

Exploring New Literacies Pedagogy and Online Reading Comprehension Among Middle School
Students and Teachers: Issues of Social Equity or Social Exclusion?

Laurie Anne Henry, Ph.D.

University of Connecticut, 2007

This study had three main purposes. First, it sought to evaluate middle school students' online reading comprehension achievement, comparing performance between students from economically privileged districts to those in economically disadvantaged districts. Second, it sought to evaluate middle school teachers' online reading comprehension achievement, comparing performance between teachers from economically privileged districts to those in economically disadvantaged districts. Third, it looked to extend the conceptualization of the digital divide to determine what factors best predict students' and teachers' online reading comprehension. By looking closely at these factors, we can begin to understand which might support and which might impede the development of online reading comprehension. Grounded in a new literacies perspective (Cope & Kalantzis, 2000; Lankshear & Knobel, 2003; Leu, Kinzer, Coiro, & Cammack, 2004), this study presents research suggesting that No Child Left Behind (NCLB) legislation (U.S. Department of Education [DOE], 2002) may have unintended consequences for those students who need our help the most, students in urban, economically disadvantaged schools.

This research used a mixed methods design. Quantitative data were collected using two measurement scales, Digital Divide Measurement Scale for Students (DDMS-S) and Digital Divide Measurement Scale for Teachers (DDMS-T), administered to sample populations of middle school students and teachers. These instruments included items designed to measure Internet access, Internet use, and online reading comprehension. Qualitative data were also collected and analyzed using content analytic techniques (Carley, 1990; Krippendorff, 1980;

Mayring, 2000; Miles & Huberman, 1994). Interviews, focus groups, and artifacts provided richer explanations of issues related to the digital divide.

Results from ANOVA analyses indicated that students and teachers from economically privileged districts had significantly higher mean scores on a measure of online reading comprehension compared to those from economically disadvantaged districts. HLM results showed that elements of a primary level digital divide (Internet access) and a secondary level digital divide (Internet use) were good predictors of online reading comprehension. Results of content analyses showed that NCLB and lack of funding were two contextual factors that may impede the development of online reading comprehension. These results suggest that factors of primary and secondary levels of the digital divide may indeed create a third level digital, which is indicated by an online reading achievement gap between middle school students and teachers from economically privileged districts and those from economically disadvantaged districts.

Laurie Anne Henry – University of Connecticut, 2007

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Students and Teachers: Issues of Social Equity or Social Exclusion?

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B.S., University of Connecticut, 1998

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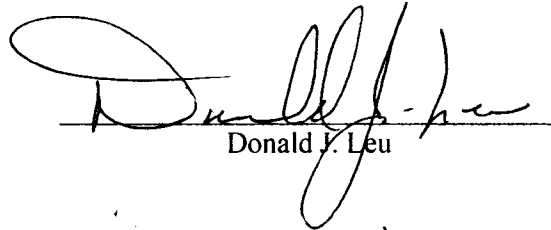
Doctor of Philosophy Dissertation

Exploring New Literacies Pedagogy and Online Reading Comprehension Among Middle School
Students and Teachers: Issues of Social Equity or Social Exclusion?

Presented by

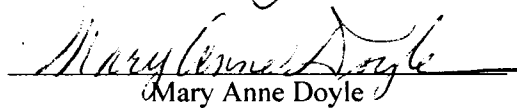
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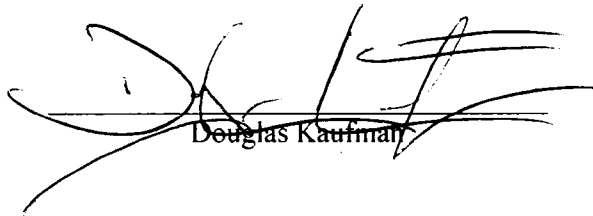
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To get through the hardest journey we need to take only one step at a time, but we must keep on stepping. (Chinese Proverb)

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Let your mind start a journey thru a strange new world. Leave all thoughts of the world you knew before. Let your soul take you where you long to be...Close your eyes and let your spirit start to soar, and you'll live as you've never lived before. (Erick Fromm)

Enjoy the journey my friends.

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CHAPTER ONE: INTRODUCTION AND OVERVIEW OF THE STUDY

The purpose of this chapter is to present an introduction and overview of the study. The chapter is divided into five sections. The first section provides a brief introduction of the study. The second section presents a statement of the problem. The problem statement leads into the third section, which provides a general discussion of the background for the study. In the fourth section, an overview of the study design is explained along with a presentation of the research questions. Finally, the significance of this study for research, public policy, and classroom practice is explored in the fifth section.

Introduction

This study had three main purposes. The first purpose was to evaluate middle school students' online reading comprehension achievement, comparing performance between students attending schools in economically privileged school districts to those in economically disadvantaged school districts. The second purpose was to evaluate middle school teachers' online reading comprehension achievement, comparing performance between teachers employed in schools in economically privileged school districts to those in economically disadvantaged school districts. Finally, the third purpose was to extend the conceptualization of the digital divide to determine what factors best predict students' and teachers' online reading comprehension achievement. The results of this study sought to answer the following questions: Does a newly defined, more complex definition of the digital divide have significant implications for student achievement? How does it relate to teachers' preparedness to teach the new literacies of online reading? Will it demand a new vision for literacy instruction and important changes for public policy? These issues were explored in this study.

Statement of the Problem

An important problem for our nation is how to ensure that all students are able to read and write at high levels (RAND Reading Study Group, 2002). Statistics speak clearly to the conclusion that we are increasingly becoming a nation divided into two categories of readers, one

predominantly white, affluent, and proficient with literacy and the other of color, poorer, and less proficient with literacy (Kleiner & Lewis, 2003). This contrast clearly marks a distinction between economically privileged and economically disadvantaged school districts that are often at the center of issues related to inequalities that exist in our public schools (Anderson, 1993; Kozol, 1991). Economically privileged school districts are often associated with less diverse populations, a higher tax base, higher median household income levels, and higher achievement levels, especially in reading (Lee & Croninger, 1994; Rothstein, 2004). Economically disadvantaged school districts are often associated with more diverse populations, a lower tax base, lower median household incomes, and lower achievement levels, especially in reading (Lee & Croninger, 1994; Rothstein, 2004). For example, data from the National Assessment of Educational Progress (NAEP) revealed that white, fourth-grade students performed at or above the “basic” level of reading at nearly twice the rate as many minority groups (Kleiner & Lewis, 2003). This report also showed that economically privileged students at the fourth grade level scored at or above the “basic” level of reading at nearly twice the rate compared to economically disadvantaged students. Additionally, the achievement gap is increasing between high and low performing students in reading. Since 1992, average reading scores on the NAEP for high-performing students have steadily increased, while those for low-performing students have steadily dropped, thus increasing the achievement gap significantly (Kleiner & Lewis, 2003). In short, lower achieving students, who are often poor and minority and at greater risk of dropping out of school, face more challenges with higher levels of reading comprehension and are falling farther and farther behind their peers.

All of these data, however, come from assessments that only measure offline reading comprehension. The growing gap between rich and poor, white and non-white students may be exacerbated by the new forms of reading comprehension required on the Internet (Coiro & Dobler, 2007; Henry, 2006b; Leu, Kinzer, Coiro, & Cammack, 2004). Poor and minority youth who are challenged by reading comprehension today are likely to be left out of an information

age tomorrow. Since home access to the Internet may be more limited in poorer communities (Lenhart, Madden, & Hitlin, 2005) and because economically disadvantaged districts may find themselves with little time or incentive to integrate the Internet into classroom instruction (The New Literacies Research Team [NLRT], in press), the achievement gap may continue to grow for those students who are not developing online reading comprehension strategies. These students may very well be left behind and unable to compete in a work force that requires these skills.

Recent federal legislation designed to close the achievement gap in reading, No Child Left Behind (US Department of Education [DOE], 2002), may actually be contributing to the problem. Because of traditionally low patterns of offline reading performance in urban, largely minority districts, these districts face greater pressure to achieve adequate yearly progress on tests that have nothing to do with online reading (Leu, Ataya, & Coiro, 2002). As a result, they must focus complete attention on the instruction of traditional literacies, abandoning any instruction in the new types of reading comprehension skills required on the Internet: searching for information, critically evaluating information, synthesizing information, or communicating online. As researchers with The New Literacies Research Team (NLRT, in press) suggest, “It may be the cruelest irony of NCLB that students who need to be prepared the most for an online age of information are precisely those who are being prepared the least” (p. 21). It seems, therefore, that understanding how districts at different ends of the economic ladder integrate the new forms of online reading comprehension the Internet requires is an important issue to study.

The state of Connecticut may be an especially appropriate location to study this issue as it is viewed as a national leader in education yet struggles with the academic achievement gaps that exist between economically privileged and economically disadvantaged schools. The most recent NAEP results “revealed that Connecticut had the nation’s largest achievement gap between rich and poor students in three of four tests—4th grade reading, 8th grade reading and 8th grade math” (The Connecticut Alliance for Great Schools [CTAGS], 2006, ¶1).

In addition, Connecticut has always prided itself on being a leader in education. For the past two years, the annual Education State Rankings (Morgan & Morgan, 2005) places Connecticut as the second 'smartest state' in the nation. Connecticut has also earned the following standings as reported by the Connecticut Association of Boards of Education (CABE, 2005):

1. Connecticut students outperformed the nation in writing on the Preliminary Scholastic Assessment Test (PSAT).
2. Connecticut is second in the nation in Scholastic Assessment Test (SAT) participation.
3. Connecticut's 4th grade reading scores are first in the nation on the NAEP.
4. Connecticut's 8th grade reading scores are second in the nation on the NAEP.

As can be seen from the results of the NAEP (see Donahue, Daane, & Jin, 2005; Donahue, Finnegan, Lutkus, Allen, & Campbell, 2001; Donahue, Voelkl, Campbell, & Mazzeo, 1999; White, 1996), Connecticut has consistently scored above the national average in reading at both the fourth and eighth grade levels with only 29 percent and 25 percent scoring below basic level respectively (Parsad & Jones, 2005). However, these aggregate statistics only tell part of the story.

Research shows that, nationwide, students in families who struggle economically achieve at significantly lower levels (Lee & Croninger, 1994). That same pattern is replicated in Connecticut. At the fourth grade level, among students eligible for reduced or free school lunch, 55 percent scored below the basic level and a mere 12 percent of students were at proficiency (Parsad & Jones, 2005). In contrast, students ineligible for reduced or free school lunch show only 19 percent below basic level and 32 percent at proficiency (Parsad & Jones, 2005). Furthermore, the most recent administration of the Connecticut Mastery Tests (CMTs), Connecticut's state-wide, standardized achievement test, indicated Connecticut's poorest schools are among the poorest performing districts across all grade levels (3rd through 8th) and all subject

areas tested, including reading, writing, and math (Frahm, 2006). “Connecticut has one of the highest overall achievement rates in the nation, yet one of the largest gaps in performance between white and African American/Hispanic students” (CTAGS, 2006, ¶3).

Aside from the achievement gap noted above, Connecticut may be a good location to study this issue since this state reports high numbers of computers in its schools but did not score very well on a measure of technology integration (Editorial Projects in Education [EPE] Research Center, 2006). A technology gap also seems to exist in Connecticut schools. Even though the state reports that, overall, 98 percent of its public schools are connected to the Internet (CABE, 2005), including 100 percent of high poverty schools (EPE Research Center, 2003), issues of Internet access are more complex than simply having the Internet enter the school door. For example, although a school may report Internet connectivity, that does not necessarily equate to teachers or students accessing the Internet within the classroom or during instruction. To better understand the complex issues surrounding a technology gap, or what is commonly coined as a digital divide, critical questions about points of access need to be answered. Who has access? Where is access provided? What is the quality of that access? Current research is not of a fine enough granularity to get at these important questions.

Connecticut has a commitment to both literacy education (Connecticut State Department of Education [CSDE], 2002; 2006a) and putting technology in schools (Center for Digital Government, 2002; Connecticut Commission for Educational Technology [CCET], 2006; Sternberg, Kaplan, & Borck, 2007). Even after expenditures in excess of \$212.6 million in E-rate funding in Connecticut alone (CentralEd, 2006), the state obtained some of the lowest rankings nationwide in the area of technology integration (EPE Research Center, 2006). Without changes to the curriculum to integrate the new reading comprehension demands of the Internet paired with appropriate professional development opportunities for teachers, the state may remain behind in the area of effective technology integration. Therefore, Connecticut may be the most ideal

location for a study that focuses on issues of social equity and how those issues relate to literacy learning and technology integration.

Background of the Study

It is increasingly apparent that the nature of literacy is changing as the Internet becomes a more central aspect of life in the 21st century (NLRT, in press). New definitions of literacy instruction are beginning to emerge that blend both traditional notions of reading comprehension with the new literacies of online reading comprehension (Coiro, 2003; Eagleton & Dobler, 2007; Henry, 2006b, 2007). As the International Reading Association (IRA) has argued, the skills and strategies required by reading on the Internet need to be integrated into today's classrooms (IRA, 2001).

Not only is reading different on the Internet but it is also multiple in nature. Alvermann (2005) argues for a new definition of classroom teaching and learning that incorporates "a broadened view of text and the multiliteracies made possible in today's new information communication technologies" (p. 10-11). Some argue for the definition of text to include visual, digital, and other multimedia formats (Meyer & Rose, 2000; The New London Group, 2000). Livingstone (2003) asserts:

By representing knowledge in a different manner from that of the traditional book or the familiar genres of television, the internet—with its multimodal, hypertextual, heterarchical, diverse forms of online knowledge representation—is transforming conventions of literacy, authority, knowledge and creativity. (p. 154)

A broadened definition of literacy would thus encompass the multiple contexts of digital technologies, and the Internet specifically, as well as the new online reading comprehension skills and strategies that are required in these multi-modal, text environments (Eagleton & Dobler, 2007; Henry, 2006a).

Online Reading Comprehension

Traditional conceptions of literacy instruction have intersected with the new literacies required for online reading. Coiro (2003) argues that although there are traditional elements of reading comprehension “(e.g. locating main ideas, summarizing, inferencing, and evaluating)” that are used during online reading, there are also “fundamentally new thought processes” that are required (p. 459). Reading experiences on the Internet vary greatly from reading linear, print-based texts (Coiro, 2003; Curry, Haderlie, Ta-Wei, Lawless, Lemon, & Wood, 1999; Henry, 2006a; Sutherland-Smith, 2002). Teachers are discovering that many students do not possess the new literacy skills required to successfully read and write with the many new technologies that regularly appear in today’s world (IRA, 2001). Yet, literacy pedagogy does not typically incorporate the Internet or digital technologies as an element of literacy instruction.

Warschauer (2006) refers to this stagnation in education as the “past/future” element of literacy and learning that schools are faced with as education moves into an information-based, digital era. The *past* literacy and learning strategies that focus on traditional, print-based texts do not provide the necessary skills required for the *future* reading contexts introduced through the increasing number of networked technologies found in schools. Therefore, an overemphasis on print-based texts in literacy instruction in our schools may be too narrow and limiting to the literacy development of students who engage in the multiple text formats of the Internet on a daily basis (Alvermann, 2005).

The fact that online reading comprehension may differ in important ways from offline reading comprehension may contribute to a richer and more complex understanding of the digital divide. Those students in economically disadvantaged school districts, for whom school is their only point of Internet access (Bronack, 2006; Coley, Cradler, & Engle, 1997), may be less likely to develop new literacies because their use of the Internet is restricted. As Hargittai (2002b) has shown, frequency of Internet use is positively correlated to proficiency in using the Internet. Unless literacy instruction begins to include strategies for reading online, a new divide is likely to emerge between those who are skilled and those who are not.

Digital Divide: A Complex Definition

The factors most commonly associated with the literacy achievement gap, including socioeconomic status, parents' occupational status, and levels of education and income (Alvermann, 2005), are the same factors that are associated with notions of a digital divide (Alvarez, 2003; Chen & Wellman, 2003; Warschauer, 2002). At its inception, the digital divide was described as a dichotomous distinction centered on access to the Internet and whether an individual had access or not (Anderson, Bikson, Law, & Mitchell, 1995). As research in this area continued, the National Telecommunication and Information Association (NTIA) reported additional categories of the digital divide to include race, income, education, age, and disability status (NTIA, 2000). While research does show a positive correlation between increased Internet use and income (DiMaggio, Hargittai, Celest, & Shafter, 2004) and socio-economic status (Sun, Unger, Palmer, Gallaher, Chou, Baezconde-Garbanati, et al., 2005), there are additional elements aside from mere access that need to be considered. In the following section, three different levels of the digital divide are presented and explained.

Primary Level Digital Divide

For the purpose of this study, I conceptualized issues of *Internet access* as a primary level of the digital divide that incorporated Internet access both inside and outside the school environment. Additionally, my definition of Internet access included the type of access to the Internet that individuals have, since this appears to impact Internet use as well. In an earlier study, students who reported dial-up service at home indicated that they use the Internet at school more often due to the faster Internet connection available there (Henry, 2005). This decision is also sustained by Lazarus, Wainer, and Lipper (2005), who argue that the differences between having access to broadband connection speed versus dial-up modem speed may be greater than the difference between simply having access or not having access.

Secondary Level Digital Divide

For the purpose of this study, I conceptualized issues of *Internet use* as a secondary level

of the digital divide. In addition to significant inequalities in access to the Internet across households, there are also differences in Internet use between economically privileged and disadvantaged students (Attewell, 2001; Livingstone, 2003; Rice, 2002). “Research on children and the Internet must go beyond access to examine the nature of Internet use—its nature and quality, social conditions, cultural practices and personal meanings” (Livingstone, 2003, p. 159). Factors associated with the quality of Internet use are often referred to as a secondary level digital divide (DiMaggio & Hargittai, 2001). The type of activities that individuals engage in when online is important to consider. For example, students from economically privileged households are four times as likely to email or word process from home and three times as likely to complete school assignments on home computers than those living in poverty (Bronack, 2006). Whereas, economically disadvantaged students, as well as those from minority populations, are more likely to use computers for drill-and-practice activities compared to their more privileged classmates (Attewell, 2001). In addition, students who lack access to the Internet outside school and/or use the Internet solely for social purposes, such as instant messaging, may lack the higher level reading skills required when searching for, evaluating, and synthesizing information on the Internet (NLRT, in press). Therefore, considering the ways in which the Internet is being used is an important aspect of a more complex definition of the digital divide, which I conceptualized as a secondary level of the digital divide.

Online Reading Comprehension: The Convergence of Primary Level and Secondary Level Digital Divides

These two levels of a digital divide, limited Internet access and patterns of Internet use, may very well result in a third level of the digital divide, differences in Internet reading skill or online reading comprehension achievement. The amount of Internet access, both at school and at home, together with the nature of Internet use in both locations is likely to impact online reading comprehension achievement. This has important implications for equity and opportunity in our nation. It is clear that digital divide issues are more complex than initially conceived.

Unfortunately, most of the research in this area has addressed the digital divide in terms of access. While richer definitions are beginning to emerge, none have actually looked at the impact of the digital divide on important outcome measures in school settings, such as the ability to read on the Internet. This study sought to fill that void. In an information economy that is heavily reliant on the use of networked technologies to complete every day tasks, the skills and strategies that are required to read on the Internet are increasingly important to develop. The time has come for research that looks at the digital divide across three different levels to better understand the impact for our students' futures.

It is likely that a more complex framing of the issues associated with the digital divide will help us to understand the challenges in richer and more powerful ways. We might then be better equipped to respond more appropriately to the challenges that the digital divide creates for our students to read, comprehend, and learn online. Consider, for example, the results of a small-scale, initial study by Lentini (2006) who found that 87 percent of students from an economically privileged district could define the acronym "URL" compared to only 15 percent of students from economically disadvantaged districts. Additionally, when asked to select the website among four choices that was the most useful and reliable for an academic assignment, 66 percent of students from an economically privileged school district were able to select the correct one compared to 49 percent of students from economically disadvantaged districts. Lentini also reported that only 8 percent of students from economically privileged districts use the Internet most often at school, compared to 45 percent of students from economically disadvantaged districts. Although these results showed significant differences between students in regard to their access to the Internet as well as their knowledge of online reading comprehension strategies, this study was conducted with a small sample of convenience. It did show that there might be significant differences between economically privileged and economically disadvantaged schools in regard to Internet access and online reading comprehension, but a more systematic study of this issue is necessary

to fully understand the complex relationships between multiple levels of the digital divide and its impact on students' and teachers' online reading comprehension ability.

It is also important to look at an additional, potential component for why some students may not be proficient with reading on the Internet. Teachers' abilities to read on the Internet may have a direct impact on students' abilities to read on the Internet. If teachers do not have the requisite skills and strategies to locate, evaluate, and synthesize information from the Internet, they may be less successful or prepared in helping their students develop these skills. Only 21 states require teachers to take at least one technology course or pass a technology competency exam to receive an initial teaching certificate and only nine states require technology-related professional development for recertification (Swanson, 2006). Moreover, most schools do not set aside the suggested 30 percent of technology funding for professional development purposes; most allocate a mere 15 percent (U.S. Congress, 1995). As a result, only a third of classroom teachers reported that they felt well prepared to use the Internet in their teaching (Rowand, 2000). This pattern continues when information from the Internet is sought to include in classroom lessons. "Teachers, even experienced Internet users, appeared to have little knowledge of the search engines and search strategies to make efficient use of Internet resources" (Gibson & Oberg, 2004, p. 571). Therefore, it becomes important to evaluate teachers' proficiency in online reading in order to determine if there are differences in teachers' skills with using the Internet between economically privileged and disadvantaged districts. This might also contribute to a richer and more complex understanding of the digital divide.

Study Design

To better understand effective literacy instruction, Pressley (2006) called for reading research that is both richer and more complex. He argued for a multilevel and multidimensional research approach that would include research on the *parts* of reading instruction, such as the literacy curriculum and reading instructional practices, as well as the *whole*, including district and state level aspects. He pointed out that reading instruction does not occur in isolation but, rather,

within a complex context of learning. This study followed Pressley's suggestion by looking at a more complex picture of the digital divide by using multilevel and multidimensional methods.

Mixed Method Procedures

Research that combines multiple methods of data collection and analyses and a wide variety of evidence types are becoming more commonplace for exploring the complex changes being generated by the Internet, including user behaviors and user contexts (see Solomon, 1997; Fabritius, 1999). Therefore, both quantitative and qualitative data were collected and analyzed to obtain thorough and detailed results for the proposed research questions.

This study was conducted in four phases. The first phase focused on measurement scale development to create two parallel measures of Internet access, Internet use, and online reading comprehension for middle school students and teachers. During this phase, I refined a previously developed survey instrument that measured similar constructs of interest (see Henry, Mills, Rogers, & Witte, 2006) using factor analysis for scale development. During the second phase, the two newly developed measurement scales were administered to middle school students and teachers in both economically privileged and economically disadvantaged school districts. The third phase consisted of using quantitative analytic techniques to understand patterns in the results among student and teacher participants. An analysis of variance (ANOVA) evaluated mean differences in students' online reading comprehension achievement between economically privileged and economically disadvantaged districts. A parallel ANOVA evaluated mean differences in teachers' online reading comprehension achievement between economically privileged and economically disadvantaged districts. The purpose of these analyses was to determine if a tertiary level digital divide existed within the sample populations. Then, a hierarchical linear modeling (HLM) analytic approach was tested to determine which variables associated with primary and secondary levels of the digital divide best predicted students' and teachers' online reading comprehension achievement. The fourth phase in this study combined several qualitative data collection and analysis techniques. Data included transcripts from

interviews and focus groups, observational field notes, and various school artifacts collected from the research sites. Analyses included a multilevel conceptual content analysis and semantic mapping. This multilevel, mixed methods approach was used to obtain a rich data set that would better explain the complexity of the issues related to the digital divide.

Operational Definition for Economically Privileged and Disadvantaged Districts

For the purpose of this study, economically privileged and economically disadvantaged school districts were operationally defined in terms of several socioeconomic factors, such as family income, education levels, and home language. Research has shown that these social factors are commonly associated with gaps in academic achievement (Lee & Croninger, 1994). For example, economically privileged students consistently outscore economically disadvantaged students on the NAEP (Kleiner & Lewis, 2003), minority students and those with limited English proficiency experience lower levels of reading comprehension than their white counterparts (CTAGS, 2006), and students who have parents with lower levels of education are more likely to struggle academically (Henderson & Berla, 1994).

In Connecticut, a classification system is used to categorize schools according to these socioeconomic factors using a District Reference Group (DRG) classification system. The Connecticut State Department of Education (CSDE) developed this classification system as a means for comparing groups of school districts that have similar characteristics for the purpose of reporting and analyzing school district data. This system is defined as such:

The district reference group system is a classification method in which Connecticut's 166 school districts and three endowed and incorporated academies have been grouped based upon seven variables: family income, parents' education levels, parents' occupations, family poverty, family structure, home language and district enrollment. The Department has established nine district reference groups and has labeled them with letters A through I. Reference

group A contains the state's most affluent districts, while reference group I contains the state's poorest districts. (CSDE, 2006a, p. 5)

Thus, a high DRG classification, such as A or B, represents economically privileged school districts, whereas a low DRG classification, such as H or I, represents economically disadvantaged school districts.

Research Questions

There were three main purposes for this study. The first purpose was to evaluate middle school students' online reading comprehension achievement and to make comparisons in performance between students attending schools in economically privileged school districts to those in economically disadvantaged school districts. The second purpose was to evaluate middle school teachers' online reading comprehension achievement and to make comparisons in performance between teachers employed in schools in economically privileged school districts to those in economically disadvantaged school districts. Finally, the third purpose was to extend the conceptualization of the digital divide to determine what factors best predict students' and teachers' online reading comprehension achievement. This study explored differences in Internet access and usage both inside school and outside school, as well as levels of Internet reading skill among middle school students and teachers to answer five research questions.

Research Question One

RQ1: Do differences in online reading comprehension achievement among middle school *students* vary significantly according to District Reference Group (DRG) classification?

It was predicted that evidence would be found of a tertiary level digital divide among students. That is, there would be a significant difference in students' Internet reading skill shown by differences in online reading comprehension achievement. Students attending schools in economically privileged districts were expected to score higher than students attending schools in economically disadvantaged school districts. Research clearly shows that a digital divide exists between schools as a result of certain economic factors (Attewell, 2001; Goslee & Conte, 1998;

Mack, 2001; Williams, Coles, Wilson, Richardson, & Tuson, 2000). It was, therefore, expected that a gap, previously identified as a tertiary level digital divide, exists between students who have ready access to the Internet at school and the requisite skills to read Internet-based texts and those who do not.

Research Question Two

RQ2: Do differences in online reading comprehension achievement among middle school *teachers* vary significantly according to District Reference Group (DRG) classification?

It was predicted that evidence would be found of a tertiary level digital divide among teachers. That is, there would be a significant difference in teachers' Internet reading skill shown by differences in online reading comprehension achievement. Teachers who are employed by economically privileged districts were expected to score higher than teachers employed by economically disadvantaged school districts. Research shows that a digital divide exists between schools where teachers from schools in poor communities report limited access to technology for instruction (Becker, 1999; Lazarus, et al., 2005; Mack, 2001; Parsad & Jones, 2005; Williams, et al., 2000). It was, therefore, expected that a tertiary level digital divide also exists between teachers who have ready access to the Internet at school along with the requisite skills to read Internet-based texts and those who do not.

Research Question Three

RQ3: What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in *students'* online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, use, and skill? It was predicted that variables associated with primary and secondary digital divides (i.e. issues of access to the Internet and patterns of Internet use) at both the student and teacher level, along with District Reference Group (DRG) classification, would have a significant impact on students' online reading comprehension achievement. Inequalities of Internet access and use have been identified in the research as contributing factors to both primary and secondary digital

divides (Dewan & Riggins, 2005; Hargittai, 2002a, 2002b; Powell, 2007). In addition, it has been noted that students have not yet developed the skills and strategies that are needed to learn within the information spaces found on the Internet (Cuban 2001; IRA, 2001). This may be a result of teachers not having the necessary skills for reading on the Internet themselves (Rowand, 2000). Therefore, it was also predicted that teachers' own reading comprehension ability might have an effect on students' development of online reading comprehension achievement. For these reasons, it was predicted that the factors associated with both the primary and secondary level digital divides along with teachers' online reading comprehension achievement would contribute to a gap in online reading comprehension for students. This gap was expected to show students from economically privileged school districts with higher levels of online reading comprehension achievement than those from economically disadvantaged school districts.

Research Question Four

RQ4: What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in *teachers'* online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, use, and skill?

It was predicted that access to the Internet, use of the Internet, and District Reference Group (DRG) classification would have a significant impact on teachers' online reading comprehension achievement. Schools that serve economically disadvantaged students report inadequate equipment and Internet access compared to those serving economically privileged students (Attewell, 2001; Goslee & Conte, 1998; Williams, et al., 2000). Research also indicates that teachers in schools with large numbers of poor and minority students have less computer training (Attewell, 2001). It was, therefore, expected that these factors would contribute to differences in teachers' online reading comprehension achievement along economic lines.

Research Question Five

RQ5: How do elements of the school context appear to contribute to the pattern of factors

that affect online reading comprehension achievement among middle school students and middle school teachers?

As Pressley (2006) asserted, learning occurs within a complex context that consists of many different characteristics; accordingly, an exploration of the contextual factors that might influence the inclusion of instruction for the new literacies of the Internet that seek to develop online reading comprehension ability was important. These factors may include the accessibility of technology and the Internet (Attewell, 2001; Goslee & Conte, 1998; Williams, et al., 2000), teachers' skill level and use of technology (Attewell, 2001; Dewan & Riggins, 2005; Hargittai, 2002a, 2002b), public policy initiatives that support or inhibit technology integration, district goals and objectives for curricula development, and teacher training and professional development opportunities. It was anticipated that this qualitative exploration would help us to better understand digital divide issues at all three levels, primary, secondary, and tertiary. As a result, an enriched understanding of the contextual factors that have an added influence on both students' and teachers' online reading comprehension may provide additional insights into the complexities associated with the digital divide.

Significance of the Study

The implications of this study for research, public policy, and classroom practice are significant. In terms of research, understanding this problem will help inform research efforts on issues of the digital divide by providing a more complex picture of what elements contribute to it and how it might impact student achievement. Public policy initiatives could better address the issues of social equity that still exist in our nation's schools if there was a clearer depiction of the issue. Perhaps the most important outcome of this research would be the impact on classroom practice. If we move toward a new vision of literacy instruction that includes the new literacies of online reading, we could help close the gap between economically privileged and economically disadvantaged students, providing the opportunities that every child deserves in an age of online information and communication.

CHAPTER TWO: REVIEW OF THE LITERATURE

The purpose of this chapter is to present the relevant literature that provides the foundation for this study. The chapter is divided into five distinct sections. The first section provides a restatement of the problem. The second section discusses the complexities associated with defining the digital divide. This discussion leads into the third section, which examines the new literacies of online reading comprehension with an emphasis on locating information and critical evaluation of information. Then, a new literacies perspective is discussed in section four, which provided the theoretical foundation for this research study. Finally, the role of public policy initiatives related to this study is reviewed.

Statement of the Problem

A central problem for our nation is that today's classrooms do not appear to prepare our students with the 21st century skills they require to be successful in an information economy (Gates, 2007; Mack, 2001; Partnership for 21st Century Skills, 2006). This may be especially true for those who require our support the most, students in economically disadvantaged communities who have Internet access at home the least (Lazarus, et al., 2005; Leu, 2007). Gates (2007) presented this issue before the Committee on Health, Education, Labor, and Pensions in which he argued that our public schools still focus on an industrial-age learning model that is outdated and does not adequately prepare our children for an economy that is based on knowledge and technology. This issue is not a new one. In 2002, the Secretary of Education had argued:

Education is the only business still debating the usefulness of technology. Schools remain unchanged for the most part despite numerous reforms and increased investments in computers and networks...we still educate our students based on an agricultural timetable, in an industrial setting, yet tell students they live in a digital age. (Paige, 2002, ¶2)

Although the Internet has been identified as the defining technology for literacy and learning among this generation (Fallows, 2004; Hay, 2000; Lenhart, et al., 2005; Leu, et al., 2004; Levin

& Arafeh, 2002), instruction, public policy, teacher education, and assessment remain archaic and outdated in preparing today's youth for life in an information age (Gates, 2007; Paige, 2002; Tarica, 2006).

Friedman's 2005 book, *The World is Flat*,¹ has contributed to a reform movement that is now looking more closely at the American education system to assess how well students are being prepared for a global, information economy. For example, the Partnership for 21st Century Skills, a consortium of education, business, and government organizations, seeks to serve "as a catalyst for change in teaching, learning, and assessment" by providing every child in America with "21st century knowledge and skills to succeed as effective citizens, workers, and leaders in the 21st century" (Partnership for 21st Century Skills, 2006, ¶ 1-2). It is increasingly clear that today's students need rich learning experiences that will present opportunities to develop multiple ways of participating in and negotiating an information-driven, technological world.

The question is no longer whether the Internet can be used to transform learning in new and powerful ways, nor is the question whether we should invest the time, the energy, and the money necessary to fulfill the Internet's promise in defining and shaping new learning opportunities (Mack, 2001). Instead, the question has become: Is education evolving along with the continuous development of digital technologies to provide our young people with the requisite skills they need to be successful in today's economy and the economies of tomorrow? Billions of dollars have already been invested by both governmental and private organizations to provide access to technology for our children in schools, public libraries, and community centers across the nation (Jukes & McCain, 2005; Kleiner & Lewis, 2003; Lazarus, et al., 2005; Oppenheimer, 2003). However, this access does not ensure that our students are being adequately prepared for living and working in a digital economy. Much more than simple access is required.

Notions of a digital divide have haunted our nation for the past decade. The digital divide in the United States still remains as a critical social imbalance and may indeed be the most inhibiting factor in realizing academic success for certain populations of our young people.

Bronack (2006) confirms this issue, “access to important technologically-enabled learning activities (e.g., communication, resource-sharing, and information-seeking) at home is driven still by social factors beyond the control of young people—namely, race, economics, and family arrangements” (p. 5). Simply providing an access point to the Internet is not enough. Our children need ready access to the Internet as well as the knowledge and skills for using that Internet connection to be productive, digital citizens.

