THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN SECONDARY SCHOOLS

A Record of Study

by

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ABSTRACT

The purpose of this study was to identify the level of teachers' knowledge and ICT integration according to the International Society for Technology in Education (ISTE) Standards for Teachers among three urban, secondary schools in Central Texas. This study also investigated why, how and whether teachers in different secondary schools may integrate new literacies (or ICT) differently and whether ICT related professional development activities and procedures might differentially contribute to the integration of ICT into classroom instruction across the three schools.

The quantitative findings from the survey instrument suggested that the urban secondary teachers described themselves as having an adequate amount of knowledge of the ISTE Standards for Teachers in Category 1, 2, and 3. The mean scores for the standards in Category 1, 2, and 3 N=12 had a mean of M=3.46.

Data collected during teacher observations were compared with the teacher self-report survey responses as a means to determine the degree of relationship between knowledge, professional development opportunity, and degree of implementation of ICT related instruction. The data indicated that in comparison to the information on the teacher survey, students did not participate in the literacies of the Internet as much as the survey indicated. The results from this study showed that some schools have fallen behind the expectation of the twenty-first century teaching and learning.

DEDICATION

I want to thank my husband, Ignacio M. Garcia, for being at my side and providing support, encouragement, and wisdom. You have been a great blessing in my life, and I am very thankful for everything you do. I am thankful to my parents, Roberto and Rosa Maria Corral. You, both, have provided a firm foundation of values, work ethics, and kindness. I have been truly blessed to have you all as my parents. The love, encouragement, and support you have given me and the entire family is as vast and deep as the ocean. I am grateful to my children, Jennifer, Christina, Nicolas, and Daniella, who are the jewels of my life. Thank you for your understanding and patience. Life is the greatest gift. You all changed my life and made it complete when each of you were born. I hope you have learned that love, kindness, and dreams are important and that hard work, determination, and persistence will help you achieve those dreams. I am thankful for being blessed with London. He has given me a fountain of joy and laughter. I had no idea what it felt like to be a grandma until you came into my life. How sweet it is. I am thankful for Mateo and Elise. They have been a blessing and have brought us many smiles and happiness into our lives. Thank you, Lizzy for bringing joy into our lives. Thank you, David, for being an inspiration in our lives.

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Contributors

This work was supervised by a dissertation committee consisting of Dr. Robert M. Capraro [Chair], Dr. Mary M. Capraro [Co-chair], Dr. Juan R. Lira [Committee member], and Dr. Randel D. Brown [Committee member]. This work was also supervised by Dr. John P. Helfeldt [Chair, retired].

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INTRODUCTION TO THE STUDY

Introduction

Currently, society is stratified and unequal with regards to educational opportunities. The areas in which these inequalities exist are: digital and media literacies; critical thinking and communication skills necessary to evaluate information; an information and knowledge gap; and collaboration and participatory inequalities (Radovanovic, 2011). Educators need to be knowledgeable and have an understanding of the importance of developing 21st century skills, including information and communications technology (ICT) literacy to assist in addressing these inequalities in the schools (Warschauer & Ware, 2008). Furthermore, educators must be aware of a knowledge-based society and the flexibility and autonomy necessary to deal with changes occurring around the world (Arnold, 2007). Globalization has brought forth increased communication demands for daily functions and the types of 'literacies' that we need to have for productive living and employment. Societies are becoming more diverse and multilingual, while the new technologies and media allow for multilingualism to exist in the virtual reality of these technologies (Johnson & Kress, 2003). In addition, people have access to a vast amount of information in a matter of minutes.

Many culturally and linguistically diverse (CLD) students are considered low socio-economic status (SES) and have fallen behind in literacy development. The extent

of oral language skills developed at home will affect the student's academic success in school. Language in school is decontexualized, and the home language is contextualized (Minami & Ovando, 2004). Decontexualized language is far removed from the environment or situation in which a child may have experience with. Contextualized language spoken at home is directly related to the environment and situation where it is spoken. Students who develop a repertoire of words and their meanings at home can apply this knowledge at school to make meaning in the decontexualized environment (Cummins, 2000).

Many CLD students attend schools that lack instructional resources such as access to ICT, effective teachers, and visionary leadership. Furthermore, the use of ICT, including new literacies of the Internet, has increased among young people, especially middle and upper middle-class students (Tapscott, 2009). These new literacies include reading digital texts, blogging, social networking, virtual worlds, video games, navigating and critically evaluating information on the Internet, and digital tools such as video editing software (MS Moviemaker), web authoring software (MS Frontpage), handheld devices, and podcasts. There is a digital divide because computer and internet access are differentiated along the lines of demographics and socio-economic status (Radovanovic, 2011). Low socio-economic status (SES) students in the United States are less likely to have access to ICT, including computers and the Internet (Attwell, 2001; Hesseldah, 2008; Ritzhaupt, Liu, Dawson, & Barron, 2013). A study conducted in Florida by Ritzhaupt et al., (2013) reported that there is a digital divide between minorities, genders, and SES in middle schools in thirteen school districts in Florida.

The research by Ritzhaupt et al., (2013) reiterated previous research that low SES students have less access to computers and the Internet in their homes. Students who do not have access to ICT beyond school have a lesser chance to use ICT for their own personal empowerment (Ritzhaupt et al., 2013).

All teachers, especially those of CLD students, need to provide media-enhanced learning environments and provide learning opportunities for all students to learn how to use ICT because all students need to be prepared for a digital society in which not only the job market, but all areas of personal living are enhanced by possessing ICT skills, including skills in new literacies of the Internet. CLD students may not be getting access to ICT at home; therefore, it is important that they learn to use ICT at school. Schools have helped to bridge the digital divide by providing computers and internet access to students, but the gap continues to exist (Stafford & Griffis, 2008). Due to school districts' focus on high-stake exams and their attempt to meet the accountability requirements, students are not receiving a twenty-first century education which encompasses ICT skills. Numerous educators are not trained in how to integrate ICT into their lessons and teach twenty-first century skills. In order to meet the demands of society and this generation, educators must reexamine pedagogy, learning theories, and the role of new literacies in student learning (Merchant, 2009).

Background of the Study

Critical Literacy

The teaching of critical literacy is important because we are living in a time where global propaganda communicated through multimedia messages and web-based information influence the public's perceptions and attitudes because the Internet is virtually open, and anyone can post any information without external editing. We are living in an informational age in which individuals must be prepared to scrutinize what they read from a variety of sources found on the Internet.

The teaching of critical literacy can help preserve the democratic values and institutions in societies. Critical literacy helps to develop responsible citizens who are able to question what they read and take action to resolve social disparities (Mirra & Morrell, 2011). Critical literacy was introduced with traditional books and print text, but can be used with text and media based information on the Internet. Freire (1970) stated that the use of praxis—dialectical cycle of action and reflection—as the source of critical consciousness for marginalized persons is imperative for teachers to include in student learning. As teachers and students participate in critical dialogue together, the traditional power structures of authority break down, and together they can critically analyze text to disclose oppression and recreate knowledge. By implementing praxis, the traditional, "banking" model of education where students are referred to as passive depositories of knowledge can be changed to a problem-solving model that concentrates on collective inquiry for shared empowerment (Feire,1970). In addition, students are taught to develop their individual voice to address social issues.

Through critical literacy, young people learn to construct meanings from various types of texts and discussions by critically evaluating information and the information sources (McLean, Boling, & Rowsell, 2009). Texts are considered to be part of a political, economic, and social agenda. Students are taught to recognize relationships and ideological underpinnings within a cultural framework that the authors may promote (Fabos, 2008). Students must be taught to evaluate Web-based information and realize that the texts found on the Web may be results of economic, political, and social power struggles. A variety of perspectives may exist within the larger social and cultural contexts (Fabos, 2008).

Access to ICT and the Use of Transformative Approaches

The access to ICT, including new literacies, is crucial for all students, including CLD students. The development of ICT literacies are factors considered for social and economic equality of marginalized population groups. Individuals who do not have access to ICT or do not know how to use the new technologies for learning school related content and skills are at a disadvantage for learning and being prepared for the 21st century (Warschauer & Ware, 2008). "ICT access and literacy are considered the new print literacy of the 21st century" (Warschauer & Ware, 2008, p. 228). Because a vast amount of information is shared via the Internet, access to ICT is of paramount importance to everyone. Social, economic, cultural, and linguistic contexts influence the access to education, academic achievement, literacy, and ICT for marginalized groups of people according to Warschauer and Ware (2008). There is a direct relationship between economic inequality and access to ICT. Economic inequality is a fact that

cannot be ignored because hundreds of millions of people globally do not have access to ICT (Johnson & Kress, 2003). Previous studies have illustrated that progressive pedagogy has been used with high SES students, such as the use of ICT for collaborative literacy projects, but different less effective instructional procedures and content has been used with low SES students in comparison with high SES students (Warschauer & Ware, 2008). Kirkwood and Price (2005) reported that a small number of students have acquired competencies across a wide range of digital tools and having basic computer knowledge does not imply sophisticated ICT skills. Similarly, the 'Net Generation' is comprised of many individuals who do not know how to utilize digital tools to strategically optimize their learning at all levels (Kennedy, Judd, Churchward, Gray, & Krause, 2008). The low SES students had been assigned perfunctory work on computers, while the high SES students were involved in more in-depth content study inquiry and critical thinking (Warschauer & Ware, 2008). The public-school system in Texas has had a strong emphasis in high-stake testing, and many teachers focus their instruction on items on the test. Students who are not doing well in Reading or are acquiring English as a second language are at a disadvantage because administrators and policy makers expect teachers to ensure that all students pass the state assessments. The Texas state assessments do not measure literacies of the Internet. Thus, a vast number of students, especially CLD students, may not have the opportunity to learn ICT skills. Due to the central focus on passing these achievement tests, school districts are not investing as much resources in teacher professional development in the area of ICT,

including new literacies. Consequently, many teachers may lack knowledge of ICT and new literacies.

Schools must be made aware of the importance of equitable teaching practices in literacy in which all students have access to progressive pedagogy and ICT. Educators must provide CLD students with interactive learning opportunities utilizing ICT to optimize learning and prevent new categories of disability from occurring. The manners in which schools incorporate ICT contribute to inequities and power relationships that exist in our society (Dalton & Proctor, 2008). Power relationships in our society have perpetuated the effect in which certain social groups are able to oblige the actions or inactions of other individuals or groups contrary to their beliefs, interests, needs, and desires. Power is derived from the ability for agents, such as politicians, wealthy persons, and other influential people, within our society to set the agenda for future action which affects all other individuals and social groups (Warschauer & Ware, 2008). With the changing times, not only have we seen an increase in new literacies, but also in the rate of technological advances. ICT, including new literacies, can potentially have a positive educational impact if they are integrated with effective pedagogical practices for all students, including the CLD students (Cummins, Brown, & Sayers, 2007). Therefore, educators must provide all students with access to equitable learning opportunities.

The study of the Challenge 2000 Multimedia Project conducted by SRI International (Penuel, Golan, Means, Korbak, 2000) included teams of K-12 teachers

and students who developed multi-media projects. Students in the project and non-project classrooms were required to work on an authentic project. A problem-solving situation which required students to collaborate in small groups using critical thinking skills about issues facing homeless students was presented to the students. The groups of students had to problem solve, make recommendations, and create a brochure stating their position. The students in the Multimedia Project classrooms out-scored the other students from the non-project classrooms on the solutions to the problems. This study indicated how ICT and transformative pedagogy can be powerful in the learning process (Penuel et al., 2000).

Today's world has changed considerably in the last two decades. Due to globalization, increased immigration, and outsourcing by corporations the job market has changed drastically in the last couple of decades (King, 2012). In addition, technological advances have transformed the way people communicate at their jobs and at home. In 2002, the Partnership for 21st Century Skills was created to bring awareness to the public of necessary skills needed in the workplace and as well-informed citizens. This organization developed a collection of elements needed for 21st century education: learning and thinking skills, information and communications technology (ICT) literacy, focus on content areas, teaching and learning 21st century content, life skills, and the integration of 21st century assessments. The Partnership for 21st Century Skills advocate the development of the 4Cs: Critical thinking and problem solving; effective communication, collaboration, and team building; and creativity and innovation for all students (Partnership for 21st Century Skills, 2002).

Conclusion

In order to address the pedagogical and digital divide that exists in our schools due to the high-stake testing era, lack of access to ICT and ICT teacher training in our schools, progressive pedagogical approaches such as transformative approaches must be integrated and implemented into the instruction of students. Many CLD students are in need of effective pedagogy to address their literacy development, including critical literacy. CLD students must also develop ICT skills, including new literacies, to keep up with a digital world and workplace (Merchant, 2009). Currently, the world has experienced a change in communication, technology, the economic, political, and international environment, the natural environment, and cross-cultural encounters. The global interdependence between countries, businesses, and other entities has increased dramatically in the last decade. Therefore, it is imperative that educational institutions address the new demands of the twenty-first century in elementary, middle and high school, and in higher education. The LEAP National Leadership Council calls on American society to advocate for the educational outcomes that will assist students to meet the challenges of living in a global society. These educational outcomes will prepare students for work, life, and citizenship for the 21st century (AAC&U, 2007). Therefore, educators and policymakers must reexamine pedagogy, learning theories, and the role of new literacies (Merchant, 2009).

Educators will be more likely to view novel teaching practices if provided with extensive professional development supporting the use of ICT, including new literacies.

Teachers must learn how to develop the knowledge and skills needed to teach young people how to utilize ICT and "learn how to learn" through the use of ICT (Dalton & Proctor, 2008). Educators must be prepared to teach students to use ICT as an instrument for problem solving and answering a large spectrum of questions (Kuiper & Volman, 2008).

Significance of the Study

CLD students have historically been deprived of an equitable education. Currently, low SES and CLD students receive more drill and practice, and technology integration is generally limited to the transmission approach to teaching, such as the teacher using a PowerPoint to teach a lesson (Warschauer & Ware, 2008). Students from middle-class or higher SES tend to receive instruction using more progressive pedagogical approaches, such as knowledge construction and critical inquiry, including the use of ICT and new literacies (Cummins et al., 2007). Schools with low SES students channel their energy into off-line reading skills to raise their test scores (Leu, McVerry, O'Byrne, Zawilinski, Castek, & Hartman, 2009). The digital divide, in that computer and internet access is divided among demographics and socio-economic status is prevalent. The workplace has also experienced a change from using the traditional printed page to accessing text on a computer screen. Employees use the Internet to communicate, read, and write. Global economic competition has caused many companies to use ICT (Leu, et al., 2009). Teachers need to provide media-enhanced learning environments and provide opportunities for all students to learn how to use ICT. Schools have helped to bridge the digital divide by providing computers and internet

access to students (Stafford & Griffis, 2008), but the manner in which technology is incorporated into classrooms varies wider among different schools between low and high SES students (Warschauer & Ware, 2008).

Problem Statement

In many low-income schools, educators are under extreme pressure to improve scores on state assessments which do not test ICT literacy strategies and skills. Therefore, students are exposed to rudimentary literacy and technology practices instead of integration of ICT (Leu et al., 2009). Due to the accountability system in place, mainstream students, but especially low SES CLD students, are also subjected to the "teaching to the test". In a study conducted in eighteen states, Amrein and Berliner (2003) reported that high-stake testing has not resulted in measurable improvement in student achievement in the Advance Placement (AP) tests, the National Assessment of Educational Progress (NAEP), the Scholastic Assessment Test (SAT), and the Academic College Test (ACT) exams.

There is also a digital divide, in that computer and internet access is not equally distributed among various demographic groups, including lower socio-economic status. Many marginalized students do not have access to a computer and Internet at home. Lower SES schools lack funding and resources and do not usually possess up-to-date instructional technology. Thus, low SES students do not experience those digital experiences that mainstream students receive (Lucey & Grant, 2009). The inequitable access and application of ICT are factors that negatively affect marginalized students

from becoming marketable employees and informed citizens. Individuals who do not have access to ICT or do not know how to use the new technologies are at a disadvantage in comparison to middle and upper-middle class students (Warschauer & Ware, 2008). Warschauer and Ware (2008) posited that social, economic, cultural, and linguistic contexts of marginalized groups influence the access to education, academic achievement, literacy, and ICT. On the other hand, school officials allocate the technology resources and determine if teachers will send students to a computer lab, and if teachers will use their computer for mostly administrative purposes (Lucey & Grant, 2009). The inequitable educational practices have continued today by not providing adequate learning in ICT, in particular, new literacies for CLD and low SES students (Warschauer & Ware, 2008).

Purpose of the Study

The purpose of this study is to identify the level of teachers' knowledge and ICT integration according to the International Society for Technology in Education (ISTE) Standards for Teachers among three secondary schools in Central Texas. This study will also investigate why, how and whether teachers in different secondary schools may integrate new literacies (or ICT) differently and whether ICT related professional

development activities and procedures might differentially contribute to the integration of ICT into classroom instruction across the three schools.

Research Questions

In comparing educators from three urban, secondary schools with a majority of CLD students:

1) How do the three secondary schools' teachers' levels of professional knowledge related to integrating ICT based instruction as measured by responses on the sections I, II, and III of the ISTE survey differ?
2) How do professional development experiences pertaining to ICT integrated instruction for the three secondary schools' teachers differ?
3) What are the differences in type and degree of access to ICT in the three secondary schools?
4) What are the differences in frequency and type of observed instruction in new literacies of the Internet implemented by teachers in the three secondary schools?

Limitations

This survey was administered in the middle of the fall semester, after teachers have been freed from the many demands that the beginning of the year brings. By administering the survey in the middle of the fall semester, teachers did not have the tendency to be biased due to the fact that a routine had been established, and there was consistency in their daily responsibilities. External validity of the research is limited to the selection process contained within Central Texas secondary schools. Schools were

chosen based on their demographics and the location. School One is a district charter school in a public, school district located in the inner west side of a Central Texas city. School One uses intense science and technology methodology incorporated with a rigorous college-preparatory liberal arts program. School One is a candidate for the International Baccalaureate (IB) Middle Years Programme (MYP) and is pursuing authorization as an IB World School. The IB schools share a common philosophy of having a commitment to a rigorous, high quality international education. School Two is a charter school located on the west side near the downtown area of a Central Texas city. School Two is a college- preparatory school which prepares students in underserved communities. School Three is a district charter school in a public, school district located in the inner northwest side of a Central Texas city. School Three is a college-preparatory, all-female school which focuses on science, math, and technology. The three schools are in the same city and are about one to six miles of each other. Due to this restriction, the generalization to other secondary schools will be compromised.

