by all.
Time to learn at this time, exceeds time to do it traditional or other ways. Again time due to lack of direct application to music.	Availability of resources and/or money Time management	I have not had much 21st cent. training but I had INSTEP and what I have seen of 21st cent., it is the same thing with different names. My fields are developing CSO's but we do not have CSO's that fit our field. I also work mainly 1 on 1.	Children do not have keyboarding
It is overwhelming! We had too many changes in a short time. I do not feel I am doing well with this before it changes.	As a coach I do not have my own classroom. I am aware of the 21st century practices and encourage and support teacher use.	Inadequate training; training that is impractical and not grade level specific (elementary, middle, and secondary curriculums are totally different).	I do not think children will learn better with Total Investigations in Math. I think a combination is the best solution.

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
21st century skills are too time consuming to teach during our school year already packed with CSO's.	More funding for technology is needed. Would be more willing to implement if the equipment didn't have to be "checked out" as needed.	I look forward to more 21st century training this summer.	K students cannot help a lot with #21 above. (Allow student input in the development of rubrics used to assess their work.)
Technology resources Takes a lot of time – have too much to cover at once.	Implementation of 21st century instructional practices is challenging because of limited access to the technology required to do so (whiteboards, student response transponders etc.).	Not enough training	Personality conflicts
Time Time Time. When we do we have time? We keep adding to the curriculum but we are not taking much out.	Not enough computers, etc.	Difficulty with technology, also math investigations	Counselors are taught to utilize these methods when doing group guidance activities and class sessions so this is all old hat.
Difficulty with technology, also math investigations	Technology resources Takes a lot of time – have too much to cover at once.	More technology training which is differentiated to the needs of teachers is required.	Teachers are no longer allowed to discipline unruly students (who disrupt teaching/learning) in any way that works. If I am expected to teach what parents SHOULD be teaching, I should be allowed to discipline as a parent!

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
I am very limited by time restraints and the access to the technology that we have in our Building. The use of technology by students in their Artwork is not a major priority in the Grade school curriculum.	Most restriction in ANY educational initiatives is $$$. We do not have the resources for wide implementation.	Training in operating equipment	
I am doing more with it when I do Inclusion. With my pull out program there is no time because I am constantly engaged with the students. No time for computer with the Wilson Reading program.	Old, outdated hardware and wiring. We have "maxed" out power source to school so more newer computers can not be added. Replacement is 3 old out:2 new in. Some have dialup/broadband/T1/DSL at home wide variety so not much chance to practice to become familiar.	Training in operating equipment	
Time to plan & implement all the materials to meet the needs in my classroom & resources.	In the past working equipment and tools have been a problem at Sherman Elementary, however, I am blessed w/an abundant amount of resources to use.	Training in operating equipment	

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
I simply need to spend more time, hands-on, becoming comfortable with the technology that I have available to use.	I am very limited by time restraints and the access to the technology that we have in our Building. The use of technology by students in their Artwork is not a major priority in the Grade school curriculum.	The one barrier is that the training is given; however, no practicle "hands on" learning takes place. Or . . . it is too much, too fast.	
Lack of time available.	Teachers need equipment such as Intelliboards and data cameras after having training.	I simply need to spend more time, hands-on, becoming comfortable with the technology that I have available to use.	
#1 Planning time, time allowed to collaborate, too many new skills/strategies at once—can't master one before another one comes along.	Major barrier – need technology in the classroom.	Looking forward to training this summer in regards to Sp. Ed. and 21st century – then I will have lots of questions.	
Time – also, less "complete" coverage of CSO's that are addressed – due to less and less time for doing so.	There is no money for technology.	Hired after the year started and didn't receive any new training.	

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
Time-Time-Time (Time to plan!!) Time to collaborate!	The only problem I faced this year was our building did not have enough computers for me to put a center in my room for students to use during center time. But we did utilize the new computer lab twice a week.	We need to know exactly what is covered under 21st century to be able to respond to questions when asked.	
Time to research and develop standards based units.	More equipment – Smart boards in all classrooms.	What are they? No one really says "what." Technology seems to be the pat answer and technology is rarely dependable.	
Time	Lack of materials	21st century skills is beginning to sound like a buzz word. No one seems to have a true definition.	
Time constraints for planning and implementation. Relaying desire to the students and parents.	Multipurpose room, no internet connections, having schedules change every 9 weeks, having students only 1 or 2 times a week (M-Th) (T-Fri) (W) No. of students. Interruptions for use of multipurpose room.	I haven't been trained—so, I don't know how to use the instructional practices. Sorry.	