Today, people residing in poorer neighborhoods may be able to access the Internet from public locations, such as libraries, schools, community centers, or even cyber cafés, but this is not the same as being able to access the Internet from a high-speed connection at home whenever it is needed (Norris, 2001). Providing “on demand” access is increasingly critical for today’s youth. Lazarus and colleagues discuss this issue in their 2005 report:

ICT access at home has emerged as a prerequisite to children fully realizing digital opportunity. Some of the most severe disparities facing low-income and ethnic minority children—such as students using computers to help with homework, parents e-mailing teachers, and young adults using software applications which employers value—were clearly a function of the limited access these children have at home to computers, the Internet, and to high-speed connections. (p. 8)

This issue has the greatest impact on children who have limited access to the Internet and who are not developing the online skills necessary to prepare for their futures beyond high school. These students are ill prepared to enter a workforce that requires basic computing skills (Mack, 2001), and they are not privileged with the skills required to be successful in college (Lazarus, et al., 2005). These students are in danger of being left behind in a digital age.

We can see that Internet access is not a one-dimensional problem. Many confounding variables aside from mere access to the Internet make the digital divide a complex issue that

continues to plague our nation. A more thorough understanding of these issues is necessary before the digital divide can be sufficiently addressed and minimized.

The Digital Divide

Concerns of a digital divide began to surface shortly after the inception of the World Wide Web and access to the Internet became somewhat widespread. As the availability of the Internet continued to grow, so did our awareness of the divisions within the networked world. Not only did a divide between industrialized and developing nations arise, but also a growing divide among rich and poor societies within nations was cause for concern. As the use of the Internet continues to grow, so does the definition of the digital divide and the extant variables that compound that divide (Barzilai-Nahon, 2006; Compaine, 2001; Cooper, 2002, 2004; Dewan & Riggins, 2005; DiMaggio & Hargittai, 2001; DiMaggio, et al., 2004; Hargittai, 2003; Norris, 2001; Warschauer, 2002, 2003). The digital divide has erupted into a complex issue that can be viewed in different ways and from many different perspectives.

Researchers agree that the digital divide is a multifaceted issue that is creating an online elite class of individuals and further marginalizing those who do not have sufficient Internet access or the skills required to participate in online activities (Barzilai-Nahon, 2006; Cooper, 2004; Dewan & Riggins, 2005; Lazarus, et al., 2005; Mossberger, Tolbert, & Stansbury, 2003). For example, Mossberger and colleagues (2003) report four different aspects of the digital divide: a) an *information divide* in which people are unable to access online information due to demographic characteristics; b) a *skills divide* that is related to the skill level of the individual; c) an *economic opportunity divide* in which training, education, and employment opportunities are restricted; and d) a *democratic divide* related to participation in e-government. Dewan and Riggins (2005) add another dimension with their discussion of an *e-commerce divide* in which individuals do not have access to the e-commerce opportunities that the Internet provides. They argue that “those most in need of finding ways to get ahead financially will be less likely to make use of the more powerful and beneficial online commerce features, thus leading to further socio-

economic stratification” (p. 327). In most instances, researchers are looking to define a more complex digital divide by reporting on issues of access as it relates to the availability of an affordable infrastructure, certain demographic variables, specific use patterns, along with social and government constraints and supports (Barzilai-Nahon, 2006). Norris (2001) presents three different aspects of the digital divide:

The *global divide* refers to the divergence of Internet access between industrialized and developing societies. The *social divide* concerns the gap between information rich and poor in each nation. And finally within the online community, the *democratic divide* signifies the difference between those who do, and do not, use the panoply of digital resources to engage, mobilize, and participate in public life. (p. 4)

For the purpose of this study, I focused on what Norris describes as the social divide, as it exists in the United States. This social digital divide has been the center of a series of studies by the United States Department of Commerce (1995, 1998, 1999, 2000, 2002), which has documented that poorer households have lower rates of Internet penetration than more affluent households. These reports alone indicate that a social digital divide exists within the borders of our country, but the social divide is much more complex than the unequal distribution of technological opportunities (Norris, 2001). A useful way to understand the complexities in defining this divide is to view it across three levels: a) a *primary level divide*, which addresses issues of access to digital technologies and the Internet; b) a *secondary level divide* that is related to Internet use by the individual; and c) a *tertiary level divide* where lack of access and limited use result in restricted proficiency when reading on the Internet, previously referred to as online reading comprehension achievement.

Primary Level Digital Divide: Issues of Access

A primary level digital divide is concerned with issues of access to digital technologies and the Internet. Historically, household income has been one of the strongest predictors of

Internet access in the United States (NTIA, 2000; Lenhart, Horrigan, Rainie, Allen, Boyce, Madden, et al., 2003). Our nation's poorest households are shown to have the lowest penetration rate of personal computers (Compaine, 2001; Hoffman & Novak, 1998). Research shows "poor and minority families are less likely than other families to have access to computers or the Internet, creating a technology gap between *information haves* and *information have-nots*" (Attewell, 2001, p. 252). In 2001, Compaine reported:

When asked why they lacked Internet access, a significant portion of households (16.8%) responded that it was too expensive. Respondents particularly cited the cost of monthly bills, followed by toll calling for ISP [Internet Service Provider] access. In addition, cost ranked highest among reasons given by those who discontinued Internet use. (p. 39)

Today, cost continues to inhibit the lowest income households from gaining access to the Internet. In 2003, only 29 percent of youth ages 7-17 from households with an annual household income under \$15,000 had home access to the Internet compared to 93 percent from households with an annual income greater than \$75,000 (Lazarus, et al., 2005). Access to a broadband connection adds another level of complexity since access to broadband service is out of reach for many households. Cooper (2004) reports, "half of all households with incomes above \$75,000 have broadband, while half of all households with incomes below \$30,000 have no Internet at home" (p. 2). "As the Internet has become increasingly central to life, work, and play—providing job opportunities, strengthening community networks and facilitating educational advancement—it becomes even more important if certain groups and areas are systematically excluded" (Norris, 2001, p. 10). Access to the Internet is shown to cut across economic lines.

Minority populations are less frequently connected to the Internet, especially at home. According to the NAEP data from the 1990s, African-American and Hispanic fourth graders, as well as students from poor, urban neighborhoods, reported using the computer at school more than any other location (Coley, et al., 1997). Additionally, the lack of computer and Internet use

in the home compared to school remains significant for those who are Black or Hispanic, live with parents who did not complete high school, live with a single mother, or live in a household where adults speak Spanish only (Compaine, 2001; Hoffman & Novak, 1998). Compaine (2001) argues, “groups that are less likely to have Internet access at home or work (such as certain minorities, those with lower incomes, those with lower education levels, and the unemployed) tend to access the Internet at public facilities, such as schools and libraries” (p. 28). Hence, school access to the Internet becomes an increasingly important factor to consider.

Many school-age children rely heavily on Internet access at school, as it is unavailable to them at home. Bronack (2006) reported, “Children and adolescents from poor households and those whose parents did not complete high school are more likely to rely solely on schools for Internet access” (¶14). The students who require school access the most may be further limited by that access, as it is not available to them on an unlimited basis. For example, Parsad and Jones (2005) argue, “making the Internet accessible in schools outside of regular school hours allows students who do not have access to the Internet at home to use this resource for school-related activities such as homework” (p. 8). Yet, only 54 percent of schools with high populations of students who are economically disadvantaged had Internet-connected computers available outside regular school hours, compared to 80 percent of schools with low populations of students who are economically disadvantaged (Parsad & Jones, 2005). These authors also reported “the ratio of students to computers with Internet access available outside of regular school hours was 22 to 1 in 2003...schools with the highest percent minority enrollment had more students per computer” (p. 9). Students who obtain Internet access solely from public locations (i.e. schools and libraries) are disadvantaged further as these institutions have limited operating hours, thus limiting access more (Marriott, 2006).

As we turn toward schools to provide Internet access, an important question is brought to bear on the issue: Can American schools provide adequate access to the Internet that is required to narrow the digital divide? Over the past decade, there has been an increasing emphasis on

using networked technologies in schools. In 1994, only three percent of instructional rooms nationwide had an Internet connection compared to more than 90 percent today (Kleiner & Lewis, 2003). The CEO Forum Report (1999) indicated, “every teacher and administrator should have ready access to appropriate communications and information technology” (p. 2). Nevertheless, according to one study of teachers’ Internet use, 27 percent reported that they did not have access to the Internet at school or at home (Becker, 1999). Thus, the issue of teacher access is an important one. Little research exists that explores the availability of Internet access to teachers specifically; even though 61 percent of classroom teachers felt Internet access in the classroom was essential to their teaching (Parsad & Jones, 2005). Teachers also report the lack of access to technology as the most inhibiting factor in the use of technology in the classroom (Henry, 2005; Williams, et al., 2000). In a recent study, only 57 percent of public school teachers agreed that computers and other technology were sufficiently available in their classroom (Lazarus, et al., 2005). There seems to be a discrepancy between what schools report regarding access to technology compared to what teachers indicate is available.

Although great strides have been made to get more classrooms connected, a differential still exists in students’ access to the Internet at school between economically privileged and economically disadvantaged students. An e-rate study (cited in Mack, 2001) indicated:

While all public schools are equally likely to have Internet access *in at least one room*, getting access at the classroom level where it can be incorporated into daily instruction has been more of a challenge. As might be expected, the percentage of classrooms with access is divided along wealth lines, with 74 percent of the wealthiest schools likely to have classroom access while only 39 percent of the poorest schools have similar capabilities. (p. 78)

Even though nearly every school is wired with high-speed Internet today, “only 36 percent of children ages 7 to 17 from households earning less than \$15,000 annually say they use the Internet at school compared to 63 percent of children from households earning more than \$75,000

annually” (Lazarus, et al., 2005, p. 8). Schools that serve the poorest, largely minority populations of students are shown to have less computer equipment available and slower Internet connections than the schools that serve a more affluent population, thus reducing access potential (Attewell, 2001; Goslee & Conte, 1998; Williams, et al., 2000).

Even though a primary level digital divide is often characterized as a binary phenomenon (i.e. Internet access is either available or it is not), to better understand the issue it is necessary to look at additional complexities. First, a disparity exists between economically privileged and economically disadvantaged students in regard to Internet access at home. Secondly, inequalities in the availability of computers and the Internet between schools located in affluent communities compared to those in poorer communities have been reported (Attewell, 2001; Goslee & Conte, 1998; Mack, 2001; Lazarus, et al., 2005). And, finally, the type of Internet access (i.e. high speed versus low speed) has been identified as an additional facet of the primary digital divide that should be considered (Lazarus, et al., 2005; Norris, 2001). A richer more complex understanding of this first level of a digital divide in our schools is important if we hope to address issues of equity in our educational system.

Secondary Level Digital Divide: Issues of Internet Use

Access is not the only issue in understanding a more complex definition of the digital divide. Once access to technology has been obtained, the nature of technology use becomes increasingly important (Dewan & Riggins, 2005; Powell, 2007). Researchers describe this as a *second* digital divide (Attewell, 2001), *second order* digital divide (Dewan & Riggins, 2005), or *second level* digital divide (Hargittai, 2002) that focuses on differences in individuals’ use of the Internet (Attewell, 2001; Dewan & Riggins, 2005; Hargittai, 2002). Dewan and Riggins (2005) describe this secondary level in terms of the inequality in the use of digital technologies once an individual has access.

It is important to look at how students are using the Internet outside school. Those who use it primarily for social networking opportunities have a different skill base than those who

engage in higher level reading activities, such as searching for information and critically evaluating information on the Internet. What type of activities are teens most likely to engage in outside school? The top three activities that teens report are: 1) sending or reading email, 2) visiting websites about movies, TV shows, music groups, or sports stars of interest, and 3) playing online games (Lenhart, et al., 2005). Lenhart and colleagues also discovered that most parents initially purchased a household computer to access the Internet for educational purposes, however the use of the Internet for entertainment and social networking has overshadowed school-related online activities. It appears that it is increasingly necessary to turn toward our public schools to help students develop the important online reading skills that will allow them success in the 21st century workplace.

In addition to understanding how students use the Internet outside of school, it is also important to look at Internet use in the school classroom. Studies have documented that appropriate use of technology in an educational context resulted in better grades, increased scores on standardized tests, increased school attendance, and improvement in school behavior (Lazarus, et al., 2005; Metiri Group, 2006). But, simply having computers in the classroom or access to the Internet does not mean that it is being used or being used effectively for teaching and learning (Kleiman, 2000; Malone, 2007). “No technology, in itself, will ever eliminate the differences that arise among people who effectively utilize a technology and those who do not” (Compaine, 2001, p. x). In a study conducted by Collis and Lai (1996) that looked at school and classroom contextual variables that contribute to effective technology integration, it was found that the teacher is the most influential variable. These researchers reported:

The good news about computers may well be that for a good teacher who wishes to innovate with computers and who has the support of the school principal, the computer can be a tool for the development of higher level thinking regardless of the amount of hardware and software available. (p. 64)

Although research has indicated that the effective use of technology can result in higher levels of learning (Collis & Lai, 1996; Metiri Group, 2006), administrative and preparatory tasks, not teaching and learning are often shown to be the primary uses of technology by teachers (Kleiner & Farris, 2002). Students in one study reported that Internet-based assignments were most often “poor instructional uses of the Internet” and “uninspiring” (Levin & Arafeh, 2002, p. iv). Since the way in which students use the Internet at school is largely driven by the activities and assignments that teachers create (Levin & Arafeh, 2002), it is important to consider the impact of teacher variables as well. Instead of simply looking at issues of physical access, we can begin to understand an additional layer of the digital divide in terms of how the Internet is used once access has been obtained.

Tertiary Level Digital Divide: Issues of Achievement

Do the factors associated with primary and secondary level digital divides converge into a tertiary level digital divide and create an even larger achievement gap for the most needy students in our schools? The inequality of access and use are only part of the problem. Inequalities of Internet skill level are also shown to be an important aspect of the digital divide. Hargittai (2002) explains, “By measuring users’ Internet skills, we can bridge the gap in the literature between mere structural measures of access and descriptions of what people do online to account for what different people are *able* to do online” (§ 5). A tertiary digital divide may exist as a result of primary and secondary digital divides that has important implications for the futures of our children. “In today’s electronic age, children who are unfamiliar with technology face an uncertain employment outlook and a diminished capacity for significant economic progress” (Mack, 2001, p. 83). Both a primary level digital divide (i.e. access to the Internet) and secondary level digital divide (i.e. use of the Internet) can be addressed by providing effective instruction for using the Internet as part of an integrated approach to teaching and learning in our schools.

Simply having a technology infrastructure in place does not ensure that meaningful integration of technology is occurring. Although the CEO Forum on Education & Technology report (1999) indicated that one-fourth of our nation's schools were effectively using technology, 50 percent of American schools were in the "Low Tech readiness" category. "With the growing number of Internet-connected computers available in schools across the United States, our classrooms are the best places for students to acquire the new literacy skills they will need for participation in the workplaces of the 21st century" (Castek, Bevans-Mangelson, & Goldstone, 2006, p. 716). Schools need to pay closer attention to determine whether students are acquiring proficiency in using digital technologies and if they are developing the skills valued in an increasingly digital economy. Mack (2001) argues, "Technology can and should be incorporated into the modern school curriculum and used as a tool for enhancing the learning process" (p. 83). Yet, even though 96 percent of the nation's states have adopted technology standards for students, only 8 percent evaluate them on those standards (EPE Research Center, 2007).

One important aspect of preparing students for the important new skills of online reading comprehension is the extent to which teachers are prepared for using the Internet. Some teachers are more skilled in using technology during instruction than others (Lenhart, et al., 2005). Research also shows poor and minority students are more likely to have teachers with less computer training (Attewell, 2001). In 2000, only one-third of teachers stated that they felt *well* or *very well* prepared to use computers and the Internet for instruction (Smerdon, Cronen, Lanahan, Anderson, Iannotti, & Angeles, 2000). Although the majority of schools provide professional development focused on technology integration, many teachers do not take advantage of these opportunities. In 2003, 82 percent of public schools reported that professional development was offered on how to integrate the Internet into the curriculum (Parsad & Jones, 2005). However, only 13 percent of the schools reported more than half their teachers attended the professional development offered, and 38 percent of the schools reported less than one-fourth of their teachers participated. Until schools make technology integration a priority and require their teachers to be

involved in this training, a tertiary digital divide is likely to result with a potential impact on students' academic achievement.

Bronack (2006) revealed, “few schools are allowing students to apply computers—and, particularly, the Internet—toward meaningful, engaging learning activities” (§13). In one study, teachers reported that it is difficult to integrate technology in the classroom when students are at varying levels of proficiency with using different Internet technologies (Henry, 2005). This problem is likely to continue, especially in schools with large percentages of students who obtain Internet access only from school. Yet, in an increasingly digital society, it is critical for our students to develop the skills they need to use the Internet as an information source. Without them, they are sure to be left behind. “Young people with well-developed digital media skills can benefit from their skills in two ways: (1) they are prepared for better jobs, and (2) they can more easily use their skills to search, apply for, and obtain jobs” (Lazarus, et al., 2005, p. 6). Until states begin to require that students be evaluated to meet certain technology standards, teachers will not focus on helping students to develop the skills required for Internet-based reading and learning.

Online Reading Comprehension

Internet access and integrating technology into the curriculum do not ensure that the new online reading comprehension skills and strategies are being taught. Current models of technology integration often center around *computer literacy*, which focuses primarily on the use of computer applications (Goodson & Mangan, 1996; Halpin, 1999; Williams, 2003) and not what many call the new literacies of reading on the Internet (e.g. Coiro, 2003, 2007; Coiro & Dobler, 2007; Eagleton & Dobler, 2007; Henry, 2005, 2006a, 2006b; Leu, 2000, 2002; Leu, et al., 2004). Carvin (2002) argues, “unless people can read and understand what they find online, Internet access isn't very meaningful” (§ 9). The development of new literacies becomes essential for learning in online environments.

Reading on the Internet is comparatively different than reading in traditional printed texts. A complete definition of reading comprehension on the Internet is yet to be developed; however, several researchers are exploring this new reading territory to create a better understanding of how readers read in this ill structured and dynamic information space (e.g. Coiro, 2003, 2007; Coiro & Dobler, 2007; Eagleton & Dobler, 2007; Eagleton, Guinee, & Langlais, 2003; Henry, in press, 2006a, 2006b; Leu, 1997, 2000, 2002). What has been discovered about online reading comprehension is that traditional reading strategies are still required to provide a basic foundation for reading, but reading an Internet text also appears to require new reading strategies (Coiro, 2003; IRA, 2001; Leu, et al., 2004; RAND Reading Study Group, 2002). Eagleton and Dobler (2007) discuss this in terms of an additional layer of complexity that is needed when reading on the Internet. They use the phrase “similar, but more complex” to compare reading comprehension in print versus web-based texts (p. 42). They also profess that in order to understand more about reading strategies for digital texts, we should build on what is already known about the reading process, learning, and teaching. For example, we know that making predictions is an important aspect of reading in traditional, printed texts. “Predicting is making guesses about what will come next in the text you are reading” (Duke & Pearson, 2002, p. 208). When reading on the Internet, not only do you make predictions based on the textual content and what will come next, but you also make predictions about what information may be housed behind a hyperlink within the text (Coiro & Dobler, 2007; Henry, 2007). Since printed texts do not have hypertext features, such as hyperlinks, this would be considered a new application for making predictions whilst reading on the Internet that comes from what we already understand about the reading process in traditional print environments (e.g. Duke & Pearson, 2002; Guthrie & Mosenthal, 1987; Pressley, 2002; Vacca, Vacca & Gove, 1991).

The majority of the text that appears on the Internet is expository in nature, an estimated 96 percent (Kamil & Lane, 1998). Consequently, readers of web-based texts rely heavily on

strategies for reading traditional informational texts, such as encyclopedias, textbooks, newspapers, and technical manuals. This creates an added difficulty for online readers, since expository texts are often the most difficult for students to read and comprehend (Beck & McKeown, 1991; McGee & Richgels, 1985). Good readers of traditional, print-based expository texts rely on the organization and structural nature of a text, as well as navigational elements, such as the table of contents, index, and headings (Armbruster & Armstrong, 1993; Dreher, 2002; Guthrie, Britten & Barker, 1991; Guthrie & Mosenthal, 1987; Meyer, Brandt, & Bluth, 1980; Vacca, et al., 1991). Although similar text features can be found in digital texts, a reader cannot count on consistency in structure across websites or even web pages within one site (Eagleton & Dobler, 2007). In fact, Dobler (2003) conducted a study that showed within a random sampling of 30 web pages, no two contained the same features or structure. Digital texts can be more challenging to read, which may produce cognitive overload or emotional frustration (Coiro, 2003). Teaching the new reading strategies that the Internet requires, therefore, becomes an important focus for literacy education (Bertelsen & Fischer, 2002/2003; Educational Testing Service [ETS], 2002).

It is likely that locating and evaluating information are the two most central skill areas in online reading comprehension. Malone (2007) affirms this argument, “teaching today’s tech-savvy kids to search and scrutinize information in an academic way [are] skills they will need to survive in an increasingly technical work force” (¶8). Locating and evaluating information are closely linked processes that drive information seeking on the Internet. As an information seeker engages in a search, all forms of Internet texts (e.g. search engine results, URLs, web page descriptions, web page content) are closely scrutinized to determine relevancy, accuracy, authorship, and currency of the information (Eagleton & Dobler, 2007; Hembrooke, Granka, Gay, & Liddy, 2005; Lankshear & Knobel, 2003; Lazonder, Biemans, & Wopereis, 2000; Rieh, 2004; Tabatabai & Shore, 2005; Walton & Archer, 2004). Depending on the seeker’s evaluation of information that is encountered during a search, it is either terminated or revised as part of a

recursive search process (Henry, 2007). Without the requisite reading skills necessary for the demands of negotiating this information space, access to information then becomes limited (Henry, in press). While it appears clear that adolescents are increasingly well versed in the skills required for instant messaging, mp3 downloads, and email (Gross, 2004; Lenhart, et al., 2005; Leu, 2000), it is also clear that they are not skilled in the higher level reading comprehension skills required to read and learn online, such as those skills required to locate information (Eagleton & Guinee, 2002; Henry, 2006a) or critically evaluate information (Eagleton & Dobler, 2007; Internet Reading Research Group [IRRG] & The New Literacies Research Team [NLRT], 2006b; Leu & Castek, 2006).

Reading While Locating Information

Reading on the Internet, particularly while searching for information, differs from reading traditional, print-based texts and requires novel reading skills and strategies (IRA, 2001; Leu, et al., 2004; RAND Reading Study Group, 2002). The amount of information on the Internet is nearly limitless. This presents important challenges during online reading and is a primary reason why the reading skills required for locating information online are so important (Henry, 2006a). Since the Internet houses so much information and because it is a poorly structured information domain, effective strategies for searching become central to accessing information and reading becomes critical for success. "If students do not possess adequate new reading skills to sort through large amounts of information, information overload can occur, creating frustration with the search task and ultimately resulting in students being unsuccessful in locating information" (Henry, 2006a, p. 615). Searching on the Internet is a complex, multidimensional process; without the ability to search and locate information effectively, access to information is restricted (Eagleton & Guinee, 2002; Henry, in press, 2005; Lazonder, et al., 2000; Nachmias & Gilad, 2002), and one cannot successfully complete an online reading comprehension task. Thus, the ability to effectively search for information can be viewed as a gate keeping skill (Henry, in

press). If you cannot read to locate the information you require online, you cannot complete your reading task (Henry, 2007).

In order to successfully locate information on the Internet, Eagleton and Dobler (2007) argue, “it is critical to have knowledge of available resources and to have flexible strategies for finding information using the most efficient methods possible” (p. 2). An extensive body of research has shown that most people, regardless of age, are inefficient and often times unsuccessful when trying to find information on the Internet (Bilal, 2002; Dennis, Bruza, & McArthur, 2002; Guinee, Eagleton, & Hall, 2003; Henry, 2007; Jansen & Pooch, 2001; Jansen, Spink, & Saracevic, 2000; Nachmias & Gilad, 2002; Palmquist & Kim, 2000; Tsai & Tsai, 2003). Some basic search skills can be explicitly taught (e.g. search engine functions and features, use of Boolean logic, specific URL extensions, etc.), but when reading while searching for information on the Internet, the development of more advanced strategies are essential for success.

Background knowledge is a vital component of locating information on the Internet. The ability to conduct a focused and successful search requires a substantial amount of knowledge (Lin & Belkin, 2005). “Relative success or failure in finding the relevant resources to satisfy the information need at hand can be the result of the searcher’s knowledge base” (Hembrooke, et al., 2005, p. 862). The use of prior knowledge is an important part of the reading process. A good reader connects what they know about a topic and text structures to develop connections as they read (Duke & Pearson, 2002). When it comes to locating information on the Internet, other types of background knowledge are relied upon. Eagleton and Dobler (2007) indicate, “the skilled Internet reader must include a strong level of prior knowledge in the areas of topic, text structure, website organization, and search engine formats” (p. 37). Prior topic knowledge and a vocabulary base about the subject of interest are critical to the search process. Without adequate knowledge of the vocabulary associated with a topic, identifying keywords to enter in a search engine becomes an impediment to locating information (Kafai & Bates, 1997; Slone, 2002).

System knowledge and task knowledge are also important to develop. Text structure, website organization, and search engine formats are often referred to as system knowledge in the research (Colaric, 2003; Rieh & Belkin, 2000; see also Henry, 2007). Task knowledge refers to the type of search task that is required to access the specific information (e.g. specific fact, chart, image, etc.) that is sought after (Bilal, 2000; Pritchard & Cartwright, 2004; Slone, 2002). Just as background knowledge is further developed through reading experiences (Snow, Burns, & Griffin, 1998), system and task knowledge are developed through experiences with searching (Hargittai, 2002a, 2002b; Rogers & Swan, 2004; Watson, 2001).

The Internet is undoubtedly an important information resource in the classroom. Use of the Internet to locate information has become a common practice in the 21st century. Reading while searching for information requires new strategies for the new text structures of the Internet, such as search engine results, as part of the reading process. Research has shown that middle school students do not read search engine results; they simply click on the first site displayed and work sequentially down the list (Guinee, et al., 2003; Henry, 2006a, 2007; Rogers & Swan, 2004). This technique has been referred to as a ‘click and look’ strategy, which is not very efficient or effective (Leu, Zawilinski, Castek, Banerjee, Housand, Liu, et al., in press). Information searching on the Internet also requires evaluation skills and strategies to determine if the results returned by a search engine are relevant to the task at hand (Lazonder, et al., 2000; Tabatabai & Shore, 2005; Walton & Archer, 2004). Unlike traditional, print-based texts in which all the information between two covers is relevant to the topic, reading on the Internet requires additional strategies to monitor and check information for relevancy.

Reading to Critically Evaluate Information

What is often referred to as critical reading, critical literacy, or reading with a critical stance becomes increasingly important when reading texts on the Internet. Critical literacy has been defined in several different ways (Green, 2001), but “a critical literacy approach always encourages students to examine beliefs about society and language” (Knickerbocker & Rycik,

2006, p. 44; see also Freire & Macedo, 1987; Jongsma, 1991; Kalbach & Forester, 2006; Shannon, 1995). The Standards for the English Language Arts (International Reading Association [IRA] & National Council of Teachers of English [NCTE], 1996) define critical reading as: “reading a text in such a way as to question assumptions, explore perspectives, and critique underlying social and political values or stances” (p. 71). Reading a text critically uncovers the latent philosophical, social, economic, and political meanings that are portrayed in an author’s message (Kalbach & Forester, 2006). When student read from a critical stance, they raise questions about whose voices are heard, whose voices are silenced, and who is empowered or disempowered by the reading of the text (McLaughlin & DeVogd, 2004).

Leino (2006) argues, “critical reading is an important skill in regard to printed texts, but in electronic texts, it is even more valuable” (p. 543). “Critical literacies are essential to reading on the Internet because issues of stance, information shaping, and information validity become so important within an information space where anyone may publish anything” (Leu, et al., 2004, p. 1601). Being a critical reader is often times more difficult on the Internet than in printed materials because there is no quality control system in place. Eagleton and Dobler (2007) explain the difficulty:

Information on the Web looks authentic through what appear to be official publications of everything from rumors to facts, with the boundaries between the two blurred. Traditional indicators of credibility, such as author and publishing information, are often difficult to find or perhaps even missing from the websites.
(p. 161)

Leino (2006) confirms their view, “missing references or writers’ names are problems that hardly ever appear in books” (p. 544). When using the Internet as an information source, judgments about credibility and authority are even more important than in traditional texts. Unlike print resources that undergo a rigid publishing process, it is quite simple to self-publish information on

the Internet making the evaluation of website authorship an essential component of online reading (Kibirige & DePalo, 2000).

Leu (1997) introduced the term “healthy skeptic” when referring to the manner in which readers should approach Internet texts. Similarly, McLaughlin and DeVogd (2004) explain that readers need to assume the role of “text critic” when they read. As Mather (1996) puts it, “[students] must call upon skills that cut across the entire curriculum to sniff out misinformation, disinformation, and bias” (Section 6.5, ¶ 8). He continues his argument to state that the credibility of an information source on the Internet “lies in the critical literacy ability of the reader”. This is what Freire (1970) first coined as “reading the world” to understand a text’s underlying purpose and messages (see also Freire & Macedo, 1987).

The goal of developing critical literacy in students is to “expand their reasoning, deepen their understanding, seek out multiple perspectives, and become active thinkers” while reading, which are higher level thinking and reading strategies (McLaughlin & DeVogd, 2004, p. 56). Just as becoming critically literate is a developmental process that requires decoding, encoding, and reading comprehension skills to develop first (Jongsma, 1991), critical literacy of Internet texts requires the development of other critical evaluation skills as a prerequisite. These skills include evaluating information for relevancy and accuracy before the higher-level evaluation of author voice, stance, authority, and audience can be considered (Eagleton & Dobler, 2007; Kibirige & DePalo, 2000; Lankshear & Knobel, 2003; Rieh & Belkin, 2000; Todd, 1998).

Determining relevancy of information is a key component of reading on the Internet. The main focus when evaluating information for relevancy is to determine the significance of the information in relation to the user’s purpose for seeking that information (Choo, Detlor, & Turnbull, 1998; 2000). Relevancy of information is determined in two distinct occurrences of online reading. First, when locating information, search engine results are reviewed to determine which link might provide the most useful, or relevant, information that the individual is seeking. Many students have difficulty selecting the website that is most pertinent to their needs and

struggle with distinguishing between appropriate and inappropriate results (Kafai & Bates, 1997; Large, Beheshti, & Rahman, 2002). Once a webpage has been selected from the search engine results, the content of the text is scanned to determine if the precise information is available. Similar to reading in print-based textbooks, online readers focus on visual cues, headings, and pictures to quickly evaluate whether the content matches the information that is needed (Bowler, Large, & Rejskind, 2001; Kafai & Bates, 1997; Palmquist & Kim, 2000; Slone, 2002). Eagleton and Dobler (2007) describe this as a “check of usability” in which the learner “evaluates the specific information available on the site to determine whether the facts and ideas will effectively answer her search question” (p. 166). Many online readers tend to evaluate web page information by the mere presence or absence of images (Slone, 2002). Developing relevancy evaluation skills is critical to online reading comprehension as shown by a small body of research (e.g. Henry, 2007).

Information on the Internet also needs to be evaluated for accuracy. Without a quality control system in place on the Internet, the information encountered is not necessarily dependable or reliable (Arunachalam, 1998). Preliminary results of a recent study (IRRG & NLRT, 2006b) showed that seventh grade students lack the necessary skills to critically evaluate information on the Internet for accuracy although 83 percent reported being required to use the Internet for school assignments. Kafai and Bates (1997) further illustrate this problem, “children were quick to assume that everything they found about their topic on the Internet was correct just because it was there” (p. 109). Once these more basic levels of critical evaluation have been developed, then students can begin to develop critical literacy skills as they construct their own meaning and feel empowered to contribute to the social construction of meaning that encompass the ideals of a critical literacy framework (Freire, 1970; Freire & Macedo, 1987; McLaughlin & DeVogd, 2004; Shannon, 1995).

Theoretical Framework

Many agree that our current definition of literacy needs to be broadened to include digital

media found on the Internet (e.g. Alvermann, 2002; Gee, 2000; IRA, 2001; Kress, 2003; Leu, 2000; RAND Reading Study Group, 2002; Snyder, 1996; Tyner, 1998). A barrage of new terms has erupted concerning literacy over the past decade, including Internet literacy (Tyner, 1998), network literacy, (McClure, 1997), and digital literacy (Gilster, 1997). These and others can all be seen as part of a *New Literacies* or *Multiliteracies* perspective (Cope & Kalantzis, 2000; Lankshear & Knobel, 2003; Leu, et al., 2004; The New London Group, 2000). These new perspectives of literacy draw from diverse theoretical underpinnings such as cognitive constructivist theory (Flavell, 1963; Piaget, 1963), social constructivist theory (Vygotsky, 1978), and sociocultural theory (Lantolf, 2000).

This study is framed in an emerging theoretical perspective referred to as *New Literacies* (Coiro, 2003; Coiro, Knobel, Lankshear, & Leu, in press; Leu, 2000, 2002; Leu, et al., 2004). A new literacies theory seeks to include the multiple text formats and multimodal reading environments associated with the complex reading demands of the Internet and other networked technologies in classroom instruction (Cope & Kalantzis, 2000; Lankshear & Knobel, 2003; Leu, et al., 2004). The RAND Reading Study Group (2002) acknowledges this central issue: "...accessing the Internet makes large demands on individuals' literacy skills; in some cases, this new technology requires readers to have novel literacy skills..." (p. xx). What are these novel literacy skills? Leu and colleagues (2004) define these skills as new literacies of the Internet and other information communication technologies (ICTs) that "allow us to identify important questions, locate information, critically evaluate the usefulness of that information, synthesize information to answer those questions, and then communicate the answers to others" (p. 1572). Recent work (Coiro, 2007; Coiro & Dobler, 2007; Eagleton & Dobler, 2007; Hartman, Leu, Olson, & Truxaw, 2005; Henry, 2005, 2006a, 2006b, 2007; Leu & Reinking, 2005; Leu, Castek, Hartman, Coiro, Henry, & Lyver, 2005) has started to explore these skill areas showing that online reading comprehension requires new skills and strategies beyond those required during offline reading comprehension.