Delimitations

The purpose of this study is to determine the level of knowledge and ICT integration according to the ISTE Standards for Teachers in secondary school teachers in three Central Texas schools. Thus, the study will not measure the efficacy of the integration of ICT on student achievement. The three schools chosen have a majority of Hispanics in their student population. In addition, the schools have a large number of students who are low SES. Therefore, the schools chosen will not have a large population of middle or high SES. The schools will not have a large proportion of

Caucasian students. The selection process was purposeful in order to include teachers who teach CLD students. The researcher will review qualitative and quantitative data to validate the data gathered through this study.

Summary

Educators must be provided with on-going professional development in ICT, in particular, new literacies, in order for teachers to be able to provide an equitable education to students. Policymakers and educators must implement changes in pedagogical and technology integration to have effective results in literacy development (Merchant, 2009). Students must acquire knowledge and skills in ICT and new literacies (Dalton & Proctor, 2008). Educators should teach students to use ICT for problem solving and searching for solutions to questions, problems, or issues (Kuiper & Volman, 2008). This investigation will examine the level of knowledge of secondary school teachers in three schools of the ISTE-T Standards for Teachers and the relationship between professional development practices and the integration of new ICT literacies in the classrooms.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Changes in Student Population

The United States has experienced a change in their population in the last thirty years. In 2002, the English language learners (ELLs) comprised about 10 percent of the student enrollment in our public schools (Martiniello, 2009). According to the Census Bureau (2010), the Hispanic population has grown to about 50 million which translates to 1 out of 6 Americans (Ceasar, 2011). Approximately 25 percent of students are children of immigrant parents (Soojin, 2011). The Hispanic population grew by about 43 percent in the last decade and is projected to comprise about one-third of the U.S. population by 2050 (Ceasar, 2011). Therefore, by the year 2050, Hispanic children will comprise about one-third of the 100 million children in the U.S. (Tienda & Haskins, 2011).

There has been a significant gap between the literacy achievements of students from diverse backgrounds in comparison to students who are considered mainstream. There are three cultural variables-ethnicity, social class, and primary language-that have been linked to academic difficulties. Many of these students come from low socio-economic homes and speak a language other than Standard English. Some of these groups include African Americans, Asian Americans, Hispanics, and Native Americans

(Gollnick & Chinn, 1990). There are certain issues that complicate the education of students of diverse backgrounds. Findings have shown that many of these students do not receive the same amount of literacy instruction as mainstream students (Fitzgerald, 1995). Another issue is that a significant number of students from diverse backgrounds have been placed in remedial or special education programs. Some of these students spend more time on skills in isolation and less time with other students who read well (Fitzgerald, 1995). Schools where there are a large number of students from diverse populations may not have the highly qualified teachers that are needed. Materials and other resources are often scarce. Special programs are not effective because of the way the school system is organized not to give these students a quality education (Allington, 1991).

Social Constructivism

Social constructivist theory is based on Vygotsky's idea that children learn through a social process. That is, as children interact about concepts they internalize the information (Wertsch, 1981). The social constructivist theory is also based on John Dewey's contributions that children learn by having experiences. Each experience changes the one who acts, and this modification will affect subsequent experiences (Dewey, 1938).

As children collaborate and face conflict through problem solving, cognitive reorganization takes place until students reach a consensus according to the Perret-Clermont's hypothesis (Perret-Clermont, 1980). In addition, Piaget (1970, p. 721)

identified four factors that contribute to cognitive development: “maturation, experience with the physical environment, social experiences, and equilibration or self-regulation.” Collaborative work requires students to integrate their conflicting ideas into a communal plan by reaching a shared perspective. A child then learns to use language to guide the problem-solving process, including the actions of other peers. Children learn to reflect on the problem-solving process and recognize the most effective procedures. These procedures can later be applied independently on challenging tasks (Forman & Cazden, 2004).

Group investigation was developed from John Dewey’s ideas. In this model, students are organized into democratic groups that problem solve together using scientific inquiry. Students are taught the democratic procedures as they work to solve social problems. Group investigation involves students in experience-based learning (Joyce, Weil, & Calhoun, 2009). Group investigation begins with a problem that the group is interested in solving. The social system governing group investigation is a democratic system consisting of reasoning and negotiation. The teacher has the role of consultant or counselor and leads the group through three levels: the problem-solving level, the group management level, and the level of individual meaning. Group investigation accomplishes the goal of combining complex social and academic problems to produce academic and social learning (Joyce et al., 2009).

The group investigation model uses cooperative groups to accomplish its goals. According to Joyce et al., (2009), there are some assumptions that form the basis for cooperative learning:

1. The synergy generated in cooperative settings generates more motivation than do individualistic, competitive environments. Integrative social groups are, in effect, more than the sum of their parts. The feelings of connectedness produce positive energy.
2. The members of cooperative groups learn from one another. Each learner has more helping hands than in a structure that generates isolation.
3. Interacting with one another produces cognitive as well as social complexity, creating more intellectual activity that increases learning when contrasted with solitary study.
4. Cooperation increases positive feelings toward one another, reducing alienation and loneliness, building relationships, and providing affirmative views of other people.
5. Cooperation increases self-esteem not only through increase learning but through the feeling of being respected and cared for by the others in the environment.
6. Students who experience tasks requiring cooperation increase their capacity to work productively together. In other words, the more children are given the opportunity to work together, the better they get at it, which benefits their general social skills.

7. Students, including primary school children, can learn from training to increase their ability to work together (Joyce et al., 2009, p.268).

Progressive Pedagogical Approaches

Progressive pedagogical approaches include child-centered activities, emphasis on relating instruction to students' experiences, and construction of knowledge through social interaction. Progressivists have been influenced by the American philosopher, John Dewey, and the Soviet-era psychologist, Lev Vygotsky (Cummins et al., 2007). In this view, education is a social process because the development of experience is through interaction among students. The teacher takes on the role of leader of the group activities (Dewey, 1938). On the other hand, traditionalists tend to like order in the classroom and a sense of right and wrong, greater instructional rigor, higher standards, emphasis on direct instruction, accountability, and focus on phonics over meaning in literacy instruction. Although certain areas of language development, such as phonics, spelling, and grammar, may be taught through the transmission approach, this may not be the best avenue to teach reading comprehension beyond the early elementary years. Generally, reading comprehension and academic language proficiency demand higher-order thinking skills rather than memorization and practice (Cummins et al., 2007).

Three pedagogical orientations

According to Cummins et al., (2007), there are three pedagogical orientations: transmission-oriented pedagogy, social constructivist pedagogy, and transformative approach to pedagogy. The transmission-oriented pedagogy focuses on the transmission

of information and skills directly to students. The social constructivist pedagogy includes the transmission of information and skills, but encompasses higher-order cognitive skills based on the co-construction of knowledge between the teacher and the students (Cummins et al., 2007). Students construct knowledge by understanding new information and making connections to their prior knowledge and their personal attitudes and values. Thus, the transmission of knowledge is unable to occur because individuals acquire knowledge when they transform the new information to a personal experience (Kuiper & Volman, 2008). The construction of knowledge is a social activity in which collaboration among students is essential. Students are expected to actively participate and share their ideas with each other. The teacher provides needed support and is a facilitator for the learning process (Kuiper & Volman, 2008). The transformative approaches to pedagogy expand the focus of transmitting the curriculum (information and skills) and constructing of knowledge, but also allow students to learn how knowledge intersects with power. This approach promotes critical literacy (Cummins et al., 2007).

Culturally Relevant Pedagogy

Educators need to use culturally relevant pedagogy (CRP) with CLD students. CRP permits CLD students to validate their cultural identity, achieve well in school, and develop critical perspectives to question inequities in society (Ladson-Billings, 1995). Culturally relevant teaching utilizes the students' culture to help students understand themselves, others, and make connections to the world around them. Culturally relevant teaching empowers students to critically study society and work toward diminishing

social injustices that may exist (Ladson-Billings, 1992). Students must possess multiple types of literacies to accomplish this, such as language, mathematical, scientific, musical, artistic, social, political, cultural, historical, and economic (Ladson-Billings, 1992).

Multiliteracies Framework

The New London Group (1996) introduced the multiliteracies framework. This is a group of international scholars who recognize the current societal changes and the implications they may have on literacy instruction. Literacy, in the past, has been reading and writing. Today, literacy includes a broader range of literacies, including literacies associated with information, communication, multimedia technologies, and culturally specific literacies. The multiliteracies framework consists of situated practice, overt instruction, critical framing and transformed practice. According to this pedagogical framework, students should have meaningful experiences, explicit instruction to support the development of concepts, and have the opportunity to reflect and examine what they have learned in a critical fashion in relation to their social relevance. They should also have the opportunity to apply what they have learned to the real world and understand how their knowledge and insights can be instrumental to positively affect people and issues (The New London Group, 1996). Globalization has

changed the workplace to include the use of multiliteracies to communicate and accomplish its goals (Johnson & Kress, 2003).

Multiliteracies is separated into the 'what' and the 'how' of multiliteracies. The 'what' of multiliteracies include: The Designed; Designing; and the Redesigned. The Designed refers to the significance of social and historical context in forming meaning. Meaning is always changing and is influenced by social and political power. The process of meaning-making through recontextualization is referred to as Designing. The product of Designing is the Redesigned, which is made by the meaning-maker. The ability to recreate meaning is the basis of multiliteracies in order for students to 'design their own social futures' (Huijser, 2006).

The Designs of meaning encompass six areas based on a greater understanding of 'texts': Linguistic Design; Audio Design; Visual Design: Gestural Design; Spatial Design, and Multimodal Design (Kalantzis & Cope, 2001). Multimodal responses to literacy instruction help students connect and improve understanding of literary components. Digital technology assists to bring meaning by using visual, audio, verbal, and animated texts. This helps students have purposeful experiences that motivate them to learn. By using these multimodal response strategies, students will learn to think critically and increase literacy skills (Whitin, 2009). Digital writing can be used by learners to respond to literacy instruction. Thus, digital literacy allows for change in pedagogical approaches and the curriculum (Merchant, 2008).

The ‘how’ of multiliteracies is the multiliteracies pedagogy which includes situated practice, overt instruction, critical framing, and transformed practice as mentioned earlier. Situated practice is about basing learning in meaningful experiences that students can relate personally, simulated work environments, and public spaces. Situated practice implies the use of student-centered approach to learning. Overt instruction has to do with the Designed, Designing, and Redesigning. Overt instruction includes the teaching of patterns of meaning and the resources to recontextualize meaning. Critical Framing allows student to critically examine text. Transformed practice is about the changes of meaning and propels students to apply their designs in a different context, and therefore redesign. Thus, meanings are changed (Huijser, 2006, p. 25).

Student achievement could be increased by implementing a multiliteracies framework and pedagogy. Research on multiliteracies (New London Group, 1996) have stressed the significance of engaging students in a variety of creative and challenging literacy practices coupled with text-based and different modes of multimedia. Moreover, Cummins’ (2001) Academic Expertise framework emphasizes the co-construction of knowledge and critical inquiry for cognitive growth. In addition, this theory includes active self-regulated learning, deep understanding, and building on learner’s background knowledge. According to Cummins (2001), instruction should concentrate on three elements:

(1) Focus on Meaning (which delineates a focus on critical literacy moving beyond a surface-level reading of a text);
(2) Focus on Language (i.e., understanding not only linguistic codes but a critical language awareness of how language as a form of capital intersects with power and functions within society to include or exclude people from achieving specific social goals); and
(3) Focus on Use (where instruction creates opportunities for all students to produce knowledge, create multimodal texts, and respond to diverse social realities) (Giampaya, 2010, p. 411).

Thus, the multiliteracies pedagogy permits the connection between multilingual practices and multimodal types of meaning-making (Giampaya, 2010).

According to The New London Group (1996), society and schools need to create learning environments to engage students in a wide range of literacy practices that are innovative, challenging, and connects text-based and media forms of meaning making. Multiliteracies pedagogy facilitates constructivist model of learning in which students learn by making meaning through authentic experiences (Borsheim, Merrit, & Reed, 2008). Multiliteracies pedagogy supports reading challenging texts and the writing process, which are traditional learning objectives. Multiliteracies pedagogy is used to advance other literacies besides the traditional objectives (Borsheim, Merrit, & Reed, 2008).

Multiliteracies assessment is an integral piece of the educational system and needs to be addressed, in order to integrate a Multiliteracies framework and pedagogy. Currently, the standardized assessments that are in place do not measure the skills needed for the twenty-first century. Standardized assessments test the basic skills of reading, writing, and arithmetic. This type of testing relies on students' memorization of facts and regurgitation of information (Kalantzis, Cope, & Harvey, 2003). Curriculum and instruction are driven by large-scale assessment policies. Therefore, new large-scale assessment policies and practices need to be in place to prepare students with the skills they need for the twenty-first century, including multiliteracies. Assessment practices need to be revamped drastically, in order to encourage new learning and to measure accurately the twenty-first century skills (Hammett, 2007). According to Kalantzis et al., (2003), multiliteracies assessment can include projects, performance assessments, group assessments, and portfolio assessments. Projects would include problem-based or otherwise. Project assessment would encompass planning, organizing, problem solving, and presenting. Project assessments involve a broad and deep understanding of the learning taking place. Performance assessments include planning, organizing, and implementing. Performance assessments require a deep understanding of the learning. Group assessments comprise of collaboration skills, problem solving skills, and conflict resolution skills. Group assessments require deep understanding, and on some occasions, broad understanding of the learning. Portfolio assessments include the measurement of the students' experiences and strengths, and the ability to reflect on their learning (Kalantzis et al., 2003).

Problem-Based Learning

Problem-based learning (PBL) is an instructional methodology which originated in medical education in the 1950s. Several universities continued developing problem-based learning through the 1970s. Problem-based learning originated in response to poor clinical performances due to learning by memorizing information in traditional health science classes. Eventually, other subject areas, including K-12 education began using PBL. PBL requires learners to solve real-world problems (Hung, Jonassen, & Liu, 2008). PBL is a student-centered, inquiry-based instructional model in which students problem-solve an ill-structured problem (Jonassen & Hung, 2008). Students use collaboration and inquiry while problem solving. Because students are working with authentic problems, they are motivated and engage in the problem-solving process (Generareo & Lyons, 2015). Learners figure out what information they need to solve their problem, conduct research, develop solutions, and present their conclusions (Barrows, 1996).

The following are some sample big questions for PBL from West Virginia Dept. of Education (2017) Teacher 21 Project Based Learning data base:

English Language Arts, 6th Grade:

Title – Democracy: Is It For Everybody?

Project Idea: Students will gather, analyze, interpret, and synthesize historical information regarding how past civilizations have contributed to the advancement of democracy in today's world as well as use that information to

make appropriate decisions regarding advancing democracy in other countries where democracy is not a way of life.

Driving Question: How can we apply lessons learned from civilizations of the past to ensure the advancement of democracy in today's world?

Assessment and Reflection: Rubrics for collaboration, written communication, content knowledge and presentation; self-evaluation, peer evaluation, notes, checklist/observations; reflections for discussion, journal writing/learning log, and Task Management Chart (West Virginia Dept. of Education, 2017).

English Language Arts, 7th Grade:

Title – Students Against Violence!

Project Idea: Students will understand that the media does affect their lives, as they obtain information to make informational brochures as part of an advertisement campaign against teen violence. This unit should work well as a follow-up activity after reading a novel such as *The Outsiders* by S.E. Hinton.

Driving Question: Students will be researching teen violence

statistics and effects of teen violence, and they will then write an editorial page

for a newspaper, with possible publication in a local newspaper.

Assessment and Reflection: Rubrics for collaboration, written communication, and presentation; self-evaluation, brochure rubric, and checklists/observations;

reflections for survey and journal writing/learning logs (West Virginia Dept. of Education, 2017).

English Language Arts, 8th Grade:

Title – Hit the Road, Jack

Project Idea: The students will synthesize the impact of socio-economic migration on the individual by comparing census data to major economic and social events in a specific area.

Driving Question: Why is population change important in your past and future? (West Virginia Dept. of Education, 2017).

Assessment and Reflection: Rubrics for collaboration, performance, and creative projects; project flowchart and student checklist; reflections on survey and Task Manager Worksheet (West Virginia Dept. of Education, 2017).

PBL is a unique instructional method because it is problem-centered. The learning process begins with a problem. As students work towards solving the problem, students gain knowledge and skills. Students are no longer receiving the content knowledge in a sequence by a textbook or the teacher, but the content is organized as a problem or successions of problems (Hung, 2009).

Common Core State Standards

Currently, the curriculum is based on curriculum standards and standardized assessments that are set by the state and federal government. Students' learning and the quality of teaching is based on the outcomes from these standardized assessments. The type of learning experiences that students have or the type of instruction that they receive are not taken into account when measuring school success (Behar-Horenstein, Mitchell, & Dolan, 2004). The Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center) have developed the Kindergarten-12 Common Core Standards for 48 states, two territories, and the District of Columbia. The English language arts standards represent a set of goals of knowledge and skills that prepare students to be successful in college and in their careers (Common Core State Standards, 2012). CCSSO and NGA worked with many educators, researchers, content experts, national organizations, and community groups to develop the standards. In addition, states, the general public, teachers, business leaders, content experts, and parents gave resourceful feedback. The standards of other high performing nations were taken into account when developing the Common Core Standards. Furthermore, the college and career readiness standards have been incorporated into the K-12 Common Core Standards (CCSS, 2012).

The K-12 Common Core State Standards were developed with the following criteria:

- Aligned with college and work expectations;

- Include rigorous content *and* application of knowledge through high-order skills;
- Build upon strengths and lessons of current state standards;
- Informed by top-performing countries, so that all students are prepared to succeed in our global economy and society; and,
- Evidence and/or research-based (CCSS, 2012, "Introduction," para. 3).

English Language Learners

The Common Core Standards for English language arts (ELA) include rigorous educational expectations or goals in the areas: listening, speaking, reading, and writing. These expectations will assist not only native English speakers, but English language learners (ELLs) to participate in social, economic, and civic events. Moreover, teachers need to build on the prior knowledge, skills, and cultural capital that students bring to the classroom (CCSS, 2012, "English" para.2; Ladson-Billings, 1995). To assist ELLs to meet the Common Core Standards in English language arts they must be provided with:

- Teachers and personnel at the school and district levels who are well prepared and qualified to support ELLs while taking advantage of the many strengths and skills they bring to the classroom;
- Literacy-rich school environments where students are immersed in a variety of language experiences;

- Instruction that develops foundational skills in English and enables ELLs to participate fully in grade-level work;
- Coursework that prepares ELLs for postsecondary education or the workplace, yet is made comprehensible for students learning content in a second language (through specific pedagogical techniques and additional resources);
- Opportunities for classroom discourse and interaction that are well-designed to enable ELLs to develop communicative strengths in language arts; and
- Speakers of English who know the language well enough to provide ELLs with models and support (CCSS, 2012, "English" para.2).