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
Computers that are working and time to research the different sites.	Computers that are working and time to research the different sites.	I do not have a SmartBoard like other teachers. I was a new position, and I have to go through over 2 nine weeks without computers in my room. Teachers need more technology development. Development on school day time. We shouldn't have to give up 3 weeks in summer.	
We have been limited with time because of the development of the new reading series.	Lack of available computers and other technology.	This is my first year teaching Trainable Mentally Impaired students. I find it, or my students find it a challenge to learn the numbers 1-5!	

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
The new reading series has encompassed 98% of my time, leaving little space for other things.	Computers are always questionable. It was March of this 2007-08 school year before we could get on-line for Odyssey and Scotts Foresman Math and Reading. Currently I have one of my 4 computers down. It is 4-30. It has been broken for months yet the parts are yet to arrive. Repair in the computer lab is very slow. There is little time at school to search out sites. IE, We have United Streaming but w/o a projector unit 23 students crowd around a single computer. For a 2-3 minute video it is too much trouble and time to schedule (if available) the library for large screen. It takes perhaps 10-15 minutes to find an appropriate video clip.	Time to plan, to research, to assess authentically is a major obstacle. Though we have a computer lab, we lack the technology tools (and quality teacher training) to use technology productively.	

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
The time spent on preparing for instruction from the new reading series has limited certain activities.	I am a music specialist and have 1 computer in my room. I see students once a week.	Not enough training on 21st century practices/expectations. I am not a regular classroom teacher. I am a preschool special needs teacher (itinerant). Some of the items don't apply because I don't have a regular classroom schedule. All the preschools I visit are fully inclusive, however, and I do some small and large group activities with all children.	
Time constraints due to RTI & new reading series.	New reading series Working technology	Lack of general and specific information. FYI – As a classroom interventionist, many parts of the survey were difficulty to address or were NA.	
New reading series Working technology	Not being provided technology tools that are given to regular ed teachers. Training would also be limited due to our teaching field.	I hate the program. We really didn't have sufficient training (1 year 5 or 6 times training) to do this program.	

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
Reading series Working technology	Reading series Working technology	Need more training for educators in 21st century skills. It seems new ideas are always implemented with less than adequate training and resources.	
Time and relationship to the curriculum with the overwhelming demands on classroom teacher.	Not enough technology equipment for students/classrooms!	I need more help in knowing what/how to teach these skills. I'm told to teach them but am not given info/materials to help.	
Time for the increasing demands we have as teachers.	Not getting the new technology for our classrooms.	Self-driven; seek out prof. dev. on my own – If my classroom's techniques are in line w/ 21st century skills it is a coincidence. I currently received NBCT status.	
Time! I know we must integrate, but sometimes I don't have time to plan how to fit it all together.	The lack of appropriate technology limits my ability to allow all students access to computers to enhance instruction. We need a computer for all students.	Had no internet access until week of 4-7 in classroom. Lack of staff development for new teachers.	
Time limits/new reading series has absorbed much of our time and activities.	Insufficient ratio of computers to students.		

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
Time in relationship to the demands of the ever-increasing curriculum.	I do not have a SmartBoard like other teachers. I was a new position, and I have to go through over 2 nine weeks without computers in my room. Teachers need more technology development. Development on school day time. We shouldn't have to give up 3 weeks in summer.		
Time restrictions during a given day is a challenge. Updated computers and software is a barrier.	Time restrictions during a given day is a challenge. Updated computers and software is a barrier.		
Time to plan, to research, to assess authentically is a major obstacle. Though we have a computer lab, we lack the technology tools (and quality teacher training) to use technology productively.	Time to plan, to research, to assess authentically is a major obstacle. Though we have a computer lab, we lack the technology tools (and quality teacher training) to use technology productively.		