New literacies theory also confronts issues of social equity. According to Leu and colleagues (2004), a New Literacies Perspective seeks to “avoid societies in which economic advantage is sustained by the wealthy and denied to the poor” (p. 1598). This gap is an important social problem and “one of the most important social equity issues facing the information society” (Eastin & LaRose, 2000, p. 54). The New London Group (2000) calls for “an authentically democratic new vision of schools [which] must include a vision of meaningful success for all; a vision of success that is not defined exclusively in economic terms” (p. 13). Gee (2000) argues for “a ‘Bill of Rights’ for all children, but most especially for minority and poor children” (p. 67) to receive better forms of instruction in schools. By turning our attention to a theory of new literacies, we confront one of the most critical issues facing the education system today.

The Role of Public Policy

Public policymakers need to understand the complexities associated with the digital divide and the implications that a lack of Internet access has for our youth. There still remains a population of students who lack Internet access altogether (Facer & Furlong, 2001). National data shows 13 percent of teenagers are not online (Lenhart, et al., 2005). These students who do not have Internet access may become further marginalized from their peers since their skill level in using the Internet is limited by their lack of access. “The digital divide has perhaps the greatest potential to doom the “have-nots” to the status of permanent underclass” (Mack, 2001, p. xi). Norris (2001) explains this phenomenon:

The chief concern about the digital divide is that the underclass of info-poor may become further marginalized in societies where basic computer skills are becoming essential for economic success and personal advancement, entry to good career and educational opportunities, full access to social networks, and opportunities for civic engagement. (p. 68)

Mack (2001) affirms this argument, “Quite simply, to be left behind in the digital age is to be unemployed, information-deprived and subject to a continual ‘technology tax’ on goods and services that are more expensive to consumers who don’t utilize Internet technology” (p. xvii). Teaching at-risk youth viable ICT skills (e.g. word processing, Web design, desktop publishing, or video production) that are common in the workplace helps them get jobs, continue their education, and become productive citizens (Lazarus, et al., 2005). Research by Hargittai (2002b) suggests that public policies aimed at providing access to the Internet, as well as training and support, are critical to bridging the digital divide.

Understanding the nature of differential integration patterns of the Internet among affluent and economically disadvantaged school districts is a central challenge for a nation that professes itself to be egalitarian and seeks to prepare all students for the literacy and learning demands of the 21st century. The No Child Left Behind (NCLB) Act of 2001 was designed to address this issue (US Department of Education [DOE], 2002). Mack (2001) argues, “Like most intractable social issues, the problem of integrating technology into minority school district classrooms is multi-faceted and will not be resolved by simply throwing dollars at the issue” (p. 82). Public policy needs to play a role not only in providing funding to schools but also by providing guidance to schools on how to develop educational programs that include the new literacies of using the Internet.

The National Digital Empowerment Act

The National Digital Empowerment Act (NDEA, 2000), presented before the 106th Congress, was directly related to issues of a social divide specific to education settings (see Appendix A). The purposes of this Act were:

- (1) To enable every child in America to cross the digital divide by ensuring that all children have access to technology and technology education.

- (2) To ensure that every child is computer literate by the time the child finishes 8th grade, regardless of the child's race, ethnicity, gender, income, geography, or disability.

Appropriations in the amount of \$100 million were allocated for fiscal year 2001 with additional appropriations provided as necessary for the four succeeding fiscal years as necessary. However, following reports that a digital divide no longer exists (U.S. Department of Commerce, 2002), the Bush Administration cut funding that supported the Act (Brenner, 2002; Carvin, 2002; Powell, 2007). Several key programs were dismantled, including Community Technology Centers (CTC) and the Technology Opportunities Program (TOP), two of the most successful efforts to bridge the divide (Dickard & Schneider, 2002).

No Child Left Behind Act of 2001

The No Child Left Behind (NCLB) Act of 2001 (DOE, 2002) included a technology component that provides technology integration funding for schools that serve high-need students. Three goals are stated in Section 2404, of the NCLB Title II Part D, *Enhancing Education through Technology Act of 2001*, (see Appendix B):

- (1) PRIMARY GOAL-The primary goal of this part is to improve student academic achievement through the use of technology in elementary schools and secondary schools.
- (2) ADDITIONAL GOALS-The additional goals of this part are the following:
 - (A) To assist every student in crossing the digital divide by ensuring that every student is technologically literate by the time the student finishes the eighth grade, regardless of the student's race, ethnicity, gender, family income, geographic location, or disability.
 - (B) To encourage the effective integration of technology resources and systems with teacher training and curriculum development to establish research-based instructional methods that can be widely implemented as

best practices by state educational agencies and local educational agencies.

For the first three years of this legislation, Congress allocated \$600 million dollars to be awarded in grant funding to support this Act. Despite reports of significant findings that showed programs supported by this Act were effectively advancing the above stated goals, funding was reduced by 28 percent to \$462 million in year four (State Educational Technology Directors Association [SETDA], 2007).

Department of Education Technology Plan

The Department of Education Technology Plan (DOE, 2004) recommends that states and districts “ensure that teachers and students are adequately trained in the use of online content” (p. 42). Even though Internet-connected computers have become prevalent in the nation’s public schools, states have not adopted policies to make sure that educators have the opportunity to take advantage of them (Anderson & Ronnkvist, 1999; Swanson, 2006), and states are not assessing whether students have adequate technology skills (EPE Research Center, 2007).

Public policy initiatives need to do a better job of helping schools with the development of educational programs that include the use of the Internet and supporting them financially in the creation of these programs. Carvin (2002) argues that too many individuals look at bridging the digital divide and improving education as two separate issues. He reports on the success of Community Technology Centers (CTCs) that provide public access to the Internet but, more importantly, learning opportunities that taught individuals how to use the Internet effectively, which expanded their reading and job skills. “While schools can’t close the digital divide at home, they can mitigate its effects by paying closer attention to how digital tools are used in the classroom” (EPE Research Center, 2007, p. 2). Public policy initiatives that focus on this issue and seek to close this gap may be more critical than ever.

The Digital Divide: No Longer a Need for Concern?

Some argue that the digital divide is closing in the United States (Arrison, 2002; Marriott,

2006; U.S. Department of Commerce, 2002). However, even though research does show individuals with lower education and income connecting to the Internet at an increasing rate (Pew Internet Research Center, 1998; U.S. Department of Commerce, 2000), their overall levels of Internet usage still remain significantly lower than middle-income groups (Cooper, 2004; Rice & Katz, 2003).

America's Digital Divide

The latest census data reveals distinct inequalities in home access, and in some cases, these inequalities have not improved over the past ten years (Lazarus, et al., 2005). These data also show children from households with an annual income more than \$75,000 are more than twice as likely to have access to a computer at home compared to those in households earning less than \$15,000. There is a “disturbing gap between low-income, ethnic minority, and disabled children and their peers in terms of reaping the benefits of digital opportunity, which prevents millions of children from receiving ICT-driven opportunities” (Lazarus, et al., 2005, p. 6). Additionally, there still remains a large gap between white and populations of color (Cooper, 2004; Fairlie, 2005). For example, Cooper (2002) provides compelling data that suggests the digital divide is still very real. One third of American households have incomes below \$25,000. Of these households, less than 25 percent report Internet access at home. In contrast, of the one third of American households with incomes greater than \$50,000, over 75 percent report Internet access at home. Using these data, Cooper (2002) asserts that the digital divide still exists:

A close look at the data shows that the perception that the digital divide has disappeared is simply wrong. Consequently, the claim that we no longer need policies to close the gap is wrong, placing tens of millions of American households at risk of being left out of the digital information age (p. 2).

Public policymakers need to take notice of the overwhelming research that confirms the digital divide is still an issue in our nation (Cooper, 2002, 2004; Fairlie, 2005; Lazarus, et al., 2005; EPE Research Center, 2007).

Today, the majority of instructional rooms in public schools are reported to have Internet access (Kleiner & Lewis, 2003; Parsad & Jones, 2005; EPE Research Center, 2007). Yet, differences still exist along economic lines. For example, schools with the highest poverty concentrations are shown to have a larger student to computer ratio than schools with the lowest poverty concentrations (Parsad & Jones, 2005). Student access to computers for low-income households continues to be an issue. “A lack of financial resources at home may preclude some from purchasing personal computers to assist in research and other class assignments during non-classroom hours” (Mack, 2001, p. 82). Research indicates there is a gap of more than 50 percentage points between students from households earning less than \$20,000 per year and those with household incomes of \$75,000 or more when measuring Internet access (EPE Research Center, 2007).

Although national policies (e.g. DOE, 2002, 2004; NDEA, 2000) have been developed in the past to address the digital divide and issues of inequity, they have fallen short in making a long-lasting impact. When research began to surface that showed the effectiveness of programs developed as part of public policy initiatives, it was determined that the digital divide was no longer an issue and funding was slashed. Public policy needs to do a better job at providing schools with what they need to prepare their students with the skills required to be active citizens in the 21st century.

Connecticut's Digital Divide

In Connecticut, 94 percent of students in an economically privileged school district reported home access to the Internet compared to only 57 percent of those from economically disadvantaged school districts (Lentini, 2006). A recent report indicated that at the national level, less than 50 percent of students report having access to a computer in their classroom, yet only 42 percent of students in Connecticut report computer access in the classroom (EPE Research Center, 2007). In this state, a gap in the student to computer ratio between high poverty schools (5.8 to 1) and low poverty schools (3.5 to 1) also remains an issue (EPE Research Center, 2007).

The current student to computer ratio in high poverty schools (5.8 to 1) is similar to the national average from 2001, which was reported as 5.4 to 1 (Kleiner & Farris, 2002; EPE Research Center, 2007). This fact may indicate that access to computers in high poverty schools remains stagnant and no better off than where they were six years ago. The student to computer ratio is also divided along minority lines. In high minority schools, this ratio stands at 5.1 to 1, whereas in low minority schools, the ratio is only 3.4 to 1, less than the current national average (EPE Research Center, 2007). Since this differential between school districts in Connecticut exists, this state may be a useful location to study what factors best predict students' and teachers' abilities to read and comprehend information on the Internet. A richer, more complete understanding of the digital divide may provide useful information regarding these factors, thus enabling schools to better prepare students and teachers with the online reading comprehension strategies that are required to be successful consumers of Internet information.

Chapter Summary

The Internet has become a critical source of information for the 21st century and central to education (Friedman, 2005; Gates, 2007). "No one should be left behind as our nation advances into the 21st century, in which having access to computers and the Internet may be key to becoming a successful member of society" (Compaine, 2001, p. 43). Knowing what elements of a more complex definition of the digital divide impact online reading comprehension may help develop a new vision for public policy, research, and literacy instruction that would better prepare our youth for life in a post-industrial era. It is time for policymakers, researchers, and educators to step off the beaten path and away from traditional notions of reading and writing instruction and move toward a new vision of literacy pedagogy that embraces the new literacies of the Internet, thus ensuring social equity exists for all students.

Stepanek (1999 cited in Mack, 2001) argues this point:

Making equipment and Net connections available isn't enough. The Internet
haves must find a way to introduce folks to the technology and then to make

access meaningful to those without. It's the difference between giving people a book and teaching them how to read. (p. xx)

It is clear that providing access to the Internet is critical if we hope to narrow the digital divide. It is also clear that schools who serve our poor and minority youth struggle to provide Internet access and instruction that will help students develop the new literacies of online reading.

In low-income schools, technology education may not be part of the curriculum because school systems cannot afford to purchase updated textbooks, much less computer technology (Mack, 2001, p. xi). The real divide that demands our attention is the tertiary level divide, which explores the link between access to the Internet (i.e. primary level digital divide) and use of the Internet (i.e. secondary level digital divide) thus creating a divide in online reading comprehension achievement. A tertiary level digital divide may have the potential to increase the achievement gap and the socioeconomic stratification of our country further. As Compaine (2001) expresses:

This is the critical divide between those who can read well and take full advantage of the treasures of information that will be so widely available, and those who are not fully literate and cannot take advantage of easily accessible information resources. (p. ix)

This may help explain why Connecticut reports the widest achievement gap in the nation (CTAGS, 2006). Unless our students can develop the higher-level reading strategies that the Internet demands, they will be left behind in an international, information-based economy. Research that seeks to identify the factors that influence students' ability to read and comprehend information on the Internet is critically important.

This study investigated differences between economically privileged and economically disadvantaged school districts in Connecticut to answer several fundamental questions: Is there a gap in students' development of online reading comprehension? Is there a gap in teachers' abilities to support the development of online reading comprehension in their students? What

contextual factors in a school contribute to students' development of online reading comprehension? These questions are central to redefining literacy instruction for the future. By looking at student, teacher, and school variables across multiple contexts, this research sought to provide a more complex definition of the digital divide that can better inform public policymakers and educators about what works and what does not work when teaching the new literacies of reading on the Internet.

CHAPTER THREE: METHODS AND PROCEDURES

The purpose of this chapter is to present the research methods and procedures that were utilized in this study. The chapter is divided into five main sections. In the first section, an overview of the study design and participating research sites is provided. Then, the following four sections—sections two through five—coincide with the four phases of the research procedures that were used. Section two describes the methods that were used for the development of two measurement scales. Then, section three provides details that explain the administration of the two measurement scales. In the fourth section, quantitative methods including analysis of variance (ANOVA) and hierarchical linear modeling (HLM) are discussed that seek to answer the first four research questions. Finally, the fifth section provides details on the qualitative methods that were used to answer the final research question.

Study Design

The purpose of this study was threefold. First it sought to evaluate middle school students' online reading comprehension achievement, comparing performance between students attending schools in economically privileged school districts to those in economically disadvantaged school districts. The second purpose was to evaluate middle school teachers' online reading comprehension achievement, comparing performance between teachers employed in economically privileged school districts to those in economically disadvantaged school districts. Finally, the third purpose was to extend the conceptualization of the digital divide to determine what factors best predict students' and teachers' online reading comprehension achievement.

This chapter describes the research methods and procedures used in this study. A description of the research sites, participant populations, instrumentation, data collection, and data analysis procedures are presented, which were used to answer the following research questions:

- RQ1: Do differences in online reading comprehension achievement among middle school *students* vary significantly according to District Reference Group (DRG) classification?
- RQ2: Do differences in online reading comprehension achievement among middle school *teachers* vary significantly according to District Reference Group (DRG) classification?
- RQ3: What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in *students*' online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill?
- RQ4: What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in *teachers*' online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill?
- RQ5: How do elements of the school context appear to contribute to the pattern of factors that affect online reading comprehension achievement among middle school students and teachers?

A mixed method approach was used during four distinct phases of this study to answer these research questions. In the first phase, scaling procedures were employed in order to develop two measurement scales to measure a more complex definition of the digital divide. One measurement scale was designed for a middle school student population, referred to as the Digital Divide Measurement Scale for Students (DDMS-S). The other was designed for a middle school teacher population, referred to as the Digital Divide Measurement Scale for Teachers (DDMS-T). The second phase of this study focused on the administration of the measurement scales to sample populations of middle school students and teachers from economically privileged and economically disadvantaged school districts. The third phase consisted of quantitative methods including analysis of variance (ANOVA) to determine whether a tertiary level digital divide exists (i.e. significant differences in online reading comprehension achievement) between

students and teachers from economically privileged (i.e. high DRG) school districts compared to those from economically disadvantaged (i.e. low DRG) school districts. And, then, hierarchical linear modeling (HLM) was used to evaluate the sources of a tertiary level digital divide. Finally, the fourth phase employed various qualitative methods to provide a richer understanding of the contextual factors that may impact a tertiary level digital divide.

Research Sites and Participants

The participants in this study included 6th through 8th grade middle school students, teachers, and administrators from four school districts in Connecticut. Research indicates that Internet use surges at the 7th grade level (Lenhart, et al., 2005). In addition, older students report different uses of the Internet than younger students (Levin & Arafah, 2002). For these reasons, students in 6th through 8th grade were targeted to obtain a better understanding of Internet use patterns among middle school students.

School districts from high and low District Reference Group (DRG) classifications were selected in order to evaluate the extent to which a digital divide may exist along economic lines, a main goal of this research. A convenience sample of two school districts was recruited from high DRG classifications. Districts at this level have a small percentage (usually less than five percent) of students eligible for free or reduced-price lunch, a small minority population (usually less than ten percent), and a small number of children living in poverty (usually less than five percent). Two additional school districts were recruited from a convenience sample of districts with low DRG classifications. Districts at this level often have a large percentage (usually in excess of 60 percent) of students eligible for free or reduced-price lunch, a relatively large minority population (usually in excess of 60 percent), and large numbers of children living in poverty (usually more than 40 percent). Within these four school districts, a total of nine schools participated in this study, four schools from high DRG districts and five schools from low DRG districts.

Using the most recent DRG classifications from the state (CSDE, 2006a), schools from the top two groupings (Groups A and B) and bottom two groupings (Groups H and I) were

targeted for recruitment. Four school districts that The New Literacies Research Team had worked with previously were contacted in a recruitment letter to the superintendent's office via facsimile transmission. This letter included a brief explanation of the study and requested a face-to-face meeting to further explain the study and participation requirements. The letter was followed by a phone call to the superintendent's office by our research team's project coordinator to schedule a meeting. Three districts, two categorized as DRG B and one as DRG H, responded positively following the meeting with the superintendent and other key personnel (e.g. school principals). One district, from DRG I, responded negatively to their participation in the study following the face-to-face meeting, thus recruitment of that district was ceased. Using this recruitment strategy, two high DRG districts and one low DRG district were successfully enlisted for participation.

Given that The New Literacies Research Team had no additional contacts in low DRG districts, three districts were randomly selected and contacted in a similar fashion (i.e. facsimile transmission of a recruitment letter and follow-up phone call to the superintendent's office). These districts included one from DRG H and two from DRG I. This recruitment strategy was unsuccessful with all three districts.

Since attempts to contact districts that our research team had no prior experience or relationship with failed, it was decided another strategy was needed. A professor and former school district superintendent with extensive knowledge of the public schools in Connecticut was contacted to seek advice on the best approach for recruiting districts within the low DRGs. He assisted by scheduling a meeting with the Executive Director and Staff Associate of the Connecticut Association of Public School Superintendents (CAPSS) to seek their assistance. These individuals presented the study to superintendents in urban districts with low DRG classifications in the state to gain their interest and support. Following this meeting, a district from DRG I was contacted by email to seek participation. The superintendent responded favorably and the fourth district for this study was successfully recruited.

Pseudonyms were created for each of the four districts in this study to ensure anonymity of the research sites and participants enrolled in this study. Districts were identified as either economically privileged or economically disadvantaged based on their DRG classification (CSDE, 2006a). The economically privileged districts included *Suburbantown* and *Suburbanville*, both belonging to the DRG B classification. The economically disadvantaged districts included *Urbantown* (DRG H) and *Urbanville* (DRG I). Table 3.1 provides an overview of the schools enrolled in this study. Schools within each district were labeled with letters followed by the grade levels of the students that attended that school as well as the grade levels of students that were enrolled in this study. For example, School A is located in Suburbantown with a DRG B classification. This school is in an economically privileged school district. Students from both fifth and sixth grade attend this school. The students in sixth grade were targeted for enrollment in this study.

Table 3.1

Participating School Sites by District

District (DRG)	Participating schools	Grades attending school	Grade levels enrolled in study
<i>Economically privileged districts</i>			
Suburbantown (DRG B)	School A	5-6	6
	School B	7-8	7-8
Suburbanville (DRG B)	School C	5-6	6
	School D	7-8	7-8
<i>Economically disadvantaged districts</i>			
Urbantown (DRG H)	School E	6	6
	School F	7-8	7-8
Urbanville (DRG I)	School G	K-8	6-8
	School H	K-8	6-8
	School I	K-8	6-8

District and School Descriptions

The state uses District Reference Group (DRG) as a classification system that groups public school students with similar socioeconomic status (SES) and need together in order to make comparisons of similar districts. A total of seven variables were used to determine DRG groupings (CSDE, 2006a):

Four variables (income, education, occupation, and family structure) were based on 2000 census data allocated to school districts for the National Center for Education Statistics (NCES). Three variables (poverty, home language, and district enrollment) were taken from the State Department of Education's October 2004 records. (p. 1).

Table 3.2 illustrates the characteristics of the DRG classifications (i.e. DRG B, H, and I) of the districts that participated in this study. As can be seen from this table, the populations in high and low DRGs are substantially different in terms of median family income, level of education, occupation, family structure, poverty rate, diversity, and district size.

Table 3.2

Characteristics of 2006 District Reference Group (DRG) Classifications

	Economically privileged districts	Economically disadvantaged districts	
	DRG B	DRG H	DRG I
Median family income	\$97,210	\$50,598	\$30,995
Percent with bachelor's degree	59.5%	19.7%	10.5%
Percent managerial/professional occupation	61.2%	28.8%	21.8%
Percent of children in single-parent families	10.6%	33.5%	54.9%
Percent of children in poverty	3.7%	41.9%	65.2%
Percent non-English home language	4.6%	22.3%	31.6%
Average district enrollment	4,741	7,535	14,374

While the above characteristics provide a general description of the districts in this study, additional indicators also showed the districts in high and low DRG classifications as substantially different. Table 3.3 highlights these characteristics for each participating district as reported in the Connecticut Strategic School Profile 2005-2006 (CSDE, 2006b). This table shows that substantial differences exist between higher and lower DRG classifications across additional variables such as: minority population, students' eligibility for free or reduced price lunch,

number of schools, number of students, and reading achievement scores as measured on the Connecticut Mastery Test (CMT).

Table 3.3

Additional Characteristics of the Four Districts in this Study

	Economically privileged districts		Economically disadvantaged districts	
	Suburbantown (DRG B)	Suburbanville (DRG B)	Urbantown (DRG H)	Urbanville (DRG I)
Total minority population	12.3%	9.0%	73.4%	90.4%
Students eligible for free/reduced lunch	1.6%	2.2%	45.1%	> 95.0%
Number of schools	5	6	14	35
Number of students	3,379	4,459	7,943	21,722
Grade 6 reading (% of students meeting state goal)	92.8%	82.9%	45.7%	33.5%
Grade 7 reading (% of students meeting state goal)	91.8%	86.1%	44.2%	33.8%
Grade 8 reading (% of students meeting state goal)	90.4%	80.3%	43.9%	33.8%

Finally, a description of the technology available at each school site is provided to gain a more detailed depiction of each school context. Table 3.4 shows the technology characteristic comparisons between the four districts along with the average rates for the state (CSDE, 2006a). As can be seen from this table, economically privileged and economically disadvantaged districts appear similar in a number of technology characteristics. But, three main differences were found: (a) Suburbanville has substantially fewer computers wired for video and voice, (b) Urbantown

has a substantially larger ratio of students per academic computer, and (c) Urbantown has substantially fewer computers with high or moderate power.

Table 3.4

Technology Characteristic Comparisons of the Four Districts in this Study

	Economically privileged districts		Economically disadvantaged districts		State AVG
	Suburbantown (DRG B)	Suburbanville (DRG B)	Urbantown (DRG H)	Urbanville (DRG I)	
Wired for video*	100%	51.8%	100%	96.4%	63.0%
Wired for voice*	100%	30.9%	100%	96.4%	72.3%
Wired for Internet*	100%	100%	100%	96.4%	96.5%
Wired for LAN *	100%	100%	100%	0%	77.3%
Students per academic computer	4.5	3.5	6.3	3.4	3.9
Computers with high or moderate power**	99.2%	100%	37.1%	90.6%	80.8%
Computers with Internet access, all speeds	100%	100%	96.5%	99.8%	96.5%
Computers with high speed Internet access	100%	100%	96.5%	99.8%	95.4%

*Percent of Classrooms, Libraries, and Labs

**At least 8 MB or more RAM, 160 MB or larger hard drive, CD-ROM and/or modem (CSDE, 2006b)

Additional descriptive information was also collected. The purpose of this additional data was to provide a richer portrayal of the availability of technology-related resources at each research site. The researcher collected this information during site visits at each participating school location and interviews with administrators and teachers.

Economically Privileged Districts

Suburbantown. This high DRG district contains five school buildings. Since this study focused on students in grades six through eight, two schools were included as research sites.

- School A: The total student population in this school is n=563. This school was opened in 2002. It houses one instructional computer lab with 26 student computers and one teacher workstation, which is connected to a ceiling mounted LCD projector. The computer lab is located in an interior room within the Library Media Center (LMC). A set of 15 laptops is available in the LMC. These can be placed on a cart and transported to other areas within the building, but they are most often used in the library with groups of students. Instruction is modeled on a laptop connected to a LCD projector and projected onto a portable white board. The laptops connect to the Internet through a wireless router. There are also four computer stations within the LMC that are primarily used to access the library's cataloguing system. Each instructional classroom in this school has a teacher workstation connected to the Internet. The school owns one portable SMART Board™, but the library media specialist reported that it has not functioned since it was acquired.
- School B: The total student population in this school is n=561. This school has one instructional computer lab with 26 computers and a teacher workstation connected to an LCD projector with a pull-down screen in the front of the lab. The Library Media Center (LMC) contains a lab area with 25 student computers and one teacher workstation connected to an LCD projector. A pull-down screen suspended from the ceiling functions as a room separator for this instructional lab area. In addition, there are four computers that support the library cataloguing system, one of which is connected to a flatbed

scanner located in the center of the room. There is one standalone computer that is not connected to the network. This is available in the event that the network is down and students or teachers need to print a file. The LMC also has three laptop computers and network wiring setup at workstations for them if additional computers are needed. The school owns a laptop cart that houses nine laptops and a wireless router for Internet access. This was purchased with grant money made available through a program within the district in which local businesses support the public school system. Every instructional room in the building has a teacher workstation that is connected to the Internet and interconnected to a 36-inch television monitor that is installed in a front corner of the classroom.

Suburbanville. The second district classified as a high DRG district includes six school buildings. Since this study focused on students in grades six through eight, the intermediate and middle school were included as research sites.

- School C: The total student population in this school is n=649. This school has a classroom that was converted into an open computer lab with 29 student computers and one teacher workstation for teachers to use through a sign-up scheduling system. The Library Media Center (LMC) also contains a computer lab area with 26 student computers, one of which is connected to a large 36" monitor on a portable cart that is used for instructional purposes. In addition, there are five computer stations in two other areas of the LMC that are used by students on an as needed basis. All of the computers in the LMC have access to the library's cataloguing system as well as the Accelerated Reader program, which the library media specialist indicated is used by some students during independent reading. An instructional computer lab houses 29 student computers and one teacher work station. This lab is used for specific instruction for computer classes that meet daily during a 35-day rotation.

- School D: The total student population in this school is n=681. When this school was built in 1997, a state of the art technology infrastructure was put in place, which included wireless Internet access throughout the building. This school has one instructional computer lab with 26 computer stations where daily instruction takes place. In addition there are two open computer labs (one with 28 computer stations and one with 30) that teachers can sign up for on an as needed basis. The Library Media Center (LMC) has 14 computer stations located in corrals; two of these stations have flatbed scanners connected to them. There is an instructional area within the LMC that includes an overhead projector, LCD projector, pull down screen, and ceiling mounted 36-inch monitor that is inter-connected to a computer with Internet access. A cart of laptops with a wireless router is housed in the LMC and available for teachers to sign out and use in their classrooms. Each of the six instructional teams has an LCD projector available for use in the classroom that is shared between the teachers assigned to a team. All instructional classrooms contain a teacher computer station inter-connected to a 36-inch, ceiling mounted monitor. In addition, every classroom has a student computer with Internet access. The Connecticut Technology Education Association (CTEA) named the Technology Education Course at this school as one of Connecticut's technology education programs of the year, and the International Technology Education Association (ITEA) recognized it with a Program Excellence Award.

Economically Disadvantaged Districts

Urbantown. This low DRG school district includes fourteen school buildings. Since this study focused on students in grades six through eight, the two middle schools were included as research sites.

- School E: The total student population in this school is n=494. This school is in its sixth year of existence. It has one instructional computer lab with 26 computers and a teacher laptop connected to a projector. There is a stationary SMART Board™ at the front of the

room. The Library Media Center (LMC) consists of two rooms. In one room, there are 16 computers located in four different areas. The second room is used for instructional purposes. This room has a stationary SMART Board™, a computer with projector on a mobile cart, and two additional computer stations. All computers in the LMC are connected to the Internet and can access the library cataloging system. There are two carts of laptops with 12 laptops on each and a wireless router to connect to the Internet. These are housed in the LMC and can be requested by teachers to use in the classroom. One classroom in the building was converted into a small lab with 12 computers that is used for enrichment activities two days per week. Teachers can sign up to use this lab on the other three days. In addition, there's a portable SMART Board™ and two LCD projectors that teachers can sign out to use in their classrooms. This school was awarded a Blue Chip technology grant from the Connecticut State Department of Education (CSDE). The monies from this grant were used to purchase the three SMART Boards™ and laptop computers.

- School F: The total student population in this school is n=1128. This school has a total of six computer labs. There are two labs that reside within the Library Media Center (LMC). The library media specialist uses one of these labs for instruction. The second lab has been allocated for a reading intervention program. Reading Naturally is the only program that is loaded on the computers. This lab services approximately 200 students on a rotating cycle. There are two instructional computer labs that are used by art teachers. One houses 24 student workstations and two teacher computers. The other contains 16 computers. These are primarily used for graphic design applications and digital photography. The technical education teacher uses an instructional lab for Computer Assisted Drafting (CAD). This lab contains 26 computers. One classroom has been converted to an open computer lab that houses 27 computers and LCD projector that teachers can sign up to use with their students. There is also a set of 16 laptops and

wireless router that is set up in one of the classrooms to be used for special projects. The library media specialist in this school is a past recipient of the Carlton Erickson Award from the Connecticut Educational Media Association (CEMA).

Urbanville. The second district classified as a low DRG district includes 35 schools. With the assistance of the District Technology Coordinator, schools were selected that would be able to fully participate in this project by having at least one computer lab facility in the building for administration of the survey. Three schools were required to provide a comparable number of students enrolled in 6th through 8th grade to the other districts in this project.

- School G: The total student population in this school is n=734. This school is newly constructed and opened its doors during the current academic year (January, 2007). Two computer labs are located next to each other with an interior door between them. Access to the Library Media Center (LMC) from both of these labs is also available via interior doors. One of the computer labs houses 24 computers and the other houses 33 computers. Both labs have a teacher workstation that is connected to a stationary SMART Board™ at the front of the room with projectors mounted from the ceiling. Each of the teacher workstations contains software that allows the teacher to view the desktop of all the students' computers with controls to freeze the machines during instruction. The LMC has seven computer workstations with space for an additional five machines. There is also a stationary SMART Board™ and ceiling mounted projector located within an instructional area of the LMC. Every instructional classroom has a stationary SMART Board™ connected to the teacher's computer. This school building also offers a public wireless access point for the Internet.
- School H: The total student population in this school is n=998. This school contains one instructional computer lab with 29 student computers, one teacher workstation, and one computer that is being used as a server. The computers are connected to the Internet through several routers that contain up to 15 ports on each. Vandalism and theft have been

problematic issues in this school. Keyboards, mice, and monitors have been stolen or vandalized. There is no computer teacher on staff to monitor activities in the lab; therefore, the principal made the decision to close the lab for an indeterminate amount of time to prevent additional incidents causing loss of equipment. There are 12 computers located in the Library Media Center (LMC) that are primarily used with the library's cataloguing system and databases for research. This school building offers a public wireless access point for the Internet.

- School I: The total student population in this school is $n=785$. This school contains one instructional computer lab with 25 student computers, one teacher workstation, and one portable SMART Board™. Many of the keyboards and mice have been vandalized. There is no computer teacher on staff to monitor activities in the lab. Teachers can sign-up to use the lab, which remains locked when not in use. When teachers do use the lab, they are responsible for the students' use of the computers. This school building offers a public wireless access point for the Internet.

Summary of Technology Descriptions

As can be seen from the above descriptions, schools that were newly constructed, regardless of DRG classification, seem to have more technology infused throughout the school building. Where a striking difference seems to occur is in the use of that technology. For example, in low DRG districts, budget constraints have eliminated staffing positions that would focus on providing additional instruction in technology use as well as support for teachers. In the newly opened school in Urbanville (i.e. School G), the school building is infused with technology, but teachers reported that they did not have adequate training to use the technology up to this point. Schools in high DRG districts seem to have readily available technology along with support for that technology that allows for Internet integration on a regular basis (e.g. classroom computers connected to large-size monitors, LCD projectors, portable SMART Boards™, and laptop carts).

Instrumentation and Procedures

This study was conducted in four phases through multiple methods of data collection and analyses. The first phase was focused on measurement scale development to create two parallel measures of Internet access, Internet use, and Internet reading skill (i.e. online reading comprehension achievement) for middle school students and teachers. This process used factor analysis for scale development to refine a previously developed survey instrument, which measured similar constructs of interest (Carter & Henry, 2006; Henry, et al., 2006). In the second phase, the two measurement scales were administered to middle school students and teachers in the four participating school districts. The third phase applied quantitative analytic methods to the data that were obtained. First, using an ANOVA for analysis, mean differences in online reading comprehension ability were examined between economically privileged and economically disadvantaged districts. The purpose of this analysis was to determine if a tertiary level digital divide exists. Then, an HLM analytic approach was tested to determine which variables associated with primary and secondary levels of the digital divide best predicted students' and teachers' online reading comprehension ability. The fourth phase in this study consisted of qualitative data collection and analyses that included data from interviews, focus groups, observations, and various school artifacts collected from the research sites. These data were explored through a multilevel content analysis to determine what contextual factors in each school contribute to or inhibit the development of the required skills for reading on the Internet. The results of this research should provide us with a more thorough understanding of the complexities associated with the digital divide and their implications for classroom learning.

Phase One: Measurement Scale Development

For this study, two scales were required to measure both students' and teachers' access and use of the Internet as well as their online reading comprehension ability. This was completed through a multi-step process. For the student version, common validation procedures were used to validate an existing measurement scale. Then, that scale was revised based on the results of the

analyses. Next, content validation and piloting was used to validate several new items that were added to create the Digital Divide Measurement Scale for Students (DDMS-S). Finally, a parallel scale was developed, the Digital Divide Measurement Scale for Teachers (DDMS-T), which was designed specifically for the teacher population of interest.

The Survey of Internet Use and Online Reading

The Teaching Internet Comprehension to Adolescents (TICA) Project Group developed and administered a survey of Internet usage to seventh grade students in 2005 that focused on patterns of Internet use in both in school and out of school settings (Leu & Reinking, 2005). The survey also included several items that assessed knowledge and skill during certain reading and writing activities using various networked technologies. This instrument, *The Survey of Internet Use and Online Reading*, was developed and administered in an electronic format via the Internet to seventh grade students in Connecticut and South Carolina (Carter & Henry, 2006; Henry, et al., 2006; IRRG & NLRT, 2006b).