Twenty-First Century Education

While the Standards have been set up to help diverse students succeed, they were also developed with a vision for a twenty-first century education. The knowledge and skills that students are expected to learn apply to different environments. Students will critically read text from print and digital sources. Students are expected to read complex literature and develop skills in listening, speaking, and writing as well. In addition,

students are expected to display cogent reasoning and use of evidence which is necessary for participation in a democratic republic (CCSS, 2012).

College and Career Readiness Standards (CCR)

The Common Core Standards are an expansion of the original initiative by CCSSO and NGA to create College and Career Readiness (CCR) standards in reading, writing, speaking, and listening, and language and mathematics as well. The CCR Reading, Writing, and Speaking and Listening Standards have been revised since they were released in September 2009 and are the foundation for the Common Core Standards. These standards set expectations for English language arts (ELA) and literacy in history/social studies, science, and technical subjects. These literacy standards are set for teachers from grade 6-12 to assist students with reading, writing, speaking, listening, and language in their content area (CCSS, 2012).

CCR and Grade-Specific Standards

The CCR standards define general, cross-disciplinary literacy expectations, and the K-12 grade-specific standards define end-of-year expectations and a cumulative progression that students must navigate through to meet college and career readiness expectations by the time they complete high school. The standards are presented in each

grade level from K-8. Two-year bands are used in grades 9-12 to allow for flexible course designs in grades (CCSS, 2012).

Descriptions of College and Career Ready Students

Students are expected to read and comprehend complex texts across different disciplines and form arguments using reasoning and evidence. Students are able to build on others' ideas and use a variety of vocabulary. Students learn to use print and digital text, critically analyze text, and become self-directed learners. Students acquire general and content-area knowledge and refine their knowledge through speaking and writing opportunities. Students become more knowledgeable through research on certain topics. A college and career ready student should be able to critically analyze text, question the author's assumptions, and use relevant evidence when supporting their own point of view. Moreover, students are expected to integrate technology in their reading, writing, speaking, listening, and language use. Students should learn to search online and gather pertinent, credible information. Furthermore, college and career ready students should understand other perspectives and cultures and be able to communicate with culturally different persons. By reading classic and contemporary literature from different cultures, time periods, and worldview, students gain invaluable experiences that prepare them to understand the world around them (CCSS, 2012).

The Common Core Standards in English language arts have attempted to set a basis for what is necessary to prepare students for college and a career. College and career ready students should critically analyze text, question the author's assumptions,

and use relevant evidence when supporting their own point of view. Students are expected to read and comprehend complex texts across different disciplines and form arguments using reasoning and evidence. Students are expected to build on others' ideas and use a variety of vocabulary. Students learn to use print and digital text, critically analyze text, and become self-directed learners. In addition, students are expected to integrate technology in their reading, writing, speaking, listening, and language use. Furthermore, college and career ready students should understand other perspectives and cultures and be able to communicate with culturally different persons (CCSS, 2012).

Although the Standards encompass a wide range of literacy skills, because of the accountability system in place students are not receiving the best education possible. Currently, students are assessed through standardized testing. The No Child Left Behind Act of 2001 (NCLB) requires that the school districts test students through standardized testing beginning in the third grade and each year thereafter until high school. Due to accountability requirements, school districts and school personnel carry an enormous pressure to meet certain standards designated by policymakers (Dennis, 2010). These exams are considered high-stake exams when pressure is placed on school administration and teachers due to publicized test results and when personnel decisions are based on these scores (Franzak, 2006). The assessments are the driving force in instruction in our schools. Unfortunately, students may not be receiving the type of instruction that they may need (Dennis, 2010).

Standardized assessments do not provide adequate information for the individual needs of each student. These exams place students in categories from advanced to below proficient level and signal whether students know how to read. Although not much information is provided by the results, many struggling readers are placed in a one-size-fits-all reading curriculum (Dennis, 2010). Therefore, struggling readers receive instruction in phonemic awareness and decoding through these programs (Dennis, 2008). Students who have difficulty in their literacy skills may not be receiving reading instruction from their content area teachers (Hall, 2006). English language learners (ELLs) may not be receiving the services they need due to these assessments. ELLs are not only trying to learn English, but also trying to develop their literacy skills in English. The scores that ELLs receive may not reflect accurate information because of the English language that is not yet mastered. Struggling readers are receiving instruction that is decontextualized and does not provide opportunities to interact with a variety of text (Dennis, 2008).

The Common Core Standards in English language arts include a variety of literacy skills needed in the twenty-first century. The Standards do not include how these skills will be taught or assessed. Although, currently school districts must meet the state and federal accountability requirements there is a need to improve our educational system. Currently, there have been global economic and technological changes that have affected the way people work, communicate, and learn. Therefore, it is imperative that educational institutions address the new demands of the twenty-first-century in elementary, middle and high school, and in higher education. The Liberal Education &

America's Promise (LEAP) National Leadership Council has proposed educational outcomes that will assist students to be prepared for the twenty-first century. These educational outcomes will prepare students for work, life, and citizenship (AAC&U, 2007).

College Learning for the New Global Century Report (LEAP Report)

The Association of American Colleges and Universities (AAC&U) is a higher education association comprised of more than 1,100 colleges and universities, including private and public institutions. AAC&U's primary mission is to improve the quality of student learning in colleges and universities. In 2005, AAC&A began an initiative, Liberal Education and America's Promise (LEAP): Excellence for Everyone as a Nation Goes to College. The LEAP National Council includes community, business, policy, and educational leaders who support and recommend the essential aims, learning outcomes, and guiding principles for a twenty-first-century college education which are included in the *College Learning for the New Global Century Report* --Liberal Education and America's Promise (LEAP) Report (AAC&U, 2007).

Currently, the world has experienced a change in communication, technology, the economic, political, and international environment, the natural environment, and cross-cultural encounters. The global interdependence between countries, businesses, and other entities has increased dramatically in the last decade. Therefore, it is imperative that educational institutions address the new demands of the twenty-first-century in elementary, middle and high school, and in higher education. The LEAP

National Leadership Council calls on American society to advocate for the educational outcomes that will assist students to meet the global challenges. These educational outcomes will prepare students for work, life, and citizenship (AAC&U, 2007).

The essential learning outcomes are based on the core values of a liberal education: expanding horizons, learning analytical and communication skills, understanding the world, and cultivate civic and social responsibility. The National Leadership Council posits that a liberal education in the twenty-first century includes a set of aims and outcomes that are necessary for all students in all professions. These educational outcomes will be the solution to continue economic strength and personal aspirations. The Council is recommending that these aims and outcomes be incorporated not only into general education courses in college, but to the major classes and public schools as well (AAC&U, 2007).

The National Leadership Council proposes that students need to learn across different disciplines, including knowledge of science, cultures, and society; acquire higher-level critical thinking skills; develop civic and social responsibility; and incorporate problem-solving skills to address complex problems. Furthermore, the Council explains that students need to become "intentional learners" who learn across different disciplines through the achievement of the essential learning outcomes. Educators will also need to become more intentional about learning needs of students and effective instructional practices that need to be in place. The Council is also recommending policymakers to advocate more inquiry-based instructional practices,

including hands-on and collaborative strategies, and to incorporate educational technologies in order for students to accomplish the essential learning outcomes (AAC&U, 2007).

The essential learning outcomes will prepare students from elementary school to higher education for the demanding challenges of the twenty-first century:

Knowledge of Human Cultures and the Physical and Natural World

- Through study in the sciences and mathematics, social sciences, humanities, histories, languages, and the arts

Focused by engagement with big questions, both contemporary and enduring

Intellectual and Practical Skills, including

- Inquiry and analysis
- Critical and creative thinking
- Written and oral communication
- Quantitative literacy
- Information literacy
- Teamwork and problem solving

Practiced extensively, across the curriculum, in the context of progressively more challenging problems, projects, and standards for performance

Personal and Social Responsibility, including

- Civic knowledge and engagement—local and global
- Intercultural knowledge and competence
- Ethical reasoning and action
- Foundations and skills for lifelong learning

Anchored through active involvement with diverse communities and real-world challenges

Integrative Learning, including

- Synthesis and advanced accomplishment across general and specialized studies

Demonstrated through the application of knowledge, skills, and responsibilities to new settings and complex problems (AAC&U, 2007, p.12).

The LEAP Report also includes *The Principles of Excellence*: Aim High—and Make Excellence Inclusive, Give Students a Compass, Teach the Arts of Inquiry and Innovation, Engage the Big Questions, Connect knowledge with Choices and Action, Foster Civic, Intercultural, and Ethical Learning, and Assess Students' Ability to Apply Learning to Complex Problems (AAC&U, 2007, p. 26).

The guiding principles, *The Principles of Excellence*, and the essential learning outcomes are of paramount importance. The essential learning outcomes represent the types of learning that is needed to meet the changing needs of the twenty-first century. Students need broad and deep learning that will prepare them to address problems and

issues in our global society. Students need intellectual skills that will assist them to work in an innovative and effective manner. Students need to exercise personal, civic, and social responsibility in a diverse democracy. In addition, twenty-first century students need to have the capacity to integrate and apply their learning to real-world problems and be proficient in using technological tools (AAC&U, 2007).

ISTE Standards

The International Society for Technology in Education (ISTE) is a nonprofit organization that works toward providing technology standards for students, educators, administrators, coaches, and computer science teachers. In addition, ISTE provides technology conferences for educators. The ISTE Standards, formally known as the National Education Technology Standards (NETS), are recognized and adopted throughout the world. They are used for twenty-first century learning and teaching, setting a standard of excellence by incorporating technology and effective learning practices. The ISTE Standards include: ISTE Standards for Students (ISTE Standards-S), ISTE Standards for Teachers (ISTE Standards-T), ISTE Standards for Administrators (ISTE-A), ISTE Standards for Coaches (ISTE Standards-C), and ISTE Standards for Computer Science Teachers (ISTE Standards-CSE). These standards, when implemented, assist in transforming education into twenty-first century learning (ISTE, 2014).

The ISTE Standards take learning and teaching to another level needed in our digital age and changing global, job market. The skills that are acquired by implementing these standards are as follows:

- Develop problem solving skills, critical thinking, and creativity
- Plan student-centered, project-based learning, and utilization of Internet
- Provides a guide to assist in the transformation of our schools to become digital age learning environments
- Prepares students for the global job market
- Incorporates professional models for collaborating and making decisions using technology (ISTE, 2014).

In order to better prepare our students for the twenty-first century, it is imperative that educators have the skills and knowledge of digital age professionals. Teachers must be willing to be co-learners with their students and other professionals (ISTE, 2014).

The ISTE Standards for Teachers are the standards used for assessing the skills and knowledge that teachers need to teach, work, and learn in the twenty-first century. Today's world is digital and globally connected by the use of ICT. In order to prepare our students for the digital age that we live in, teachers must incorporate the ISTE Standards for Students as they plan and assess student learning. Students will be more engaged and as a result, learning will be improved. The ISTE Standards for Teachers are as follows:

- Facilitate and inspire student learning and creativity
- Design and develop digital age learning experiences and assessments
- Model digital age work and learning
- Promote and model digital citizenship and responsibility
- Engage in professional growth and leadership (ISTE, 2014, "ISTE Standards Teachers").

The ISTE Standards set up a platform for teaching with ICT and using effective learning practices to develop twenty-first century skills. The ISTE Standards also work hand-in-hand to assist in the implementation of the Common Core Standards, such as problem solving, critical thinking, creativity, and collaboration skills. Thus, these standards will prepare our students for the global, digital job market (ISTE, 2014).

ICT Integration Professional Development and Research

For many years teachers have been attending professional development workshops that were one-time trainings with no follow-ups. Teachers have simply placed the information received in a folder and filed it away in a cabinet. The way that professional development has been implemented for years has not been very effective. This traditional approach has failed to make a long-term impact on instructional practices. The professional development must be designed taking into account the context of the educational setting and the broader educational goals (Wells, 2007). High quality professional development is of paramount importance when implementing an educational reform. Professional development should be long-term with follow-up

sessions, and the workshops should have active participation in relevant activities. The professional development should also foster collaboration, community building and shared understanding of student achievement among the attendees and should include access to new technologies (Martin et al, 2010).

Summary

The demographics of the United States have changed in the last three decades (Martiniello, 2009). By the year 2050, one-third of the U.S. population will be Hispanic (Ceasar, 2011), and Hispanic children will comprise about one-third of the 100 million children in the U.S. (Tienda & Haskins, 2011). Historically, there has been a wide gap between the literacy achievements of CLD students and mainstreamed students (Gollnick & Chinn, 1990). Efforts to close the gap have been implemented. But, in the age of standardized testing the quality of teaching and learning have been greatly affected. In an effort to set standards for our educational system, The Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center) have developed the Kindergarten-12 Common Core Standards for 48 states, two territories, and the District of Columbia. The English language arts standards represent a set of goals of knowledge and skills that prepare students to be successful in college and in their careers. While the Standards have been set up to help diverse students succeed, they were also developed with a vision for a twenty-first century education. (Common Core State Standards, 2012).

In addition, The Liberal Education & America's Promise (LEAP) National Leadership Council has proposed educational outcomes that will assist students to be prepared for the twenty-first century. These educational outcomes will prepare students for work, life, and citizenship (AAC&U, 2007). In order to better prepare our students for the twenty-first century, it is imperative that educators have the skills and knowledge of digital age professionals. Teachers must be willing to be co-learners with their students and other professionals (ISTE, 2014). The ISTE Standards for Teachers are the standards used for assessing the skills and knowledge that teachers need to teach, work, and learn in the twenty-first century. In order to prepare our students for the digital age that we live in, teachers must incorporate the ISTE Standards for Students as they plan and assess student learning (ISTE, 2014). Quality professional development is a priority when implementing an educational reform. Professional development should be long-term with follow-up sessions, and the workshops should have active participation in relevant activities. The professional development should also foster collaboration, community building and shared understanding of student achievement among the attendees and should include access to new technologies (Martin et al, 2010).

CHAPTER III

RESEARCH METHODOLOGY

Introduction

This section describes the methods used to conduct a study to examine the level of knowledge and integration of ICT of school teachers from three secondary schools in Central Texas. The components of the section are: the research design, the research sample, instrumentation, data collection procedures, and data analysis procedures.

Research Design

This research employed a survey and observational procedures to collect data that were quantitatively analyzed. This design was selected because it gave the researcher a better understanding of the phenomenon under investigation. This quantitative method study was used to examine the level of knowledge possessed and ICT instructional procedures implemented by teachers from three secondary schools. Teachers' responses to a survey reflecting ISTE Standards yielded quantitative data describing their level of knowledge related to integrating ICT to support their teaching (Sam, 2011). Data collected during teacher observations were compared with the teacher self-report survey responses as a means to determine the degree of relationship between knowledge, professional development opportunity, and degree of implementation of ICT related instruction.

The Research Sample

The teachers from three secondary schools located in a large Central Texas city were involved in the study. Convenience sampling was used to select the schools for this study. Convenience sampling is a kind of non-probability sampling method that selects the sampling from a population that is readily available to the researcher. Therefore, the data collection is from sources that are relatively easy to access (Research Methodology, 2016). These schools were selected because they are all urban schools, at least 50% of the student population is Hispanic, and 50% of the students are low SES. The researcher selected secondary school teachers to take the survey. The three schools are located about one to six miles from each other. School One is about one mile from School Two. School Three is about five miles from School Two. School One is about six miles from School Three. The three schools are representative of urban, secondary schools located within a city with a population of approximately 1.5 million individuals.

School One-District IB Charter School

There are about 800 students in School One. School One has a population that consists of 99% of students who are Hispanic and 93% of students are economically disadvantaged. Nineteen percent of the students are classified as English Language Learners (ELLs).

School One has 44 teachers. Twenty-five of the teachers are Hispanic (56.8%), nine are White (20.5%), six are African American (13.6%), three are two or more races (6.8%), and one is Asian (2.3%). School One has four beginning teachers (9.1%),

fourteen teachers have 1-5 years of experience (31.8%), five teachers have 6-10 years of experience (11.4%), thirteen teachers have 11-20 years of experience (29.5%), and eight teachers have over 20 years of experience (18.2%). A beginning teacher is a teacher who is in their first year of teaching.

School Two-College-Prep Charter School

The Charter School has about 500 students. The Charter School has a Hispanic population of 95%, and 88% of all the students are economically disadvantaged. Twenty-eight percent of the student population is classified as ELLs.

The Charter School has 24 teachers. Ten of the teachers are Hispanic (41.7%), eight are White (33.3%), five are African American (20.8%), and one is Asian (4.2%). The Charter School has one beginning teachers (4.2%), nineteen teachers have 1-5 years of experience (79.1%), two teachers have 6-10 years of experience (8.3%), one teacher has11-20 years of experience (4.2%), and one teacher has over 20 years of experience (4.2%).

School Three-District All-Female Charter School

School Three has an enrollment of about 425 students. School Three has a Hispanic population of 90%, and 60% of all the students are economically

disadvantaged. Approximately two percent of the student population is classified as ELLs.

School Three has 26 teachers. Twelve of the teachers are White (46.1%), ten are Hispanic (38.5%), and four are African American (15.4%). School Three has three beginning teachers (11.5%), seven teachers have 1-5 years of experience (27%), five teachers have 6-10 years of experience (19.2%), eight teachers have 11-20 years of experience (30.8%), and three teachers have over 20 years of experience (11.5%).

Instrumentation

A teacher survey was used for the data collection that included their educational background, teaching experience, staff development training, and twenty items total designed to obtain information on their level of ICT knowledge and integration according to the ISTE Standards for Teachers (see Appendix A). The instrument reflected the ISTE Standards for Teachers (ISTE-T), formally known as the National Education Technology Standards for Teachers (NETS-T) by the International Society for Technology in Education (ISTE, 2011). The instrument included three sections in which survey participants described their use of technology in the classroom (Sam, 2011). The instrument consists of a 5-point Likert scale that permits survey participants to determine their level of ICT knowledge and integration in each standard (Sam, 2011).