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
I've visited the site & like many of the activities. However – I'm stuck to a curr. map /w/ no time for these activities.	Need more training for educators in 21st century skills. It seems new ideas are always implemented with less than adequate training and resources.		
Time!! Too much of my time is spent running off materials the county could provide but chooses not to buy (ex. Math Investigations).	There is a lack of time for planning to implement 21st cent. instructional practices. Also, there are limited technology resources available for use.		
County adopted textbooks restrict my teaching, limit my ability to make learning flow across the curriculum – limited to teaching only reading text/math text – difficulty to coordinate skills – integrate understanding of skills – allow children to apply skills – develop ownership – too much testing/worksheets	Old computer Time – 40 minute periods (last year was 1 hr. per grade level (class) a week) Over 500 students a week to plan for		

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
There is a lack of time for planning to implement 21st cent. instructional practices. Also, there are limited technology resources available for use.	Major factor has been equipment age and availability. Equipment is often not functioning and inadequate for a classroom of 22. Instruction time is on rebooting, missing headphones, missing operating systems.		
Elementary teachers spend many hours beyond the work hours daily. When is there time for this? Teacher time to study, reflect, plan, share. Teacher time is filled with "necessary" duties – parent notes, student issues, gathering materials for the multiple subjects covered by an elementary teacher daily, make-up work, reports, etc.	Technology that works, is updated! We are trying to use 21st century teaching w/ antiquated equipment, which is highly frustrating.		

Barriers or challenges to implementation of 21st century instructional practices, as reported by participants (continued)

Time	Resources	Training	Other
Old computer Time – 40 minute periods (last year was 1 hr. per grade level (class) a week) Over 500 students a week to plan for	Had no internet access until week of 4-7 in classroom. Lack of staff development for new teachers.		
I can't find time for everything else after tiered reading is finished.			

APPENDIX P

Hours of Professional Development as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

		Hours of Professional Development								
		0 – 3		4 – 9		10 – 20		21+		
Influences		n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. My building principal	*(k)*	44	70.62	40	83.52	53	87.96	27	89.61	4.52
	(i)	42	74.17	39	74.71	52	85.90	27	88.31	3.16
2. Peers/colleagues	*(k)*	44	76.69	40	77.40	53	89.21	27	86.35	2.58
	(i)	42	76.79	38	68.29	52	84.10	27	93.59	5.95
3. School or district-sponsored professional development	*(k)*	44	61.91	41	78.73	52	93.50	27	100.59	16.49***
	(i)	42	65.74	39	74.99	52	86.44	27	99.98	11.42***
4. State-sponsored professional development (through the WVDE or CPD)	*(k)*	44	55.88	38	82.74	51	89.68	27	100.15	20.43***
	(i)	42	54.63	38	82.58	50	85.27	27	100.26	20.39***
5. Personal reading/research	*(k)*	44	66.88	40	83.04	52	86.50	27	96.44	8.08***
	(i)	42	67.55	40	78.65	51	85.54	27	93.87	6.68

***p<.000
(k) = knowledge
(i) = implementation

APPENDIX Q

Age as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

		Years of Age								
		0 – 38		39 – 48		49 – 55		56 – 69		
Influences		n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. My building principal	*(k)*	59	110.59	48	105.58	60	115.21	52	107.39	0.82
	(i)	56	109.68	46	106.33	59	112.70	51	95.99	2.49
2. Peers/colleagues	*(k)*	59	110.81	48	98.33	60	114.93	52	114.15	2.46
	(i)	56	111.06	46	99.90	59	105.52	50	106.51	0.94
3. School or district-sponsored professional development	*(k)*	59	106.23	47	113.69	60	107.37	52	111.88	0.56
	(i)	56	103.77	46	109.55	59	106.25	51	107.04	0.25
4. State-sponsored professional development (through the WVDE or CPD)	*(k)*	56	104.89	48	108.32	59	111.36	51	105.12	0.44
	(i)	53	100.46	46	104.20	58	110.67	51	101.95	1.02
5. Personal reading/research	*(k)*	58	118.26	48	114.80	60	95.83	51	108.50	4.66
	(i)	55	115.80	46	115.07	59	93.26	51	101.99	5.64