Survey development. Development of this instrument began with identification of the constructs to be measured, which included: (a) use of Internet tools, (b) online reading material, (c) Internet critical evaluation skills, and (d) technology self-perception. An initial item pool was generated based on the researchers' knowledge of the constructs (Netemeyer, Bearden, & Sharma, 2003). This item pool consisted of 6 demographic questions, 81 Likert-scale items, 5 forced-response, and 4 open-ended items. Seven experts in the field of literacy and technology established content and face validity. These experts completed content validation procedures to judge how well the items reflected the intended constructs (Netemeyer, et al., 2003). Fifteen items were identified as problematic and were either reworded or dropped from the instrument. Pilot testing was conducted with a sample of middle school students (n=386) to further refine the scale. The final survey consisted of six demographic questions, 70 Likert-scale items, five forced response items, and four open-ended items for a total pool of 85 items (see Appendix C). This instrument was then used to collect data from 7th grade students (n=1025) in eight school districts

located in Connecticut and South Carolina (Carter & Henry, 2006; Henry, et al., 2006; IRRG & NLRT, 2006b).

Validation procedures. Using the data collected by the TICA Project Group, validation procedures were conducted to test the psychometric properties of the survey instrument. Two internal consistency estimates of reliability were computed for the Likert-scale items on the survey instrument: a split-half coefficient expressed as a Spearman-Brown corrected correlation and coefficient alpha. For the split-half coefficient, the scale was split into two halves such that the two halves would be as equivalent as possible. The value for the split-half coefficient was .9389 and the coefficient alpha was .9345, each indicating satisfactory reliability (Green & Salkind, 2003).

The dimensionality of the Likert-scale items was analyzed using an exploratory factor analysis (EFA) procedure to determine the factor structure and examine internal reliability of *The Survey of Internet use and Online Reading* measurement scale. This procedure was conducted using an existing data set of seventh grade students in Connecticut and South Carolina (n=1025) that was collected as part of an Institute of Educational Sciences (IES) research grant (see Leu & Reinking, 2005). A principal axis factor (PAF) procedure using an oblimin rotation was conducted in order to obtain a simple structure of the factors (Thompson, 2004). Since the factors on this scale are assumed to be somewhat correlated, an oblimin rotation was the best rotation method to use (Pett, Lackey, & Sullivan, 2003). The rotated solution yielded four interpretable factors: (a) use of the Internet at school; (b) use of the Internet outside school; (c) reading in academic contexts, and (d) critical evaluation skills. The factors accounted for 44.3 percent of the total item variance.

Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were used to evaluate the strength of the linear association among the 58 items in the correlation matrix. Bartlett's Test of Sphericity was significant ($\chi^2 = 21654.7$, $p = .000$), which indicated that the correlation matrix is not an identity matrix. The KMO statistic (.892), which is

an index that compares the magnitude of the observed correlations with the magnitude of the partial correlation coefficients, was “meritorious” and nearly “marvelous” according to Kaiser’s (1974) criteria. This suggests that there was a sufficient sample size relative to the number of items in the scale.

A measure of sampling adequacy (MSA) for each item indicates how strongly that item is correlated with other items as shown by the anti-image correlation (AIC) matrix. Individual MSAs that are greater than .70 are ideal (Pett, et al., 2003). The correlations ranged from .739 to .943. The individual MSAs are “middling” to “marvelous” according to Kaiser’s (1974) criteria, thus indicating, “the correlations among the individual items are strong enough to suggest that the correlation matrix is factorable” (Pett, et al., 2003, p. 81).

An item analysis of the five forced response questions that measured Internet reading skill indicated that the item difficulty was sufficient. The P-values of the items ranged from .31 to .86 indicating that none of the questions were too easy or too difficult (Haladyna, 1999). Item discrimination, R(IT), indicates the relationship between how well students performed on a question and their total test score (Haladyna, 1999). A Point-Biserial correlation (PBS) was conducted for each of these items. Three items had a test discrimination value greater than .40 (.52, .58, .59) that classifies them as “very good questions” and two items were in the .30 to .39 range (.33, .36) indicating they are “good questions” (Haladyna, 1999).

The four open-ended, skill items were scored on a 4-point rubric from *no skill* (0) to *highly skilled* (3). Four raters jointly scored a random selection of student responses (n=100) and conducted a Cohen’s Kappa analysis to determine the degree of reliability between the raters (Rourke, Anderson, Garrison, & Archer, 2001). Inter-rater reliability for the four skill items on the survey instrument was $k=.87$, which is in the desirable .80 to .90 range (Rourke, et al., 2001). An internal consistency estimate of reliability using Cronbach’s alpha was .69. Although an alpha of at least .70 is desirable, a cut-off of .60 is common in exploratory research (Miller, 1995).

The results of the validation procedures for measurement scale development that were used indicated that this instrument, *The Survey of Internet Use and Online Reading*, was an adequate measure of four factors. These factors included: (a) use of the Internet at school, (b) use of the Internet outside school, (c) reading in academic contexts, and (d) critical evaluation skills. Since the present study was interested in related constructs, this instrument was appropriate to use as a starting point for the development of similar measurement scales.

Digital Divide Measurement Scale for Students (DDMS-S)

To develop the student version of the scale used in this study, *The Survey of Internet Use and Online Reading* described above was used as a foundation, but it underwent a refinement process to ensure it would measure the constructs of interest for this study. Revisions to the existing instrument were carefully considered based on the results of the exploratory factor analysis (EFA). Then, additional items were generated to create a more interpretable measure of online reading comprehension that focused on locating information and critical evaluation of information. A teacher version of the measurement scale was also created that required minor revisions to the language of some items and the creation of additional items specific to this population, which is described in detail in the next subsection of this chapter. Content validation and piloting were conducted to establish reliability of the refined instrument before it was used in this study.

Refinement procedures for Internet use construct. The factor loadings of the 58 items that measured Internet use both inside and outside school were analyzed to determine if modifications should be made. Items that had loadings less than .40, which is often used as a cut-point in scale development (Netemeyer, et al., 2003), were removed from the item pool. This included a total of six items:

1. I use the Internet to read discussion boards AT SCHOOL.
2. I use the Internet to read discussion boards OUTSIDE SCHOOL.
3. I use the Internet to post to discussion boards AT SCHOOL.

4. I use the Internet to post to discussion boards OUTSIDE SCHOOL.
5. I use the Internet to read manga or comics AT SCHOOL.
6. I use the Internet to read manga or comics OUTSIDE SCHOOL.

The removal of these items reduced the initial item pool of 58 items down to 52 items.

Examination of the correlation matrix indicated that several items had high inter-correlations and should be carefully reviewed to determine if redundancy exists within these items. Items that had “moderate” to “very strong” correlations (Pett, et al., 2003; see also Hinkle, Wiersma, & Jurs, 1998; Pett, 1997) on both the AT SCHOOL and OUTSIDE SCHOOL portions of the scale were identified for revision or possible removal. As Table 3.5 shows, a total of six pairs of items were earmarked for further review.

Table 3.5

Item Correlations with Values >.60 from the Correlation Matrix

	Correlations
I read email AT SCHOOL	.901
I send email AT SCHOOL	
I read blogs (like LiveJournal or MySpace) AT SCHOOL	.650
I post to blogs (like LiveJournal or MySpace AT SCHOOL	
I use the Internet to find images AT SCHOOL	.607
I use the Internet to view clip art and pictures AT SCHOOL	
I read email OUTSIDE SCHOOL	.938
I send email OUTSIDE SCHOOL	
I read blogs (like LiveJournal or MySpace) OUTSIDE SCHOOL	.864
I post to blogs (like LiveJournal or MySpace OUTSIDE SCHOOL	
I use the Internet to find images OUTSIDE SCHOOL	.839
I use the Internet to view clip art and pictures OUTSIDE SCHOOL	

These twelve items were revised to create six new parallel items, which included:

1. I use email AT SCHOOL
2. I use email OUTSIDE SCHOOL
3. I use blogs (like LiveJournal or MySpace) AT SCHOOL
4. I use blogs (like LiveJournal or MySpace) OUTSIDE SCHOOL
5. I use the Internet to find clip art and pictures AT SCHOOL
6. I use the Internet to find clip art and pictures OUTSIDE SCHOOL

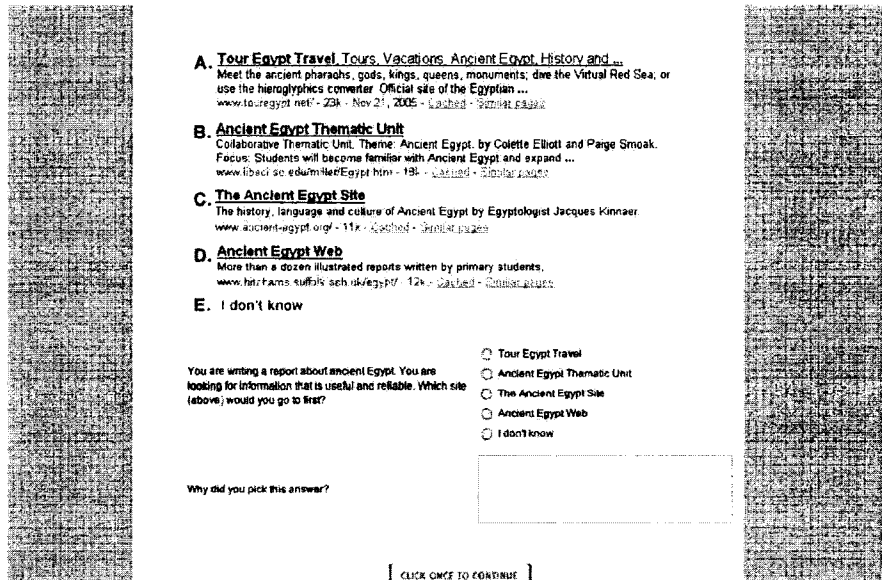
This revision further reduced the Likert-style items to a total of 46 items.

In order to further condense this section of the survey to create an instrument that could be administered during a typical middle school class period (40-45 minutes), additional items were carefully scrutinized. As a result, one pair of parallel items was found to be multidimensional, or what Netemeyer and colleagues (2003) call “double –barrel” statements that measure more than one topic. These included: (a) I use the Internet to read about movies, music, or sports stars or other entertainment topics AT SCHOOL; and (b) I use the Internet to read about movies, music, or sports stars or other entertainment topics OUTSIDE SCHOOL. These two items appear to measure multiple topics. Another pair of parallel items appeared to be redundant, or similar in content, to the aforementioned pair of items. These similarly worded items included: (a) I use the Internet to read information about my hobbies AT SCHOOL; (b) I use the Internet to read information about my hobbies OUTSIDE SCHOOL. Wording of items that are too similar may “increase measures of internal consistency without substantively contributing to the content validity of the measure” (Netemeyer, et al., 2003, p. 98). Since a hobby is defined as “an activity or interest pursued outside one’s regular occupation and engaged in primarily for pleasure” (hobby, n.d.), it could easily be argued that these four items are measuring very similar topics. Therefore, these items were revised to create a new pair of parallel items that sought to encompass the same content in a more general statement: (a) I use the Internet to read about things that interest me AT SCHOOL; and (b) I use the Internet to read about things that interest

me OUTSIDE SCHOOL. Finally, an additional set of parallel items was identified as problematic. These included: (a) I use the Internet for things other than school assignments AT SCHOOL; and (b) I use the Internet for things other than school assignments OUTSIDE SCHOOL. It could be argued that any of the items that are not related to using the Internet for school assignments (e.g. I use the Internet to view pictures) would fall under this generalized statement, which would indicate that it is already being measured by other items on the instrument. These two items were removed from the scale to ensure clarity (Netemeyer, et al., 2003). Following these revisions, a total item pool for the parallel portions of the scale that measure Internet use AT SCHOOL and OUTSIDE SCHOOL included 22 items each for a total of 44 Likert-style items in this section of the measurement scale.

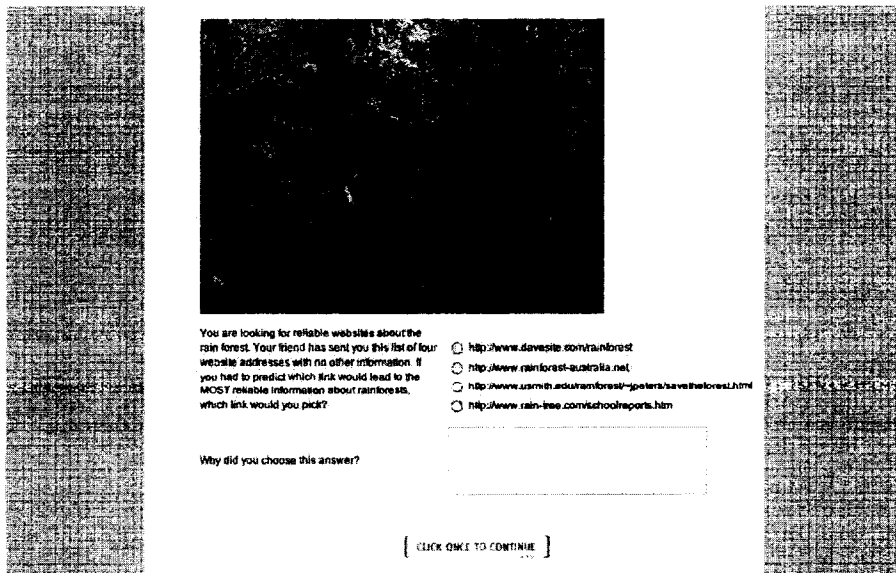
Refinement procedures for online reading comprehension construct. The forced-response items were carefully reviewed to include only those items that measured reading skills required to locate information or critically evaluate information on the Internet, as these were the central aspects of online reading comprehension that this study focused on. The reading to locate information construct sought to identify behaviors that individuals employ when reading to locate information on the Internet. This multidimensional construct included elements of using a keyword strategy with a search engine to locate information as well as reading to locate information within search engine results and web pages. The reading to critically evaluate information construct sought to identify the critical evaluation skills that individuals employ when reading on the Internet. Also a multidimensional construct, it included elements of evaluating information for accuracy, relevancy, reliability, and bias. Only two of the original items across the two areas of online reading (i.e. reading to locate information and reading to critically evaluate information) were maintained. Figure 1 provides a screen shot of the original item that measured the locating information construct of interest as it appeared in the TICA Project Group instrument (see Appendix C). As can be seen from this image, this item measured skill in reading to locate information within search engine results.

Figure 1. Screen shot from original scale with an item for reading to locate information within search engine results



The second item that was maintained from the original scale (see Appendix C) is shown in Figure 2. This item sought to measure the reading to critically evaluate information as related to determining the reliability of an information source.

Figure 2. Screen shot from original scale with item for reading to critically evaluate information for reliability



Finally, all of the open-ended response items were removed from the original scale, including this aspect of the items in Figures 1 and 2. Although several of the items corresponded with the constructs being measured, the intent of the survey refinement was to produce a simplified measure of Internet use and online reading. The researcher's experience with previous administrations of the original scale showed that many students were unable to complete all of the items during a typical middle school class period (40-45 minutes). Additionally, students' constructed responses on these items were further impeded by the typing ability of many of the students. Therefore, the elimination of open-ended items created a more streamlined measurement scale that only required students to point and click with a computer mouse to select the desired response for each item.

Creation of new items for online reading comprehension construct. In order to have an adequate measure of the two elements of online reading comprehension of interest (i.e. locating information and critical evaluation of information), additional forced-response items were developed. In scale development, it is desirable to have at least four items to measure a construct of interest (Netemeyer, et al., 2003; Pett, et al., 2003). However, since each construct of interest in this study, reading to locate information and reading to critically evaluate information, was multi-dimensional in nature as previously mentioned, at least two items were desired to measure each dimension of these two constructs. A total of six items to measure the construct for reading to locate information and eight items to measure the construct for reading to critically evaluate information was desired.

An initial item pool of 16 forced-response items was created through consultation with an expert in the field of the new literacies of online reading comprehension and based on the scale developer's own knowledge of this topic (Netemeyer, et al., 2003). These 16 items were combined with the 2 items from the original survey for a total pool of 18 items. Content validation procedures with experts in the field of literacy and technology were completed to ensure the total item pool had face and content validity for measuring the targeted constructs.

Revisions to the item pool were made based on the results of a content validation analysis by retaining those items evaluated on average as at least *somewhat representative* of the construct (Netemeyer, et al., 2003). Four items were eliminated based on the content validation leaving a total item pool of 14. Revisions were made to three of the 14 items to clarify the wording based on expert feedback. Six items sought to measure the reading comprehension skills required to locate information with two items across each of the three dimensions: (a) reading to locate information using a keyword search strategy, (b) reading to locate information within search engine results, and (c) reading to locate information within a webpage. Eight items sought to measure the reading comprehension skills required to critically evaluate information with two items across each of the four dimensions: (a) reading to critically evaluate information for accuracy, (b) reading to critically evaluate information relevancy, (c) reading to critically evaluate information reliability, and (d) reading to critically evaluate information for bias.

Piloting of the above 14 items was conducted with a convenience sample of seventh grade students (n=51). An item analysis of the 14 forced response questions was conducted to identify any problematic items. Point-biserial correlations and P-values were computed. A minimum point-biserial correlation of at least 0.15 is acceptable, but a point-biserial above 0.25 is more desirable (Varma, n.d.). The point-biserial correlations for the 14 items ranged from 0.153 to 0.531, which were all in the acceptable range. P-values greater than .30 indicate “good questions” and those greater than .40 are classified as “very good questions” when conducting item discrimination (Haladyna, 1999). The P-values of the 14 items ranged from 0.381 to 0.601 indicating that the items were sufficiently developed.

Final instrument. The final version of the Digital Divide Measurement Scale for Students (DDMS-S) consisted of a total of 72 items across the three main constructs of interest: (a) Internet access both inside and outside school, (b) Internet use both inside and outside school, and (c) Internet reading skill as a measure of online reading comprehension derived of two dimensions, reading to locate information and reading to critically evaluate information (see Appendix D).

The scale consisted of 5 demographic variables (items 1-5), 7 items related to Internet access (items 6-12), 22 items that measured Internet use inside school (items 13-34), 20 items that measured Internet use outside school (items 37-56), 6 forced response items that measured locating information (59, 62-65, & 68), and 8 forced response items that measured critical evaluation of information (items, 60-61, 66-67, & 69-72).

Digital Divide Measurement Scale for Teachers (DDMS-T)

Item revisions. Four items on the DDMS-S were reworded for the teacher version of the measurement scale to make them more relevant to the teacher population. These items are shown in Table 3.6 below. Variables that required rewording included one demographic variable, two Internet use variables, and two Internet reading skill variables.

Table 3.6

Item Revisions for Teacher Version of Measurement Scale

Items	Version
<i>Demographic variables</i>	
What grade are you currently in?	Student
What grade(s) do you currently teach?	Teacher
<i>Internet use variables</i>	
How often have you been REQUIRED to use the Internet for a school assignment?	Student
How often have you REQUIRED students to use the Internet for a school assignment?	Teacher
How often have you been GIVEN THE OPTION to use the Internet for a school assignment?	Student
How often have you GIVEN THE OPTION to students to use the Internet for a school assignment?	Teacher

(Table continues)

Items	Version
<i>Internet reading skill variables</i>	
You are writing a report about ancient Egypt. You are looking for information that is reliable. Which site would you go to first?	Student
You are looking for a classroom resource about ancient Egypt. You are looking for information that is reliable. Which site would you go to first?	Teacher
You are studying the Civil War. You are looking for information about what it was like to be a soldier. You have come to this webpage. What would be the best thing to do?	Student
You are teaching a unit on the Civil War. You are looking for information about what it was like to be a soldier. You have come to this webpage. What would be the best thing to do?	Teacher

Creation of new items. In addition to these item revisions, five additional items were created. These items included one demographic variable and four items related to the integration of the Internet for instructional purposes:

1. What subjects do you currently teach?
2. How often do you use information from the Internet to help you prepare lessons for your classroom?
3. How often do you teach with the Internet in your classroom?
4. How often do your students use the Internet in your classroom?
5. How often do you assess your students' ability to use the Internet in your classroom?

Scale developers often use existing scales “that tap the domain of one’s construct” as a source for item generation (Netemeyer, et al., 2003, p. 96). The four items related to the integration of the Internet for instructional purposes were adapted from a scale developed as part of a Carnegie Foundation grant that was used with a sample of pre-service teachers (Hartman, et al., 2005).

Hartman and colleagues sought to measure a construct of Internet use specific to the integration of technology during classroom instruction in a measurement scale, *Survey of Online Reading & Teaching*, developed as part of their research (see also Hartman, Leu, Olson, & Truxaw, 2007).

Final instrument. The final version of the Digital Divide Measurement Scale for Teachers (DDMS-T) consisted of 77 items across the three main constructs of interest: (a) Internet access both inside and outside school, (b) Internet use both inside and outside school, and (c) Internet reading skill as a measure of online reading comprehension derived of two dimensions, reading to locate information and reading to critically evaluate information (see Appendix E). This measurement scale consisted of 6 demographic variables (items 1-6), 7 items related to Internet access (7-13), 4 items related to using the Internet for instructional purposes (items 14-17), 22 items that measured Internet use inside school (18-39), 20 items that measured Internet use outside school (items 42-61), 6 forced response items that measured locating information (items 64, 67-70, & 73), and 8 forced response items that measured critical evaluation of information (items 65-66, 71-72, & 74-77).

Phase Two: Measurement Scale Administration

The Digital Divide Measurement Scale for Students (DDMS-S) and the Digital Divide Measurement Scale for Teachers (DDMS-T) were administered to sample populations of students and teachers at the nine research sites in this study. Both measurement scales were produced in a web-based format created through the use of Survey Monkey (2006), electronic survey software that provides an Internet-based system for the development and administration of survey instruments.

Digital Divide Measurement Scale for Students (DDMS-S)

Procedures. Consent forms were distributed to all students enrolled in 6th through 8th grade at each of the nine research sites. In Suburbantown and Suburbanville, the two high DRG districts, forms were only prepared in English as their population of students with a non-English home language was minimal (less than 4%). In Urbantown and Urbanville, the two low DRG

districts, consent forms were double-sided with English and Spanish versions on opposing sides in order to support the large number of students with a non-English home language enrolled in these schools (greater than 38%). Once consent forms were returned at each research site, the researcher worked directly with the principal or other designated person to schedule the survey administration in such a way that it would have a minimal impact on students' instructional day.

The Digital Divide Measurement Scale for Students (DDMS-S) was administered in a computer lab setting via a secure Internet system. Each administration was conducted with students during one class period (approximately 40-45 minutes). The researcher trained two graduate students to assist with the administration of the measurement scale. One of these individuals or the researcher was present during the administration and followed a scripted protocol. A brief introduction and directions were provided in the form of an information sheet at the start of the survey administration. This information sheet was read aloud by the survey administrator with an opportunity for participants to ask questions. The information sheet included the necessary components as required by the Institutional Review Board (IRB) such as a description of the research project, a statement that participation was voluntary, and the researcher's contact information. Students selected either "I agree to take this survey" or "No thank you" before advancing to the measurement scale items. Students who decided not to participate were sent back to class. The students' responses were automatically saved on a secure server in a format compatible with the Statistical Package for Social Sciences (1996). SPSS was the software system for data management and analysis that was used for analyzing the quantitative data in this study.

Student participants. Table 3.7 provides an illustration of the total number of students who received consent forms as the targeted population in each school. In addition, the number of returned permission forms and participation rates are also provided for each school with totals by district. Although a similar number of students were targeted in economically privileged (i.e. high DRG) districts (n=2454) and economically disadvantaged (i.e. low DRG) districts (n=2546), the

participation rates vary significantly between these two groups with a 45.3 percent participation rate in high DRG districts and a 25.8 percent participation rate in low DRG districts. A total of n=5000 consent forms were distributed with an overall student participant population of n=1768 (participation rate of 35.4 percent) who took part in the administration of the DDMS-S.

Table 3.7

Student Consent Form Distribution and Return Rates

Economically privileged districts				Economically disadvantaged districts				
Suburbantown (DRG B)		Suburbanville (DRG B)		Urbantown (DRG H)			Urbanville (DRG I)	
<i>Targeted participant population by school</i>								
A	B	C	D	E	F	G	H	I
563	561	649	681	494	1128	222	354	348
<i>Total consent form distribution by district</i>								
1124		1330		1622			924	
<i>Returned consent forms by school</i>								
A	B	C	D	E	F	G	H	I
188	206	291	427	345	109	103	82	17
<i>Total returned consent forms by district</i>								
394		718		454			202	
<i>Participation rate by school</i>								
A	B	C	D	E	F	G	H	I
33.4%	36.7%	44.8%	62.7%	69.8%	9.7%	46.4%	23.2%	4.9%
<i>Total participation rate by district</i>								
35.1 %		54.0%		28.0%			21.9%	

Table 3.8 shows the ethnicity/race of the student participants by district. The percentage rates are provided for the general student population in each district as well as the participant population. As can be seen from these percentage rates, the participant population represented a fairly close approximation to the students enrolled in three of the districts thus providing a representative sample. In Urbanville, the participation rate of Hispanic students was somewhat inflated compared to the general population in this district. Also, both Black and White students were somewhat under represented compared to the general student population in the district.

Table 3.8

Student Participants' Ethnicity/Race by District Showing Both the General Population (GP) and the Participant Population (PP)

Ethnicity/race	Economically privileged districts				Economically disadvantaged districts			
	Suburbantown (DRG B)		Suburbanville (DRG B)		Urbantown (DRG H)		Urbanville (DRG I)	
	GP	PP	GP	PP	GP	PP	GP	PP
American Indian	0.1%	< 1%	0.2%	< 1%	0.5%	1.1%	0.1%	<1%
Asian American	6.6%	5.7%	3.0%	3.6%	5.9%	5.8%	3.0%	4.5%
Black	2.5%	1.3%	1.8%	1.7%	35.0%	28.0%	42.4%	28.7%
Hispanic	3.1%	2.0%	3.9%	2.4%	32.1%	29.2%	44.8%	59.4%
White	87.7%	87.5%	91.0%	90.7%	26.6%	25.2%	9.6%	2.5%
Other	--	3.0%	--	1.1%	--	10.7%	--	4.5%

Digital Divide Measurement Scale for Teachers (DDMS-T)

Procedures. Teacher participants were scheduled to respond to the Digital Divide Measurement Scale for Teachers (DDMS-T) at a time that was convenient to their teaching schedules. Arrangements were made for teachers to take the survey during a staff meeting, team

meeting, or other such structured meeting time so that contracted planning or personal time would not be infringed upon. A scripted protocol was followed to provide directions at the start of the survey. In Suburbantown, Suburbanville, & Urbantown, the administration took place during school faculty meeting or team meeting times in a computer lab setting. In two schools, School B and School F, the computer lab facility was not adequate to accommodate the entire teaching staff. At these two research sites, the teachers were brought together in one large group to receive an overview and directions before they began. They were then dispersed to several computer lab locations or their classroom computer to complete the measurement scale. A link to the survey was distributed to them on email. The researcher circulated throughout the building to monitor and assist if teachers had questions. In Urbanville, since there was a very small percentage of the staff at the 6th through 8th grade level, teachers accompanied their students to the computer lab and took the DDMS-T at the same time that their students completed the DDMS-S. They received the same directions as the students at the start and then were directed to the teacher version of the measurement scale. The teachers agreed to participate on a voluntary basis after reading an information sheet presented at the start. Teachers' responses were automatically saved on a secure server in a format compatible with SPSS (1996).

Teacher participants. Table 3.9 shows the number of teacher participants in each district by gender as well as the total number of teacher participants and participation rate for each district. Urbanville had the smallest participation rate. This may have been a result of the manner in which teachers were scheduled to participate in this district as previously described. A total of n=282 teachers participated in the administration of the DDMS-T.

Table 3.9

Teacher Participation Rate by District

	Economically privileged districts				Economically disadvantaged districts			
	Suburbantown (DRG B)		Suburbanville (DRG B)		Urbantown (DRG H)		Urbanville (DRG I)	
Gender	16M	44F	16M	73F	44M	74F	5M	10F
Total number	60		89		118		15	
Participation rate	73.2%		92.7%		96.7%		41.7%	

An ethnic/racial description of the teacher participants in each district is provided in Table 3.10. This table indicates that across all four districts the majority of the teachers responding to the measurement scale classified themselves as White. Urbantown and Urbanville were shown to have larger numbers of teachers of color compared to Suburbantown and Suburbanville. The percent of minority participants was determined to be a close approximation of the percent of minority teachers employed by each district. Since these rates are shown to vary each academic year—plus or minus up to 4 percentage points—and the data are from the previous academic year (i.e. 2005-2006), it was felt that the participant sample was representative of the general teacher population in each district.

Table 3.10

Teacher Participants' Ethnicity/Race by District

	Economically privileged districts		Economically disadvantaged districts	
	Suburbantown (DRG B)	Suburbanville (DRG B)	Urbantown (DRG H)	Urbanville (DRG I)
American Indian	1.7%	0%	<1%	0%
Asian American	1.7%	0%	<1%	0%
Black	0%	0%	3.4%	21.4%
Hispanic	0%	0%	3.4%	0%
White	96.7%	100%	89.8%	78.6%
Other	0%	0%	1.7%	0%
% Minority of participant population	3.4%	0%	10.2%	21.4%
% Minority of teachers by district*	0%	1%	8.3%	31.2%

*Data obtained from Strategic School Profiles for 2005-2006 (CSDE, 2006)

Phase Three: Quantitative Methods

Data Analysis

Data from the DDMS-S and DDMS-T were first screened to identify any problems. Descriptive procedures were performed to address instances of missing data. After data screening, an exploratory factor analysis (EFA) was conducted on both measurement scales. EFA is a data-reduction technique used to reduce a large number of item scores into a smaller number of factors in order to identify relationships among observed variables (Pett, et al., 2003; Tabachnick & Fidell, 2001; Thompson, 2004). In this study, EFA was used to determine which items clustered tightly around each of the following factors of interest:

For the Digital Divide Measurement Scale for Student (DDMS-S)

1. Students' access to the Internet
2. Students' use of the Internet
3. Students' online reading comprehension achievement

For the Digital Divide Measurement Scale for Teachers (DDMS-T)

1. Teachers' access to the Internet
2. Teachers' use of the Internet
3. Teachers' online comprehension achievement

A Common factor analysis (Netemeyer, et al., 2003) was conducted using an oblique rotation to increase the interpretability of the factors (Tabachnick & Fidell, 2001). An oblique rotation allows factors to correlate, thus revealing more meaningful theoretical factors (Netemeyer, et al., 2003). Items that loaded at .40 or higher on a given factor were used to define each of the factors of interest (Floyd & Widaman, 1995).

Analysis of Variance

Once the survey instrument was refined and data collected, two separate one-way analysis of variance (ANOVA) tests were conducted to answer the first two research questions:

- (RQ1) Do differences in online reading comprehension achievement among middle school *students* vary significantly according to District Reference Group (DRG) classification?
- (RQ2) Do differences in online reading comprehension achievement among middle school *teachers* vary significantly according to District Reference Group (DRG) classification?

Since the participant population was selected from two distinct DRG classification groupings (high and low) an ANOVA procedure is preferable to multiple t-tests to identify differences between these groups in order to minimize type-I error (Glass & Hopkins, 1996). A measure of online reading comprehension achievement was calculated by combining scores from the 14

forced-response items, which were scored dichotomously (i.e. 1=correct, 0=incorrect), into a total score ranging from 0 to 14 for this portion of the survey instrument. This measure of online reading comprehension achievement was then used for each ANOVA (i.e. test of mean differences between students and test of mean differences between teachers) to determine if DRG classification was significant.

Hierarchical Linear Modeling

Hierarchical Linear Modeling (HLM) was used to determine what factors associated with a more complex conception of the digital divide, which includes primary level factors (i.e. Internet access) and secondary level factors (i.e. Internet use), had the greatest effect on online reading comprehension achievement. Two-level HLM models were used to answer the next two research questions:

- RQ3: What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in *students'* online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill?
- RQ4: What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in *teachers'* online reading comprehension achievement in terms of a more complex conception of the digital divide which includes elements of Internet access, Internet use, and Internet reading skill?

HLM is an appropriate statistical analysis for research in academic settings since students are not randomly assigned to schools but assignment is based on geographic factors (Osborne, 2000). Thus, common characteristics such as socioeconomic status, race/ethnicity, religion and other variables that are associated with belonging to a certain community can be accounted for in the model.

HLM for Windows, version 6.0 (Raudenbush, Bryk, Cheong, & Congdon, 2004) was used to estimate model parameters. General two-level models were tested (see Appendices F &

G). In these analyses, the level-1 models represented associations among student variables relative to the outcome measure of students' online reading comprehension achievement scores (SORCS), and teacher variables relative to the outcome measure of teachers' online reading comprehension achievement scores (TORCS) respectively. The Level-2 models examined the influence of school characteristics on the outcome measures of interest (SORCS and TORCS).

Two-level HLM for students' online reading comprehension achievement. Student level (Level-1) predictors were chosen based on the review of the research literature regarding variables that are related to primary and secondary levels of the digital divide. These variables were derived from scores obtained from the Digital Divide Measurement Scale for Students (DDMS-S). Predictor variables associated with a primary level digital divide (i.e. Internet access) were used in each model. These variables included students' Internet access outside of school (SACCOU), students' Internet access inside school (SACCIN), and students' access to a broadband connection at home (SBAND) at the student level (Level 1). Predictor variables relative to a secondary level digital divide (i.e. Internet use) were also used at the student level in the model. These predictor variables included students' use of the Internet outside school (SUSEOU) and students' use of the Internet inside school (SUSEIN).

Additional predictor variables were used in the model at the school level (Level-2). One of these variables was a school average for teachers' online reading comprehension achievement scores (TORCS) as derived from scores on the Digital Divide Measurement Scale for Teachers (DDMS-T). The inclusion of this variable was to determine if teachers' online reading comprehension achievement had an effect on students' online reading comprehension achievement. The second school-level (level 2) predictor variable was derived from average school scores for the reading scale score (READING) from the 2006 administration of the Connecticut Mastery Test, which is a combination of four reading comprehension subtest scores. First, z-scores were computed for each average school score. These scores were then converted to t-scores that were used as a school-level indicator of reading comprehension performance to

assist with interpretability. This predictor variable was included for two reasons. First of all, the variables associated with the digital divide have been identified as the same variables associated with gaps in literacy achievement (Alvermann, 2005). Secondly, it has been argued that online reading comprehension is built on traditional reading strategies (Coiro & Dobler, 2007; Eagleton & Dobler, 2007). Therefore, it was predicted that this variable would have an effect on the outcome measure, online reading comprehension achievement. The third school-level predictor was District Reference Group (DRG) classification.