Sam (2011) validated the instrument by allowing the review of the instrument by three experts in educational technology, which included a high school technology director, a library media specialist of a middle school, and the technology director from

the state department of education in Rhode Island. The reliability of the instrument was established by Sam (2011) and produced a reliability coefficient of higher than 0.84 (Sam, 2011). For the study, the validity of the instrument was established by experts in educational technology which included one technology specialist and two library media specialists in Central Texas, by allowing them to review the instrument. Reliability of the instrument for the present study was established with the Cronbach's Coefficient of reliability of higher than 0.80.

Classroom observations were conducted by the researcher (see Appendix C). The researcher observed twelve teachers at each school for at least thirty minutes to determine the degree to which ICT literacies are being integrated into classroom instruction. These teachers were selected stratified randomly by selecting teachers with high ICT knowledge and teachers with low ICT knowledge. The classroom observation form includes twenty-four technology tools that could be used for instructional purposes. There are teacher and student columns to designate who was using the technology tool. These classroom observations were used to verify the teacher survey responses.

Data Collection Procedures

The researcher requested to attend a faculty meeting, in order to briefly explain what the study is about and to request teacher participation. The surveys were delivered to the three secondary schools by the researcher. The surveys were administered to the teachers by the researcher, while taking the proper steps to preserve confidentiality. Each survey was coded with a number and a code was assigned to the school. The surveys

were administered by the researcher during a faculty meeting in the school library during the fall of 2017. Surveys and questionnaires were turned in to the researcher within 30 minutes. Responses from this survey instrument were statistically analyzed. Descriptive statistics were used for participant profiles and to report summative findings of the participants' descriptions of their level of ISTE-T competency (Sam, 2011).

Data Analysis Procedures

The results of the surveys were reported by the use of descriptive statistics, such as frequencies, percentages, mean, and standard deviation in a table. An analysis of variance comparing the differences on the three questions between the three schools was calculated. The observations conducted were analyzed using frequencies. The data from the observations conducted was compared with the level of knowledge of the teachers. The Statistical Package for the Social Sciences (IBM SPSS, 2015) was used to analyze the quantitative data produced from the survey item.

The data from the survey demonstrated how secondary teachers described their level of knowledge of the ISTE Standards for Teachers. In addition, the survey included the amount of technology staff development hours the teachers have received. The researcher used a Cronbach's alpha reliability coefficient of 0.80 to make certain internal consistency of individual response items was ascertained. Frequency distributions were calculated using an F test with a criterion of statistical significance of $p < .05$. Comparison of the means was conducted using a one-way analysis of variance

(ANOVA) with Scheffe's post hoc tests. The tests were utilized to observe any differences from the survey data between the three secondary schools.

The data from the observations showed the frequency and the type of observed instruction in new literacies of the Internet and other technology that secondary teachers implemented. The researcher observed twelve teachers from each school. The researcher conducted a total of thirty-six observations. The observations and feedback gave the researcher data on the access of technology in the three secondary schools. The data from the observations was compared to the data from the surveys for the three secondary schools.

Summary

This quantitative method study used a survey and observational procedures to collect data that were quantitatively analyzed. This design allowed the researcher a better understanding of the phenomenon that was researched. This quantitative method study was used to examine the level of knowledge possessed and ICT instructional procedures implemented by teachers from three secondary schools. Teachers' responses to a survey reflecting ISTE Standards yielded quantitative data describing their level of knowledge related to integrating ICT to support their teaching (Sam, 2011). Data collected during teacher observations were compared with the teacher self-report survey responses as a means to determine the degree of relationship between knowledge, professional development opportunity, and degree of implementation of ICT related instruction.

CHAPTER IV

THE FINDINGS

Introduction

Research findings and an analysis of the data collected from this research study was included in this chapter. This research study used a quantitative method to collect data to show how secondary school teachers from three urban, secondary schools described their level of knowledge and integration of Information and Communication Technology (ICT) according to the International Society for Technology in Education (ISTE) Standards for Teachers. Secondly, this study investigated why, how and whether teachers in different secondary schools may integrate new literacies (or ICT) differently and whether ICT related professional development activities and procedures might differentially contribute to the integration of ICT into classroom instruction across the three schools.

Descriptive statistics was used for participant profiles and to report summative findings of the participants' descriptions of their level of knowledge according to the ISTE Standards for Teachers. The results of the surveys were reported by the use of descriptive statistics, such as frequencies, percentages, mean, and standard deviation in a table. An analysis of variance comparing the differences on the three questions between the three schools was calculated. The observations conducted were analyzed using frequencies. The data from the observations conducted was compared with the level of

knowledge of the teachers. The Statistical Package for the Social Sciences (IBM SPSS, 2015) was used to analyze the quantitative data produced from the survey item.

Research Questions

In comparing educators from three urban, secondary schools with a majority of CLD students:

1) How do the secondary schools' teachers' levels of professional knowledge related to integrating ICT based instruction as measured by responses on the sections I, II, and III of the ISTE survey differ?
2) How do professional development experiences pertaining to ICT integrated instruction for the three urban, secondary schools' teachers differ?
3) What are the differences in type and degree of access to ICT in the three urban, secondary schools?
4) What are the differences in frequency and type of observed instruction in new literacies of the Internet implemented by teachers in the three urban, secondary schools?

Data Collection Results

This research employed a survey and observational procedures to collect data that were quantitatively analyzed. This design was selected because it gave the researcher a better understanding of the phenomenon under investigation. This quantitative method study was used to examine the level of knowledge possessed and ICT instructional procedures implemented by teachers from three urban, secondary schools. Teachers' responses to a survey reflecting ISTE Standards yielded quantitative data describing their level of knowledge related to integrating ICT to support their teaching (Sam, 2011). Data collected during teacher observations were compared with the teacher self-report survey responses as a means to determine the degree of relationship between knowledge, professional development opportunity, and degree of implementation of ICT related instruction.

The survey was administered to study participants in the three urban, secondary schools during the fall 2017. The ISTE survey was administered by the researcher at the school library before the start of a faculty meeting. The researcher used these steps to ensure at least 50% response rate. First, a letter describing the study was sent to the principals. Second, the researcher sent an email to follow-up and to set an appointment with the principal. Third, the researcher met with the principal to discuss the study, obtain permission, and to set a timeline for the collection of the data. Lastly, the researcher went to administer the survey before the onset of a faculty meeting. The researcher conducted observations of twelve teachers at each school. In School One, twenty-five of the forty-four teachers completed the survey. In School Two, twenty-one

of the twenty-four teachers completed the survey. In School Three, twenty-three of the twenty-six teachers completed the survey. The overall response rate of 77.6% was obtained from the administration of the survey to the teachers from the three schools. Teachers from each school were observed and yielded a total of $N = 36$ classroom teachers. The researcher observed twelve teachers at each school. Data collected during teacher observations were compared with the teacher self-report survey responses as a means to determine the degree of relationship between knowledge, professional development opportunity, and degree of implementation of ICT related instruction.

The *International Society for Technology in Education Standards for Teachers* survey included demographic information of the survey respondents which is shown on Table 1. The analysis of the data indicates that 6% of the survey respondents were beginning teachers who were in their first year of teaching; 50% had 1-5 years of teaching experience; 11% had 6-10 years of teaching experience; 22% had 11-20 years of experience, and 11% had over 20 years of experience. School One is a district International Baccalaureate (IB) charter school and 36% of the respondents indicated working for School One. School Two is a college-preparatory charter school and 30% of the respondents indicated working for School Two. School Three is an all-female college-preparatory district charter school and 34% of the respondents indicated working for School Three.

Table 1 *Demographics of Survey Respondents Participating in the ISTE Survey*

Demographics	Number	Percentage
Years of Experience		
Beginning	4	6
1-5 years	34	50
6-10 years	8	11
11-20 years	15	22
21+ years	8	11
Type of School		
District IB Charter	25	36
College-Prep Charter	21	30
Dist. All-Female Charter	23	34

Research Design

This study (personification) used a quantitative method to examine the level of knowledge possessed and ICT instructional procedures implemented by teachers in three urban, secondary schools. This design was selected because it gave the researcher a better understanding of the phenomenon under investigation. Teachers' responses to a survey reflecting ISTE Standards yielded quantitative data describing their level of knowledge related to integrating ICT to support their teaching (Sam, 2011). Data collected during teacher observations were compared with the teacher self-report survey responses as a means to determine the degree of relationship between knowledge, professional development opportunity, and degree of implementation of ICT related instruction.

Reliability of Data

The reliability of the data from the surveys was established by calculating the alpha reliability for the five sections of the ISTE survey. The ISTE survey was expected to have acceptable reliability of at least 0.80. Table 2 shows the alpha reliability of the ISTE survey instrument. The ISTE survey had a total of 20 items and had a Likert scale. The five-point Likert scale survey was measured for reliability using a Cronbach alpha which yielded a reliability rate greater than .80.

Table 2 *Alpha Internal Consistency Reliabilities of Sections Within the International Society for Technology in Education Standards for Teachers Survey*

Section	Number of Items	Alpha Reliability
Facilitating and Inspiring Student Learning	4	.818
Developing and Designing Digital-Age Learning Experiences and Assessments	4	.802
Model Digital-Age Work and Learning	4	.896
Promoting and Making Digital Citizenship and Responsibility	4	.869
Engaging in Professional Growth and Leadership	4	.867

Data Analysis of Research Questions

Research Question 1: How do the secondary schools' teachers' levels of professional knowledge related to integrating ICT based instruction as measured by responses on the sections I, II, and III of the ISTE survey differ?

Research Question 1 was addressed using quantitative data from the survey instrument. The survey was administered to secondary teachers from three urban schools. The instrument had five sections from the ISTE Standards for Teachers, and each section consisted of n=4 response items which represented the standard of each section. The survey had a total of n=20 items. The participants in the study were a total of n=69 secondary teachers who responded to a total of 28 question items, including demographic and open-ended questions.

Table 3 contains data concerning how secondary teachers described their level of knowledge on the ISTE Standards for Teachers. The secondary teachers responded to a 5-point Likert scale survey to indicate their level of knowledge of the ISTE Standards for Teachers. The study participants responded to a 1 to 5 scale reflecting from low to high levels of knowledge of that particular standard. The mean scores of 3.06 (SD 1.1) to 3.77 (SD 1.1) range indicated a medium level of knowledge as described by secondary teachers of their level of knowledge of the ISTE Standards for Teachers.

Table 3 *Results in Percentages, Means, and Standard Deviations on the International Society for Technology in Education Standards for Teachers Survey N=20*

Survey Questions	Low	2	3	4	High	M	SD
Promote, support, and model creative innovative thinking and inventiveness. (1)	0	4	39	41	16	3.7	.8
Engage students in exploring real-world issues and solving authentic problems using digital tools and resources. (2)	3	6	33	35	23	3.7	1.0
Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative process. (3)	1	16	33	38	12	3.4	.9
Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments. (4)	3	10	42	26	19	3.5	1.0
Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity. (5)	1	12	32	46	9	3.5	.0
Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress. (6)	3	15	45	27	10	3.3	.9
Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources. (7)	3	10	46	29	12	3.4	.9
Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching. (8)	6	7	48	27	12	3.3	1.0

Table 3 Continued

Survey Questions	Low	2	3	4	High	M	SD
Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations. (9)	6	11	45	25	13	3.3	1.0
Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation. (10)	3	10	30	35	22	3.6	1.0
Communicate relevant information and ideas to parents, students, and peers using a variety of digital-age media and formats. (11)	4	9	31	39	17	3.6	1.0
Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning. (12)	6	15	36	30	13	3.3	1.1
Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright intellectual property, and the appropriate documentation of sources. (13)	7	3	30	35	25	3.7	1.1
Address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources. (14)	3	6	35	44	13	3.6	.9
Promote and model digital etiquette and responsible social interactions related to the use of technology and information. (15)	6	4	23	41	26	3.8	1.1
Develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaboration tools. (16)	12	9	23	42	14	3.4	1.2

Table 3 Continued

Survey Questions	Low	2	3	4	High	M	SD
Participate in local and global learning communities to explore creative applications of technology to improve student learning. (17)	9	20	42	15	14	3.1	1.1
Exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others. (18)	4	19	49	18	10	3.1	1.0
Evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning. (19)	6	12	46	23	13	3.3	1.0
Contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of the school community. (20)	1	10	47	22	20	3.5	1.0

Note. Survey Response Scale: 1=Low knowledge level, 2, 3, 4, 5=high knowledge level. Adapted from Standards issued by the International Society for Technology in Education (ISTE), 2008.

Response items 1, 2, 4, 5, 10, 11, 13, 14, 15, and 20 had a $M = 3.5$ or higher. Response item 1, *Promote, support, and model creative innovative thinking and inventiveness*, obtained a $M = 3.7$; 79.7% of the respondents described their level of knowledge as medium high level. The participants responded generally positively (68.1%) that they had medium high knowledge to item 2, *Engage students in exploring real-world issues and solving authentic problems using digital tools and resources*. The participants responded generally positively (68.1%) that they had medium high knowledge to item 4, *Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments*. The participants responded generally positively (78.3%) that they had medium high knowledge to item 5, *Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity*. The participants responded

generally positively (65.2%) that they had medium high knowledge to item 10, *Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation*. The participants responded generally positively (69.5%) that they had medium high knowledge to item 11, *Communicate relevant information and ideas to parents, students, and peers using a variety of digital-age media and formats*. The participants responded generally positively (65.2%) that they had medium high knowledge to item 13, *Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright intellectual property, and the appropriate documentation of sources*. The participants responded generally positively (78.3%) that they had medium high knowledge to item 14, *Address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources*. The participants responded generally positively (63.8%) that they had medium high knowledge to item 15, *Promote and model digital etiquette and responsible social interactions related to the use of technology and information*. The participants responded generally positively (68.1%) that they had medium high knowledge to item 20, *Contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school community*. The fact that the mean scores clustered between medium and medium high suggests that the majority of the participants described their level of knowledge of the ISTE-T standards as adequate.

Table 4 displays data regarding how teachers describe their level of knowledge of the ISTE-T standards in Category 1 by school classification. The survey was

administered to secondary teachers in three urban schools. Note that standard 2, *Engage students in exploring real-world issues and solving authentic problems using digital tools and resources*, and standard 4, *Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments*, did not have significant differences among school classification in category one.

Table 4 *Category 1: Facilitate – Analysis of Variance Results and Summary of Significant Differences (Summary) Among School Classification*

		School Type					
Category/ Item:		District IB Charter	College-Prep Charter	District All-Female Charter	F	p	Summary
Facilitate Section							
Mean	*M*	3.7	3.2	3.8	3.67	.145	NSD
	SD	.85	.95	.89			
1. Promote creative thinking	*M*	3.6	3.4	4.04	4.42	.016	SIG
	SD	.76	.67	.82			
2. Engage in real-world issues	*M*	4.0	3.3	3.8	2.94	.060	NSD[a]
	SD	1.02	.85	1.0			
3. Promote student reflection	*M*	3.6	2.9	3.8	6.63	.002	SIG
	SD	.77	1.01	.85			
4. Model collaborative knowledge construction	*M*	3.6	3.3	3.5	.70	.502	NSD
	SD	.86	1.27	.90			

SIG=significant difference. NSD=no significant difference. NSD[a]=approaching significant difference

In analyzing the data, standard 2 *Engage students in exploring real-world issues and solving authentic problems using digital tools and resources,* approached significance at F=2.94 and p=.060. Survey participants from the district charter schools had a higher mean than the college-preparatory charter school. These data indicate that teachers at the two district charter schools felt more knowledgeable and adept to use real-world issues and authentic problems with digital tools.

Note that standard 5 *Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity*, standard 6 *Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress*, standard 7 *Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources,* and standard 8 *Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching* did not have a significant difference among school classification in Category 2.

Table 5 *Category 2: Design – Analysis of Variance Results and Summary of Significant Differences (Summary) Among School Classification*

Category/ Item:		District IB Charter	School Type College-Prep Charter	District All-Female Charter	F	p	Summary
Design Section							
Mean	*M*	3.5	3.0	3.5	2.02	.164	NSD
	SD	.93	1.05	.73			
5. Design using digital tools	*M*	3.6	3.2	3.6	1.89	.160	NSD
	SD	.91	1.03	.58			
6. Develop Tech-enriched environments	*M*	3.28	3.0	3.5	1.16	.319	NSD
	SD	.98	.92	.90			
7.Customize learning activities	*M*	3.4	3.0	3.6	2.65	.078	NSD[a]
	SD	.96	.95	.78			
8. Provide summative and formative assessments	*M*	3.6	3.0	3.3	2.39	.099	NSD
	SD	.87	1.28	.98			

SIG=significant difference. NSD=no significant difference. NSD[a]=approaching significant difference

In analyzing the data, standard 7 *Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources* approached significance at *F*=2.65 and p=.078. Survey participants from the district charter schools had a higher mean than the college-preparatory charter school. These data indicate that teachers at the two district charter schools felt more knowledgeable and adept to customize learning activities.

Note that standard 10 *Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation* did not have a significant difference among school classification in Category 3.

Table 6 *Category 3: Model – Analysis of Variance Results and Summary of Significant Differences (Summary) Among School Classification*

Category/ Item:		School Type: District IB Charter	College-Prep Charter	District All-Female Charter	F	p	Summary
Model Section							
Mean	*M*	3.5	3.0	3.8	3.30	.056	SIG
	SD	.90	1.20	.90			
9. Demonstrate fluency in techn systems	*M*	3.3	2.8	3.7	4.07	.022	SIG
	SD	.85	1.21	.88			
10. Collaborate using digital tools	*M*	3.6	3.3	3.9	2.11	.130	NSD
	SD	.91	1.19	.95			
11. Communicate using a variety of digital media	*M*	3.7	3.1	3.6	3.67	.031	SIG
	SD	1.03	1.09	1.02			
12. Model use of digital tools to support research	*M*	3.4	2.9	3.7	3.35	.041	SIG
	SD	.81	1.31	.93			

SIG=significant difference. NSD=no significant difference. NSD[a]=approaching significant difference

In analyzing data, the four standards in Category 3 demonstrated the means of the district charter schools higher than the mean of the college-preparatory charter school. Although, standard 10 *Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation* did not have a significant difference among school classification in category three the means for the district charter schools were higher than the mean for the college-preparatory charter school. The data from Category 3 indicate that district charter school teachers felt more knowledgeable and adept in modeling digital-age work and learning.