(k) = knowledge
(i) = implementation

APPENDIX R

Years of Experience as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

		Years of Experience								
		0 – 8		9 - 21		22 - 29		30 - 41		
Influences		n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. My building principal	*(k)*	65	116.85	58	123.48	57	110.62	56	123.28	1.54
	(i)	61	113.58	57	119.88	56	107.30	56	121.33	1.74
2. Peers/colleagues	*(k)*	65	116.51	58	113.58	58	121.48	56	124.94	1.04
	(i)	61	117.79	57	108.92	56	116.04	55	117.15	0.73
3. School or district-sponsored professional development	*(k)*	65	120.51	57	126.63	59	108.65	56	120.38	2.30
	(i)	61	113.16	57	121.54	56	105.50	56	121.91	2.56
4. State-sponsored professional development (through the WVDE or CPD)	*(k)*	62	115.10	57	122.01	57	113.59	56	115.41	0.57
	(i)	58	109.53	56	116.42	56	113.88	56	114.32	0.36
5. Personal reading/research	*(k)*	64	123.23	58	123.13	58	111.70	56	115.34	1.37
	(i)	60	123.17	57	117.37	57	113.34	56	107.58	1.83

(k) = knowledge
(i) = implementation

APPENDIX S

School Size as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

		School Size								
		0 – 252		253 - 339		340 - 518		519 - 627		
Influences		n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. My building principal	*(k)*	60	120.90	62	128.70	70	99.39	48	140.19	12.49***
	(i)	57	110.77	62	130.59	67	99.57	48	133.61	11.37***
2. Peers/colleagues	*(k)*	60	116.07	63	121.57	70	114.66	48	135.67	3.32
	(i)	56	108.30	62	118.98	67	115.27	48	127.01	2.30
3. School or district-sponsored professional development	*(k)*	61	114.59	63	122.70	69	128.91	48	115.54	1.90
	(i)	57	107.61	62	122.63	67	122.82	48	115.19	2.25
4. State-sponsored professional development (through the WVDE or CPD)	*(k)*	58	112.38	60	115.81	70	121.12	47	123.09	0.93
	(i)	56	108.08	59	116.02	67	115.76	47	120.88	1.08
5. Personal reading/research	*(k)*	60	110.35	62	115.10	70	130.45	47	123.21	3.44
	(i)	58	100.95	61	113.93	67	128.66	47	124.17	6.43

***p<.000
(k) = knowledge
(i) = implementation

APPENDIX T

School SES as Related to Influences on Teacher Knowledge and Implementation of 21st Century Instructional Practices

		Percentage of Students Receiving Free and Reduced Lunch								
		0 – 42		43 - 56		57 - 63		64 - 89		
Influences		n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	X(3)
1. My building principal	*(k)*	71	119.40	57	114.29	56	113.56	56	135.15	3.94
	(i)	71	110.31	55	118.15	55	114.34	53	129.74	2.93
2. Peers/colleagues	*(k)*	71	112.36	58	115.17	56	121.69	56	137.30	5.04
	(i)	70	109.99	55	110.00	55	118.35	53	132.13	4.46
3. School or district-sponsored professional development	*(k)*	72	106.70	57	127.54	56	112.43	56	141.30	9.98***
	(i)	71	103.98	55	118.21	55	112.79	53	139.76	9.75***
4. State-sponsored professional development (through the WVDE or CPD)	*(k)*	70	114.76	58	114.22	53	108.31	54	135.78	5.48
	(i)	70	106.78	55	111.48	52	108.21	52	136.58	7.86***
5. Personal reading/research	*(k)*	71	119.43	58	114.94	55	103.13	55	142.95	10.43***
	(i)	71	117.80	55	114.96	54	97.00	53	128.42	10.99***

***p<.000
(k) = knowledge
(i) = implementation

CURRICULUM VITAE

EDUCATION

Marshall University
Doctorate in Curriculum and Instruction, 2009
Marshall University
Master of Arts in Leadership Studies, 2005
Marshall University
Master of Arts in Secondary Education, 1998
Glenville State College
Bachelor of Arts in Education (English/Social Studies), 1994

CERTIFICATION

State of West Virginia, Secondary Education, 5-12, Permanent
Specializations: English/Language Arts and Social Studies
State of West Virginia, Principal, PK-Adult, Original

PROFESSIONAL EXPERIENCE

1998 – 2001	Teacher, Clay County High School, Clay, West Virginia
2001 – 2003	Visiting Instructor of Reading, Glenville State College, Glenville, West Virginia
2003 – 2005	Teacher, Clay County High School, Clay, West Virginia
2005 – 2007	Principal, Lizemores Elementary School, Lizemores, West Virginia
2007 – Present	Assistant Principal, Clay County High School, Clay, West Virginia