In the event that evidence is found to sustain a tertiary digital divide, the results of this analytic approach would show what extant variables have the greatest effect on students' online reading comprehension achievement scores (SORCS). I expected the results to indicate that the variables associated with primary levels (i.e. Internet access both inside and outside school and access to a broadband connection) and secondary levels (i.e. Internet use both inside and outside school) of the digital divide would account for some of the variance in the outcome measure (SORCS). It was also expected that the school level variables (i.e. average reading score, teachers' online reading comprehension, and DRG classification) would also account for some of the variance in students' online reading comprehension between District Reference Groups.

The effects of the predictor variables were studied relative to students' online reading comprehension performance. As each predictor was added, the amount of variance explained by that variable was recorded until a best-fit model was determined. Predictor variables with significant effects were later used to guide the qualitative content analysis procedures in phase three.

Effect sizes were computed for all significant effects following guidelines outlined by Raudenbush (1997) and his colleagues (see also, Raudenbush & Bryk, 2002). An intercepts-as-outcomes model was used, which showed differences in means in the dependent variable (SORCS) that could be predicted from the independent variables. The analyses began with a test

of the unconditional model, which only included intercepts at each level to obtain baseline data for comparison.

Two-level HLM for teachers' online reading comprehension achievement. Teacher level (Level-1) predictors were chosen based on the review of the research literature regarding variables that are related to primary and secondary levels of the digital divide. These variables were derived from scores obtained from the Digital Divide Measurement Scale for Teachers (DDMS-T). Predictor variables associated with a primary level digital divide (i.e. Internet access) were used in each model. These variables included teachers' Internet access outside of school (TACCOUT), teachers' Internet access inside school (TACCIN), and teachers' access to a broadband connection at home (TBAND). Predictor variables relative to a secondary level digital divide (i.e. Internet use) were also used at the teacher level (Level-1) in the model. These predictor variables included teachers' use of the Internet outside school (TUSEOUT) and teachers' use of the Internet inside school (TUSEIN). An additional predictor variable was used in the model at the school level (Level-2). This school level predictor was District Reference Group (DRG) classification.

In the event that evidence is found to sustain a tertiary digital divide, the results of this analytic approach would show what extant variables have the greatest effect on teachers' online reading comprehension achievement scores (TORCS). I expected the results to indicate that the variables associated with primary levels (i.e. Internet access both inside and outside school and access to a broadband connection) and secondary levels (i.e. Internet use both inside and outside school) of the digital divide would account for some of the variance in the outcome measure (TORCS). It was also expected that the school level variable (i.e. DRG classification) would account for some of the variance in teachers' online reading comprehension achievement between District Reference Groups.

The effects of the predictor variables were studied relative to teachers' online reading comprehension performance. As each predictor was entered into the model, the amount of

variance explained by that variable was recorded until a best-fit model was determined. Predictor variables with significant effects were later used to guide the qualitative content analysis procedures in phase three.

Effect sizes were computed for all significant effects following guidelines outlined by Raudenbush (1997) and his colleagues (see also, Raudenbush & Bryk, 2002). An intercepts-as-outcomes model was used, which showed differences in means in the dependent variable, teachers' online reading comprehension achievement scores (TORCS), that could be predicted from the independent variables. The analyses began with a test of the unconditional model, which only included intercepts at each level to obtain baseline data for comparison.

Phase Four: Qualitative Methods

Qualitative methods were used in the final phase of this study to provide a richer understanding of the specific variables associated with a more complex definition of the digital divide. The results of the HLM analyses guided these procedures to look specifically at the contextual variables that contribute to or inhibit the development of the skills and strategies required to read on the Internet. Data from interviews, focus groups, and textual artifacts were explored through a multilevel content analysis. In addition, researcher field notes from observations provided additional insights and explanations.

Interviews

The interviews were designed to obtain additional information about the school context that might have an effect on issues related to the digital divide. Semi-structured interview protocols were developed that would explore contextual factors associated with the three levels of the digital divide including issues of Internet access, Internet use, and Internet reading skill. The results of the HLM guided the analyses to look more closely at the variables which were identified as having a significant impact on teachers' and students' online reading comprehension achievement. The interviews also provided an opportunity for triangulation of the data collected with the measurement scales, focus group discussions, and observations.

Procedures. Semi-structured, individual interviews were conducted with both administrator and teacher populations (see Appendices H and I). These interviews consisted of six main constructs of interest: (a) visionary goals in regard to technology and Internet integration (e.g. Can you tell me about the school's vision in regard to technology and Internet integration?), (b) access to technology and the Internet (e.g. How is the accessibility of technology and the Internet in your building?), (c) use of the Internet during instruction (Can you tell me about your use of the Internet during classroom instruction?), (d) Internet skill level (e.g. What do you think about your students' abilities in using the Internet? Do you think they have good skills in using the Internet?), (e) contextual factors that might impede or enhance technology integration (e.g. What do you think some of the biggest challenges are when it comes to Internet and technology integration?), and (f) professional development opportunities related to technology and Internet integration (e.g. What types of professional development opportunities have been provided by the district for technology integration?). Additional questions and probes were used to get a thorough depiction of the above stated constructs as outlined in the semi-structured protocols.

Due to the difficulty in coordinating schedules, interviews were conducted over the telephone. Individuals were initially contacted through an email communication to select a time that was most convenient to their schedule. Then, the researcher placed the call at the designated time. Each interview lasted approximately 20-30 minutes. A common set of questions prompted discussion with further probing dependent upon the participant's responses. Interview data were audio recorded and transcribed to ensure the content of the conversation was correctly represented.

Teacher participants. Since development of online reading comprehension is the focus of this study, each school's reading and/or language arts teachers, computer teacher(s), and library media specialist(s) were targeted for selection to participate in the teacher interviews. In all participating schools, only one library media specialist was on staff. This individual was interviewed in all cases with a total of nine interviews (n=9) being conducted. In addition, the

researcher sought to interview one computer or technology teacher in each school building; however, Urbanville (DRG I) no longer has computer teachers employed at the three schools in the study as their positions were eliminated during budget cuts for the 2006-2007 budget cycle. A total of six interviews (n=6), one at each of the remaining schools, were completed with computer and/or technology personnel.

The random sample selection tool that is available in SPSS (1996) was used to select reading language arts teachers from the measurement scale respondents that indicated they teach either Reading/Literature or English/Language Arts at the sixth, seventh, or eighth grade level. A sample of 25 percent of these teachers was randomly selected from each school district. Table 3.11 highlights the number of respondents that indicated they teach the subject area of interest. In addition, the number of interviews requested as determined by the random sampling technique, and the actual number of interviews conducted are also provided. A total of eight interviews were conducted in economically privileged (i.e. high DRG) districts and five were conducted in economically disadvantaged (i.e. low DRG) districts. These data show a larger number of teachers at the sixth grade level participating in the interviews across all four districts, which is indicative of the sample population in each district that responded to the DDMS-T.

Table 3.11

English/Language Arts Teacher Interview Participants by District

	Economically privileged districts						Economically disadvantaged districts					
	Suburbantown (DRG B)			Suburbanville (DRG B)			Urbantown (DRG H)			Urbanville (DRG I)		
	Grades			Grades			Grades			Grades		
	6 th	7 th	8 th	6 th	7 th	8 th	6 th	7 th	8 th	6 th	7 th	8 th
Survey respondents	20	3	4	21	7	6	21	19	16	11	1	2
Interviews requested	3	2	2	4	2	3	6	3	5	3	1	0
Interviews completed	2	1	0	3	1	1	3	1	0	0	1	0
Total by district	3			5			4			1		
Participation rate	42.9%			55.6%			28.6%			25.0%		

Administrator participants. The administrator participant population included principals and assistant principals in each of the participating schools. These individuals only participated in the qualitative portion of the study by responding to interviews conducted by the researcher. A total of two administrators were interviewed in each school building with the exception of School A and School E. In School A, there was only one administrator on staff. The principal of School E was on medical leave; therefore, only the assistant principal was available for an interview. A total of 13 administrators were interviewed with seven from economically privileged (i.e. high DRG) districts and six from economically disadvantaged (i.e. low DRG) districts. There were an equal number of male (50.0%) and female (50.0%) participants. One administrator was Hispanic, two were Black, and ten were Caucasian.

Analysis. Three common elements of qualitative content analysis were employed to organize and reduce the interview transcripts into meaningful units (Miles & Huberman, 1994). First, data reduction was used to select specific excerpts from the data that coincided with the

research questions through a combined deductive and inductive coding process (Mayring, 2000). The focus of this element was to identify what the different respondent groups suggested in regard to the contextual factors of interest (Neuendorf, 2002). Second, an organized data display was created that assembled the relevant information into a matrix that was used to analyze response patterns (Miles & Huberman, 1994). Table 3.12 presents a partial data display matrix that was used for analyzing patterns related to Internet reading skills. This matrix sorted responses by economically privileged and economically disadvantaged districts. This type of data display allows for simplicity in cross-case analysis. Both deductive and inductive analysis procedures were used as can be seen from the column headings. The first columns (i.e. locating information and critical evaluation) represent dimensions of online reading comprehension that were predetermined for the deductive coding process. The final two columns, Internet safety and software use, document new themes that arose as part of the inductive coding process.

Table 3.12

Data Matrix for Interview Question: What specific skills and strategies are taught in relation to Internet use?

Deductive coding themes		Inductive coding themes	
Locating information	Critical evaluation	Internet safety	Software use
<i>Economically privileged districts</i>			
<ul style="list-style-type: none"> Advanced search options Locating information Learning Internet searches How to find what they're looking for 	<ul style="list-style-type: none"> Critical evaluation A lot of website evaluation How to evaluate what they're looking for The difference 	<ul style="list-style-type: none"> Places not to go (Internet Safety) 	

(Table continues)

-
- Searching on the Internet, different skills with that
 - between .com, .org, .edu and what it means

Economically disadvantaged districts

- Goes over with students what they're looking for
 - I don't think there are many
 - Mostly skill oriented, Word, PowerPoint, Publisher, Excel
 - Using Print Shop—how to create a pamphlet or folder
 - It's more of "how to" right now
-

Finally, the third element of content analysis as described by Miles and Huberman (1994) focused on conclusion drawing and verification. Conclusion drawing is the process of developing possible hypotheses that explain a particular phenomenon. Then, verification is used to test the plausibility of that conclusion (Neuendorf, 2002). Unlike quantitative statistics in which validity measures are based on number theory that can statistically prove whether a construct measures what it purports to measure, validity in qualitative content analysis is somewhat subjective. In qualitative analysis, it is critical for the researcher to be cautious about jumping to conclusions prematurely and ensuring that the stated conclusions are indeed credible and defensible based on the data (Neuendorf, 2002).

Student Focus Groups

In order to be more supportive of the student population, focus groups were conducted instead of individual interviews. Focus groups are a popular format for collecting data as the

verbal interactions among participants are more likely to extract perceptions and beliefs that are not commonly stated in individual interviews (Gall, Gall & Borg, 2003; Lunt & Livingstone, 1996). “People often need to listen to others’ opinions and understandings to clarify their own. Often, the questions in a focus group setting are deceptively simple; the trick is to promote interactive talk...” (Rossman & Rallis, 2003, p. 193). This data collection technique may put students more at ease in lieu of a one on one interview with the researcher thus reducing anxiety and maximizing data collection (Morgan, 1996).

Procedures. Conducting focus groups at each of the school locations sought to increase the reliability of the data (Sim, 1998). The focus group interviews were conducted at least three weeks following the administration of the Digital Divide Measurement Scale for Students (DDMS-S) to ensure the discussions were not influenced by items on the measurement scale. The topics of discussion for each meeting were centered on the following two themes: (a) students’ experiences with the Internet within the school context, and (b) students’ experiences with the Internet outside of the school context (see Appendix J). Within each of these themes, guidelines for probes were used to obtain data for the constructs of interest: (a) access to the Internet (e.g. How many computers do you have at home? How many are connected to the Internet?), (b) use of the Internet (e.g. What kinds of things do you do on the Internet?), and (c) Internet reading skill (e.g. Have any of your teachers taught you strategies for locating information on the Internet?). The focus group probes were also designed for the purpose of triangulating other data points. For example, students were asked about the ways in which their teachers use the Internet during classroom instruction to triangulate with teachers’ responses on the DDMS-T and teacher interviews.

A total of 12 focus groups participated in the study. Ten met on two separate occasions for approximately 30 minutes for each session. Two focus groups in one school, School C, met on only one occasion for approximately 40 minutes. After parents raised concerns about the amount of instructional time that students would miss by participating, the principal requested that only

one session be conducted with each of the two groups. Both topics above were discussed during the 40-minute sessions with approximately 20 minutes allocated to each of the two topics. Each focus group meeting was audio and video taped for analysis. Video taping assisted with the transcription of the dialogue during the focus group meetings as an audiotape alone makes it difficult to identify which participant is speaking at any given time (Lunt & Livingstone, 1996).

Participants. Focus group interviews were conducted with small groups of students. The students were purposefully selected across the three grade levels in each school based on the results of the DDMS-S to create two contrasting groups: (a) the most tech-savvy group in each district, and (b) the least tech-savvy group in each district. The purpose of this was for the researcher to have the opportunity to document differential use patterns between these two groups that might be attributed to factors associated with the digital divide. In order to identify these groups, responses on the survey instrument were combined to create three sub-scores: (a) Internet use *inside* school, (b) Internet use *outside* school, and (c) Internet reading skill.

The most tech-savvy group consisted of students who had the highest composite sub-scores obtained from the DDMS-S, and the least tech-savvy group consisted of students who had the lowest composite sub-scores. The score for Internet use inside school combined responses across 22 variables (items 15-36), scored using a 6-point Likert scale (0-5), with a total possible score of 110. The score for Internet use outside school combined responses across a parallel set of 22 variables (items 37-58), scored using the same 6-point Likert scale (0-5), with a total possible score of 110. The score for Internet reading skill was composed from 14 forced-choice responses (items 59-72), scored as either correct (1) or incorrect (0), with a total possible score of 14. These three scores were divided into quartiles. Students who scored in the top quartile on all three composite scores were identified as the most tech-savvy students. Students who scored in the bottom quartile on all three composite scores were identified as the least tech-savvy.

This sampling technique allowed for comparisons between school districts to determine similarities and differences of students' experiences with technology in relation to DRG

classification, both inside and outside school. Table 3.13 shows a comparison of the mean scores of the composite variables between the total sample and the two subgroups of students (i.e. high tech-savvy and low-tech savvy). The mean score for the high tech-savvy group was at least one standard deviation above the mean score for the total sample across all three composite variables. The mean score for the low tech-savvy group was at least one standard deviation below the mean score for the total sample across the same three composite variables. These results indicate that the selection procedures used to create the contrasting focus groups were successful.

Table 3.13

Comparison of Focus Group Students with Total Sample

	Total sample (n=1751)		High tech-savvy (n=28)		Low tech-savvy (n=29)	
	Mean	SD	Mean	SD	Mean	SD
Inside school use	15.79	8.78	25.05	8.42	7.26	4.99
Outside school use	35.13	17.9	53.38	13.75	14.70	8.10
Internet reading skill	5.69	1.93	7.86	1.93	3.30	0.93

Due to the low return rate (39.9%) of parental consent forms for participation in the measurement scale, over-sampling was used to recruit an adequate number of students to participate in the focus groups. Consent forms were distributed to an average of 24 to 26 students in each school that fell within the top and bottom quartile on all three sub-scores in order to obtain an adequate number of students to participate in each focus group (i.e. six to eight students). Even with over-sampling, recruitment of students for focus groups was difficult in several of the districts.

In Suburbanville (DRG B), the deadline for returning consent forms was extended on two occasions at both schools, School C and School D. Also, in School C, only two consent forms were returned, one of which stated that the student did not want to participate. The principal

indicated that parents were concerned with the amount of instructional time that students would miss (approximately 60-90 minutes). It was agreed that this would be reduced to one class period (approximately 40 minutes) and a second set of consent forms was distributed with this change. Even with this change, only six additional forms were returned out of 22 that were redistributed.

In Urbantown (DRG H), only two consent forms were returned. The deadline was extended in hopes of obtaining additional participants to no avail. The assistant principal redistributed the consent forms through her office and had her secretary follow-up with the students on a daily basis for the seven-day period students were given to return them. Only 7 of the 22 students returned the forms.

In Urbanville (DRG I), recruitment of students to participate in focus groups was unsuccessful. In each of the three schools, consent forms were sent home with students on three separate occasions with the return date extended each time. In School G, only one form was returned. In both School H and School I, none of the consent forms were returned. All three principals indicated that it is difficult for them to motivate their students to return any type of paperwork to the school. The focus groups in these three schools were cancelled due to lack of participants.

Table 3.14 highlights the participation rates by each district. In Suburbantown, Suburbanville, and Urbantown, the high tech-savvy and low-tech savvy focus groups at each school were somewhat balanced with similar numbers of students in each group.

Table 3.14

Student Focus Group Participation Rates by District

	Economically privileged districts				Economically disadvantaged districts				
	Suburbantown (DRG B)		Suburbanville (DRG B)		Urbantown (DRG H)		Urbanville (DRG I)		
Consent form return rates	48%		27%		42%		< 1%		
	A	B	C	D	E	F	G	H	I
High tech-savvy	7	5	4	3	5	4	0	0	0
Low tech-savvy	5	6	3	3	7	5	0	0	0

Analysis. The same three common elements of qualitative content analysis that were used to analyze the interview data were employed to organize and reduce the focus group transcripts into meaningful units (Miles & Huberman, 1994). First, data reduction was used to select specific excerpts from the data that coincided with the research questions through a combined deductive and inductive coding process (Mayring, 2000). The focus of this element was to identify what the different respondent groups, high tech-savvy and low-tech savvy, suggested in regard to the contextual factors of interest. Second, an organized data display was created that assembled the relevant information into a matrix that was used for cross comparisons between both high and low tech-savvy groups as well as high and low DRG districts. Finally, the third element, as described previously, focused on conclusion drawing and verification of the data (Miles & Huberman, 1994).

Classroom Observations

Procedures. The researcher collected field notes during one observation session in each school to better describe computer and Internet integration at that school. The researcher sent an email communication to the principal in each school building that indicated a “drop in”

observation would be conducted at some point within a stipulated two-week period. This strategy was used to ensure that the researcher would observe the use of the school's technology in a natural setting and not during a contrived lesson. During the observation period, the researcher circulated through the school building visiting each area in which computers were being used. These areas included computer labs, library media centers, and individual classrooms. Photographs of the facilities were also taken. This observational data provided an additional data point to describe the school context and how technology was being used during the school day.

Field notes were written in an open-ended format. The researcher spent approximately two hours at each research site and rotated through the school to the various locations where technology was housed. Field notes included a general description of the technology available within the school. For example, the location of computers and numbers of computers available in classrooms, the lab(s), and/or library media center(s) were documented. The types of activities students were engaged in on computers and details about the supervising teacher (i.e. classroom teacher versus computer teacher) were noted. Also, whether additional technology was being used, such as SMART Board™ or projection devices, was also documented.

Analysis. A formal analysis method was not used with field note data. Instead, the field notes recorded by the researcher served as an additional data source to provide any added insights into the contextual factors that may impact the development of online reading comprehension achievement. Also, these data served as a source for the triangulation of the data that was collected by the other methods in this study.

Collection of Artifacts

Various artifacts were collected to enhance the description of the schools' contexts provided by the interviews, focus groups, and observations. Table 3.15 highlights the artifacts collected from each of the four districts.

Table 3.15

Artifacts Collected from School Districts

	Reading/ language arts curriculum	Technology curriculum	Technology plan	District/school improvement plan
Suburbantown (DRG B)	X	--	--	--
Suburbanville (DRG B)	--	X	X	--
Urbantown (DRG H)	X	--	X	X
Urbanville (DRG I)	--	--	--	X

Procedures. These documents were secured through a request to the school principal. Two districts, Suburbantown and Urbantown, had electronic versions of these materials available via a file download from the school district website. Two other districts, Suburbanville and Urbanville, provided these in hardcopy form. In addition, the researcher secured average reading achievement scores from the Spring 2006 administration of the Connecticut Mastery Test for each school. The reading scale score, which is a combination of four reading comprehension subtest scores was used as a variable during the quantitative analysis previously discussed.

A coding protocol was constructed to provide guidance in the analysis across documents. This protocol contained the identification of eight coding choices as a general guideline as suggested by Carley (1993) and colleagues (Carley & Palmquist, 1992). By developing a coding protocol, replicability of the coding scheme can be obtained (Rourke, et al., 2001). The coding protocol that was developed prior to analysis of the documents is outlined below:

1. Level of analysis—The level or unit of analysis looked at single words and phrases (e.g. “computer” or “computer technology”) that were identified as one concept. Budd, Thorp, and Donohew (1967) describe a concept as “...a single thought unit or idea unit that conveys a single item of information extracted from a segment of content” (p. 34).

2. Irrelevant information—Irrelevant information was skipped over during analysis. Since the texts were coded by hand, there was no need to delete irrelevant information from the documents as is customary when conducting computer assisted, content analysis (Carley, 1993).
3. Predefined or interactive concept choice—An interactive analysis was conducted, which allowed for flexibility in the coding process to incorporate important material that would have bearing on the results as opposed to coding from a pre-defined list of concepts (Carley, 1990). This method of analysis enabled the researcher to make specific comparisons between similar documents from each of the four districts in order to aid with the interpretation of the results.
4. Level of generalization—Generalization often leads to greater comparability across texts (Carley & Palmquist, 1992). A bottom-up approach was used to construct generalized concepts, which allowed concepts to be extracted separately and then translated into generalizations (Carley, 1993).
5. Creation of translation rules—Translation rules were developed to ensure coding of specific concepts was consistent throughout the coding process (Carley, 1993). As the interactive coding was implemented, a two-column list of concepts was developed for the two broad categories of interest (i.e. literacy and technology). As generalized concepts were developed, a special purpose thesaurus was developed that translated each unique concept into a generalized concept (Carley, 1993).
6. Level of implication for concepts—Only explicitly present concepts were coded within the documents. Rourke and colleagues (2001) refer to this as manifest content that is easily observable. The coding of manifest content is

highly objective in nature, formalized, and removes much of the interpretive load placed on the coder, thus resulting in higher reliability (Hagelin, 1999).

7. Existence or frequency of concepts—The frequency of concepts was coded in that each occurrence of the concept was documented creating frequency counts. This strategy allowed for frequency-based comparisons as part of the analysis (Carley, 1993).
8. Number of concepts—Carley (1993) explains that “100 to 500 concepts seems sufficient to capture many of the nuances and individual differences within texts, [yet] it is still a small enough number that some generalization and comparison is possible” (p. 86). Since explicitly present concepts were extracted using an iterative method, the number of concepts was not established a priori but reported as part of the analysis for comparison purposes.

By following the above stated coding protocol, the set of documents (n=8) was coded by hand on hard copies with multiple colored highlighters to identify relevant concepts. Since electronic versions of all text documents were not available, computer assisted analysis was not possible.

On the first pass through the data, manifest content was coded that related to the two pre-established categories of interest, literacy and technology. A second pass through the data was made with the same intent to ensure thoroughness in the identification of the relevant concepts. In order to develop generalized concepts, a third pass was completed to note general categories, develop a special purpose thesaurus, and reexamine the context in which the extracted concepts were nested. This continuous exploration and comparison ensured that the generalized categories would not alter the contextual meaning of the concepts (Altheide, 1987). A final pass through the data confirmed that the coding was accurately conducted according to the coding protocol and the list of generalized concepts.

Analysis. Content analyses were used to determine how technology, and the Internet specifically, was integrated within each school context. Two different content analysis techniques were conducted, a conceptual analysis and a semantic analysis (see Krippendorf, 1980). These procedures were used to analyze the content of the artifacts that were collected from each school district, including reading/language arts and technology curricula, school improvement plans, and technology plans where available. These analyses were conducted in two distinct stages.

During stage one, a conceptual analysis of the content within the artifacts collected from each school was conducted. The purpose of this analysis was to look at the frequency of concepts that occurred in the documents that related to two broad themes, literacy and technology. The level of analysis looked at single words or sets of words (e.g. “computer” or “computer technology”) that were identified as one concept.

An interactive analysis was conducted (Northcutt & McCoy, 2004), which allowed for flexibility in the coding process to incorporate important material that would have bearing on the results as opposed to coding from a pre-defined list of concepts (Carley, 1990). This method of analysis enabled the researcher to make specific comparisons between similar documents from each of the four districts in order to aid with the interpretation of the results. Translation rules were developed to ensure the coding of specific concepts was consistent throughout the coding process (Carley, 1993). Irrelevant information was skipped over and only portions of the text that included relevant concepts were included. Coding of the documents was completed by hand on hard copies with multiple colored highlighters to identify the concepts. As this interactive coding was implemented, a two-column list of concepts was developed for the two broad categories of interest (i.e. literacy and technology). Two passes were made through the data to ensure thoroughness in the identification of the relevant concepts. Frequency counts were calculated for each concept to make comparisons and report results.

In the second stage, a semantic analysis was completed that looked at where the concepts associated with the two broad categories, literacy and technology, appeared in relation to each

other within the text documents (Palmquist, Carley, & Dale, 1997). Semantic analysis allows for the comparison of semantic connections across texts through a proximity map analysis (Carley & Palmquist, 1992). Before beginning this analysis, it is customary to develop a question of focus (Carley, 1993). The question for this study was: *How is technology being integrated into reading/language arts curriculum?* The previously coded samples of text were used to conduct a proximity map analysis. A map analysis technique was used because the researcher was concerned with the explicit concepts that appeared within the texts and not emotional consideration or interpretations of the author(s) (Carley & Palmquist, 1992). A graphic representation of the relationships between concepts associated with reading and technology was developed to aid in the interpretation of the relationships.

Chapter Summary

There were three main purposes for this study. First it sought to evaluate middle school students' online reading comprehension achievement, comparing performance between students attending schools in economically privileged school districts to those in economically disadvantaged school districts. The second purpose was to evaluate middle school teachers' online reading comprehension achievement, comparing performance between teachers employed in economically privileged school districts to those in economically disadvantaged school districts. Finally, the third purpose was to extend the conceptualization of the digital divide to determine what factors best predict students' and teachers' online reading comprehension achievement. The multi-dimensional research design and procedures described above were developed and implemented to accomplish the goals of this study. Through both quantitative and qualitative data collection and analysis procedures, the researcher sought to gather a rich data set in order to answer the central research questions of this study:

- RQ1: Do differences in online reading comprehension achievement among middle school *students* vary significantly according to District Reference Group (DRG) classification?

- RQ2: Do difference in online reading comprehension achievement among middle school *teachers* vary significantly according to District Reference Group (DRG) classification?
- RQ3: What is the best-fit explanatory model in a three level HLM approach that accounts for the variability in *students'* online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill?
- RQ4: What is the best-fit explanatory model in a three level HLM approach that accounts for the variability in *teachers'* online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill?
- RQ5: How does school context appear to contribute to this pattern of factors that affect online reading comprehension achievement among middle school students and teachers?

CHAPTER FOUR: RESULTS

This study explored differential patterns in Internet access, Internet use, and online reading comprehension achievement among middle school students and teachers in both economically privileged and economically disadvantaged school districts. As previously reported, two scales were developed to measure teachers' and students' Internet access, Internet use, and Internet reading skill (i.e. online reading comprehension achievement). An overview of the results from the analyses of the data collected by the two measurement scales along with qualitative data that was also obtained from each research site are presented.

This chapter is organized into three main sections. The first section presents the results from the first phase of this study, measurement scale development. In the second section, the outcomes from the quantitative analyses conducted in phase three of this study, including ANOVA and HLM procedures, are provided. Finally, the third section reports the findings from the qualitative analyses conducted in phase four.

Overview

This study had three main purposes. The first purpose was to evaluate middle school students' online reading comprehension achievement, comparing performance between students attending schools in economically privileged school districts to those in economically disadvantaged school districts. The second purpose was to evaluate middle school teachers' online reading comprehension achievement, comparing performance between teachers employed in schools in economically privileged school districts to those in economically disadvantaged school districts. Finally, the third purpose was to extend the conceptualization of the digital divide to determine what factors best predict students' and teachers' online reading comprehension achievement.

A more complex conception of the digital divide included factors associated with a primary level divide (i.e. differences in Internet access), a secondary level divide (i.e. differences in Internet use), and a tertiary level divide (i.e. differences in online reading comprehension

achievement) when comparing economically privileged (i.e. high DRG) and economically disadvantaged (i.e. low DRG) school districts. The research design was a mixed method design that included the collection and analyses of both quantitative and qualitative data. These data were analyzed to obtain thorough and detailed results for the proposed research questions of interest in this study:

RQ1: Do differences in online reading comprehension achievement among middle school *students* vary significantly according to District Reference Group (DRG) classification?

RQ2: Do differences in online reading comprehension achievement among middle school *teachers* vary significantly according to District Reference Group (DRG) classification?

RQ3: What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in *students'* online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill?

RQ4: What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in *teachers'* online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill?

RQ5: How do elements of the school context appear to contribute to this pattern of factors that effect online reading comprehension achievement among middle school students and teachers?

Phase One: Measurement Scale Development

The purpose of the first phase in this study was to develop two measurement scales that would be adequate measures of the three levels of the digital divide: Internet access, Internet use, and Internet reading skill (i.e. online reading comprehension

achievement). These two scales, Digital Divide Measurement Scale for Students (DDMS-S) and Digital Divide Measurement Scale for Teachers (DDMS-T), were used to collect data from participating middle schools in economically privileged and economically disadvantaged school districts. Once data were collected, parallel analyses were conducted to ensure both scales were good measures of the constructs of interest (i.e. Internet access, Internet use, and Internet reading skill). This section reports on the measurement scale administration and the psychometric properties of the two instruments developed for this study.

Measurement Scale Administration

The two measurement scales (i.e. DDMS-S and DDMS-T) were administered in this study to better understand the complexities associated with three different levels of the digital divide. These two measurement scales were designed to measure instances of a primary level digital divide (i.e. Internet access), a secondary level digital divide (i.e. Internet use), and a tertiary level digital divide (i.e. Internet reading skill) among middle school students and teachers from economically privileged and economically disadvantaged school districts.

Data were collected from schools in two economically privileged (i.e. high DRG) school districts and two economically disadvantaged (i.e. low DRG) school districts. A total of nine schools participated across four districts. As previously reported, sample populations of middle school students (n=1768) and middle school teachers (n=282) participated in the administration of the measurement scales.

Data Screening

Data collected from each of the two measurement scales was first screened to identify any problems. Both data sets were automatically entered into a data file by the electronic platform at the time of administration; therefore, errors associated with data entry were not a major concern. Frequency distributions were used to ensure that there was nothing obviously wrong with the data file once it was imported into SPSS (1996). Since the data collected with these two

measurement scales was ordinal and nominal, the screening procedures utilized simple statistical techniques (Glass & Hopkins, 1996). Using frequency distributions, the number of respondents, percent of respondents, and the mode was reviewed for each nominal variable. These same three data points were reviewed for the ordinal variables along with the range, median, and quartiles for each variable. The results of the screening procedures indicated that there were no issues with either of the two data sets, students and teachers.

Missing Data

Each case in both the student and teacher data sets was checked for completeness. Any cases that had 50 percent or more of the item responses missing were deleted from the data file. In the student data set (n=1,768), there were 17 cases removed leaving a final data set of n=1,751. Since only about 1 percent of the cases were eliminated, there was no cause for concern that the removal of these cases in this large data set would affect the results (Tabachnik & Fidell, 2001). Only three cases were removed from the teacher data set (n=282), again only about 1 percent of the data, leaving a final data set of n=279 for analysis.

Participants

The sample populations of teachers and students from each participating district are shown in Table 4.1 below. There was a nearly equal participation rate for students in economically privileged (i.e. high DRG) districts and economically disadvantaged (i.e. low DRG) districts with 52.4 percent and 47.6 percent respectfully. The participation rate for teachers in high DRG districts (52.6%) compared to low DRG districts (47.3%) was nearly equal as well.

Table 4.1

Teacher and Student Sample Populations by District

	Students		Teachers	
<i>Economically privileged districts</i>				
Suburbantown (DRG B)	295	16.8%	59	21.1%
Suburbanville (DRG B)	624	35.6%	88	31.5%
District totals	919	52.4%	147	52.6%
<i>Economically disadvantaged districts</i>				
Urbantown (DRG H)	635	36.3%	117	41.9%
Urbanville (DRG I)	197	11.3%	15	5.4%
District totals	832	47.6%	132	47.3%
Participant totals	1751	100%	279	100%

Reliability Estimates

Two internal consistency estimates of reliability were computed for the Likert-scale items on the two measurement scales, a split-half coefficient expressed as a Spearman-Brown corrected correlation and coefficient alpha. For the split-half coefficient, each scale was split into two halves such that the two halves would be as equivalent as possible (Green & Salkind, 2003). The value for the split-half coefficient was .946 and the coefficient alpha was .897 on the student version of the measurement scale (i.e. DDMS-S), both of which indicated satisfactory reliability (Green & Salkind, 2003). On the teacher version of the measurement scale (i.e. DDMS-T), the value for the split-half coefficient was .963 and the coefficient alpha was .920, which also indicated satisfactory reliability.

Factor Analysis Procedures

After data screening, an exploratory factor analysis (EFA) was conducted on each of the two measurement scales to determine which items clustered tightly around each of the factors of

interest. The EFA procedure for the student version looked at two factors of interest: (a) students' use of the Internet inside school, and (b) students' use of the Internet outside school. The EFA procedure for the teacher version also looked at two factors of interest: (a) teachers' use of the Internet inside school, and (b) teachers' use of the Internet outside school. The dimensionality of the two scales was analyzed using principal axis factoring (PAF). Three criteria were used to determine the number of factors to rotate: (a) the a priori hypothesis that each scale measured two factors, (b) the scree test, and (c) the interpretability of the factor solution. Based on these criteria, two factors were rotated using a direct oblimin rotation procedure, which allowed factors to correlate thus revealing more meaningful theoretical factors (Netemeyer, et al., 2003). Items that loaded at .40 or higher on a given factor were used to define the two factors on each measurement scale (Floyd & Widaman, 1995).