The quantitative findings from the survey instrument suggest that the urban secondary teachers describe themselves as having an adequate amount of knowledge of the ISTE Standards for Teachers in Category 1, 2, and 3. The mean scores for the standards in Category 1, 2, and 3 N=12 had a mean of M=3.46. In particular, standards 3, 6, 7 8, 9, and 12 fell below the M=3.46. These standards indicated a lower mean score in the descriptive statistics. The analysis of variance demonstrated differences among schools in the standards 1, 3, 9, 11, and 12. District All-Female charter school teachers described themselves to some extent more knowledgeable in modeling creative innovative thinking, promoting student reflection, demonstrating fluency in technology systems, communicating with a variety of digital-age media, and facilitating digital tools to support research. District IB charter school teachers described themselves slightly more knowledgeable in engaging students in real-world issues and authentic problems using digital tools.

Research Question 2: How do professional development experiences pertaining to ICT integrated instruction for the three secondary schools' teachers differ?

Research Question 2 was addressed using quantitative data from the survey instrument. The survey was administered to secondary teachers from three urban schools. The instrument had five sections from the ISTE Standards for Teachers, and each section comprised of N=4 response items which represented the standard of each section. The survey had a total of N=20 items. The participants in the study were a total

of *N*=69 secondary teachers which responded to a total of 28 question items, including demographic and open-ended questions.

Table 7 demonstrates the professional development hours in technology received by the secondary teachers during the last four years. The study participants responded to an open-ended question item to designate the number of professional development hours in technology for the last four years. The mean scores of 1.36 (SD 4.6) to 1.58 (SD 5.3) range indicated a very low level of professional development hours in technology as described by secondary teachers of the three secondary schools.

Table 7 *Results in Percentages, Means, and Standard Deviations on the Professional Development in Technology*

Professional Development Hours	0	1-5	6-10	11-15	16-20	21-25	26-30	31-40	M	SD
School Year: 2017-2018	80	11	7	1	0	0	0	1	1.6	5.3
School Year: 2016-2017	86	6	4	0	3	1	0	0	1.4	4.4
School Year: 2015-2016	81	11	4	0	1	3	0	0	1.5	4.7
School Year: 2014-2015	86	7	3	0	1	3	0	0	1.4	4.6

The study participants responded to an open-ended question item to designate the number of professional development hours in technology for the last four years. The mean scores of 1.36 (SD 4.6) to 1.58 (SD 5.3) range indicated a very low level of professional development hours in technology as described by secondary teachers of the three secondary schools.

Table 8 displays data regarding how teachers describe their level of professional development hours in technology by school classification. The survey was administered to secondary teachers in three urban schools. Note that the professional development hours in technology in the four years did not have significant differences among school classification.

Table 8 *Analysis of Variance Results and Summary of Significant Differences (Summary) of Professional Development Hours in Technology Among Three Secondary Schools*

		School Type					
Year		District IB Charter	College-Prep Charter	District All-Female Charter	F	p	Summary
2017-2018	*M*	2.3	.81	1.5	.43	.650	NSD
	SD	8.03	2.32	.68			
2016-2017	*M*	1.2	.19	2.6	1.72	.188	NSD
	SD	4.33	.87	5.99			
2015-2016	*M*	1.3	.24	3.0	1.93	.154	NSD
	SD	4.34	1.09	6.56			
2014-2015	*M*	1.2	.24	2.6	1.42	.250	NSD
	SD	4.33	1.09	6.52			

SIG=significant difference. NSD=no significant difference. NSD[a]=approaching significant difference

In analyzing the data, in school year 2015-2016 F=1.93 and p=.154. Survey participants from the district charter schools had a higher mean than the college-

preparatory charter school. These data indicate that teachers at the two district charter schools reported slightly more professional development hours in technology. The data suggest that the teachers at the three secondary schools received very few hours in professional development in technology during the last four years.

Research Question 3: What are the differences in type and degree of access to ICT in the three secondary schools?

Research Question 3 was addressed using quantitative data from the survey instrument. The survey was administered to secondary teachers from three schools. The instrument had five sections from the ISTE Standards for Teachers, and each section comprised of n=4 response items which represented the standard of each section. The survey had a total of n=20 items. The participants in the study were a total of n=69 secondary teachers which responded to a total of 28 question items, including demographic and open-ended questions.

Table 9 demonstrates the type of technology teachers use the majority of the time in the three urban, secondary schools. The study participants responded to an open-ended question item to indicate the type of technology they use most of the time.

Table 9 *Results in Percentages on the Types of Technology Used by Teachers*

Type of Technology	All Charters	District IB Charter	College-Prep Charter	District All-Female Charter
Computer, Elmo, Eiki	62	68	90	30
Smartboard, Computer, Elmo, Eiki	30	20		70
iPad, Computer, Elmo, Eiki				
Computer, Elmo, Eiki, Clickers	2	4		
Computer, Elmo, Eiki, Phones	4	8	5	
Computer, Elmo, Eiki, Kindle	2		5	

The responses indicate that 62% of teachers in the three urban, secondary schools use a computer, Elmo, and Eiki to teach students. The survey responses indicated that 30% of teachers in the three urban, secondary schools use a Smartboard, computer, Elmo, and Eiki during instruction. The responses for the District IB Charter School demonstrated that 68% of the teachers use a computer, Elmo, and Eiki to teach students and 20% of the teachers use a Smartboard, computer, Elmo, and Eiki. The responses for the College-Prep Charter School showed that 90% of the teachers use a computer, Elmo, and Eiki to teach. The survey responses indicated that 30% of the teachers in the District All-Female Charter School use a computer, Elmo, and Eiki during instructional time, and 70% of the teachers use a Smartboard, computer, Elmo, and Eiki to teach students.

Table 10 demonstrates the type of technology students use the majority of the time in the three urban, secondary schools. The study participants responded to an open-ended question item to indicate the type of technology they use most of the time.

Table 10 *Results in Percentages on the Types of Technology Used by Students*

Type of Technology	All Charters	District IB Charter	College-Prep Charter	District All-Female Charter
No Technology Used	18	4	10	40
Laptops/Chromebooks	58	56	80	40
iPads	1			4
Computer Lab Only	1			4
Laptops/Chromebooks/Cell Phones	16	28	10	8
Cell Phones Only	3	8		
Laptops/Chromebooks/Clickers	3	4		4

The survey responses showed that 18% of the students from the three secondary schools do not use technology during their learning in class. The responses demonstrated that 58% of the students from the three secondary schools use laptops or Chromebooks. The responses indicated that 16% of the students from the three secondary schools use laptops or Chromebooks and cell phones during their learning time in the classroom. Responses indicated that 4% of the students do not use technology in the District IB Charter School, and that 56% of the students use laptops or Chromebooks. The survey responses demonstrated that 28% of the students in the District IB Charter School use laptops or Chromebooks and cell phones in the classroom. The responses from the survey showed that 10% of the students do not use technology in the College-Prep Charter School, and that 80% of the students use laptops or Chromebooks. The survey responses indicated that 10% of the students in the College-Prep Charter School use laptops or Chromebooks and cell phones in the

classroom. Survey responses indicated that 40% of the students do not use technology in the District All-Female Charter School, and that 40% of the students use laptops or Chromebooks. The survey responses demonstrated that 8% of the students in the District All-Female Charter School use laptops or Chromebooks and cell phones during their learning in the classroom.

Table 11 demonstrates the ways technology is used by students in the three secondary schools. The study participants responded to an open-ended question item to indicate the type of technology they use most of the time.

Table 11 *Results in Percentages on the Ways Technology Is Used by Students*

Type of Technology	All Charters	District IB Charter	College-Prep Charter	District All-Female Charter
Research	12	8	0	26
Games	6	8	9	
Assessments	4		9	4
Research and Assessments	4	4	5	4
Internet Resources/Games/Research	60	76	72	31
Microsoft Word and PPT only	14	4	5	35

The survey responses showed that 60% of the students from the three urban, secondary schools use technology for Internet resources, games, and research in class. The responses demonstrated that 14% of the students from the three secondary schools

use technology for Microsoft Word and PowerPoint only. The responses indicated that 12% of the students from the three secondary schools use technology for research only during their learning time in the classroom. Responses indicated that 76% of the students use technology for Internet resources, games, and research in the District IB Charter School, and that 8% of the students use technology for games only. The survey responses demonstrated that 8% of the students in the District IB Charter School use technology for research only in the classroom. The responses from the survey showed that 72% of the students use technology for Internet resources, games, and research in the College-Prep Charter School, and that 9% of the students use technology for games. The survey responses indicated that 9% of the students in the College-Prep Charter School use technology for Assessments only in the classroom. Survey responses indicated that 35% of the students use technology for Microsoft Word and PowerPoint only in the District All-Female Charter School, and that 31% of the students use technology for Internet resources, games, and research. The survey responses demonstrated that 26% of the students in the District All-Female Charter School use technology for research only during their learning in the classroom.

Table 12 demonstrates results in frequencies on the access to technology based on the observations n=36 and feedback of the three secondary schools.

Table 12 *Results in Frequencies on the Access to Technology in Observed Classrooms*

Type of Technology	All Charters	District IB Charter	College-Prep Charter	District All-Female Charter
Smartboard	19	8	0	11
Cart of Laptops/Chromebooks	15	5	7	3
Teacher Computer	36	12	12	12
Eiki Projector	36	12	12	12
Elmo Document Camera	24	11	12	1
Printer	8	7	0	1
iPads	1	0	1	0
Kindles	1	0	0	1
Electronic Calculators	2	0	0	2
T.V.	3	3	0	0
Teacher Cell Phone	2	0	2	0

Based on the observations *n*=36, all the teachers had a teacher computer or laptop and a projector. The data demonstrated that 24 teachers had an Elmo or document camera in the three secondary schools. The data from the observations indicated that 19 teachers have access to a Smartboard or Interactive Whiteboard. Furthermore, the data showed 15 teachers had a cart with student laptops. The carts of student laptops are shared by grade level or with another teacher. Two teachers were observed using behavior management App called "Life School" on their cell phones during the observations. The data indicated that 8 teachers observed had Smartboards at the District IB Charter School and 11 teachers observed had Smartboards at the District All-Female Charter School. The school district purchased Smartboards for the teachers in

their district at the beginning of the school year 2017-2018. According to the data from the classroom observations, 5 teachers had a cart of student laptops at District IB Charter School. The data showed that 7 teachers observed had a cart of student laptops or Chromebooks at the College-Prep Charter School. The data from the observations demonstrated 3 teachers had a cart of student laptops or Chromebooks at the District All-Female Charter School. The data demonstrates that schools may be in need of more laptops, Chromebooks, or iPads for student use.

Research Question 4: What are the differences in frequency and type of observed instruction in new literacies of the Internet implemented by teachers in the three secondary schools?

Research Question 4 was addressed using quantitative data from the classroom observations n=36. The researcher observed twelve teachers n=12 at each school for at least thirty minutes to determine the degree to which ICT literacies are being integrated into classroom instruction. These teachers were selected stratified randomly by selecting teachers with high ICT knowledge and teachers with low ICT knowledge. The classroom observation form includes twenty-four technology tools that could be used for instructional purposes. There are teacher and student columns to designate who was using the technology tool. These classroom observations were used to verify the teacher survey responses.

The data from the observations showed the frequency and the type of observed instruction in new literacies of the Internet and other technology that secondary teachers

implemented. The researcher observed twelve teachers *n*=12 from each school. The researcher conducted a total of thirty-six observations *n*=36. The observations and feedback gave the researcher data on the access of technology in the three secondary schools. The data from the observations were compared to the data from the surveys for the three urban, secondary schools.

Table 13 demonstrates results in frequencies on the types of new literacies observed based on the observations *n*=36 of the three secondary schools.

Table 13 *Results in Frequencies on the Types of New Literacies Being Used by Students*

Type of New Literacies	All Charters	District IB Charter	College-Prep Charter	District All-Female Charter
Reading Digital Text	6	3	3	
Blogging				
Social Networking				
Virtual Worlds				
Video Games				
Navigating/Evaluating Internet Info	1	1		
Video Editing				
Web Authorizing Software				
Podcasts				
Wikis				
Videos	4	1	2	1
Instant Messaging				
Fan Fiction				
Emailing	1			1
Online Discussion				
Creating Music Videos				
Photoshopping Images				
Photo Sharing				
Digital Mashups				
Google Classroom	1		1	

Reading digital text by students was observed in 3 classrooms in the District IB Charter School. Reading digital text by students was observed in 3 classrooms in the College-Prep Charter School. There were no classes observed reading digital text by

students in the District All-Female Charter School. The results indicate that teachers may not be implementing enough new literacies instruction in the classrooms.

The survey responses showed that 60% of the students from the three secondary schools use technology for Internet resources, games, and research in class. The data from the observations showed that 36% of the observations included students using Internet resources, games or research as part of their instruction. Responses indicated that 76% of the students use technology for Internet resources, games, and research in the District IB Charter School. Data from the observations indicated that 42% of the observations involved the use of Internet resources, games, or research at the District IB Charter School. The responses from the survey showed that 72% of the students use technology for Internet resources, games, and research in the College-Prep Charter School. Data from the observations showed that 50% of the observations involved the use of Internet resources, games, or research by the students at the College-Prep Charter School. Survey responses indicated that 31% of the students use technology for Internet resources, games, and research in the District All-Female Charter School. Data from the observations indicated that 17% of the observations involved the use of Internet resources, games, or research by the students at the District All-Female Charter School. The data indicate that in comparison to the information on the teacher survey, students are not participating in the literacies of the Internet as much as the survey indicates.

Summary

A quantitative method was used in this research study to collect data to demonstrate how secondary school teachers from three urban, secondary schools described their level of knowledge and integration of Information and Communication Technology (ICT) according to the International Society for Technology in Education (ISTE) Standards for Teachers. Secondly, this study investigated why, how and whether teachers in different secondary schools may have integrated new literacies (or ICT) differently and whether ICT related professional development activities and procedures might have differentially contributed to the integration of ICT into instruction across the three urban, secondary schools.

The secondary teachers responded to a 5-point Likert scale survey to indicate their level of knowledge of the ISTE Standards for Teachers. The study participants responded to a 1 to 5 scale reflecting from low to high levels of knowledge of that particular standard. The mean scores of 3.06 (SD 1.1) to 3.77 (SD 1.1) range indicated a medium level of knowledge as described by secondary teachers of their level of knowledge of the ISTE Standards for Teachers. The participants described their level of knowledge of the ISTE-T standards as sufficient due to the mean scores collecting between medium and medium high. The quantitative findings from the survey instrument suggested that the urban secondary teachers described themselves as having an adequate amount of knowledge of the ISTE Standards for Teachers in Category 1, 2, and 3. The mean scores for the standards in Category 1, 2, and 3 N=12 had a mean of M=3.46.

The study participants responded to an open-ended question item to designate the number of professional development hours in technology for the last four years. The mean scores of 1.36 (SD 4.6) to 1.58 (SD 5.3) range indicated a very low level of professional development hours in technology as described by secondary teachers of the three urban, secondary schools. The professional development hours in technology in the four years did not have significant differences among school classification. The data suggested that the teachers at the three secondary schools received a very small amount of professional development hours in technology during the last four years.

The responses indicated that 62% of teachers in the three urban, secondary schools used a computer, Elmo, and Eiki to teach students. The survey responses indicated that 30% of teachers in the three urban, secondary schools use a Smartboard, computer, Elmo, and Eiki during instruction. The survey responses showed that 18% of the students from the three secondary schools do not use technology during their learning in class. The responses demonstrated that 58% of the students from the three secondary schools use laptops or Chromebooks. The responses indicated that 16% of the students from the three secondary schools used laptops or Chromebooks and cell phones during their learning time in the classroom.

Based on the observations n=36, all the teachers had a teacher computer or laptop and a projector. The data demonstrated that 24 teachers had an Elmo or document camera in the three secondary schools. The data from the observations indicated that 19 teachers had access to a Smartboard or Interactive Whiteboard. Furthermore, the data

showed 15 teachers had a cart with student laptops. The carts of student laptops were shared by grade level or with another teacher. The data demonstrated that schools may be in need of more laptops, Chromebooks, or iPads for student use.

Data collected during teacher observations were compared with the teacher self-report survey responses as a means to determine the degree of relationship between knowledge, professional development opportunity, and degree of implementation of ICT related instruction. Based on the observations n=36, the data demonstrated that reading digital text by students was observed in 6 classrooms and watching video clips by students was observed in 4 classrooms. The results indicated that teachers may not be implementing enough new literacies instruction in the classrooms. The survey responses showed that 60% of the students from the three secondary schools used technology for Internet resources, games, and research in class. The data from the observations showed that 36% of the observations included students using Internet resources, games or research as part of their instruction. The data indicated that in comparison to the information on the teacher survey, students were not participating in the literacies of the Internet as much as the survey indicated.

Due to this study, there are important issues that all stakeholders need to take into account to address the needs of students, especially CLD and low SES students. Many students do not have access to an adequate amount of integration of ICT. Students are not developing the twenty-first century skills needed in the *Digital Age.* Educators are not receiving enough professional development and support to address the needs for the

twenty-first century. Some schools lack technology resources, teacher support, and ICT integration into the learning. Students who do not have access to ICT or do not know how to use the new technologies are at a disadvantage in comparison to middle and upper-middle class students (Warschauer & Ware, 2008). Warschauer and Ware (2008) posited that social, economic, cultural, and linguistic contexts of marginalized groups influence the access to education, academic achievement, literacy, and ICT. Schools with low SES students focus on off-line reading skills to raise their test scores (Leu, McVerry, O'Byrne, Zawilinski, Castek, & Hartman, 2009). Educators concentrate their efforts on improving scores on state assessments which do not test ICT literacy strategies and skills. Therefore, students are exposed to rudimentary literacy and technology practices instead of integration of ICT (Leu et al., 2009). The digital divide, in that computer and internet access is divided among demographics and socio-economic status is widespread (Leu, et al., 2009). Lower SES schools lack funding and resources and do not usually have up-to-date instructional technology. Consequently, marginalized students are not exposed to those digital experiences that mainstream students receive (Lucey & Grant, 2009).

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This quantitative method research study examined how secondary school teachers from three urban, secondary schools described their level of knowledge and integration of Information and Communication Technology (ICT) according to the International Society for Technology in Education (ISTE) Standards for Teachers. Secondly, this study investigated why, how and whether teachers in different secondary schools may integrate new literacies (or ICT) differently and whether ICT related professional development activities and procedures might differentially contribute to the integration of ICT into classroom instruction across the three schools.

Problem Statement

Many students in urban, low SES schools receive basic literacy and technology instruction instead of ICT integration in their learning. Educators have the demand of improving scores on the state assessments which do not include ICT literacy strategies and skills (Leu, et al., 2009). All students, including low SES CLD students, are exposed to the ill effects of standardized assessments, such as teachers focusing on only the tested standards. In a study conducted in eighteen states, Amrein and Berliner (2003) reported that high-stake testing has not resulted in measurable improvement in student achievement in the Advance Placement (AP) tests, the National Assessment of Educational Progress (NAEP), the Scholastic Assessment Test (SAT), and the Academic College Test (ACT) exams.

Currently, there is a digital divide among different demographic groups. Computer and internet access is not equally dispersed among various demographic populations, including lower socio-economic status. Many marginalized students do not have access to a computer and Internet at home. In addition, lower SES schools do not have the funding and resources needed for the latest instructional technology. Consequently, low SES students do not have the digital experiences that mainstream students experience (Lucey & Grant, 2009).

The inequitable access and application of ICT are factors that adversely affect lower SES students from becoming marketable employees and informed citizens. Individuals who do not have access to ICT or do not know how to use the new

technologies are at a disadvantage in comparison to middle and upper-middle class students (Warschauer & Ware, 2008). Warschauer and Ware (2008) posited that social, economic, cultural, and linguistic contexts of marginalized groups influence the access to education, academic achievement, literacy, and ICT. On the other hand, school officials allocate the technology resources and determine if teachers will send students to a computer lab, and if teachers will use their computer for mostly administrative purposes (Lucey & Grant, 2009). The inequitable educational practices have continued today by not providing adequate learning in ICT, in particular, new literacies for CLD and low SES students (Warschauer & Ware, 2008).

Principal Findings

This quantitative study yielded some findings based on the data analysis of the ISTE survey results and the classroom observations conducted by the researcher. The findings will be presented by addressing each research question.

Research Question 1: How do the secondary schools' teachers' levels of professional knowledge related to integrating ICT based instruction as measured by responses on the sections I, II, and III of the ISTE survey differ?

Principal Finding 1: Level of Knowledge of ISTE-T Standards. Descriptive statistics was used for participant profiles and to report summative findings of the participants' descriptions of their level of knowledge according to the ISTE Standards for Teachers. The participants in the study were a total of n=69 secondary teachers which responded to a total of 28 question items, including demographic and open-ended

questions. The mean scores of 3.06 (SD 1.1) to 3.77 (SD 1.1) range indicated a medium level of knowledge as described by secondary teachers of their level of knowledge of the ISTE Standards for Teachers. Due to the mean scores collecting between medium and medium high suggests that the majority of the participants described their level of knowledge of the ISTE-T standards as adequate.

The findings suggest that the urban, secondary teachers describe their level of knowledge of the ISTE-T standards as sufficient. But, these results may indicate that they are not aware or fully understand the ISTE-T standards. The ISTE Standards, formally known as the National Education Technology Standards (NETS), are recognized and adopted throughout the world. The ISTE-T standards set a higher standard of integrating technology and effective pedagogy for twenty-first century learning and teaching. When the ISTE-T standards are used, education is transformed into twenty-first century learning (ISTE, 2014). Based on the survey results and the classroom observations, the data indicated that teachers may not be sufficiently knowledgeable of the ISTE-T standards. Data collected during teacher observations were compared with the teacher self-report survey responses as a means to determine the degree of relationship between knowledge, professional development opportunity, and degree of implementation of ICT related instruction.

Principal Finding 2: Teachers at the two district charter schools felt more knowledgeable and adept to promote creative innovative thinking, use real-world issues and authentic problems with digital tools, and promote student reflection using

collaborative tools. Standard 1 *Promote, support, and model creative innovative thinking and inventiveness* had a significant difference at F=4.42 and p=.016. Standard 2 *Engage students in exploring real-world issues and solving authentic problems using digital tools and resources* approached significance at F=2.94 and p=.060. Survey participants from the district charter schools had a higher mean than the college-preparatory charter school. Standard 3 *Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative process* had a significant difference at F=6.63 and p=.002. These data indicate that teachers at the two district charter schools felt more knowledgeable and adept to promote creative innovative thinking, use real-world issues and authentic problems with digital tools, and promote student reflection using collaborative tools. This may be attributed to the number of years of experience in teaching in comparison to the teachers at the College-Prep Charter School. Teachers with more experience also have more professional development experiences in learning and teaching.

The District IB Charter School had four beginning teachers (9.1%), fourteen teachers had 1-5 years of experience (31.8%), five teachers had 6-10 years of experience (11.4%), thirteen teachers had 11-20 years of experience (29.5%), and eight teachers had over 20 years of experience (18.2%). A beginning teacher is a teacher who is in his/her first year of teaching. The College-Prep Charter School had one beginning teacher (4.2%), nineteen teachers had 1-5 years of experience (79.1%), two teachers had 6-10 years of experience (8.3%), one teacher had 11-20 years of experience (4.2%), and one teacher had over 20 years of experience (4.2%). The District All-Female Charter School

had three beginning teachers (11.5%), seven teachers had 1-5 years of experience (27%), five teachers had 6-10 years of experience (19.2%), eight teachers had 11-20 years of experience (30.8%), and three teachers had over 20 years of experience (11.5%). In the College-Prep Charter School, 83.3% of the teachers had five or less years of teaching experience, while the District IB Charter School and the District All-Female Charter School had 40.9% and 38.5% respectively. The majority of the teachers at the College-Prep Charter School had less teaching experience than the majority of the teachers at the two district charter schools. Thus, based on the data the teachers at the two district charter schools felt more knowledgeable and adept to promote creative innovative thinking, use real-world issues and authentic problems with digital tools, and promote student reflection using collaborative tools. This may be contributed to the number of years of experience in teaching and the professional development hours received in prior years in comparison to the teachers at the College-Prep Charter School.

Problem-based learning (PBL) is a student-centered, inquiry-based instructional method which requires students to solve a problem that is poorly structured (Jonassen & Hung, 2008). PBL uses real-world problems that students can solve collaboratively (Hung et al., 2008). Students are motivated and engaged in the problem-solving process due to the authenticity of the problems (Generareo & Lyons, 2015). Students investigate to find out the information that is needed to solve the problem, conduct research, develop solutions, and present conclusions to the problem (Barrows, 1996). PBL is an exceptional instructional method because it is problem-centered. A problem is the inception of the learning process. As students work towards solving the problem,

students gain knowledge and skills. Students are no longer receiving the content knowledge in a sequence by a textbook or the teacher, but the content is organized as a problem or a succession of problems (Hung, 2009).

The ISTE Standards for Teachers set a high bar for educators to transform learning and teaching in our digital age and changing global, job market. The skills that are obtained by implementing these standards are as follows:

- Develop problem solving skills, critical thinking, and creativity
- Plan student-centered, project-based learning, and utilization of Internet
- Provides a guide to assist in the transformation of our schools to become digital age learning environments
- Prepares students for the global job market
- Incorporates professional models for collaborating and making decisions using technology (ISTE, 2014).

Teachers must possess the digital knowledge and skills, in order to provide a learning environment conducive to twenty-first century learning. Educators must be willing to learn along-side students and other professionals in this digital age (ISTE, 2014).

Principal Finding 3: Category 2 did not have a significant difference among school classification, but teachers at the two district charter schools felt slightly more knowledgeable and adept to customize learning activities. The second category, *Design*, includes standard 5 *Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity*,

standard 6 *Develop technology-enriched learning environments that enable all student to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress*, standard 7 *Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources*, and standard 8 *Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching*. Category 2 did not have a significant difference among school classification. Standard 7 *Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources* approached significance at F=2.65 and p=.078. Survey participants from the district charter schools had a higher mean than the college-preparatory charter school. These data indicate that teachers at the two district charter schools felt lightly more knowledgeable and adept to customize learning activities.

Society and schools need to create learning environments to engage students in a wide range of literacy practices that are challenging, innovative, and allow for meaning making through text and media (New London Group, 1996). Multiliteracies pedagogy facilitates constructivist model of learning in which students learn by making meaning through authentic experiences (Borsheim, Merrit, & Reed, 2008). Multiliteracies pedagogy is used to advance other literacies besides the traditional objectives (Borsheim et al., 2008).

Multiliteracies assessment is an integral piece of the educational system and needs to be addressed, in order to integrate a Multiliteracies framework and pedagogy. Multiliteracies assessment can include projects, performance assessments, group assessments, and portfolio assessments (Kalantzis et al., 2003). Projects would include problem-based or otherwise. Project assessment would include planning, organizing, problem solving, and presenting. Project assessments entail a wide and deep understanding of the concepts. Performance assessments consist of planning, organizing, and implementing. Performance assessments require a deep understanding of the learning. Group assessments comprise of collaboration skills, problem solving skills, and conflict resolution skills. Group assessments require deep understanding and, on some occasions, broad understanding of the learning. Portfolio assessments include the measurement of the students' experiences and strengths, and the ability to reflect on their learning (Kalantzis et al., 2003).

This study shows that schools and educators are not providing students with sufficient learning with ICT, including the development of other twenty-first century skills that are needed to meet the global and digital demands needed for the workforce. Students need broad and deep learning that will prepare them to address problems and issues in our global society. Students need intellectual skills that will assist them to work in an innovative and effective manner. Students need to exercise personal, civic, and social responsibility in a diverse democracy. In addition, twenty-first century students need to have the capacity to integrate and apply their learning to real-world problems and be proficient in using technological tools (AAC&U, 2007).

Finding 4: District charter school teachers felt more knowledgeable and adept in modeling digital-age work and learning. Standard 9 *Demonstrate fluency in technology systems and the transfer of current knowledge systems to new technologies and situations* had a significant difference at F=4.07 and p=.022. Standard 11 *Communicate relevant information and ideas to parent, students, and peers using a variety of digital-age media and formats* had a significant difference at F=3.67 and p=.031. Standard 12 *Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning* had a significant difference at F=3.35 and p=.041. The four standards in Category 3 demonstrated the means of the public charter schools higher than the mean of the college-preparatory charter school. Although, standard 10 *Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation* did not have a significant difference among school classification in Category three the means for the public charter schools were higher than the mean for the college-preparatory charter school. The data from Category 3 indicate that district charter school teachers felt more knowledgeable and adept in modeling digital-age work and learning.

Historically, literacy encompassed reading and writing skills. In the twenty-first century, literacy includes a broader assortment of literacies, such as information, communication, multimedia technologies, and culturally specific literacies. The multiliteracies framework consists of situated practice, overt instruction, critical framing and transformed practice. The multiliteracies framework entails meaningful

experiences, explicit instruction to support the development of concepts, and the opportunity to reflect and examine what was learned in a critical manner in relation to their social relevance. They should also have the opportunity to apply what they have learned to the real world and understand how their knowledge and insights can be instrumental to positively affect people and issues (The New London Group, 1996). Globalization has changed the job market to include the use of multiliteracies to communicate and accomplish its goals (Johnson & Kress, 2003).

The Designs of meaning encompass six areas based on a greater understanding of 'texts': Linguistic Design; Audio Design; Visual Design: Gestural Design; Spatial Design, and Multimodal Design (Kalantzis & Cope, 2001). Multimodal responses to literacy instruction assist students in making connections and improving understanding of literary components. Digital technology assists to bring meaning by using visual, audio, verbal, and animated texts. This permits students to have purposeful experiences that motivate them to be more engaged in their learning. By using these multimodal response strategies, students will learn to think critically and increase literacy skills (Whitin, 2009). Digital writing can be used by learners to respond to literacy instruction. Thus, digital literacy allows for change in pedagogical approaches and the curriculum (Merchant, 2008).

Student achievement could be improved by implementing a multiliteracies framework and pedagogy. Research on multiliteracies (New London Group, 1996) has emphasized the importance of engaging students in a variety of creative and challenging

literacy practices coupled with text-based and different modes of multimedia. Furthermore, Cummins' (2001) Academic Expertise framework stresses the co-construction of knowledge and critical inquiry for cognitive growth. This theory includes active self-regulated learning, deep understanding, and building on learner's background knowledge, as well. According to Cummins (2001), instruction should focus on three elements:

(1) Focus on Meaning (which delineates a focus on critical literacy moving beyond a surface-level reading of a text);
(2) Focus on Language (i.e., understanding not only linguistic codes but a critical language awareness of how language as a form of capital intersects with power and functions within society to include or exclude people from achieving specific social goals); and
(3) Focus on Use (where instruction creates opportunities for all students to produce knowledge, create multimodal texts, and respond to diverse social realities) (Giampaya, 2010, p. 411).

Thus, the multiliteracies pedagogy permits the connection between multilingual practices and multimodal types of meaning-making (Giampaya, 2010).

Research Question 2: How do professional development experiences pertaining to ICT integrated instruction for the three secondary schools' teachers differ?

Finding 5: Teachers at the three secondary schools received very few hours in professional development in technology during the last four years. The mean scores of

1.36 (SD 4.6) to 1.58 (SD 5.3) range indicated a very low level of professional development hours in technology as described by secondary teachers of the three secondary schools. The professional development hours in technology in the four years did not have significant differences among school classification. In school year 2015-2016 F=1.93 and p=.154. Survey participants from the district charter schools had a higher mean than the college-preparatory charter school. This data indicated that teachers at the two district charter schools reported slightly more professional development hours in technology. The data suggest that the teachers at the three secondary schools received very few hours in professional development in technology during the last four years.

The manner in which professional development has been implemented in the past has not been very effective. This conventional approach has not made a long-term improvement on instructional practices. The professional development must be designed taking into account the context of the educational setting and the broader educational goals (Wells, 2007). High quality professional development is not only essential, but critical, when implementing an educational reform. Professional development should be long-term with follow-up sessions, and the workshops should have active participation in relevant activities. The professional development should also cultivate collaboration, community building and shared understanding of student achievement among the attendees and should include access to new technologies (Martin et al, 2010).

Research Question 3: What are the differences in type and degree of access to ICT in the three secondary schools?

Finding 6: The two district charter schools had access to Smartboards. The responses indicated that 62% of teachers in the three urban, secondary schools used a computer, Elmo, and Eiki to teach students. The survey responses indicated that 30% of teachers in the three urban, secondary schools used a Smartboard, computer, Elmo, and Eiki during instruction. The responses for the District IB Charter School demonstrated that 68% of the teachers used a computer, Elmo, and Eiki to teach students and 20% of the teachers used a Smartboard, computer, Elmo, and Eiki. The responses for the College-Prep Charter School showed that 90% of the teachers used a computer, Elmo, and Eiki to teach. The survey responses indicated that 30% of the teachers in the District All-Female Charter School used a computer, Elmo, and Eiki during instructional time, and 70% of the teachers used a Smartboard, computer, Elmo, and Eiki to teach students.

Based on the observations n=36, all the teachers had a teacher computer or laptop and a projector. The data demonstrated that 24 teachers had an Elmo or document camera in the three secondary schools. The data from the observations indicated that 19 teachers had access to a Smartboard or Interactive Whiteboard. The data indicated that 8 teachers observed had Smartboards at the District IB Charter School and 11 teachers observed had Smartboards at the District All-Female Charter School. The school district purchased Smartboards for the teachers at the beginning of the school year 2017-2018. Therefore, the two district charter schools had access to Smartboards.

Computer and internet access is not equally distributed among various demographic groups, including lower socio-economic status. This digital divide exists because many lower SES students do not have access to a computer and Internet at home. Schools with a larger population of low SES students do not have the funding and resources, including current instructional technology. Consequently, marginalized students do not experience those digital experiences that mainstream student receive (Lucey & Grant, 2009). The inequitable access and application of ICT are factors that adversely keep low SES students from becoming marketable employees and informed citizens. Due to the lack of access to ICT and the knowledge needed to use the new technologies, lower SES students are at a disadvantage in comparison to middle and upper-middle class students (Warschauer & Ware, 2008). Warschauer and Ware (2008) posited that social, economic, cultural, and linguistic contexts of marginalized groups influence the access to education, academic achievement, literacy, and ICT. Conversely, school officials allocate the technology resources and decide if educators will send students to a computer lab, and if teachers will use their computer for mostly administrative purposes (Lucey & Grant, 2009). The inequitable educational practices have continued today by not providing adequate learning in ICT, in particular, new literacies for CLD and low SES students (Warschauer & Ware, 2008).

This study demonstrates how many students, including CLD students, are not receiving a twenty-first century education and are not being prepared to meet the demands of the digital society. Due to the demands of state assessments, possible lack of funding, and insufficient professional development in ICT, school districts are not

giving students an education that will prepare them for the *Information Age.* Marginalized students are not being provided with sufficient access to technology and ICT instruction.

Finding 7: Schools may be in need of more laptops, Chromebooks, or iPads for student use. The survey responses showed that 18% of the students from the three secondary schools do not use technology during their learning in class. The responses demonstrated that 58% of the students from the three secondary schools use laptops or Chromebooks. The responses indicated that 16% of the students from the three secondary schools use laptops or Chromebooks and cell phones during their learning time in the classroom. Responses indicated that 4% of the students do not use technology in the District IB Charter School, and that 56% of the students use laptops or Chromebooks. The survey responses demonstrated that 28% of the students in the District IB Charter School use laptops or Chromebooks and cell phones in the classroom. The responses from the survey showed that 10% of the students do not use technology in the College-Prep Charter School, and that 80% of the students use laptops or Chromebooks. The survey responses indicated that 10% of the students in the College-Prep Charter School use laptops or Chromebooks and cell phones in the classroom. Survey responses indicated that 40% of the students do not use technology in the District All-Female Charter School, and that 40% of the students use laptops or Chromebooks. The survey responses demonstrated that 8% of the students in the District All-Female Charter School use laptops or Chromebooks and cell phones during their learning in the classroom.

Based on the observations, data showed 15 teachers had a cart with student laptops. The carts of student laptops were shared by grade level or with another teacher. According to the data from the classroom observations, 5 teachers had a cart of student laptops at District IB Charter School. The data showed that 7 teachers observed had a cart of student laptops or Chromebooks at the College-Prep Charter School. The data from the observations demonstrated 3 teachers had a cart of student laptops or Chromebooks at the District All-Female Charter School. The data demonstrates that schools may be in need of more laptops, Chromebooks, or iPads for student use.

Globalization, immigration, and outsourcing by corporations have changed the job market tremendously in the last two decades (King, 2012). Technological advances have transformed the manner in which people communicate at their jobs and at home. In 2002, the Partnership for 21st Century Skills was created to bring awareness to the public of necessary skills needed in the workplace and as well-informed citizens. This organization developed a collection of elements needed for 21st century education: learning and thinking skills, information and communications technology (ICT) literacy, focus on content areas, teaching and learning 21st century content, life skills, and the integration of 21st century assessments. The Partnership for 21st Century Skills advocate the development of the 4Cs: Critical thinking and problem solving; effective communication, collaboration, and team building; and creativity and innovation for all students (Partnership for 21st Century Skills, 2002).