Digital Divide Measurement Scale for Students (DDMS-S). Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were used to evaluate the strength of the linear association among the 40 items in the correlation matrix. Bartlett's Test of Sphericity was significant ($\chi^2 = 16110.9$, $p = .000$), which indicated that the correlation matrix is not an identity matrix. The KMO statistic (.919), which is an index that compares the magnitude of the observed correlations with the magnitude of the partial correlation coefficients, was "marvelous" according to Kaiser's (1974) criteria. This suggests that there was a sufficient sample size relative to the number of items in the scale.

A measure of sampling adequacy (MSA) for each item indicates how strongly that item is correlated with other items as shown by the anti-image correlation (AIC) matrix. Individual MSAs that are greater than .70 are ideal (Pett, et al., 2003). The correlations ranged from .888 to .951. The individual MSAs range from "meritorious" to "marvelous" according to Kaiser's (1974) criteria, thus indicating the correlation matrix was factorable (Pett, et al., 2003).

The rotated solution for the student version of the instrument yielded two interpretable factors. (See Table 4.2.) Factor one was labeled *Inside School use of the Internet*. A total of 11

items had their highest loadings (all greater than .42) on this factor, with a mean loading of .559. Factor two was labeled *Outside School Use of the Internet*. A total of 13 items had their highest loadings (all greater than .41) on this factor, with a mean loading of .615. The inside school use factor accounted for 20.9 percent of the item variance, and the outside school use factor accounted for 30.8 percent of the item variance. Experts report that the number of extracted factors should account for 50 to 60 percent of the variance in items (Netemeyer, et al., 2003). Since a total of 51.7 percent of the item variance was accounted for by these two factors, a two-factor solution was shown to be an interpretable solution.

Table 4.2

Factor Loadings for Students' Use of the Internet

Items	Factors	
	Inside school	Outside school
I use the Internet AT SCHOOL	.579	
I use search engines AT SCHOOL	.490	
I use the Internet to find clip art and pictures AT SCHOOL	.422	
I use the Internet to learn more about things that interest me AT SCHOOL	.507	
I use the Internet to read online newspapers and current events AT SCHOOL	.500	
I use the Internet to read about science AT SCHOOL	.672	
I use the Internet to read about social studies AT SCHOOL	.673	
I use the Internet to read about literature AT SCHOOL	.599	
I use the Internet to read about math AT SCHOOL	.459	
I use the Internet to read about other school subjects AT SCHOOL	.642	
I use the Internet for school-related assignments AT SCHOOL	.606	

(Table continues)

Items	Factors	
	Inside school	Outside school
I use the Internet OUTSIDE SCHOOL		.726
I use search engines OUTSIDE SCHOOL		.584
I use email OUTSIDE SCHOOL		.711
I use Instant Messenger (IM) OUTSIDE SCHOOL		.693
I use chat rooms OUTSIDE SCHOOL		.570
I use the Internet to download music OUTSIDE SCHOOL		.769
I use the Internet to find clip art and pictures OUTSIDE SCHOOL		.611
I use the Internet to view videos OUTSIDE SCHOOL		.791
I use blogs (like LiveJournal or MySpace) OUTSIDE SCHOOL		.558
I use the Internet to learn more about things that interest me OUTSIDE SCHOOL		.520
I use the Internet OUTSIDE SCHOOL to help me decide what to buy		.559
I use the Internet to play online games OUTSIDE SCHOOL		.492
I use the Internet to create websites OUTSIDE SCHOOL		.410

The results of the factor analysis indicated that this measurement scale was an adequate measure of students' use of the Internet across the two factors of interest: (a) students' use of the Internet inside school, and (b) students' use of the Internet outside school.

Digital Divide Measurement Scale for Teachers (DDM-T). Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were used to evaluate the strength of the linear association among the 40 items in the correlation matrix. Bartlett's Test of Sphericity was significant ($\chi^2 = 2454.3$, $p = .000$), which indicated that the correlation matrix was not an identity matrix. The KMO statistic (.884), which is an index that compares the magnitude of the observed correlations with the magnitude of the partial correlation coefficients, was

“meritorious” and nearly “marvelous” according to Kaiser’s (1974) criteria. This suggests that there was a sufficient sample size relative to the number of items in the scale.

A measure of sampling adequacy (MSA) for each item indicates how strongly that item is correlated with other items as shown by the anti-image correlation (AIC) matrix. Individual MSAs that are greater than .70 are ideal (Pett, et al., 2003). The correlations ranged from .629 to .926. The individual MSAs ranged from “mediocre” to “marvelous” according to Kaiser’s (1974) criteria. Since none of the correlations among the individual items were below .60, the correlation matrix was factorable (Pett, et al., 2003).

The rotated solution for the teacher version of the instrument yielded two interpretable factors. (See Table 4.3.) Factor one was labeled *Inside School use of the Internet*. A total of 14 items had their highest loadings (all greater than .42) on this factor, with a mean loading of .583. Factor two was labeled *Outside School Use of the Internet*. A total of 10 items had their highest loadings (all greater than .43) on this factor, with a mean loading of .645. The inside school use factor accounted for 26.1 percent of the item variance, and the outside school use factor accounted for 32.6 percent of the item variance. Experts report that the number of extracted factors should account for 50 to 60 percent of the variance in items (Netemeyer, et al., 2003). Since a total of 58.7 percent of the item variance was accounted for by these two factors, a two-factor solution was shown to be an interpretable solution.

Table 4.3

Factor Loadings for Teachers' Use of the Internet

Items	Factors	
	Inside school	Outside school
I use the Internet AT SCHOOL	.648	
I use search engines AT SCHOOL	.756	
I use email AT SCHOOL	.420	
I use the Internet to find clip art and pictures AT SCHOOL	.581	
I use the Internet to view videos AT SCHOOL	.524	
I use the Internet to learn more about things that interest me AT SCHOOL	.620	
I use the Internet to read online newspapers and current events AT SCHOOL	.582	
I use the Internet to read about science AT SCHOOL	.502	
I use the Internet to read about social studies AT SCHOOL	.603	
I use the Internet to read about literature AT SCHOOL	.662	
I use the Internet to read about math AT SCHOOL	.479	
I use the Internet to read about other school subjects AT SCHOOL	.604	
I use the Internet for school-related purposes AT SCHOOL	.676	
I use the Internet AT SCHOOL to help me decide what to buy	.507	
I use the Internet OUTSIDE SCHOOL		.938
I use search engines OUTSIDE SCHOOL		.840
I use email OUTSIDE SCHOOL		.860
I use Instant Messenger (IM) OUTSIDE SCHOOL		.428
I use the Internet to download music OUTSIDE SCHOOL		.522

(Table continues)

Items	Factors	
	Inside school	Outside school
I use the Internet to find clip art and pictures OUTSIDE SCHOOL		.444
I use the Internet to view videos OUTSIDE SCHOOL		.565
I use the Internet to learn more about things that interest me OUTSIDE SCHOOL		.669
I use the Internet to read online newspapers and current events OUTSIDE SCHOOL		.558
I use the Internet OUTSIDE SCHOOL to help me decide what to buy		.629

The results of the factor analysis indicated that this measurement scale was an adequate measure of teachers' use of the Internet across the two factors of interest: (a) teachers' use of the Internet inside school, and (b) teachers' use of the Internet outside school.

Item Analysis for the Measure of Online Reading Comprehension Achievement

An item analysis of the fourteen forced response questions indicated that the item difficulty was sufficient. The P-values of the items ranged from .32 to .84 showing that none of the questions were too easy or too difficult (Haladyna, 1999). Item discrimination, $R(IT)$, shows the relationship between how well individuals performed on a question and their total test score (Haladyna, 1999). A Point-Biserial correlation (PBS) was conducted for each of the items. All the items had a test discrimination value greater than .25, which indicated that they were "good questions" (Varma, n.d.).

Summary

The results of the reliability estimates and factor analysis procedures indicated that the two measurement scales developed for this study were adequate measures of Internet use inside school and Internet use outside school using sample populations of middle school students and teachers. The item analyses showed that these scales were also good measures of the two

elements of online reading comprehension (i.e. reading to locate information and reading to critically evaluate information) that were the focus of this study. From these analyses, it can be concluded that the Digital Divide Measurement Scale for Students (DDMS-S) and the Digital Divide Measurement Scale for Teachers (DDMS-T) are psychometrically sound instruments for measuring Internet use inside school, Internet use outside school, and Internet reading skill.

Phase Three: Quantitative Methods

Phase three of the research design had two main purposes. The first purpose was to test for mean differences in online reading comprehension achievement between groups of students and groups of teachers from economically privileged (i.e. high DRG) districts and economically disadvantaged (i.e. low DRG) districts. Two separate one-way analysis of variance (ANOVA) tests were conducted to answer the first two research questions using online reading achievement as the dependent variable. Since the participant populations were selected from two distinct DRG category groupings (high and low), an ANOVA procedure was preferable to multiple t-tests to identify differences between these groups in order to minimize type-I error (Glass & Hopkins, 1996). A measure of online reading comprehension was calculated by combining scores from the 14 forced-response items, which were scored dichotomously (i.e. 1=correct, 0=incorrect), into a total score ranging from 0 to 14 for this portion of the measurement scales. This measure of online reading comprehension was then used for each ANOVA to test for differences between teachers and differences between students from high DRG and low DRG districts to determine if DRG classification (i.e. high DRG or low DRG) was significant.

The second purpose was to explore what variables best predict online reading comprehension achievement for both students and teachers using Hierarchical Linear Modeling (HLM). Various models were assessed in the HLM analyses. In order to address the next two research questions in this phase of the study, two sets of HLM models were tested. The first set of HLM models tested what student and school level variables best predict students' online reading comprehension achievement scores (SORCS). The second set of HLM models tested what

teacher and school level variables best predict teachers' online reading comprehension achievement scores (TORCS). HLM for Windows, version 6.0 (Raudenbush, et al., 2004) was used to estimate model parameters.

Research Question One

A one-way analysis of variance (ANOVA) was used to answer the first research question:

(RQ1) Do differences in online reading comprehension achievement among middle school students vary significantly according to District Reference Group (DRG) classification?

This analysis was conducted to evaluate the relationship between District Reference Group (DRG) classification and students' online reading comprehension achievement scores (SORCS). The independent variable, the District Reference Group classification, included two levels, high DRG and low DRG. The dependent variable was the students' online reading comprehension achievement scores (SORCS) as measured on the DDMS-S, which had a total possible score of 14 points. It was predicted that significant differences would be discovered in students' online reading comprehension achievement with students who attend schools in economically privileged districts scoring significantly higher than students attending schools in economically disadvantaged school districts. Table 4.4 displays the mean scores and standard deviations for students' online reading comprehension achievement scores (SORCS) by district and DRG classification.

Table 4.4

Means and Standard Deviations for SORCS

District	Mean	SD	N
Economically Privileged Districts	6.06	1.89	930
Suburbantown	6.23	1.94	297
Suburbanville	6.01	1.86	633
Economically Disadvantaged Districts	4.92	1.88	838
Urbantown	5.06	1.87	636
Urbanville	4.46	1.86	202

The ANOVA was significant, $F(1,1731) = 157.9$, $p < .001$. The online reading comprehension achievement scores for students attending schools in high DRG districts were significantly higher ($M = 6.06$, $SD = 1.89$) than those attending schools in low DRG districts ($M = 4.92$, $SD = 1.88$). The strength of the relationship between DRG classification and students' online reading comprehension achievement scores (SORCS), as assessed by η^2 , was of medium strength (Green & Salkind, 2003) with DRG accounting for 8.4 percent of the variance of the dependent variable. These results showed that differences in online reading comprehension achievement among middle school students do vary significantly according to District Reference Group (DRG) classification. Students from high DRG districts scored significantly higher on this measure of Internet reading skill compared to students from low DRG districts.

Additional analyses. Two additional analyses of variance and post-hoc means comparisons were conducted to understand more completely the differences in students' online reading comprehension scores. First, a one-way analysis of variance (ANOVA) was conducted to evaluate if students' online reading comprehension scores varied by district. Second, a multivariate analysis of variance (MANOVA) was conducted between economically privileged (i.e. high DRG) districts and economically disadvantaged (i.e. low DRG) districts on the two

major elements of online reading comprehension achievement measured by the DDMS-S: (a) reading to locate information, and (b) reading to critically evaluate information. To control for experimentwise or Type I error across multiple ANOVAs, a Bonferroni adjustment was used to test each ANOVA at the .025 level. This second analysis was performed to evaluate the response patterns to determine if students in high and low DRG districts differed on the two major elements of online reading comprehension, reading to locate information and reading to critically evaluate information.

District analyses. To determine if students' online reading comprehension scores (SORCS) varied by district, an analysis of variance was conducted comparing total mean scores from the SORCS among the four districts. This showed that students' online reading comprehension scores were significantly different by district, $F(3,1729) = 61.183$, $p < .01$. Next, a post-hoc Tukey-Kramer multiple comparison test for unequal cell sizes was used for pairwise comparisons across the four districts. The results revealed that the average students' online reading comprehension achievement score (SORCS) was significantly higher in Suburbantown than in both low DRG districts, Urbantown ($p < .01$) and Urbanville ($p < .001$). Also, the mean score in Suburbanville was significantly higher than both low DRG districts, Urbantown ($p < .001$) and Urbanville ($p < .001$). The pairwise comparison of the two high DRG districts, Suburbantown and Suburbanville, was non-significant ($p = .362$) with students in Suburbantown showing a slightly higher mean score than those in Suburbanville. Significant differences appeared on the mean scores for SORCS between the two economically disadvantaged districts. The average SORCS for Urbantown was significantly higher than for Urbanville ($p < .001$). As we shall see later, this difference is important to keep in mind.

These post-hoc analyses showed a main effect for SORCS by district to be significant. They also revealed that the separate mean comparisons for SORCS between the two high DRG districts and the two low DRG districts were significant as expected. Additionally, the mean comparison for SORCS between the two high DRG districts was non-significant, again as

anticipated. Finally, the mean comparison for SORCS between the two low districts was significant, which was an unexpected finding.

Comparing reading to locate information and reading to critically evaluate information.

To more completely understand the patterns of online reading comprehension performance on the SORCS, differences between economically privileged districts (i.e. high DRG) and economically disadvantaged districts (i.e. low DRG) were evaluated on the two major elements of online reading comprehension achievement measured by the DDMS-S: (a) reading to locate information, and (b) reading to critically evaluate information. It was not clear if differences between the two types of districts were due primarily to reading to locate information, reading to critically evaluate information, or both. A one-way multivariate analysis of variance (MANOVA) was conducted between DRG groups using reading to locate information and reading to critically evaluate information as the two dependent variables. Table 4.5 contains the means and standard deviations on the dependent variables for the two groups of students. Significant differences were found among the District Reference Group (DRG) classifications on the dependent measures, Wilks's $\Lambda = .101$, $F(1, 1687) = 7529.6$, $p < .01$. The multivariate η^2 based on Wilks's Λ was quite strong, .90.

Table 4.5

Post-hoc Mean Comparisons for Two Elements of SORCS by DRG

	Economically privileged districts			Economically disadvantaged districts		
	Mean	SD	N	Mean	SD	N
Reading to locate information*	3.19	1.27	902	2.47	1.27	787
Reading to critically evaluate*	2.90	1.12	902	2.51	1.15	787

*Mean comparisons between district types were significant at the .025 level

Analyses of variance (ANOVA) tests were conducted on each dependent variable as follow-up tests to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the

.025 level. The ANOVA on both elements of students' online reading comprehension achievement scores (SORCS) were statistically different between students in high and low DRG classifications. That is, the mean scores for students in high DRG districts were significantly higher than the mean scores for students in low DRG districts for both reading to locate information, $F(1,1687) = 137.01, p < .01, \eta^2 = .08$, and reading to critically evaluate information $F(1,1687) = 47.75, p < .01, \eta^2 = .03$. Students from economically privileged districts had significantly higher mean scores than students from economically disadvantaged districts on both elements of Internet reading skill, reading to locate information and reading to critically evaluate information.

Analyses of individual item comparisons for reading to locate information by DRG. Chi-square analyses were conducted to understand patterns of student performance on individual items on the SORCS that measured reading to locate information. A total of 6 items were tested using a chi-square statistic to determine if differences existed between District Reference Group (DRG) classifications (i.e. high and low DRG). As can be seen by the frequencies of correct responses cross-tabulated in Table 4.6, there was a significant difference between DRG on 5 of the 6 items that measured reading to locate information on the Internet. That is, on 5 of the 6 items, a significantly greater proportion of students from high DRG districts provided correct responses compared to students from low DRG districts, thus indicating that students from high DRG districts were more skilled with reading to locate information on nearly every item type than students from low DRG districts.

Table 4.6

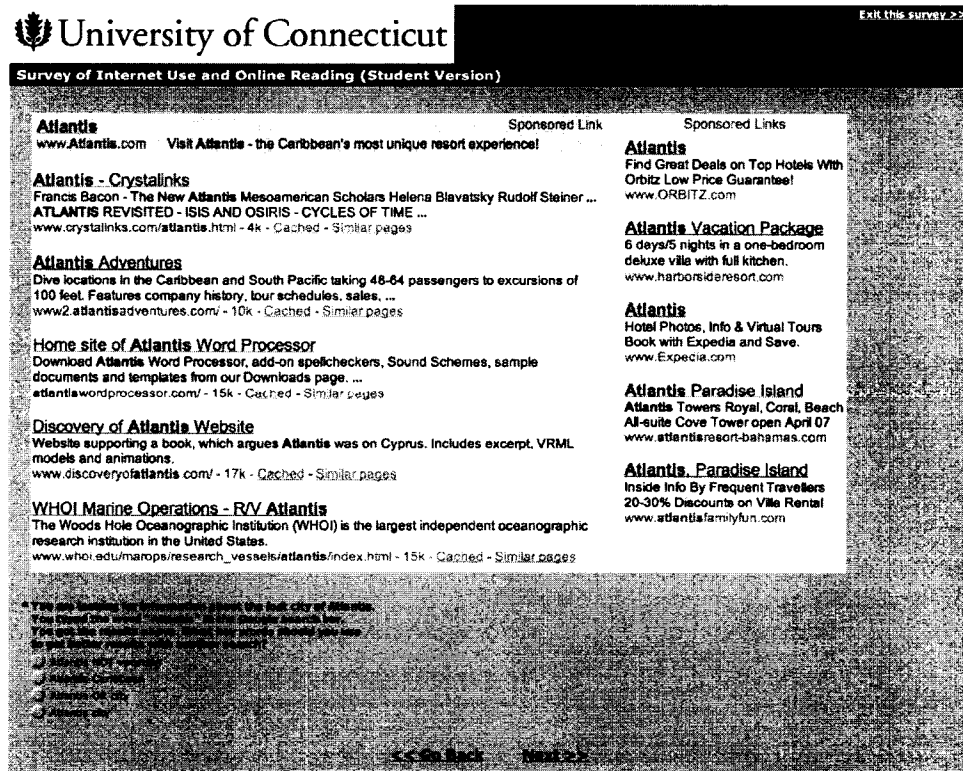
Results of Chi-square Analyses Across 6 Items that Measured Reading to Locate Information Element of SORCS by DRG

Item	Economically privileged districts			Economically disadvantaged districts			χ^2
	Correct	Incorrect	N	Correct	Incorrect	N	
Item 59	654	267	921	426	390	816	65.05*
Item 62	414	506	920	279	533	812	20.35*
Item 63	435	484	919	264	545	809	38.60*
Item 64	304	613	917	177	629	806	26.70*
Item 65	470	446	916	278	521	799	47.34*
Item 68	647	263	910	558	239	797	0.242

*Chi-square statistic was significant at the .05 level

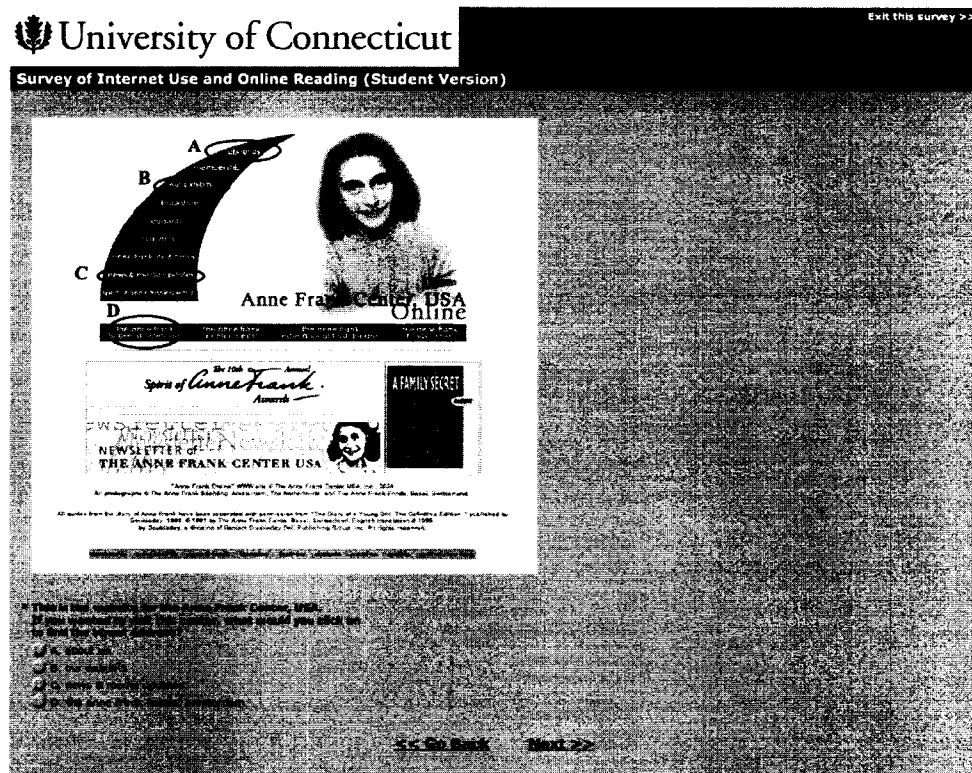
Mean score performance on only one item was not significantly different between the two types of districts, item 68. The purpose of this item was to determine if students were familiar with common search strategies that can be employed to refine and narrow search results when locating information on the Internet. (See Figure 3.) Of the students in high DRG districts, 71.1 percent provided a correct response for this item. Of the students in low DRG districts, 70 percent provided a correct response. This indicated that students in the two types of districts performed significantly different on most types of reading to locate information but performed at the same average level on skills related to refining and narrowing search engine results when locating information on the Internet.

Figure 3. Item 68 of DDMS-S that measured use of a key word strategy for reading to locate information



Students from both high and low DRG districts performed the worst on item 64, shown in Figure 4, which sought to measure skills in relation to locating information on a web page. The purpose of this item was to determine if students were familiar with common aspects of web page structure and design for locating a specific piece of information typically located at the “About Us” link, the address of the institution represented at a web page. A common feature on web pages is an “About Us” section that provides information about a web page author or sponsor and often includes contact information. In this item, students were required to select the website hyperlink that would provide a street address for the Anne Frank Center. (See Figure 4.)

Figure 4. Item 64 of DDMS-S that measured skill for reading to locate information within a web page



Of the students in economically privileged (i.e. high DRG) school districts, 33.2 percent provided a correct response for this item. Of the students in economically disadvantaged (i.e. low DRG) school districts, 22 percent provided a correct response. Overall, it appears that students are more skilled with the use of a keyword strategy used to refine a search and less skilled when reading to locate information within a webpage or search engine results screen.

Analyses of individual item comparisons for reading to critically evaluate information by DRG. Chi-square analyses were conducted to understand patterns of student performance on individual items on the SORCS that measured reading to critically evaluate information. A total of 8 items were tested using a chi-square statistic to determine if differences existed between District Reference Group (DRG) classifications (i.e. high and low DRG). Table 4.8 shows the frequency of correct responses cross-tabulated by item. Students from high DRG districts performed significantly better than students from low DRG districts on four out of eight items

(items 60, 66, 67, and 70). Students from low DRG groups performed significantly better than students from high DRG districts on only one item (item 69). Three items (61, 71, and 72) did not demonstrate a significant difference. See Table 4.7.

Table 4.7

Results of Chi-square Analyses Across 8 Items that Measured Reading to Critically Evaluate Information Element of SORCS by DRG

Item	Economically privileged districts			Economically disadvantaged districts			χ^2
	Correct	Incorrect	N	Correct	Incorrect	N	
Item 60	685	236	921	502	311	813	31.89*
Item 61	435	486	921	405	408	813	1.15
Item 66	688	225	913	427	373	800	90.66*
Item 67	322	589	911	228	570	798	8.94*
Item 69	58	850	908	103	692	795	21.36*
Item 70	392	515	907	305	489	794	4.04*
Item 71	62	843	905	38	751	789	3.14
Item 72	13	890	903	10	778	788	0.09

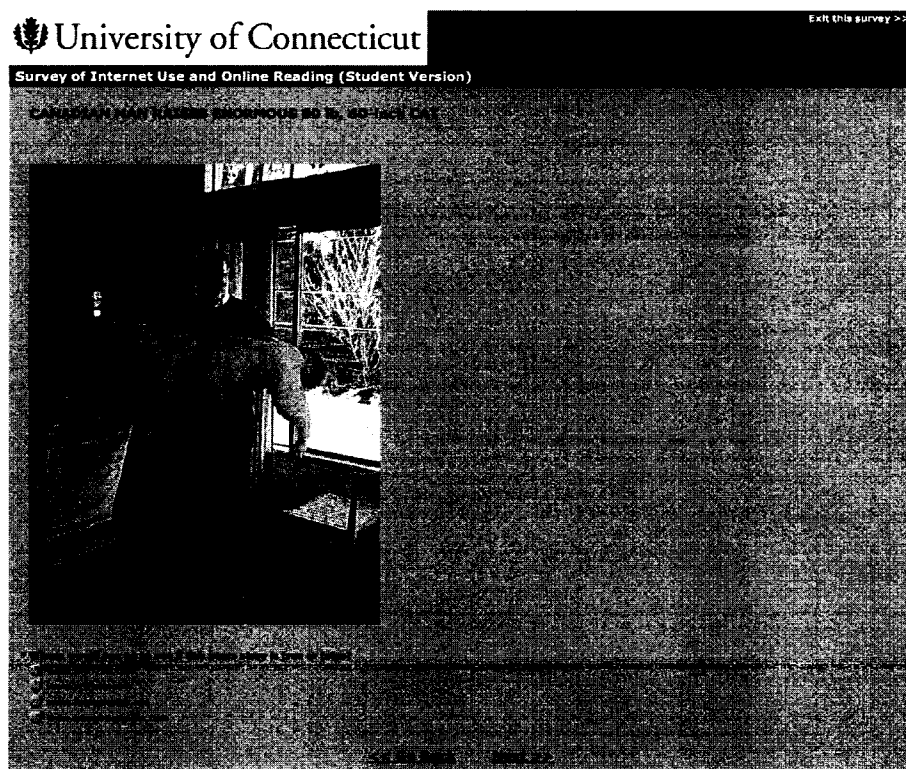
*Chi-square statistic was significant at the .05 level

These results show that students in high DRG districts generally do better on critical reading tasks that require students to: (a) read critically to evaluate the reliability of information (items 60 and 70), (b) read critically to evaluate information for its relevancy (item 66), and (c) read critically to evaluate information for accuracy (item 67). On item 69, an item that measured critical evaluation of the reliability of an information source (a phish message about a bank), twice as many students from low DRG districts responded correctly to this item compared to students from high DRG districts, but both groups showed very low correct response rates (less than 15 percent).

Three items (61, 71, and 72) did not significantly discriminate between types of district. Item 61 had similar correct response rates by about 40 percent of the students in both high and low DRG districts. This result suggests that students in high and low DRG districts have similar skills for critical reading tasks involving the evaluation of search engine results to find the most reliable source among several options. Items 71 and 72 had very low correct response rates. For illustrative purposes, these two items are shown in Figures 5 and 6.

The purpose of item 71 was to determine if students were familiar with a common web site (<http://www.snopes.com>) that provides information regarding hoaxes that appear on the Internet. This site provides a collection of false and inaccurate information that is often circulated through email, blogs, and other websites links (See Figure 5).

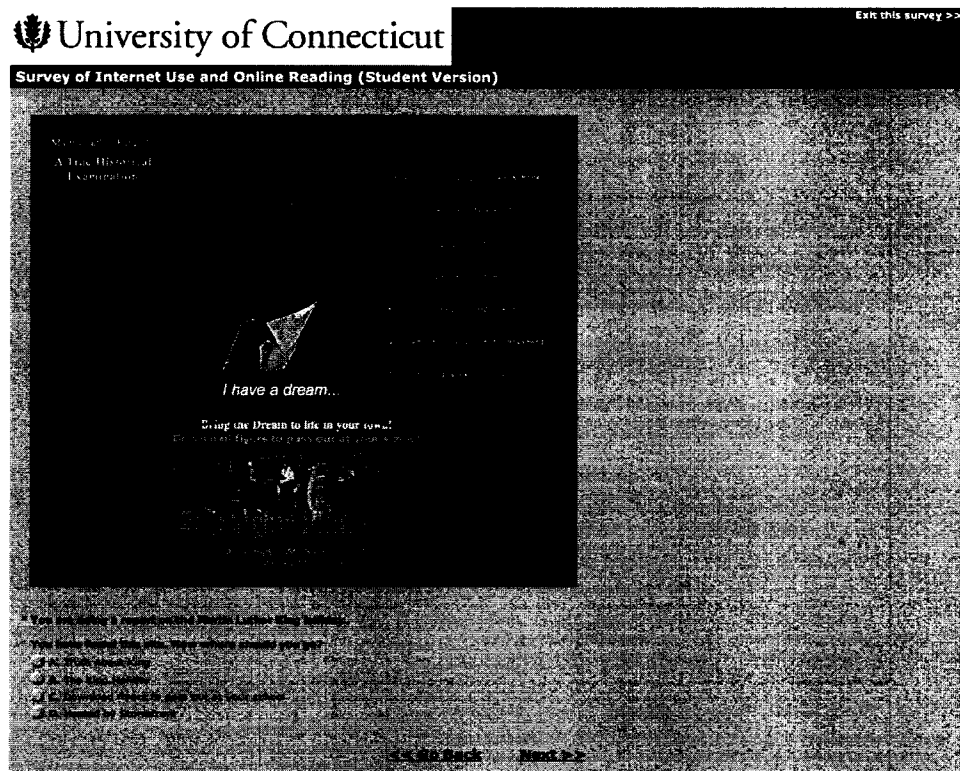
Figure 5. Item 71 of DDMS-S that measured reading to critically evaluate information for accuracy



Item 72 sought to measure skills in relation to reading to critically evaluate information for bias. When using the Internet for an information source, it is important to check the authorship

of a web site to determine how the author(s) or sponsor(s) of the site may shape the presented information. The purpose of this question was to determine if students understood the importance of checking a web sites' authorship to evaluate information bias before using it as an information source (see Figure 6).

Figure 6. Item 72 of DDMS-S that measured reading to critically evaluate information for bias



These results suggest that critical reading tasks involving critical evaluation of the accuracy of an image on a web site (item 71) and critical evaluation of information for bias (item 72) are especially challenging for students in both types of districts. These skills may need to be included more systematically in any curriculum that includes the new literacies of online reading comprehension.

Summary. Four main conclusions can be drawn from these analyses. First, it appears that a tertiary level digital divide (i.e. differences in students' online reading comprehension achievement) exists between students from economically privileged (i.e. high DRG) districts and those from economically disadvantaged (i.e. low DRG) districts as measured by the Digital

Divide Measurement Scale for Students (DDMS-S). Second, in general, students in high DRG districts were more skilled with both elements of online reading comprehension (i.e. reading to locate information and reading to critically evaluate information) than students in low DRG districts. Third, students from both high and low DRG districts performed relatively well on items that used a keyword strategy to refine or narrow a search when locating information on the Internet. However, students from both DRG classifications were shown to be less skilled when reading to locate information within a web page or search engine results screen. Finally, students from both high and low DRG districts seem to lack the necessary skills to evaluate information for accuracy and bias when reading on the Internet.

Research Question Two

A second one-way analysis of variance (ANOVA) was conducted to answer the second research question:

RQ2: Do differences in online reading comprehension achievement among middle school teachers vary significantly according to District Reference Group (DRG) classification?

This analysis was conducted to evaluate the relationship between District Reference Group (DRG) classification and teachers' online reading comprehension achievement scores (TORCS). The independent variable, the District Reference Group classification, included two levels, high DRG and low DRG. The dependent variable was the teachers' online reading comprehension achievement scores (TORCS) as measured on the DDMS-T, which had a total possible score of 14 points. It was predicted that significant differences would be discovered in teachers' online reading comprehension achievement that would show teachers who are employed by schools in economically privileged districts scoring significantly higher than teachers employed by schools in economically disadvantaged districts. Table 4.8 displays the mean scores by DRG classification, districts, and schools.

Table 4.8

Mean Scores for Teachers' Online Reading Comprehension Achievement Scores (TORCS)

	Economically privileged districts				Economically disadvantaged districts				
	Suburbantown (DRG B)		Suburbanville (DRG B)		Urbantown (DRG H)		Urbanville (DRG I)		
	A	B	C	D	E	F	G	H	I
School									
School means	8.63	8.52	8.19	8.03	6.71	6.84	7.83	7.29	--
District means	8.56		8.11		6.80		7.07		
DRG means	8.29				6.83				

The ANOVA was significant, $F(1,270) = 35.40$, $p < .001$. The online reading comprehension achievement scores for teachers employed by high DRG districts were significantly higher ($M = 8.29$, $SD = 1.96$) than the scores for teachers employed by low DRG districts ($M = 6.83$, $SD = 2.10$). The strength of the relationship between DRG classification and teachers' online reading comprehension achievement scores (TORCS), as assessed by η^2 , was of medium strength (Green & Salkind, 2003) with DRG accounting for 11.6 percent of the variance of the dependent variable. These results showed that differences in online reading comprehension achievement among middle school teachers do vary significantly according to District Reference Group (DRG) classification. Teachers from high DRG districts scored significantly higher on the two elements of Internet reading skill compared to teachers from low DRG districts.