The access to ICT is critical to all citizens because an immeasurable amount of information is shared via the Internet. "ICT access and literacy are considered the new print literacy of the 21st century" (Warschauer & Ware, 2008, p. 228). Social, economic, cultural, and linguistic contexts influence the access to education, academic achievement, literacy, and ICT for marginalized groups of people according to Warschauer and Ware (2008). There is a direct relationship between economic inequality and access to ICT. Economic inequality is a fact that cannot be ignored because hundreds of millions of people globally do not have access to ICT (Johnson & Kress, 2003).

Finding 8: The District IB Charter School and the College-Prep Charter School had more students use technology for Internet resources, games, and research. The survey responses showed that 60% of the students from the three urban, secondary schools use technology for Internet resources, games, and research in class. The responses demonstrated that 14% of the students from the three secondary schools use technology for Microsoft Word and PowerPoint only. The responses indicated that 12% of the students from the three secondary schools use technology for research only during their learning time in the classroom. Responses indicated that 76% of the students use technology for Internet resources, games, and research in the District IB Charter School, and that 8% of the students use technology for games only. The survey responses demonstrated that 8% of the students in the District IB Charter School use technology for research only in the classroom. The responses from the survey showed that 72% of the students use technology for Internet resources, games, and research in the College-

Prep Charter School, and that 9% of the students use technology for games. The survey responses indicated that 9% of the students in the College-Prep Charter School use technology for Assessments only in the classroom. Survey responses indicated that 35% of the students use technology for Microsoft Word and PowerPoint only in the District All-Female Charter School, and that 31% of the students use technology for Internet resources, games, and research. The survey responses demonstrated that 26% of the students in the District All-Female Charter School use technology for research only during their learning in the classroom. The data indicated that the District IB Charter School and the College-Prep Charter School had more students use technology for Internet resources, games, and research.

The Common Core Standards set expectations for English language arts (ELA) and literacy in history/social studies, science, and technical subjects. These literacy standards are set for teachers from grade 6-12 to assist students with reading, writing, speaking, listening, and language in their content area (CCSS, 2012). Common Core Standards were also developed with a vision for a twenty-first century education. The knowledge and skills that students are expected to learn apply to different environments. Students will critically read text from print and digital sources. Students critically analyze text and become self-directed learners. Students should learn to search online and gather pertinent, credible information. In addition, students are expected to integrate technology in their reading, writing, speaking, listening, and language use (CCSS, 2012). These new literacies include reading digital texts, blogging, social networking, virtual worlds, video games, navigating and critically evaluating information on the Internet,

and digital tools such as video editing software (MS Moviemaker), web authoring software (MS Frontpage), handheld devices, and podcasts (Radovanovic, 2011).

Educators must integrate the ISTE Standards for Students as they plan and assess student learning, in order to prepare our students for the twenty-first century. Student achievement will increase due to the motivation and engagement of the students. The ISTE Standards for Students are as follows:

- Creativity and Innovation
- Communication and Collaboration
- Research and Information Fluency
- Critical Thinking, Problem Solving, and Decision Making
- Digital Citizenship
- Technology Operations and Concepts (ISTE, 2014, "ISTE Standards Teachers").

In order to prepare our students for the digital age that we live in, teachers must incorporate the ISTE Standards for Students as they plan and assess student learning. Students will be more engaged and as a result, learning will be improved.

The ISTE Standards set up a guide for teaching with ICT and using effective learning practices to develop twenty-first century skills. The ISTE Standards also work to assist in the implementation of the Common Core Standards, such as problem solving,

critical thinking, creativity, and collaboration skills. As a result, these standards will prepare our students for the global, digital job market (ISTE, 2014).

Research Question 4: What are the differences in frequency and type of observed instruction in new literacies of the Internet implemented by teachers in the three secondary schools?

Finding 9: Students are not participating in the literacies of the Internet as much as the survey indicates. Reading digital text by students was observed in 3 classrooms in the District IB Charter School. Reading digital text by students was observed in 3 classrooms in the College-Prep Charter School. There were no classes observed reading digital text by students in the District All-Female Charter School. The results indicate that teachers may not be implementing enough new literacies instruction in the classrooms.

The survey responses showed that 60% of the students from the three secondary schools use technology for Internet resources, games, and research in class. The data from the observations showed that 36% of the observations included students using Internet resources, games or research as part of their instruction. Responses indicated that 76% of the students use technology for Internet resources, games, and research in the District IB Charter School. Data from the observations indicated that 42% of the observations involved the use of Internet resources, games, or research at the District IB Charter School. The responses from the survey showed that 72% of the students use technology for Internet resources, games, and research in the College-Prep Charter

School. Data from the observations showed that 50% of the observations involved the use of Internet resources, games, or research by the students at the College-Prep Charter School. Survey responses indicated that 31% of the students use technology for Internet resources, games, and research in the District All-Female Charter School. Data from the observations indicated that 17% of the observations involved the use of Internet resources, games, or research by the students at the District All-Female Charter School. The data indicate that in comparison to the information on the teacher survey, students are not participating in the literacies of the Internet as much as the survey indicates.

Schools provide computers and internet access for students, but the digital divide still exists despite these efforts (Stafford & Griffis, 2008). The state assessments are the main focus for schools and districts. Due to the accountability system, teachers are not educating students to be prepared for the digital society and workplace. Educators are under excessive demand to improve scores on high-stake state exams which do not test ICT literacy strategies and skills. Hence, students are exposed to rudimentary literacy and technology practices instead of integration of ICT (Leu et al., 2009). Because of the accountability system in place, mainstream students, but especially low SES CLD students, are also subjected to the "teaching to the test" (Merchant, 2009).

With the changing times, not only have we seen an increase in new literacies, but also in the rate of technological advances. Numerous educators are not trained in how to integrate ICT into their lessons and teach twenty-first century skills (Merchant, 2009). ICT, including new literacies, can potentially have a positive educational impact if they

are integrated with effective pedagogical practices for all students, including the CLD students (Cummins et al., 2007).

Discussion of the Findings

In the 1940's at Columbia University, John Dewey told students, "The world is moving at a tremendous rate – no one knows where. We must prepare our children not for the world of the past – not for our world – but, for their world – the world of the future." (Kandel, 1941). Economic historians have identified three key economic revolutions: the move from hunting and gathering societies to an agriculture economy, the move from an agrarian society to the *Industrial Age,* and the present move from industrialization to the *Knowledge Economy* (Atkinson, 2004). This new economy is also referred to *Digital Age, Information Age, and New Economy* (Atkinson, 2004; Trilling & Fadel, 2009). In the past, production was the process of people and machines producing goods from raw materials. The new production of the twenty-first century includes having knowledge, information, creativity and innovation, among other skills (Friedman, 2005; Hersh, 2009). According to Pelligrino and Hilton (2012) in the 2012 report *Education for Life and Work,* the Committee on Defining Deeper Learning and twenty-first century Skills based their definition of deeper learning as "transfer" or the process through which a person becomes competent of taking what was learned in one situation and applying it to new situations. Many scholars dispute that the essence of "twenty-first century" learning is not what component of knowledge students have; rather, it is what students can do with the knowledge once they have obtained it (Silva, 2008). The Committee organized the twenty-first century competencies into three

domains. The cognitive domain encompassed critical thinking, reasoning, argumentation, information literacy, and innovation. The intrapersonal domain included intellectual openness, conscientiousness, work ethics, and positive core self-evaluation. The interpersonal domain encompassed collaboration, teamwork, and leadership (Pellegrino & Hilton, 2012). Twenty-first century competencies are knowledge and skill sets that give people the capacity to know how, why, and when to put into practice the knowledge and skills to solve problems and answer questions (Nehring & Szczesiul, 2015).

The twenty-first century workplace demands a different set of knowledge and skills, including literacy (Silva, 2008). Literacy includes other types of literacies, such as information and communications technology (ICT) literacy and digital literacy. ICT literacy is the ability to use technology and digital resources to construct knowledge and skills in the content area. Individuals must have the capacity to use technology to learn, think critically, problem solve, collaborate, communicate, and use information to answer questions and problems. People should also develop their creativity and innovativeness (Dede, 2010).

The results from this study showed that some schools are lagging behind the expectations of the twenty-first century teaching and learning. The urban, secondary teachers in this study described themselves as having adequate knowledge of the ISTE Standards for Teachers. But, the data indicated that the teachers may not be fully competent in the ISTE Standards for Teachers. The dispersion of twenty-first century

skills into public education continues to remain at a weak level internationally (Anandiadou &Claro, 2009; Voogt & Roblin, 2012). The high-stake exams which are mandated in many industrialized countries have been a tremendous obstacle, especially for lower SES schools, to advance deeper learning. Schools that are under pressure for test performance have narrowed the curriculum and instruction (McMurrer, 2007; Hinde, 2003). Therefore, schools do not generally focus on deep learning due to their concentration on these state assessments, and the learning gap between low SES students and mainstream students increases in an important skill set that is not measured. Twenty-first century learning does not take place in many schools due to the accountability system in place (Schoen & Fusarelli, 2008).

The study indicated that the three urban, secondary schools may be in need of more laptops, Chromebooks, and iPads for student use. The 'mobile generation' which are persons born from 1995 to 2009 (Geck, 2007) have grown up with iPads, tablets, laptops, Smart T.V.s, Smartphones, and other devices. In addition, this generation has used a variety of social media platforms (Oparaocha et al., 2014). These changes in ICTs present different educational needs for the future generation, as the 'mobile generation' will be expected to function using these ICTs in their workplace and as informed citizens (Mishra et al., 2009; Ikeguchi, 2008; Sharples et al., 2013). The twenty-first century learners are rapidly 'demonstrating decreased tolerance for lecture-style dissemination of knowledge' (Roehl et al., 2013). Today's students prefer

learning in an environment that is conducive to the technological landscape and social trends of the mobile age instead of conventional instructional practices (Oparaocha, 2017). Consequently, all educational stakeholders must have a sense of urgency to adjust to millennial learning preferences (Roehl et al., 2013).

Educators, especially those of CLD students, need to provide media-enhanced learning environments and provide learning opportunities for all students to learn how to use ICT, including skills in new literacies of the Internet, in order to be prepared for a digital society in which not only the job market, but all areas of personal living are enhanced by possessing ICT skills. CLD students may not be getting access to ICT at home; therefore, it is important that they learn to use ICT at school. Schools have assisted in attempting to close the gap by providing computers and internet access, but the digital divide and the gap between the "haves" and the "have nots" continues to exist (Stafford & Griffis, 2008). A study conducted in Edith Cowan University (ECU) in Australia in 2012 to examine the ownership and use of ICT among college students provided some interesting results. The researchers posed the question, 'Is ECU's School of Education ready to institute a Bring Your Own Digital Device (BYOD) Policy?' The results indicated that after a number of slow years, the university students had reached a point of saturation where most students owned an ICT device or multiples devices in 2012. But, the use of a device in student-study was less satisfactory. The study made recommendations to the university to take advantage of the technology ownership, to adjust their pedagogy, and to provide support for the ICT devices (Pagram & Cooper, 2013). The taking of devices to schools is a different story, in that school-age students

may not have the maturity to carry ICT devices. Educators may see these mobile devices and others as unwanted distractions in the classroom (Vie, 2008). Thus, schools must either provide ICT devices that teachers can supervise or students can be expected to BYOD, whereas the latter has more complications due to the maturity level of the students.

The teachers in the three urban, secondary schools are not participating in new literacies learning or using ICT as much as the survey indicated. The students, often, use new technologies before their teachers do. Students, in many situations, are more familiar with some ICT and social media trends. Educators may find it difficult to stay abreast the latest ICT. Thus, the introduction of ICT may be difficult for teachers, especially if they continue to use the same pedagogy that has been used in the past. In addition, technology is constantly and rapidly changing. The ICT skills that the teachers possess will probably be outdated before they can fully integrate those ICT skills into their lessons. Accordingly, it is crucial that our school districts begin using a pedagogy that allows for the twenty-first century learner to develop the skills needed in this digital age (Cheng, 2015; Roel et al., 2013).

Problem-Based Learning (PBL) provides real-world problems that learners have to solve (Hung et al., 2008). PBL is a student-centered, inquiry-based instructional model in which students problem-solve a real-world problem (Jonassen & Hung, 2008). Students develop their collaboration and inquiry skills while problem solving. Because students are working with authentic problems, they are motivated and engaged as they

learn (Generareo & Lyons, 2015). Learners conclude what information they need to solve their problem, conduct research, develop solutions, and present their conclusions (Barrows, 1996). PBL is an exceptional instructional method because it is problem-centered. The learning process begins with a problem. As students work towards solving the problem, students gain knowledge and skills. The learning does not take place through the transmission approach where the teacher is delivering the content knowledge through information presented from sources, such as a textbook in a sequential manner. But, the content is organized as a problem or a series of problems (Hung, 2009).

The urban, secondary teachers from the three schools in the study did not receive very much professional development in the last four years. In order to support the integration of instructional technology into classrooms, school districts must have a technology or ICT plan in place. Technology planning involves the process of developing, revising, and implementing a technology plan that guides the school and educators in developing lessons that integrate ICT (Baylor & Ritchie, 2002). A technology plan states the school's expectations, goals, contents, and actions and acts as a blueprint for the school to follow in the hopes of integrating ICT into teaching and learning (Baylor & Ritchie, 2002; van Braak, 2003). The technology plan should include the district and school's vision for ICT integration, professional development, technology curriculum planning, and evaluation (Vanderlinde & van Braak, 2013).

How This Work Informs Research

As a result of this study, there is evidence to suggest that some urban, secondary schools are not preparing students for the twenty-first century and the global society. This study indicated that that the three schools lack sufficient technology resources. Educators and students are not using very much literacies of the Internet in their learning. The teachers are not using the pedagogy that is conducive to twenty-first century learning, such as problem-based learning. In addition, teachers are not receiving a sufficient amount of professional development and coaching that is needed to integrate ICT or literacies of the Internet. These three urban, secondary schools are charter schools that aim at preparing students for college. The District Charter IB School states that it uses an intense science and technology methodology, along with a college-preparatory liberal arts program. The College-Prep Charter School states that it prepares students for college and life through the development of academic skills, intellectual habits, character traits, and to become caring, compassionate critical thinkers. The District Charter All-Female School states that it is a college-preparatory school that focuses on math, science, and technology. Despite the fact that these schools have the intentions of preparing students for college and to integrate technology, the data indicate that these schools are trailing behind the expectations of twenty-first century learning. More research needs to be conducted on schools that specialize in technology, college-preparation, twenty-first century learning, STEM (Science, Technology, Engineering, and Math), and other areas. Public schools also have magnet schools within high

schools that specialize in certain areas, such as health and science, business, engineering and robotics, and others.

Stakeholders must take two steps back and reflect on the education that is being provided to our public-school students. Policy makers need to reconsider learning theories and pedagogy that are necessary to prepare students for the *Information Age.* Twenty-first century learning and teaching are needed at all schools, in order to prepare students for the global job market and personal living. The assessments need to be revamped to reflect the skills needed in the twenty-first century. Too much money and resources have been spent on trying to have students pass a minimal skills exam. These high-stake exams have not improved the overall education of students (Amrein & Berliner, 2003). Policy makers can initiate the change by introducing a new accountability system and exams that require twenty-first century learning and teaching. The resources and money should be invested in the transformation of school districts and schools to state-of-the-art digital-age learning environments.

Recommendations

These recommendations serve to assist school districts to better prepare students for twenty-first century learning, in order that students become equipped to live their personal lives, work productively, and become informed, caring citizens in the *Information Age*. In addition, these recommendations will assist in the development of educators to take on the challenge of integrating ICT using progressive pedagogy that empowers students to become life-long learners in the twenty-first century.

Superintendents and District Administrators

- Find funding sources for ICT integration from government grants, bonds, fundraising, and equipment donations (Purdue University, 2018).

- Administer an ICT Needs Assessment and take into account the following questions:

  What resources are presently available in schools, and how are they distributed?

  For example, are there two computers in every classroom or a dedicated computer lab? Or are there mobile laptop/tablet stations?

  What are the 1-, 3-, and 5-year goals in terms of digital learning"

  What devices do students already bring to school?

How do they use those devices?

How fast are the internal and external connections in schools?

How fast must they be to meet students' and educators' needs?

What are the major strengths and challenges this area has in terms of Technology? (Office of Educational Technology, 2018).

- Develop a Technology/ICT Plan for the district and for the schools. The technology plan should state the district's and schools' expectations, goals, contents, and actions (Baylor & Ritchie, 2002; van Braak, 2003). The technology plan should include the district's vision for ICT integration, professional development, technology curriculum planning, and evaluation (Vanderlinde & van Braak, 2013).
- To maximize ICT access to educators and students, consider viewing comprehensively all funding and support that can be provided to the district and schools.
    1. Leveraging economies of scale: At both the multi-district and multi-state levels, school systems can negotiate more favorable rates with vendor by collaborating with others seeking similar devices/services. Louisiana, Maine, Illinois, North Carolina, among other states have done this successfully.

2. Public-private partnerships: Cross-sector collaboration can prove mutually beneficial. What major businesses/industries are in this region? They have a stake in ensuring students graduate digitally literate and may be willing to partner in funding, device donation, connectivity-sharing, or training to advance that purpose.
3. Cross-agency coordination: Some states and districts leverage higher education or medical facility resources to boost education access.
4. Device refurbishment: Repairing, upgrading, and reusing devices business/community members no longer need can create both an educational opportunity and a source of low-cost devices. In making its transition to online assessment, Delaware used this strategy.
5. BYOD and student wireless access: Some states and districts leverage the devices students already own, carefully considering privacy, security, and logistical issues. In other locales, it may be possible to negotiate very low rates for student wireless devices and services, which they could use both in and out of school.
6. Strategic decommissioning: What activities or resources are no longer needed? Areas to consider include paper textbooks, copy machines and supplies, fax machines and supplies, copper-line phone service, paper supplies, consumable workbooks, in-person trainings where virtual or peer-to peer options exist, printing (schedules, grades, and announcements), and others, depending on context.

7. Leveraging student experience: Where can students themselves serve as technologists, professional developers, and technicians? How can students support educators in advancing their technology-based professional capacity? (Office of Educational Technology, 2018).