Additional analyses. Two additional analyses of variance and post-hoc means comparisons were conducted to understand more completely the differences in teachers' online reading comprehension scores. First, a one-way analysis of variance (ANOVA) was conducted to evaluate if teachers' online reading comprehension scores varied by district. Second, a multiple analysis of variance (MANOVA) was conducted between economically privileged (i.e. high DRG) districts and economically disadvantaged (i.e. low DRG) districts on the two major

elements of online reading comprehension measured by the DDMS-T: (a) reading to locate information, and (b) reading to critically evaluate information. To control for experimentwise or Type I error across multiple ANOVAs, a Bonferroni adjustment was used to test each ANOVA at the .025 level. This second analysis was performed to evaluate the response patterns to determine if teachers in high and low DRG districts differed on the two major elements of online reading comprehension, reading to locate information and reading to critically evaluate information.

District analyses. To determine if teachers' online reading comprehension scores (TORCS) varied by district, an analysis of variance was conducted comparing total mean scores from the TORCS among the four districts. This showed that teachers' online reading comprehension scores (TORCS) were significantly different by district, $F(3, 274) = 11.703, p < .01$. Next, a post-hoc Tukey-Kramer multiple comparison test for unequal cell sizes was used for pairwise comparisons across the four districts. The means and standard deviations for the districts are reported in Table 4.9. The results revealed that the pairwise comparison of the two high DRG districts, Suburbantown and Suburbanville, was non-significant ($p = .808$) with teachers in Suburbantown showing a slightly higher mean score than those in Suburbanville. The pairwise comparison of the two low DRG districts showed that the mean scores of teachers in Urbanville were higher than Urbantown, but this was also a non-significant difference ($p = .951$). There was a significant difference between the two high DRG district teachers and Urbantown; Urbantown teachers scored significantly lower than teachers in both Suburbantown ($p < .01$) and Suburbanville ($p < .01$). There was no significant difference between Urbanville teachers and the two high DRG district teachers; Urbanville teachers' mean scores were similar to teachers in both Suburbantown ($p = .124$) and Suburbanville ($p = .296$), though the small n in this district should be noted. As we shall see later, this lack of significance is important to keep in mind.

Table 4.9

Means and Standard Deviations for TORCS by District

District	Mean	SD	N
Suburbantown	8.42	1.94	59
Suburbanville	8.11	2.02	88
Urbantown	6.76	2.12	117
Urbanville	7.07	2.27	14

These post-hoc analyses showed a main effect for TORCS by district to be significant. They also revealed that the separate mean comparisons for TORCS between the two high DRG districts and one of the low DRG districts were significant. The mean comparison for TORCS between the two high DRG districts was non-significant as expected. Additionally, the mean comparison for TORCS between the two low DRG districts was non-significant, again as anticipated. Finally, the mean comparison for TORCS between one of the low DRG districts (i.e. Urbanville) and the two high DRG districts (i.e. Suburbantown and Suburbanville) was non-significant, which was an unexpected finding.

Comparing reading to locate information and reading to critically evaluate information.

To more completely understand the patterns of online reading comprehension performance on the TORCS, differences between economically privileged districts (i.e. high DRG) and economically disadvantaged districts (i.e. low DRG) were evaluated on the two major elements of online reading comprehension achievement measured by the DDMS-T: (a) reading to locate information, and (b) reading to critically evaluate information. It was not clear if differences between the two types of districts were due primarily to reading to locate information, reading to critically evaluate information, or both. A one-way multivariate analysis of variance (MANOVA) was conducted between DRG groups using reading to locate information and reading to critically evaluate information as the two dependent variables. Table 4.10 contains the means and standard

deviations on the dependent variables for the two groups of teachers. Significant differences were found among the District Reference Group (DRG) classifications on the dependent measures, Wilks's $\Lambda = .063$, $F(1, 276) = 2041.15$, $p < .01$. The multivariate η^2 based on Wilks's Λ was quite strong, .94.

Table 4.10

Post-hoc Mean Comparisons for Two Elements of TORCS by DRG

	Economically privileged districts			Economically disadvantaged districts		
	Mean	SD	N	Mean	SD	N
Reading to locate information*	4.78	1.11	147	4.03	1.34	131
Reading to critically evaluate*	3.46	1.42	147	2.76	1.28	131

* Mean comparisons between district types were significant at the .025 level

Analyses of variance (ANOVA) tests were conducted on each dependent variable as follow-up tests to the MANOVA. Using the Bonferroni method, each ANOVA was tested at the .025 level. The ANOVA on both elements of teachers' online reading comprehension achievement scores (TORCS) were statistically different between teachers in high and low DRG classifications. That is, the mean scores for teachers in high DRG districts were significantly higher than the mean scores for teachers in low DRG districts for both reading to locate information, $F(1, 276) = 25.917$, $p < .01$, $\eta^2 = .09$, and reading to critically evaluate information $F(1, 276) = 18.11$, $p < .01$, $\eta^2 = .06$. Teachers from economically privileged districts had significantly higher mean scores than teachers from economically disadvantaged districts on both measures of Internet reading skill, reading to locate information and reading to critically evaluate information.

Analyses of individual item comparisons for reading to locate information by DRG. Chi-square analyses were conducted to understand patterns of teacher performance on individual items on the TORCS that measured reading to locate information. A total of 6 items were tested

using a chi-square statistic to determine if differences existed between District Reference Group (DRG) classifications (i.e. high and low DRG). As Table 4.11 shows, there was a significant difference between DRG on 4 of the 6 items that measured reading to locate information on the Internet. That is, on 4 of the 6 items, a significantly greater proportion of teachers from high DRG districts provided correct responses compared to teachers from low DRG districts. These results indicated that teachers in high DRG districts generally do better on reading to locate information tasks than teachers in low DRG districts.

Table 4.11

Results of Chi-square Analyses across 6 Items that Measured Reading to Locate Information Element of TORCS by DRG

Item	Economically privileged districts			Economically disadvantaged districts			χ^2
	Correct	Incorrect	N	Correct	Incorrect	N	
Item 64	127	20	147	113	18	131	.001
Item 67	106	41	147	55	76	131	25.79*
Item 68	123	24	147	90	41	131	8.67*
Item 69	124	23	147	103	28	131	1.52
Item 70	130	17	147	102	29	131	5.61*
Item 73	93	54	147	65	66	131	5.26*

*Chi-square statistic was significant at the .05 level

Analyses of individual item comparisons for reading to critically evaluate information by DRG. Chi-square analyses were conducted to understand patterns of teacher performance on individual items on the TORCS that measured reading to critically evaluate information. A total of 8 items were tested using a chi-square statistic to determine if differences existed between District Reference Group (DRG) classifications (i.e. high and low DRG). Table 4.12 shows the frequencies of correct responses cross-tabulated by item. Generally, teachers from high DRG

districts performed better than teachers from low DRG districts on all eight items. Only three items (items 71, 72, and 75) showed this difference in performance to be significant. The remaining five items (65, 66, 74, 76, and 77) did not demonstrate a significant difference between teachers from high and low DRG districts.

Table 4.12

Results of Chi-square Analyses across 8 Items that Measured Reading to Critically Evaluate Information Element of TORCS by DRG

Item	Economically privileged districts			Economically disadvantaged districts			χ^2
	Correct	Incorrect	N	Correct	Incorrect	N	
Item 65	83	64	147	59	72	131	3.62
Item 66	43	104	147	36	95	131	0.11
Item 71	140	7	147	105	26	131	15.07*
Item 72	69	78	147	46	85	131	3.99*
Item 74	33	114	147	24	107	131	0.72
Item 75	88	59	147	59	72	131	6.11*
Item 76	45	102	147	28	103	131	3.05
Item 77	7	140	147	5	126	131	0.15

*Chi-square statistic was significant at the .05 level

Teachers from both high and low DRG districts performed the worst on item 77, which sought to measure skills in relation to the critical evaluation of information for bias. This result may help explain why students from both high and low DRG districts performed poorly on this item as well. If teachers have not developed these critical evaluation skills, they cannot pass them on to their students. These skills may need to be included more systematically through professional development opportunities that include the new literacies of online reading comprehension.

Summary. Four main conclusions can be drawn from these analyses. First, it appears that a tertiary level digital divide (i.e. differences in teachers' online reading comprehension achievement) exists between teachers from economically privileged (i.e. high DRG) districts and those from economically disadvantaged (i.e. low DRG) districts as measured by the Digital Divide Measurement Scale for Teachers (DDMS-T). Second, teachers in one of the low DRG districts (i.e. Urbantown) had total mean scores on TORCS that were significantly lower than the two high DRG districts. Yet, teachers in the second low DRG district (i.e. Urbanville) had mean scores in online reading comprehension achievement that were similar to teachers from both high DRG districts on TORCS. Third, overall, teachers from high DRG districts were more skilled with both elements of online reading comprehension (i.e. reading to locate information and reading to critically evaluate information) than teachers from low DRG districts. Finally, teachers from both high and low DRG districts seem to lack the necessary skills to evaluate information for bias when reading on the Internet.

Research Question Three

A multilevel analysis, or hierarchical linear model (HLM), was conducted to address the third research question:

(RQ3): What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in students' online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill?

To address this question, two-level hierarchical linear models were used to predict students' online reading comprehension achievement scores relative to student- and school-level effects (see Appendix F). All of the models consisted of two levels with students (Level-1) nested within schools (Level-2). In these analyses, the Level-1 model represented associations among student variables relative to the outcome measure of students' online reading comprehension achievement

scores (SORCS). The Level-2 model examined the influence of school characteristics relative to the outcome measure of students' online reading comprehension achievement scores (SORCS).

Predictor variables associated with a primary level digital divide (i.e. Internet access) were used in each model. These variables included students' Internet access outside of school (SACCOOUT), students' Internet access inside school (SACCIN), and students' access to a broadband connection at home (SBAND) at the student level (Level-1). Predictor variables relative to a secondary level digital divide (i.e. Internet use) were also used at the student level in the models. These predictor variables included students' use of the Internet outside school (SUSEOUT) and students' use of the Internet inside school (SUSEIN).

Additional predictor variables were used in the models at the school level (Level-2). One of these variables was a school average for teachers' online reading comprehension achievement scores (TORCS) as derived from scores on the Digital Divide Measurement Scale for Teachers (DDMS-T). The second school-level predictor variable was derived from average school scores for the reading scale score (READING) from the 2006 administration of the Connecticut Mastery Test, which is a combination of four reading comprehension subtest scores. The third school-level predictor was District Reference Group (DRG) classification. Table 4.13 provides a description of the predictor variables that were tested in these models.

Table 4.13

Variables Tested to Determine Best-fit Model for SORCS Outcome Measure

Variable	Description
Level 1	
SACCOU	Students' access to the Internet outside school (scale 0 to 6 indicated number of unique access points)
SACCIN	0=No Internet access in school; 1=Internet access in school
SBAND	0=No access to broadband Internet at home; 1=access to broadband Internet at home
SUSEIN	Composite score indicating students' frequency of use for various Internet activities inside school (scale 0 to 110)
SUSEOUT	Composite score indicating students' frequency of use for various Internet activities outside school (scale 0 to 110)
Level 2	
TORCS	Average school score for teachers' online reading comprehension achievement scores
READING	Average school score for 2006 CMT reading comprehension scores
DRG	0=Low District Reference Group; 1=High District Reference Group

Unconditional model. An intercepts-as-outcomes model was used to show differences in mean scores of the dependent variable, students' online reading comprehension achievement scores (SORCS), which could be predicted from the independent variables identified above. To gauge the magnitude of variation in students' online reading comprehension achievement scores (SORCS), a test of the unconditional model was conducted to obtain baseline data for comparison. An unconditional model is the simplest of models as there are no Level-1 or Level-2

predictors; instead the model focuses on mean-level differences. In this model, students' online reading comprehension achievement scores (SORCS) were tested to show mean differences.

Unconditional model. Level-1: $Y_{ij} \text{ (SORCS)} = \beta_{0j} + r_{ij}$

Level -2: $\beta_{pj} = \gamma_{p0} + u_{pj}$

The total variation in the students' online reading comprehension achievement scores (SORCS) was partitioned into variation within and between schools. The amount of variance that the unconditional model accounted for represents the total amount of variance possible in subsequent models. A chi-square statistic was used to determine if the null hypothesis that there were no individual differences among students' online reading comprehension achievement scores (SORCS) could be confirmed. If the chi-square statistic was significant ($< .05$), then the null hypothesis was rejected indicating that there was remaining variation to be explained.

The results of the unconditional model showed mean student level differences for students' online reading comprehension achievement scores (SORCS) and statistically significant variations among their scores. The mean for students' online reading comprehension achievement scores (SORCS) was 5.40 with a standard error of 0.26. The pooled within-school variance (or Level-1 variance, σ^2) was 3.44 percent, and the variance among the school means (τ_{00}) was 0.64 percent. The proportion of variance between schools (i.e. the intraclass correlation, $\tau_{00}/(\tau_{00} + \sigma^2) = 0.64/0.64 + 3.44$) was estimated as 15.7 percent. The null hypothesis that no residual variance remains to be explained was rejected for students' online reading comprehension achievement scores (SORCS) [$\chi^2 = 247.48$, $p < .001$]. This result indicated that additional models were necessary to determine what other variables accounted for the variability in students' online reading comprehension achievement scores.

Full Level-1 model. The first set of HLM models examined the effects of student-level predictors on the outcome of interest, students' online reading comprehension achievement scores

(SORCS). A full Level-1 model was used to determine the amount of variance in SORCS that could be accounted for by the five Level-1 predictors.

$$\text{Full Level-1 model: } Y_{ij} = \beta_{0j} + \beta_{1j}(\text{SACCOU})_{1j} + \beta_{2j}(\text{SACCIN})_{2j} + \beta_{3j}(\text{SBAND})_{3j} + \beta_{4j}(\text{SUSEO})_{4j} + \beta_{5j}(\text{SUSEIN})_{5j} + r_{ij}$$

Table 4.14 presents the significance of the Level-1 predictors on the outcome (SORCS). Two of the predictor variables associated with a primary level digital divide (i.e. Internet access) were significant predictors for students' online reading comprehension achievement scores (SORCS): (a) students' Internet access outside school ($p = .01$), and (b) students' access to the Internet inside school ($p < .01$). One element of a secondary level digital divide (i.e. Internet use) was a significant predictor for students' online reading comprehension achievement scores (SORCS), Internet use outside school ($p = .024$).

Table 4.14

Significance of Level-1 Effects on SORCS

	Coefficient	Standard error	T-ratio	P-value
INTERCEPT	4.401	0.265	16.619	0.000
SACCOU	0.121	0.047	2.579	0.010*
SACCIN	0.533	0.081	6.588	0.000*
SBAND	0.125	0.113	1.115	0.265
SUSEO	0.003	0.001	2.257	0.024*
SUSEIN	-0.008	0.004	-0.212	0.832

*Predictor variable was significant at the .05 level

The remaining variance, following the evaluation of the Level-1 variables in this model, represents the residual variance at Level-1 that remains unexplained after taking into account the Level-1 variables: (a) students' Internet access outside school (SACCOU), (b) students' Internet access inside school (SACCIN), (c) students' access to a broadband connection at home

(SBAND), (d) students' use of the Internet outside school (SUSEOUT), and (e) students' use of the Internet inside school (SUSEIN). The pooled within-school variance (or Level-1 variance, σ^2) was 3.36 percent, and the variance among the school means (τ_{00}) was 0.64 percent. The proportion of variance between schools (i.e. the intraclass correlation, $\tau_{00}/(\tau_{00}+\sigma^2) = 0.64/0.64+3.36$) was estimated as 16 percent. After including the Level-1 predictors, within school variability was reduced by 2.3 percent from the unconditional model [$\sigma^2(\text{unconditional model}) - \sigma^2(\text{full level-1 model})/\sigma^2(\text{unconditional model}) = (3.44 - 3.36)/3.44$]. Three of the Level-1 variables, SACCOU, SACCIN, and SUSEOUT, were statistically significant in the model for students' online reading comprehension achievement scores (SORCS). The null hypothesis that no residual variance remains to be explained was rejected for students' online reading comprehension achievement scores (SORCS) [$\chi^2 = 211.76, p < .01$] for the five Level-1 predictors in the model. The results of this model indicated that additional models were necessary to determine what other variables accounted for the variability in students' online reading comprehension achievement scores.

Full Level-2 model. The next set of HLM models examined the effects of school-level predictors on the outcome of interest, students' online reading comprehension achievement scores (SORCS). A full Level-2 model was used to determine the amount of variance in SORCS that could be accounted for by the three Level-2 predictors.

$$\text{Full Level-2 model: } \beta_{pj} = \gamma_{p0} + \gamma_{p1}(\text{DRG})_{1jk} + \gamma_{p2}(\text{READING})_{2j} + \gamma_{p3k}(\text{TORCS})_{3j} + u_{pj}$$

Table 4.15 presents the significance of the Level-2 predictors on the outcome (SORCS). Two of the Level-2 predictors were significant. First, average school scores on a traditional measure of reading comprehension (READING) was a significant predictor for students' online reading comprehension achievement scores ($p = .024$). Second, average school scores for teachers' online reading comprehension achievement (TORCS) was a significant predictor for students' online reading comprehension achievement scores ($p = .011$). The unexpected inverse effect of TORCS

is explained following the final set of models in this section. District Reference Group classification (DRG) was non-significant ($p = .062$).

Table 4.15

Significance of Level-2 Effects on SORCS

	Coefficient	Standard error	T-ratio	P-value
INTERCEPT	2.574	1.086	2.370	0.062
DRG	0.247	0.582	0.425	0.688
READING	0.145	0.042	3.442	0.024*
TORCS	-0.160	0.038	-4.183	0.011*

*Predictor variable was significant at the .05 level

The remaining variance, following the evaluation of the Level-2 variables in this model, represents the residual variance at Level-1 after taking into account the Level-2 variables: (a) District Reference Group classification (DRG), (b) schools' average reading subscale score (READING), and (c) schools' average score for teachers' online reading comprehension achievement scores (TORCS). The pooled within-school variance (or Level-1 variance, σ^2) was 3.44 percent, and the variance among the school means (τ_{00}) was 0.09 percent. The proportion of variance between schools (i.e. the intraclass correlation, $\tau_{00}/(\tau_{00}+\sigma^2) = .09/.09+3.44$) was estimated as 2.6 percent. After including the Level-2 predictors, within school variability (i.e. variance in the Level-1 model) was reduced by less than 1.0 percent from the unconditional model [$\sigma^2(\text{unconditional model}) - \sigma^2(\text{full level-2 model})/\sigma^2(\text{unconditional model}) = 3.44 - 3.44/3.44$]. The Level-2 variables READING and TORCS were statistically significant in the model for students' online reading comprehension achievement scores (SORCS). The null hypothesis that no residual variance remains to be explained was rejected for students' online reading comprehension achievement scores (SORCS) [$\chi^2 = 42.32, p < .001$] for the three Level-2 predictor variables in the model. The results of this model indicated that additional models were

necessary to determine what other variables accounted for the variability in students' online reading comprehension achievement scores.

Conditional model. The final set of HLM models was to determine a best-fit explanatory model, which included both Level-1 and Level-2 predictors.

Conditional model.

$$\text{Level-1: } Y_{ij} = \beta_{0j} + \beta_{1j}(\text{SACCOUT})_{1j} + \beta_{2j}(\text{SACCIN})_{2j} + \beta_{3j}(\text{SUSEOOUT})_{3j} + r_{ij}$$

$$\text{Level -2: } \beta_{pj} = \gamma_{p0} + \gamma_{p1}(\text{TORCS})_{1jk} + \gamma_{p2}(\text{READING})_{2j} + u_{pj}$$

The conditional model (i.e. best-fit model) accounts for the largest proportion of variance explained by the Level-1 and Level-2 variables. Table 4.16 presents the significance of the Level-1 and Level-2 predictors on the outcome measure, students' online reading comprehension achievement scores (SORCS). Two elements of a primary level digital divide (i.e. Internet access) were significant predictors for SORCS: (a) students' Internet access inside school ($p < .01$), and (b) students' Internet access outside school ($p = .009$). One element of a secondary level digital divide (i.e. Internet use) was a significant predictor for SORCS, students' Internet use outside school ($p = .017$). At Level-2, a traditional measure of reading comprehension achievement was shown to be a significant predictor for SORCS ($p < .01$). Finally, teachers' online reading comprehension achievement scores (TORCS) was also a significant predictor for SORCS ($p = .012$).

Table 4.16

Significance of Level-1 & Level-2 Effects on SORCS

	Coefficient	Standard error	T-ratio	P-value
INTERCEPT	1.945	0.485	4.011	0.009
SACCIN	0.508	0.092	5.537	0.000*
SACCOUT	0.127	0.049	2.612	0.009*
SUSEOUT	0.002	0.001	2.393	0.017*
READING	0.165	0.008	19.485	0.000*
TORCS	-0.133	0.036	-3.743	0.012*

*Predictor variable was significant at the .05 level

The remaining variance, following the evaluation of the Level-1 and Level-2 variables in this model, represents the residual variance at Level-1 that remains unexplained after taking into account both the Level-1 and Level-2 variables: (a) students' Internet access inside school (SACCIN), (b) students' Internet access outside school (SACCOUT), (c) students' Internet use outside school (SUSEOUT), (d) schools' average reading subscale score (READING), and (e) schools' average for teachers' online reading comprehension achievement scores (TORCS). The pooled within-school variance (or Level-1 variance, σ^2) was 3.37 percent, and the variance among the school means (τ_{00}) was 0.08 percent. The proportion of variance between schools (i.e. the intraclass correlation, $\tau_{00}/(\tau_{00}+\sigma^2)$, = 0.08/0.08+3.37) was estimated as 2.3 percent. After including the Level-1 and Level-2 predictors, within school variability (i.e. variance in the Level-1 model) was reduced by 2.0 percent from the unconditional model [$\sigma^2(\text{unconditional model}) - \sigma^2(\text{conditional model})/\sigma^2(\text{unconditional model}) = 3.44 - 3.37/3.44$]. That is, the variables in this model accounted for 2.0 percent of the student level variance in the outcome measure, students' online reading comprehension achievement scores (SORCS).

The Level-1 and Level-2 variables, students' Internet access inside school (SACCIN), students' Internet access outside school (SACCOUT), students' Internet use outside school (SUSEOUT), schools' average reading subscale score (READING), and schools' average for teachers' online reading comprehension achievement scores (TORCS), were all statistically significant predictors in the model for students' online reading comprehension achievement scores (SORCS). The estimated proportion of variance between schools explained by the best-fit model is 87.4 percent. That is, about 87 percent of the true between-school variance in students' online reading comprehension achievement scores (SORCS) was accounted for by the Level-1 and Level-2 predictor variables in the model.

Although these five variables were shown to be significant predictors of students' online reading comprehension achievement scores (SORCS), additional variables not tested in these models accounts for additional between school variance. After including the three Level-1 predictor variables and the two Level-2 predictor variables in the model, the null hypothesis that no residual variance remains to be explained was rejected for students' online reading comprehension achievement scores (SORCS) [$\chi^2 = 45.90$, $p < .001$]; that is, there is additional variance left to be explained by variables not tested in the models.

Summary of results. The results of the HLM analyses demonstrated that three student level (i.e. Level-1) predictor variables were shown to be significant predictors for students' online reading comprehension achievement scores (SORCS). Two elements of a primary level digital divide were significant predictors of students' online reading comprehension achievement scores (SORCS), including: (a) students' Internet access inside school (SACCIN), and (b) students' Internet access outside school (SACCOUT). Students' Internet access inside school predicted an increase of .508 on average for students' online reading comprehension achievement scores (i.e. $\beta_{1j} = .508$; $t = 5.537$; $p < .001$). Students' Internet access outside school predicted an increase of .127 on average for students' online reading comprehension achievement scores (i.e. $\beta_{2j} = .127$; $t = 2.612$; $p = .009$). One element of a secondary level digital divide was a significant predictor of

students' online reading comprehension achievement scores (SORCS), students' Internet use outside school (SUSEOUT). Students' Internet use outside school predicted an increase of .002 on average for students' online reading comprehension achievement scores (i.e. $\beta_j = .002$; $t = 2.393$; $p = .017$). Students' access to a broadband connection at home (SBAND) and students' Internet use inside school (SUSEIN) were non-significant Level-1 predictor variables.

Two school level (i.e. Level-2) predictors were shown to be significant predictors of students' online reading comprehension achievement scores (SORCS) at the .05 level, including: (a) school's average score on a measure of traditional reading comprehension (READING), and (b) school's average for teachers' online reading comprehension achievement scores (TORCS). Schools' average score for reading comprehension predicted an increase of .165 on average for students' online reading comprehension achievement scores (i.e. $\gamma_{p1} = .165$, $t = 19.485$, $p < .001$). Teachers' online reading comprehension predicted a decrease of .133 on average for students' online reading comprehension achievement scores (i.e. $\gamma_{p2} = -.133$; $t = -3.743$; $p = .012$). District Reference Group classification (DRG) was a non-significant Level-2 predictor variable.

Additional analyses. Correlation coefficients were computed in an attempt to uncover the inverse effect of teachers' online reading comprehension achievement scores (TORCS) on students' online reading comprehension achievement scores (SORCS). First, it was predicted that a positive correlation between TORCS and SORCS across schools would exist. Specifically, higher TORCS should align well with higher SORCS given an average performance by both teachers and students within schools. The result of a correlational analysis between the school averages for TORCS and the school averages for SORCS showed a moderate to somewhat strong, positive correlation coefficient of .657 as was expected. Second, it would seem that a similar pattern would exist between TORCS and SORCS by District Reference Group (DRG) classification. Specifically, higher average scores for TORCS should align well with higher average scores for SORCS in high DRG districts, and higher average scores for TORCS should align well with higher average scores for SORCS in low DRG districts, again, given an average

performance by both teachers and students within schools. However, a correlational analysis between TORCS and SORCS by DRG group revealed an interesting pattern that may help to explain the inverse effect of TORCS found in the HLM analyses. As shown in Table 4.17, a moderate correlation coefficient (.368) was found between TORCS and SORCS in the high DRG schools as expected, but a negative correlation coefficient (-.527) was found between average TORCS and SORCS for the low DRG schools.

Table 4.17

Correlations Between SORCS and TORCS by DRG

	Mean score for TORCS	Mean score for SORCS	Correlation coefficient
<i>Economically privileged districts</i>			
Suburbantown	8.42	6.23	.368
Suburbanville	8.11	6.01	
<i>Economically disadvantaged districts</i>			
Urbantown	6.76	5.06	-.527
Urbanville	7.07	4.46	

Students in Urbanville had the lowest mean score for students' online reading comprehension achievement scores (SORCS) out of all four districts (mean = 4.46, SD = 1.86; see also Table 4.5). Yet, the teachers from Urbanville had mean scores for teachers' online reading comprehension achievement (TORCS) that were similar to teachers in the two high DRG districts (mean = 7.07, SD = 2.27; see also Table 4.10). Recall that previous analyses showed a non-significant difference between Urbanville teachers compared to Suburbantown teachers ($p = .124$) and Suburbanville teachers ($p = .296$) for TORCS. While it appears that the teachers in Urbanville are somewhat skilled with online reading comprehension with similar response patterns to teachers in high DRG districts, the students in Urbanville scored the lowest overall.

The inverse effect that shows in the HLM analyses for TORCS as a significant predictor for SORCS appears to be a result of the characteristics of this one district. These characteristics will be described in the qualitative analyses section that follows and further discussed in chapter five.

Research Question Four

A multilevel analysis, or hierarchical linear model (HLM), was conducted to address the fourth research question:

(RQ4): What is the best-fit explanatory model in a two level HLM approach that accounts for the variability in teachers' online reading comprehension achievement in terms of a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill?

To address this question, two-level hierarchical linear models were used to predict teachers' online reading comprehension achievement scores relative to teacher- and school-level effects (see Appendix G). All of the models consisted of two levels with teachers (Level-1) nested within schools (Level-2). In these analyses, the Level-1 model represented associations among teacher variables relative to the outcome measure of teachers' online reading comprehension achievement scores (TORCS). The Level-2 model examined the influence of school characteristics relative to the outcome measure of teachers' online reading comprehension achievement scores (TORCS).

Predictor variables associated with a primary level digital divide (i.e. Internet access) were used in each model. These variables included teachers' Internet access outside of school (TACCOUT), teachers' Internet access inside school (TACCIN), and teachers' access to a broadband connection at home (TBAND) at the teacher level (Level-1). Predictor variables relative to a secondary level digital divide (i.e. Internet use) were also used at the teacher level in the model. These predictor variables included teachers' use of the Internet outside school (TUSEOUT) and teachers' use of the Internet inside school (TUSEIN).

One additional predictor variable was used in the model at the school level (Level-2). This variable was District Reference Group classification (DRG). Table 4.18 provides a description of the predictor variables that were tested in these models.

Table 4.18

Variables Tested to Determine Best-fit Model of TORCS Outcome Measure

Variable	Description
Level 1	
TACCOUT	Teachers' access to the Internet outside school (scale 0 to 6 indicated number of unique access points)
TACCIN	0=No Internet access in school; 1=Internet access in school
TBAND	0=No access to broadband Internet at home; 1=access to broadband Internet at home
TUSEIN	Composite score indicating teachers' frequency of use for various Internet activities inside school (scale 0 to 110)
TUSEOUT	Composite score indicating teachers' frequency of use for various Internet activities outside school (scale 0 to 110)
Level 2	
DRG	0=Low District Reference Group; 1=High District Reference Group

Unconditional model. An intercepts-as-outcomes model was used to show differences in mean scores of the dependent variable, teachers' online reading comprehension achievement scores (TORCS), which could be predicted from the independent variables identified above. To gauge the magnitude of variation in teachers' online reading comprehension achievement scores (TORCS), a test of the unconditional model was conducted to obtain baseline data for comparison. An unconditional model is the simplest of models as there are no Level-1 or Level-2 predictors; instead the model focuses on the mean-level differences. In this model, teachers'

online reading comprehension achievement scores (TORCS) were tested to show mean differences.

Unconditional model. Level-1: $Y_{ij}(\text{TORCS}) = \beta_{0j} + r_{ij}$

Level -2: $\beta_{pj} = \gamma_{p0} + u_{pj}$

The total variation in the teachers' online reading comprehension achievement scores (TORCS) was partitioned into variation within and between schools. The amount of variance that the unconditional model accounted for represents the total amount of variance possible in subsequent models. A chi-square statistic was used to determine if the null hypothesis that there were no individual differences among teachers' online reading comprehension achievement scores (TORCS) could be confirmed. If the chi-square statistic was significant ($< .05$), then the null hypothesis was rejected indicating that there was remaining variation to be explained.

The results of the unconditional model showed mean school level differences for teachers' online reading comprehension achievement scores (TORCS) and statistically significant variations among their scores. The mean score for teachers' online reading comprehension achievement score (TORCS) was 7.51 with a standard error of 0.36. The pooled within-school variance (or Level-1 variance, σ^2) was 3.97 percent, and the variance among the school means (τ_{00}) was 1.03 percent. The proportion of variance between schools (i.e. the intraclass correlation, $\tau_{00}/(\tau_{00} + \sigma^2) = 1.03/1.03 + 3.97$) was estimated as 20.6 percent. The null hypothesis that no residual variance remains to be explained was rejected for teachers' online reading comprehension achievement scores (TORCS) [$\chi^2 = 54.42, p < .001$]. This result indicated that additional models were necessary to determine what other variables accounted for the variability in teachers' online reading comprehension achievement scores.

Full Level-1 model. The first set of HLM models examined the effects of teacher-level predictors on the outcome of interest, teachers' online reading comprehension achievement scores (TORCS). A full Level-1 model was used to determine the amount of variance in teachers'

online reading comprehension achievement scores (TORCS) that could be accounted for by the five Level-1 predictors.

$$\text{Full Level-1 model: } Y_{ij} = \beta_{0j} + \beta_{1j}(\text{TACCOU})_{1j} + \beta_{2j}(\text{TACCIN})_{2j} + \beta_{3j}(\text{TBAND})_{3j} + \beta_{4j}(\text{TUSEOUT})_{4j} + \beta_{5j}(\text{TUSEIN})_{5j} + r_{ij}$$

Table 4.19 presents the significance of the Level-1 predictors on the outcome (TORCS). One element of a primary level digital divide (i.e. Internet access) was a significant predictor for teachers' online reading comprehension achievement scores (TORCS), teachers' Internet access outside school ($p = .007$). One element of a secondary level digital divide (i.e. Internet use) was a significant predictor for TORCS, teachers' Internet use outside school ($p = .002$).

Table 4.19

Significance of Level-1 Effects on TORCS

	Coefficient	Standard error	T-ratio	P-value
INTERCEPT	7.479	0.378	19.760	0.000
TACCOU	0.941	0.343	2.744	0.007*
TACCIN	0.513	0.482	1.063	0.289
TBAND	0.547	0.452	1.211	0.227
TUSEOUT	0.032	0.010	3.167	0.002*
TUSEIN	0.010	0.009	1.145	0.253

*Predictor variable was significant at the .05 level

The remaining variance, following the evaluation of the Level-1 variables in this model, represents the residual variance at Level-1 that remains unexplained after taking into account the Level-1 variables: (a) teachers' Internet access outside school (TACCOU), (b) teachers' Internet access inside school (SACCIN), (c) teachers' access to a broadband connection at home (TBAND), (d) teachers' use of the Internet outside school (TUSEOUT), and (e) teachers' use of the Internet inside school (TUSEIN). The pooled within-school variance (or Level-1 variance, σ^2)

was 3.58 percent, and the variance among the school means (τ_{00}) was 1.19 percent. The proportion of variance between schools (i.e. the intraclass correlation, $\tau_{00}/(\tau_{00}+\sigma^2) = 1.19/1.19+3.58$) was estimated as 25 percent. After including the Level-1 predictors, within school variability was reduced by 9.8 percent from the unconditional model [$\sigma^2(\text{unconditional model}) - \sigma^2(\text{full level-1 model})/\sigma^2(\text{unconditional model}) = (3.97 - 3.58)/3.97$]. Two of the Level-1 variables, TACCOUT and TUSEOUT, were statistically significant in the model for teachers' online reading comprehension achievement scores (TORCS). The null hypothesis that no residual variance remains to be explained was rejected for teachers' online reading comprehension achievement scores (TORCS) [$\chi^2 = 60.89, p < .001$] for the five Level-1 predictors in the model. The results of this model indicated that additional models were necessary to determine what other variables accounted for the variability in teachers' online reading comprehension scores.