- Investigate current state and local laws and regulations to align district ICT goals and policy. Consider the following questions.
    1. Do any existing laws or regulations need to change in order to reach the goals? For example, are specific kinds of instructional resources mandated in statute that may not align with a digitally-focused strategy?
    2. Are students prohibited from using their own devices? Do policies need to change to ensure that virtual courses are accepted for student credit?
    3. Are there policies that would support advancing digital access? For example, where can blended and personalized learning be incentivized, if that aligns with the local goal?
    4. How can transparency help? Louisiana used public reports about individual district readiness to highlight areas that are and are not ready for online instruction and assessment.
    5. Within an SEA or an LEA, do leaders in all major offices understand and support the goals and strategies? Curriculum and instruction,

assessment, operations, finance, and other organizational units will need to focus together (Office of Educational Technology, 2018).

Curriculum and Instruction Directors, Coordinators, and Instructional Coaches

- Be knowledgeable about twenty-first century skills.
- Know the ISTE Standards for Coaches, the ISTE Standards for Administrators, the ISTE Standards for Teachers, and the ISTE Standards for Students.
- Include the twenty-first century skills and the ISTE Standards for Teachers in the observation instrument.
- Develop a follow-up plan for the implementation of the twenty-first century skills and the ISTE Standards for Teachers.

School Administrators

- Ensure that teachers become familiar with the ISTE Standards for Teachers.
- Administration must be familiar with the ISTE Standards for Teachers and the ISTE Standards for Students. In addition, administration should also learn the ISTE Standards for Administrators.
- Use the professional learning communities (PLCs) to conduct ICT professional development, peer tutoring, share feedback, and lesson planning integrating ICT.

- Develop and support a vision for preparing students for the twenty-first century.
- Evaluate the current integration of ICT in the school.
- Evaluate the PLCs and the current collaboration among teachers.
- Create goals and steps necessary to fulfill the ICT vision.
- Conduct a needs assessment for teachers to identify what areas are in need.
- Assess students' knowledge of twenty-first century skills.

Educators

- Learn about twenty-first century learning.
- Become familiar with the ISTE Standards for Teachers.
- Rethink pedagogy and use the pedagogy that will be conducive for integrating ICT and preparing students for the twenty-first century, such as problem-based learning.
- Share instructional technology practices with other educators.
- In planning lessons, consider how ICT and the 4 Cs (creativity, critical thinking, communication, and collaboration) can be integrated.
- Attend professional development on twenty-first century skills and ICT integration in person and online and share information learned with other colleagues.
- Request ICT coaching from district instructional technology coaches.
- Be willing to learn along-side students and other professionals (ISTE, 2014).

Recommendations for Further Study

This research study showed how secondary school teachers from three urban, secondary schools described their level of knowledge and integration of Information and Communication Technology (ICT) according to the International Society for Technology in Education (ISTE) Standards for Teachers. Secondly, this study investigated why, how and whether teachers in different secondary schools may integrate new literacies (or ICT) differently and whether ICT related professional development activities and procedures might differentially contribute to the integration of ICT into classroom instruction across the three schools. This study included *N*=69 teachers that answered the ISTE survey and *N*=36 for observations that were conducted to compare with the survey results. The study was limited to three urban, secondary schools in a central Texas city. These schools included a charter school and two district charter schools.

Globalization has brought forth increased communication demands for daily functions and the types of 'literacies' that we need to have for productive living and employment (Johnson & Kress, 2003). Educators need to be knowledgeable and have an understanding of the importance of developing 21st century skills, including information and communications technology (ICT) literacy to assist in addressing these inequalities in the schools (Warschauer & Ware, 2008). The following are recommendations for future research:

- Explore how administrators describe their knowledge of the ISTE Standards for Administrators.
- Investigate how technology coaches describe their knowledge of the ISTE Standards for Coaches.
- Examine how students at the elementary, middle, and high school levels describe their knowledge of the ISTE Standards for Students.
- Study the effects on learning that ICT may have.
- Survey teachers at the elementary level on how they describe their knowledge of the ISTE Standards for Teachers.
- Compare different types of ICT professional development to find the most effective.
- Investigate the type of support that teachers may need to be effective in the integration of ICT.
- Compare different ICT coaching models.
- Explore online professional development and coaching.

Summary

This quantitative method research study examined how secondary school teachers from three urban, secondary schools described their level of knowledge and integration of Information and Communication Technology (ICT) according to the International Society for Technology in Education (ISTE) Standards for Teachers. Secondly, this study investigated why, how and whether teachers in different secondary

schools may integrate new literacies (or ICT) differently and whether ICT related professional development activities and procedures might differentially contribute to the integration of ICT into classroom instruction across the three schools. This chapter presents the major findings of the research study and recommendations for future research.

Many schools provide outdated literacy and technology instruction to students, especially CLD and low SES students. School districts and schools are under great pressure from the accountability system in place and the mandated state assessments which do not include ICT literacy strategies and skills (Leu et al., 2009). All students, including low SES CLD students, are exposed to the negative effects of standardized assessments, such as teachers focusing on only the tested standards. The digital divide that exists today greatly affects people from different demographic populations. Access to ICT is not equally dispersed among various demographic groups, including lower socio-economic status. Many marginalized students do not have access to ICT in their homes (Lucey & Grant, 2009). The inequitable access and application of ICT adversely affect CLD and lower SES students from becoming marketable employees and informed citizens. People who do not have access to ICT or do not know how to use the new technologies are at a disadvantage in comparison with the mainstream population (Warschauer & Ware, 2008).

The results from this study showed that some schools have fallen behind the expectation of the twenty-first century teaching and learning. The data indicated that the

teachers may not be fully competent in the ISTE Standards for Teachers. The dispersion of twenty-first century skills into public education continues to remain at a weak level internationally (Anandiadou &Claro, 2009; Voogt & Roblin, 2012). The study indicated that the three urban, secondary schools may be in need of more laptops, Chromebooks, and iPads for student use. The 'mobile generation' has grown up with iPads, tablets, laptops, Smart T.V.s, Smartphones, and other devices, including a variety of social media platforms (Oparaocha et al., 2014). Today's students prefer learning in an environment that is conducive to the technological landscape and social trends of the mobile age instead of conventional instructional practices (Oparaocha & Pokidko, 2017). The teachers in the three urban, secondary schools are not integrating new literacies of the Internet as much as the survey indicated. The students, often, use new technologies before their teachers do. Students, in many situations, are more familiar with some ICT and social media trends. The urban, secondary teachers from the three schools in the study did not receive very much professional development in the last four years. In order to support the integration of instructional technology into classrooms, school districts must have a technology or ICT plan in place. Technology planning involves the process of developing, revising, and implementing a technology plan that guides the school and educators in developing lessons that integrate ICT (Baylor & Ritchie, 2002).

The manner in which ICT has been integrated in the schools contribute to the inequities and power relationships that exist in our society (Dalton & Proctor, 2008). Power relationships in our society have perpetuated the effect in which certain social groups, such as politicians, wealthy people, and other influential persons, are able to

oblige the actions or inactions of other individuals or groups contrary to their beliefs, interests, needs, and desires (Warschauer & Ware, 2008). In recent years, we have seen an explosion of technological advances, including new literacies of the Internet. The integration of ICT can potentially have a positive affect if effective pedagogy is also implemented for all students (Cummins et al., 2007).

Due to school districts' focus on high-stake exams and their attempt to meet the accountability requirements, students are not receiving a twenty-first century education which encompasses ICT skills. Numerous educators are not trained in how to integrate ICT into their lessons and teach twenty-first century skills. In order to meet the demands of society and this generation, educators must reexamine pedagogy, learning theories, and the role of new literacies in student learning (Merchant, 2009).

The ISTE Standards set up a platform for teaching with ICT and using effective learning practices to develop twenty-first century skills. The ISTE Standards also work hand-in-hand to assist in the implementation of the Common Core Standards, such as problem solving, critical thinking, creativity, and collaboration skills. Thus, these standards will prepare our students for the global, digital job market (ISTE, 2014).

More research needs to be done on various student populations, such as students with special needs and Gifted and Talented students, and with different demographics. Research on the funding sources and availability and access of technology is needed. Research is also needed on the impact of various types of professional development on teacher's instructional practices. Research is needed on the effects of having

instructional technology coaches at school districts. Research should be conducted on the effects of lack of ICT skills on different populations of adults, such millennials, and other adults. Furthermore, researchers should explore how podcasts and similar means of providing educators with professional development have changed the teaching practices of educators.

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APPENDIX A

ISTE TEACHER SURVEY INSTRUMENT

International Society for Technology in Education Standards for Teachers

(ISTE Standards-T)

Directions: Please indicate your perception of, the degree to which you feel competent in each ISTE Standard-T. Circle the number using the scale below.

ISTE Standards-T 2008					
	Low				**High**
	1	2	3	4	5

I. **Facilitate and Inspire Student Learning and Creativity- Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments**.

Promote, support, and model creative innovative thinking and inventiveness.	**1**	**2**	**3**	**4**	**5**
Engage students in exploring real-world issues and solving authentic problems using digital tools and resources.	**1**	**2**	**3**	**4**	**5**
Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative process.	**1**	**2**	**3**	**4**	**5**
Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments.	**1**	**2**	**3**	**4**	**5**

Standards issued by the International Society for Technology in Education (ISTE), 2008.

Adapted from Sam, D. (2011). *Middle school teachers' descriptions of their level of competency in the National education technology standards for teachers* (Doctoral dissertation). Retrieved from Proquest Dissertations and Theses database. (UMI No. 3450428)

International Society for Technology in Education Standards for Teachers

(ISTE Standards-T)

Directions: Please indicate your perception of, the degree to which you feel competent in each ISTE Standard-T. Circle the number using the scale below.

ISTE Standards-T 2008					
	Low				**High**
	1	2	3	4	5

II. Design and Develop Digital-Age Learning Experiences and Assessments – Teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the ISTE Standards for Students.

Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity.	**1**	**2**	**3**	**4**	**5**
Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress.	**1**	**2**	**3**	**4**	**5**
Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources.	**1**	**2**	**3**	**4**	**5**
Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching.	**1**	**2**	**3**	**4**	**5**

Standards issued by the International Society for Technology in Education (ISTE), 2008.

Adapted from Sam, D. (2011). *Middle school teachers' descriptions of their level of competency in the National education technology standards for teachers* (Doctoral dissertation). Retrieved from Proquest Dissertations and Theses database. (UMI No. 3450428)

International Society for Technology in Education Standards for Teachers

(ISTE Standards-T)

Directions: Please indicate your perception of, the degree to which you feel competent in each ISTE Standard-T. Circle the number using the scale below.

ISTE Standards-T 2008					
	Low				**High**
	1	2	3	4	5

III. Model Digital-Age Work and Learning – Teachers exhibit knowledge, skills and work processes representative of an innovative professional in a global and digital society.

Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations.	**1**	**2**	**3**	**4**	**5**
Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation.	**1**	**2**	**3**	**4**	**5**
Communicate relevant information and ideas to parents, students, and peers using a variety of digital-age media and formats.	**1**	**2**	**3**	**4**	**5**
Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning.	**1**	**2**	**3**	**4**	**5**

Standards issued by the International Society for Technology in Education (ISTE), 2008.

Adapted from Sam, D. (2011). *Middle school teachers' descriptions of their level of competency in the National education technology standards for teachers* (Doctoral dissertation). Retrieved from Proquest Dissertations and Theses database. (UMI No. 3450428)

International Society for Technology in Education Standards for Teachers

(ISTE Standards-T)

Directions: Please indicate your perception of, the degree to which you feel competent in each ISTE Standard-T. Circle the number using the scale below.

ISTE Standards-T 2008					
	Low				**High**
	1	2	3	4	5

IV. Promote and Model Digital Citizenship and Responsibility – Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.

Advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright intellectual property, and the appropriate documentation of sources.	**1**	**2**	**3**	**4**	**5**
Address the diverse needs of all learners by using learner-centered strategies and providing equitable access to appropriate digital tools and resources.	**1**	**2**	**3**	**4**	**5**
Promote and model digital etiquette and responsible social interactions related to the use of technology and information.	**1**	**2**	**3**	**4**	**5**
Develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital-age communication and collaboration tools.	**1**	**2**	**3**	**4**	**5**

Standards issued by the International Society for Technology in Education (ISTE), 2008.

Adapted from Sam, D. (2011). *Middle school teachers' descriptions of their level of competency in the National education technology standards for teachers* (Doctoral dissertation). Retrieved from Proquest Dissertations and Theses database. (UMI No. 3450428)

International Society for Technology in Education Standards for Teachers

(ISTE Standards-T)

Directions: Please indicate your perception of, the degree to which you feel competent in each ISTE Standard-T. Circle the number using the scale below.

ISTE Standards-T 2008					
	Low				**High**
	1	2	3	4	5

V. Engage in Professional Growth and Leadership – Teachers continuously approve their professional practice, model life-long learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

Participate in local and global learning communities to explore creative applications of technology to improve student learning.	**1**	**2**	**3**	**4**	**5**
Exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others.	**1**	**2**	**3**	**4**	**5**
Evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning.	**1**	**2**	**3**	**4**	**5**
Contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school community.	**1**	**2**	**3**	**4**	**5**

Standards issued by the International Society for Technology in Education (ISTE), 2008.

Adapted from Sam, D. (2011). *Middle school teachers' descriptions of their level of competency in the National education technology standards for teachers* (Doctoral dissertation). Retrieved from Proquest Dissertations and Theses database. (UMI No. 3450428)

APPENDIX B

QUESTIONNAIRE FOR TEACHERS

Part 2: Open Ended Questions Relating to Formative Assessment

1. Please describe strategies that you use to integrate technology in the classroom.

_____

_____

_____

2. Please describe the different manners in which students use technology in the classroom.

_____

_____

_____

3. Please describe technology tools that you customarily use the **majority** of the time.

_____

_____

_____

Describe and give the number of hours of professional development in ICT (Information & Communication Technology) and/or New Literacies that you have had in the last four years. Attach any documentation that you may have of the professional development.

2017-2018: _____

_____

2016-2017: _____

_____

2015-2016: _____

_____

2014-2015: _____

_____

2013-2014: _____

_____

Section 3: Demographics

1. What content areas do you teach?

   _____

2. How many years have you been teaching?

   _____

3. What degree(s) do you have?

   _____

4. What certification(s) do you have?

   _____

Your input is of great value and is very much appreciated. Thank you for completing this survey.

Adapted from Sam, D. (2011). *Middle school teachers' descriptions of their level of competency in the National education technology standards for teachers* (Doctoral dissertation). Retrieved from Proquest Dissertations and Theses database. (UMI No. 3450428)

APPENDIX C

ICT TEACHER OBSERVATION INSTRUMENT

Teacher Observation Form

Name:	**Date:**	**Time:**
Subject:	**Grade Level:**	**School:**

	Technology Use in the Classroom:	**Teacher Use:**	**Student Use:**
1.	Computers	**Teacher Use: _____**	**Student Use: _____**
2.	Handheld(s) (Palm, iPod, etc.)	**Teacher Use: _____**	**Student Use: _____**
3.	Flatbed Scanner(s)	**Teacher Use: _____**	**Student Use: _____**
4.	Digital Camera(s)	**Teacher Use: _____**	**Student Use: _____**
5.	Multimedia Data Projector(s)	**Teacher Use: _____**	**Student Use: _____**
6.	Interactive Whiteboard(s)	**Teacher Use: _____**	**Student Use: _____**
7.	Word Processing Software (MS Word)	**Teacher Use: _____**	**Student Use: _____**
8.	Presentation Software (PowerPoint)	**Teacher Use: _____**	**Student Use: _____**
9.	Spreadsheet Software (Excel)	**Teacher Use: _____**	**Student Use: _____**
10.	Database Software (MS Access)	**Teacher Use: _____**	**Student Use: _____**
11.	Video Editing Software (MS Moviemaker)	**Teacher Use: _____**	**Student Use: _____**
12.	Desktop Publishing Software (MS Publ.)	**Teacher Use: _____**	**Student Use: _____**
13.	Web Authoring Software (MS Frontpage)	**Teacher Use: _____**	**Student Use: _____**
14.	CD or DVD Creation Software	**Teacher Use: _____**	**Student Use: _____**
15.	Electronic Encyclopedias (CD or online)	**Teacher Use: _____**	**Student Use: _____**
16.	Email	**Teacher Use: _____**	**Student Use: _____**
17.	Internet	**Teacher Use: _____**	**Student Use: _____**
18.	Online Databases (EBSCOhost, etc.)	**Teacher Use: _____**	**Student Use: _____**
19.	Blogs	**Teacher Use: _____**	**Student Use: _____**
20.	Podcasts	**Teacher Use: _____**	**Student Use: _____**
21.	Wikis	**Teacher Use: _____**	**Student Use: _____**
22.	Distance Learning (WV Virtual School)	**Teacher Use: _____**	**Student Use: _____**
23.	Instant Messaging	**Teacher Use: _____**	**Student Use: _____**
24.	Electronic Classroom Responders	**Teacher Use: _____**	**Student Use: _____**

25. Other **Teacher Use: _____** **Student Use: _____**

26. Other **Teacher Use: _____** **Student Use: _____**

Adapted from Bickel Sigman, K. (2008). *A study of West Virginia secondary public-school library media centers and library media specialists and their use of 21st century technology tools* (Doctoral dissertation). Retrieved from Proquest Dissertations and Theses database. (UMI No. 3326237)

APPENDIX D

STUDY INVITATION FOR PRINCIPALS

Dear Secondary Principals,

The purpose of this letter is to invite your faculty to participate in a research study. The purpose of the study is to identify the level of teachers' knowledge of Information and Communications Technology (ICT) integration according to the International Society for Technology in Education (ISTE) Standards for Teachers in public charter and charter secondary schools. The study will examine how teachers use technology to support student learning. The results of this study can provide your school with information that can assist in planning professional development in the area of instructional technology and with school improvement plans.

- The study is called *The Role of Information and Communication Technology in Secondary Schools*.
- The study will adhere to the ethics established for research and the information would be kept anonymous. The school **will not** be identified by name or address. The school will be referred, for example: A charter school in a Central Texas city. Teachers will participate on a voluntary basis. Teacher responses & observations will be kept confidential. Participants will be referenced according to their job position.
- The dissertation Committee will be the only other individuals who will have access to the records of data collected from the surveys and classroom observations. The records will be destroyed at the completion of the study.
- The study will include a survey based on the ISTE Standards with about twenty questions for all the secondary school teachers which will take approximately 15 minutes to complete.
- The study will include classroom observations of about twelve teachers for approximately 30 minutes each.

Should you need to contact me, please call me at (956) 337-6616 or email me at rcgarcia747@yahoo.com. You may also contact my Committee Co-Chair, Mr. Robert Capraro at rcapraro@tamu.edu.

Sincerely,
Rosalinda Corral Garcia