Full Level-2 model. The next set of HLM models examined the effects of school-level predictors on the outcome of interest, teachers' online reading comprehension achievement scores (TORCS). A full Level-2 model was used to determine the amount of variance in TORCS that could be accounted for by the Level-2 predictor, District Reference Group classification (DRG).

$$\text{Full Level-2 model: } \beta_{pj} = \gamma_{p0} + \gamma_{p1}(\text{DRG})_{ijk} + u_{pj}$$

Table 4.20 presents the significance of the Level-2 predictor on the outcome (TORCS). District Reference Group classification (DRG) was a significant predictor for teachers' online reading comprehension achievement scores ($p < .01$).

Table 4.20

Significance of Level-2 Effects on TORCS

	Coefficient	Standard Error	T-ratio	P-value
INTERCEPT	6.804	0.089	76.27	0.000
DRG	1.505	0.150	10.063	0.000*

*Predictor variable was significant at the .05 level

The remaining variance, following the evaluation of the Level-2 variable in this model, represents the residual variance at Level-1 that remains unexplained after taking into account the Level-2 variable, District Reference Group classification (DRG). The pooled within-school variance (or Level-1 variance, σ^2) was 4.0 percent, and the variance among the school means (τ_{00}) was 0.001 percent. The proportion of variance between schools (i.e. the intraclass correlation, $\tau_{00}/(\tau_{00}+\sigma^2) = .001/(.001+4.00)$) was estimated as .025 percent. The Level-2 variable DRG was statistically significant ($< .05$) in the model for teachers' online reading comprehension achievement scores (TORCS). There was no residual variance left to be explained for teachers' online reading comprehension achievement scores (TORCS) [$\chi^2 = 13.64$, $p = 0.057$] for the Level-2 predictor variable DRG in the model.

Conditional model. The final set of HLM models was to determine a best-fit explanatory model, which included both Level-1 and Level-2 predictors.

Conditional model.

$$\text{Level-1: } Y_{ij} = \beta_{0j} + \beta_{1j}(\text{TACCOUT})_{1j} + \beta_{2j}(\text{TUSEOUT})_{2j} + r_{ij}$$

$$\text{Level -2: } \beta_{pj} = \gamma_{p0} + \gamma_{p1}(\text{DRG})_{1jk} + u_{pj}$$

The conditional model (i.e. best-fit model) accounts for the largest proportion of variance explained by the Level-1 and Level-2 variables. Table 4.21 presents the significance of the Level-1 and Level-2 predictors on the outcome measure, teachers' online reading comprehension achievement scores (TORCS). One element of a primary level digital divide (i.e. Internet access) was a significant predictor for TORCS, teachers' Internet access outside school ($p = .047$). One element of a secondary level digital divide (i.e. Internet use) was shown to be a significant predictor for TORCS, teachers' Internet use outside school ($p < .01$). The Level-2 predictor variable, District Reference Group classification, was also shown to be a significant predictor for TORCS ($p < .01$).

Table 4.21

Significance of Level-1 & Level-2 Effects on TORCS

	Coefficient	Standard error	T-ratio	P-value
INTERCEPT	6.804	0.089	76.105	0.000
TACCOUT	0.946	0.403	2.350	0.047*
TUSEOUT	0.039	0.006	6.065	0.000*
DRG	1.505	0.149	10.083	0.000*

*Predictor variable is significant at the .05 level

The remaining variance, following the evaluation of the Level-1 and Level-2 variables in this model, represents the residual variance at Level-1 that remains unexplained after taking into account both the Level-1 and Level-2 variables: (a) teachers' Internet access outside school (TACCOUT), (b) teacher's Internet use outside school (TUSEOUT), and (c) District Reference Group classification (DRG). The pooled within-school variance (or Level-1 variance, σ^2) was 3.63 percent, and the variance among the school means (τ_{00}) was .001 percent. The proportion of variance between schools (i.e. the intraclass correlation, $\tau_{00}/(\tau_{00}+\sigma^2) = .001/.001+3.63$) was estimated as .028 percent. After including the Level-1 and Level-2 predictors, within school variability (i.e. variance in the Level-1 model) was reduced by 8.6 percent from the unconditional model [$\sigma^2(\text{unconditional model}) - \sigma^2(\text{conditional model})/\sigma^2(\text{unconditional model}) = 3.97 - 3.63/3.97$]. That is, the variables in this model accounted for 8.6 percent of the teacher level variance in the outcome measure, teachers' online reading comprehension achievement scores (TORCS).

The Level-1 and Level-2 variables TACCOUT, TUSEOUT, and DRG were all statistically significant predictors in the model for teachers' online reading comprehension achievement scores (TORCS). The estimated proportion of variance between schools explained by the best-fit model is 38.1 percent. That is, about 38 percent of the true between-school

variance in teachers' online reading comprehension achievement scores (TORCS) was accounted for by the Level-1 and Level-2 predictor variables in the model.

Summary of results. The results of the HLM analyses demonstrated that two teacher level (i.e. Level-1) predictors were shown to be significant predictors of teachers' online reading comprehension achievement scores (TORCS). One element of a primary level digital divide was a significant predictor of teachers' online reading comprehension achievement scores (TORCS) at the .05 level, teachers' Internet access outside school (TACCOUT). Teachers' Internet access outside school predicted an increase of .946 on average for teachers' online reading comprehension achievement scores (i.e. $\beta_{1j} = .946$; $t = 2.350$; $p = .047$). One element of a secondary level digital divide was a significant predictor of teachers' online reading comprehension achievement scores (TORCS) at the .05 level, teachers' Internet use outside school (TUSEOUT). Teachers' Internet use outside school predicted an increase of .039 on average for teachers' online reading comprehension achievement scores (i.e. $\beta_{2j} = .039$; $t = 6.065$; $p < .001$).

One school level (i.e. Level-2) predictor was shown to be a significant predictor of teachers' online reading comprehension achievement scores (TORCS) at the .05 level, District Reference Group classification (DRG). District Reference Group classification predicted an increase of 1.505 on average for teachers' online reading comprehension achievement scores (i.e. $\gamma_{p1} = 1.505$; $t = 10.083$; $p < .001$). All of the between teacher variance was accounted for in these models. The null hypothesis that no residual variance remains to be explained was confirmed for teachers' online reading comprehension achievement scores (TORCS) [$\chi^2 = 1.16$, $p > .50$]; that is, there was no variance left to be explained in the model.

Summary of HLM Analyses

The first set of models included variables of interest in this study to address the impact of elements associated with the digital divide on students' online reading comprehension

achievement. The first set of models was unconditional. These models showed students' online reading comprehension achievement scores differed between students. The models also provided an estimate of the maximum between student variations that could be accounted for in students' online reading comprehension achievement scores, which was used in subsequent variation calculations for the other models. The second set of models included student level predictor variables. These models showed that three variables were significant predictors of students' online reading comprehension achievement. The third set of models included school level predictor variables. These models showed that two variables were significant predictors of students' online reading comprehension achievement. The final set of models tested the best-fit model, which accounted for the largest proportion of variance in students' online reading comprehension achievement that could be explained by the Level-1 and Level-2 predictors.

Three Level-1 predictor variables were significant in predicting students' online reading comprehension achievement, including: (a) students' Internet access inside school, (b) students' Internet access outside school, and (c) students Internet use outside school. Two Level-2 predictor variables were significant in predicting students' online reading comprehension achievement, including: (a) schools' average reading scale score as measured by the Connecticut Mastery Test, and (b) schools' average for teachers' online reading comprehension achievement scores as measured by the DDMS-T. These models showed that about 87 percent of the true between-school variance in students' online reading comprehension achievement scores were accounted for by the Level-1 and Level-2 predictor variables in the model. It appears that issues related to both a primary level digital divide (i.e. Internet access) and secondary level digital divide (i.e. Internet use) may indeed converge creating a tertiary level digital divide that is defined by differences in online reading comprehension achievement between students from economically privileged school districts and those from economically advantaged school districts.

The second set of models included variables of interest in this study to address the impact of elements associated with the digital divide on teachers' online reading comprehension

achievement. The first set of models was unconditional. These models showed teachers' online reading comprehension achievement scores differed between teachers. The models also provided an estimate of the maximum between teacher variations that could be accounted for in teachers' online reading comprehension achievement scores, which was used in subsequent variation calculations for the other models. The second set of models included teacher level predictor variables. These models showed that two variables were significant predictors of teachers' online reading comprehension achievement. The third set of models included school level predictor variables. These models showed that one variable was a significant predictor of teachers' online reading comprehension achievement. The final set of models tested the best-fit model, which accounted for the largest proportion of variance in teachers' online reading comprehension achievement that could be explained by the Level-1 and Level-2 predictors.

Two Level-1 predictor variables were significant in predicting teachers' online reading comprehension achievement, including: (a) teachers' Internet access outside school, and (b) teachers' Internet use outside school. One Level-2 predictor variable was significant in predicting teachers' online reading comprehension achievement, District Reference Group classification. These models showed that about 38 percent of the true between-school variance in teachers' online reading comprehension achievement scores were accounted for by the Level-1 and Level-2 predictor variables in the model. It appears that issues related to both a primary level digital divide (i.e. Internet access) and secondary level digital divide (i.e. Internet use) may indeed converge creating a tertiary level digital divide that is defined by differences in online reading comprehension achievement between teachers from economically privileged school districts and those from economically advantaged school districts.

Summary of Quantitative Analyses

The results of the quantitative analyses conducted in this phase of the research indicated that a tertiary level digital divide (i.e. differences in online reading comprehension achievement) exists between students from economically privileged school districts and those from

economically disadvantaged school districts. Results also indicated that a tertiary level digital divide exists between teachers from economically privileged school districts and those from economically disadvantaged school districts. Some elements of a primary level digital divide (i.e. Internet access) were shown to be significant predictors of the tertiary level digital divide for both students and teachers. In addition, the results also indicated that some elements of a secondary level digital divide (i.e. Internet use) were significant predictors of the tertiary level digital divide for both students and teachers. Internet access outside school and Internet use outside school were both significant predictors of students' and teachers' online reading comprehension achievement. Internet access inside school was significant for students' online reading comprehension achievement but not teachers' online reading comprehension achievement. Access to a broadband Internet connection and Internet use inside school were non-significant predictors for both students' and teachers' online reading comprehension achievement.

District Reference Group classification (DRG) was expected to be a significant predictor for both students' and teachers' online reading comprehension achievement. However, while District Reference Group classification was shown to be a significant predictor for teachers' online reading comprehension achievement scores ($p < .01$), it was non-significant for students' online reading comprehension achievement scores ($p = .688$). For students, schools' average reading scale score from the Connecticut Mastery Test was shown to have a significant effect on students' online reading comprehension achievement. There was no residual variance to be explained for teachers' online reading comprehension achievement scores, but there was residual variance left for students' online reading comprehension achievement scores from variables not tested in the HLM models.

There was an unusual inverse effect from teachers' online reading comprehension achievement scores on students' online reading comprehension achievement, which may be explained by the contextual variables within one of the districts, Urbanville. Students in Urbanville showed significantly lower scores on SORCS compared to both high DRG districts.

However, teachers in Urbanville showed non-significant differences on TORCS compared to teachers in both high DRG districts, indicating that they have similar Internet reading skills. Additional contextual variables for Urbanville will be explored and further discussed in chapter five to help explain this unusual pattern.

Phase Four: Qualitative Methods

Research Question Five

The qualitative data analyses focused on exploring school contextual factors to investigate the final research question:

RQ5: How does school context appear to contribute to the pattern of factors that effect online reading comprehension achievement among middle school students and teachers?

The purpose of the analyses in this phase of the research was to use qualitative methods to further explore the three levels of a more complex definition of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill. Four separate data sets were used during the qualitative analyses, including interview transcripts, focus group transcripts, textual artifacts, and field notes from classroom observations. The results of these analyses are organized by data type with evidence presented at each of the three levels of the digital divide with comparisons between economically privileged and economically disadvantaged school districts. Additional themes that emerged from the data are also presented. These themes included references to literacy and technology integration, student assessment, professional development, and public policy.

Administrator and Teacher Interview Data

A content analysis of the interview transcripts from administrators and teachers was conducted to provide a richer context for the factors identified in the HLM as having an effect on students' and teachers' online reading comprehension scores. A combination of preset categories and emergent categories was used during this analysis (Taylor-Powell & Renner, 2003). The

purpose of this multilevel approach to the qualitative analyses was to ensure that elements of a complex definition of the digital divide as indicated by the HLM analyses would be explored, but, also, additional themes that appeared through an inductive analysis process would be documented. The preset list of themes that guided the analyses included elements of the three levels of the digital divide, including: (a) Internet access at the primary level, (b) Internet use at the secondary level, and (c) Internet reading skill at the tertiary level. In addition, through an iterative process, additional categories or themes that emerged from the transcripts were also documented. These themes included: (a) literacy and technology integration, (b) student assessments, (c) professional development opportunities, and (d) No Child Left Behind legislation.

The results from the interviews revealed that certain contextual factors appeared to contribute to the differences between economically privileged (i.e. high DRG) districts and economically disadvantaged (i.e. low DRG) districts across all three levels of the digital divide. First, aspects of a primary level digital divide were apparent in that teachers and administrators in high DRG districts reported greater access to technology and the Internet within their schools compared to those from low DRG districts. Second, aspects of a secondary level digital divide were evident by the types of activities that were a customary part of the school day in high DRG versus low DRG districts. Third, aspects of a tertiary level digital divide were described in relation to specific skills in relation to online reading comprehension that are specifically taught in high DRG districts but seemingly overlooked in low DRG districts. Finally, professional development opportunities and pressures from No Child Left Behind legislation were shown to be relative to the differences that were discovered across districts.

Primary level digital divide: Internet access. The results of the content analyses of interview transcripts indicated that students and teachers from economically privileged (i.e. high DRG) districts have greater accessibility to technology, and the Internet, on a regular basis inside

school compared to those from economically disadvantaged (i.e. low DRG) districts. The following two excerpts show this contrast between districts:

[High DRG] Every classroom has Internet access. We have a seventh and eighth grade building where there are certain teams there that are exploratory. They have a 36-day exploratory in the computer room. The students regularly go to one of our two computer labs in their Science and Social Studies or Language Arts class; and those are also Internet accessible. I have observed many classes in those labs that are not only using the computer but they are using the Internet for research to complete their projects. (School D, Mr. Gordon¹, Transcript 7)

[Low DRG] I think we would like to see at least a computer for each one of our teachers, because we don't even have that yet. Our, our...server is sometimes slow and, um, the...I think that there's such, not really with our server as much as...but the computers that the teachers use are so slow. I mean...they're hand me downs. (School F, Ms. Irene, Transcript 30)

In high DRG districts, computers with Internet access are located in every classroom. In contrast, individuals from low DRG districts reported that not all classrooms have a computer. There's also an indication about the slowness of the computers by participants from low DRG districts. The technology descriptions provided in chapter three illustrated this difference. Schools from low DRG districts reported fewer moderate to high-powered computers than school in high DRG districts (CSDE, 2006b). None of the administrators or teachers from high DRG districts made similar comments about the age or speed of the technology available in their school buildings.

In economically disadvantaged (i.e. low DRG) districts, even when teachers make an effort to gain access to technology that is available in the school building, it can be difficult for them to obtain. As Ms. Leslie illustrates in regard to signing up to use the open computer labs in her school:

[Low DRG] We sign up...basically, if you want to sign up for them, they're available about a week in advance; you could sign up. If you wait after a week, then someone else will have them. So, it's first come first serve, you know? So, it is available, but there are people who take it more than others, and it's not always...it's not always fairly used. (School E, Ms. Leslie, Transcript 12)

¹ In order to maintain anonymity of the participants, pseudonyms were generated from the 2005-2006 list of named hurricanes from the National Hurricane Center. Any similarities to names of the actual participants are strictly coincidental.

Access to technology appears to be less of a problem for teachers in economically privileged (high DRG) districts where technology is readily available within each teacher's classroom. For example:

[High DRG] In the classrooms, teachers do have access, too, based on the design of the classrooms that we have. Everyone has the widescreen TV and it interconnects with the one or two classroom computers there in each room. The teacher can work with the kids from the computer and frequently will draw upon the Internet either for research-based things, or we also are, um, we have a subscription to streaming video that we access through the Internet. Teachers will frequently access video snippets to use to support instruction in the classroom. (School D, Mr. Rafael, Transcript 17)

The above transcript excerpts also highlight an important difference in the availability of technology to teachers in high DRG versus low DRG districts. This difference may have the greatest impact on "teachable moments" during classroom instruction (Bentley, 1995; Hansen, 1998). Teachers in high DRG districts can easily share something with their students in a moments notice with technology and the Internet readily available in their classroom at all times. Teachers in low DRG districts may be required to wait a week or more before gaining that same access, thus reducing their opportunity to take advantage of teachable moments in their classroom.

The issue of student access to the Internet outside school was not directly addressed by most of the interview participants. One administrator from an economically privileged district (Suburbantown) did state, "ninety-five percent, if not higher now, of our families have Internet access at home" [School B, Mr. Alberto, Transcript 1]. According to the results of the measurement scale, this statement is confirmed since 97.9 percent of the students from economically privileged districts (Suburbantown and Suburbanville) reported Internet access at home compared to 83.4 percent of those from economically disadvantaged districts (Urbantown and Urbanville).

When asked about the biggest challenges in regard to technology integration, an overwhelming majority of participants indicated that the lack of technology or access to technology was the biggest barrier, regardless of the socioeconomic level of the district.

[High DRG] Oh, without a doubt, the lack of hardware. The computer labs are scheduled electronically, that's another thing. It's done through an email request and then either [*computer teachers' name removed*] or I can schedule the labs. Without fail, they are scheduled several weeks in advance. If we had more labs we would do much more. (School B, Ms. Helene, Transcript 8)

[Low DRG] I definitely think the technology in this building; just what the teachers have to work with. The computers are very old and very slow. The computer lab, I mean, three labs with 75 computers for 1100 kids. I think that the teachers are very willing to learn but I think that they get frustrated with what's available and...they're just trying to sign up for things and get things done and not have it be a complete hassle using the technology and the Internet. (School F, Ms. Irene, Transcript 30)

In School B, as depicted in the first of these two excerpt examples, the student to computer ratio is approximately 9 to 1 in relation to the computers that are available in open computer labs. In School F, represented in the second excerpt, this ratio is 14 to 1. The student to computer ratios for these two schools indicates a difference between high and low DRG districts in regard to access of open computer labs for teachers to utilize for instruction. School B also has an Internet connected computer in every classroom that is interconnected to a 36-inch monitor as well as a cart of laptops available to teachers. Even so, access to technology was still reported as an inhibition to technology integration in this school from a high DRG district.

Secondary level digital divide: Internet use. Participants from both economically privileged (i.e. high DRG) and economically disadvantaged (i.e. low DRG) districts discussed the different activities they use the Internet for inside school. Participants were asked to talk about their own use of the Internet as well as how other teachers in their school buildings were using the Internet. Teachers from both high and low DRG districts talked about using the Internet with students to conduct research. They also talked about products that students created using computers as illustrated in the following transcript excerpts:

[High DRG] A lot of teachers are using it for research. For instance, in our seventh grade social studies curriculum, they're used to find information on different countries of the world. Um, and then, they use that information to create brochures, travel brochures, solving an information problem about the country. Go to an African country and try to find out what their biggest problem is and try to solve it, that kind of thing. That's happening a lot. Um...they've been known to look up, in Language Arts, they've been known to look up information about various authors. Um, you know we try to encourage the use of the Internet but we also try to encourage the use of the, all of our information materials, books, magazines, and the Internet. (School D, Ms. Sandy, Transcript 18)

[Low DRG] Um, I have the students, um, we're actually coming up to this project. I have the students in Language Arts create a power point and they have to become an author that they enjoy. So, they use the Internet for research. I have a few sites that I bookmark and I set it up through, um...I forgot what the website is called actually, but you set it up where the teacher can come up with the site, and they can go and they can click on the websites. It's all set up for them already. I forget the name of it but I have it already. So the kids have it set up where they can go on and just click on the site I have already set up for them, so they can do Internet research. I don't usually have them do Yahoo or Google searches on their own because sometimes the school, sometimes the block is not up, sometimes there's a problem, so I always usually, if I tell them to use the Internet, I actually direct them to the sites I want them to go to. (School E, Ms. Leslie, Transcript 12)

As can be seen from these two examples, teachers are using the Internet for similar purposes and activities. However, teachers in low DRG districts tended to be cautionary about allowing students full access to the open Internet to find information for their research projects. This cautionary approach to using the Internet as described by Ms. Leslie seemed to be a direct result of past experiences with the school's filtering tools not functioning properly as illustrated in the transcript excerpt above.

Participants were also asked to describe what particular administrative activities (e.g. recording grades, taking attendance, etc.) were completed with computers or the use of the school's network. Participants from low DRG districts indicated that these types of administrative tasks are still completed by hand in their districts, whereas the school's network and the Internet appear to be extensively used in high DRG districts for the same tasks. This pattern that emerged from the analyses of the interview transcripts is illustrated below. The first set of excerpts includes teachers from low DRG districts as they discussed how all their administrative tasks

were still completed by hand despite past indications that the district would switch over to an electronic system.

[Low DRG] Nothing. That's what, you know [*principal's name removed*] got all excited from a conference that he attended. "Oh, next year, we're going to have you know the attendance, and we're gonna have, you know the grade books, blah, blah, blah", but I've heard that before since I've been here. I can say as of this date, nothing. Everything's done by hand. Even the attendance, so the secretaries literally have to type in by hand every kid. What a pain in the neck that is. (School F, Ms. Cindy, Transcript 24)

[Low DRG] We do not have grading. The funny thing is, five years ago, the district bought us a grading program for us to soon be using. We were going to have it implemented starting with the high school, the middle school, and then get to elementary schools. It only made it to the high school, so we don't do any type of grading on the computers. Teachers are dying to do it and the system, the district, is currently looking into a student information system that will include a grading module. But we do not do anything on the computers as far as grading. Some teachers might choose to write out progress reviews using basically word processing or something like that, but that's not something everyone has to do. I wish it was but it isn't. (School E, Mr. Oscar, Transcript 15).

The next set of excerpts includes teachers from high DRG districts as they discussed how the majority of their administrative tasks were completed on the computers, including attendance, grades, and the distribution of daily bulletins and other such documents.

[High DRG] Both our attendance and grading. We are not required to have a webpage; we are encouraged to. We are required to do email. And really at first people weren't really reluctant. I don't think anyone blinked an eye...that I know of. We get the daily bulletin through email; we get the attendance sheets; we get all kinds of things through email, and, of course, parental notifications. [pause] Also the school sends out the parents' newsletter electronically now. Before we were printing, we were running them off and putting them in the mail. And blanket emails to parents at times, for a variety of things. (School C, Ms. Ophelia, Transcript 35).

[High DRG] We have Power School and Power Grade. Power grade is for actual record book, Power School is for the attendance. Power School its pretty good. It allows the teacher to check on a student for any period; it gives the teachers the students home address, the home phone number, and the phone for the family. What else? Of course we use it to check our email. I mean you are at a school where I walked in this morning – I left last night at possibly 4:20 pm and I checked it last night at about 10 pm – and when I walked in this morning I had 18 emails on my school email. Now this is not my private one, so we use it a lot to communicate. I'm not going to say that handouts were cut out, but as far as how they use handouts and things, I don't think we get a lot of handouts anymore from the front office. It's all email. Hmmm...what else do we use it for? Oh geez...the superintendent sends us everything, hmm what is it called? It's called

[document title removed]. It's our monthly flyer from the superintendent that would go over changes from the school system and grants that we are given and awards that were won. He used to send that all out on hardcopy. That's all on email now. I'm trying to think – what else – we use it for grading, taking attendance, emails, and of course for tons of research – I mean I'm online constantly...(School C, Mr. Tony, Transcript 19)

For teachers and administrators in high DRG districts, the use of computers and the Internet appears to be an integral part of daily routines. This is a stark contrast to what was reported by teachers in low DRG districts where paper-based systems for administrative tasks are still utilized.

Tertiary level digital divide: Internet reading skill. Participants from both economically privileged (i.e. high DRG) and economically disadvantaged (i.e. low DRG) districts reported that students do not have adequate skills and strategies for reading on the Internet. Most of the participants agreed that students are well versed in using the Internet for recreational or communication-based activities, such as email, MySpace, and gaming. But, reading to locate information and reading to critically evaluate information were two areas that were identified as areas in which students lack the necessary skills.

First, when talking about students' abilities to locate information on the Internet, it was noted that they rely on Google and often do not have alternative methods of searching if a search is ineffective.

[High DRG] I don't think they're as good as far as trying to get...if we want them to do research. I think they have difficulty. I mean if it wasn't for Google...but on the other aspect, they wouldn't know, um, if you typed in one word and you didn't get what you wanted, they wouldn't know where else to go. They're not imaginative enough to say, oh, I could try this. (School C, Mr. Isaac, Transcript 9)

In this example, Mr. Isaac indicated that students' lack skills for locating information on the Internet. He also indicated that students over rely on Google to find information. Teachers also referred to students' skills for locating information in relation to efficiency. An 8th grade reading/language arts teacher explained, "I think they're inefficient. I don't know that they

always search for things in the fastest, most efficient manner” [School E, Ms. Patty, Transcript 16].

When talking about students’ abilities to critically evaluate information on the Internet, 43 out of the 45 interview participants identified this Internet reading skill as an online reading strategy that students do not possess. They also indicated that this skill was important for their students to develop.

[High DRG] I think some students are quick to accept anything that they see on the Internet, accept it as truth. And, I don’t know that they’re always conscientious about checking the source to see where it comes from and whether or not it’s going to be accurate. (School D, Ms. Gert, Transcript 28)

[Low DRG] I think that the challenge that any middle school teacher has is when reading information, being able to filter it, find main ideas. Often times when they [students] go online to gather information on a single topic in which they need to maybe write two or three paragraphs or, you know, a five page essay, they accumulate hundreds of pages from the Internet. They don’t know how to, um, prioritize what is a good site, what is good information, what site is at their level as far as reading level. (School F, Ms. Irene, Transcript 30)

Here, both of these teachers discussed issues of critically evaluating information for accuracy as well as the information source. Ms. Irene, from the low DRG district, indicated that students struggle with evaluating information for relevancy as she described students who accumulate hundreds of pages from the Internet. Ms. Irene also mentioned an issue of reading level in relation to website evaluation, which was not an element of critical evaluation measured in this study. This factor shows an additional element of critical evaluation in that students can end up on web pages that contain reading material much higher than their own reading ability. Students should be aware of these occurrences so that they can adjust their information resources to better suit their own reading level.

A distinct difference was shown between economically privileged (i.e. high DRG) and economically disadvantaged (i.e. low DRG) districts in regard to the specific skills and strategies that are directly taught to students. For example, many participants from high DRG districts

indicated that very specific skills and strategies were taught for reading on the Internet as illustrated below:

[High DRG] We make a concerted effort actually, to teach evaluating - Can you find out when? Can you find out who? Can you find out details? The different criterions – you know – When was it updated? We do that purposefully. (School B, Ms. Helene, Transcript 8)

In this example, Ms. Helene indicated that critical evaluation of an information source is intentionally taught to students. In contrast, interviewees from low DRG districts did not indicate that specific skills and strategies were taught as can be seen in the following excerpt:

[Low DRG] Not that I'm aware of. I mean, I know that we have a teacher's assistant up in the computer lab and she does, you know, before any project, goes over with the students what they're looking for and such. But, I don't think there are many, like, I don't think a whole class is really taught on it regularly throughout the building. (School F, Ms. Harvey, Transcript 29)

As these two excerpts illustrated, it seems that teachers in high DRG districts place a greater emphasis on teaching the online reading comprehension skills and strategies that are required when reading on the Internet than those from low DRG districts.

Professional development. When asked about professional development opportunities, responses were similar regardless of District Reference Group classification. For the most part, over the past several years, professional development sessions have focused on learning new software products. In high DRG districts, these products were most often related to administrative tasks, such as attendance and grading programs. In low DRG districts, workshops to teach Microsoft PowerPoint and other Microsoft Office products were most often offered; workshops on PowerPoint were also popular in high DRG districts. Although, professional development specific to Internet or technology integration in high DRG districts had been offered in the past, none of these types of workshops have been available for at least two years. None of the teachers in low DRG districts could recall any professional development offerings in the past that focused on Internet or technology integration in the curriculum.

Public policy: The No Child Left Behind Act. There was a contrast between economically privileged and economically disadvantaged districts when participants responded to a question about the impact of No Child Left Behind on technology integration. The following two excerpts illustrate how participants from economically privileged (i.e. high DRG) districts responded to this question:

[High DRG] I don't know of any [impact]. Unless No child Left Behind is really forcing us to do more rote things of which we are not doing here. But if we were to do that, it would make you focus on the basics. I suppose that could be a risk. That wouldn't happen here. (School B, Mr. Gordon, Transcript 7)

[High DRG] I think that you're asking, because of No Child Left Behind would I be less likely to go on the computer because it might not support what I need to do where No Child Left Behind is concerned? I would not feel that way, no. (School D, Ms. Nadine, Transcript 14)

In contrast, participants from economically disadvantaged (i.e. low DRG) districts had a very different opinion. In these schools, the pressure of increasing test scores has made technology less of a priority, which may have a long-term impact for students in these districts.

[Low DRG] As far as No Child Left Behind, um, I think that what, what's taking place in the public schools, especially in urban districts with technology is, students are being left behind, because the, the surrounding areas have a lot more, they have a lot more to offer the kids and the kids are more better prepared for a higher education than our kids are. (School F, Ms. Irene, Transcript 30)

[Low DRG] I definitely think that trying to make the, the individual connections with students to get them up to par are. We do what we have to do to get them to meet the No Child Left Behind requirements. (School E, Ms. Leslie, Transcript 12)

These excerpts from the interview transcripts illustrate the differences between high and low DRG districts when it comes to issues of No Child Left Behind. This legislation seems to have a greater impact on low DRG districts compared to high DRG districts when it comes to the integration of technology and the Internet. Teachers in high DRG districts reported little or no impact from this legislation. Conversely, those in low DRG districts alluded to the pressures of meeting No Child Left Behind mandates as having an impact in two ways. In the first example, Ms. Irene addressed the impact of No Child Left Behind on the ability of urban districts to have

equal access to computers to prepare their students thus indicating that No Child Left Behind is a financial hardship. In the second example, Ms. Leslie reported that the No Child Left Behind requirements to get student to the level they need to be on is having an impact on technology integration.

Another topic that emerged from the interviews that appeared to be related to No Child Left Behind was student assessment. In low DRG districts, computers were often used for computer-based assessments. Several participants indicated that programs, such as Accelerated Reader, assisted them with making data driven and research-based decisions based on students' performance with this type of program. Participants from economically privileged (i.e. high DRG) districts did not address student assessments at all. Although this topic could arguably indicate a secondary level digital divide in relation to Internet use, because of the recent emphasis on data-based decision making as part of the accountability system in our public schools as a result of No Child Left Behind (DOE, 2002), it was identified as a separate theme.

Summary of interview data analyses. The interview data exposed five contextual variables that appear to play a role in a tertiary level digital divide between economically privileged (i.e. high DRG) districts and economically disadvantaged (i.e. low DRG) districts. First, schools in high DRG districts showed increased availability of technology and the Internet specifically compared to schools in low DRG districts. Second, schools in high DRG districts showed more expansive uses of technology and the Internet compared to low DRG districts, including daily administrative tasks and various communications through email. Third, skills and strategies associated with the development of online reading comprehension achievement among students was much more prevalent in high DRG districts than in low DRG districts, where it seemed to be non-existent. Fourth, while No Child Left Behind legislation does not seem to effect technology integration in high DRG districts, it may cause low DRG districts to use technology primarily for the assessment of basic reading and math skill development, not the higher level, critical reading skills for online reading. Finally, there appears to be a different emphasis for

professional development opportunities between high and low DRG districts as well. High DRG districts reportedly offered professional development focused on Internet integration in the past; however, this was not the case for low DRG districts.

Student Focus Group Data

A content analysis of the focus group transcripts was conducted to identify the contextual factors that might impact students' and teachers' online reading comprehension. A combination of deductive and inductive analyses (Mayring, 2000) was used with this aspect of the data. The purpose of this multilevel approach to the content analyses was to ensure that elements of a complex definition of the digital divide as indicated by the results of the HLM would be explored, but also, additional themes that appeared through an inductive analysis process would be documented. The results of the focus group data analyses are presented in relation to the three levels of the digital divide with comparisons between economically privileged and economically disadvantaged districts. In addition, comparisons between high tech-savvy and low tech-savvy students are provided.

The results from the focus groups revealed that certain contextual factors appeared to contribute to the differences between economically privileged (i.e. high DRG) districts and economically disadvantaged (i.e. low DRG) districts across all three levels of the digital divide. First, aspects of a primary level digital divide were apparent in that students in high DRG districts reported greater access to technology and the Internet both inside and outside school compared to students from low DRG districts. Second, aspects of a secondary level digital divide were evident by the differential use patterns that were documented. Students in high DRG districts reported increased use of the Internet both inside and outside school as well as an increased number of Internet activities that they engaged in on a regular basis compared to students in low DRG districts. In addition, rules for use of the Internet imposed by parents, issues of Internet safety, and cyberbullying were also indicators of contextual factors contributing to a secondary level digital divide. Finally, aspects of a tertiary level digital divide were described in relation to

students' knowledge about skills related to online reading comprehension. Students in high DRG districts described specific lessons and strategies that were taught for reading to locate information and reading to critically evaluate information on the Internet, which were not reported by students in low DRG districts.

Primary level digital divide: Internet access. During the focus group discussions, students were prompted to talk about their access to the Internet both inside and outside school. Through this discussion, various themes related to Internet access emerged. These themes documented Internet access points, Internet availability, and Internet connection speeds. Table 4.22 illustrates the themes that emerged from discussions in economically privileged school districts. The results indicated that all students, both low tech-savvy and high tech-savvy groups, in economically privileged school districts have ready access to the Internet inside and outside school. Both groups also reported the use of laptops and wireless Internet access at home.

Table 4.22

Themes Related to Internet Access in Economically Privileged Districts

Focus groups	Inside school	Outside school
Low tech-savvy group	-Internet speed -Number of computers	-Computer sharing -Internet speed -Laptops -Number of computers -Rules -Wireless access
High tech-savvy group	-Projection device in classroom -Computer club (after school) -COWs: Computers on Wheels -Number of computers	-Laptops -Number of computers -Wireless access

As illustrated in Table 4.23, the low-tech savvy group reported additional elements of Internet access outside school that related to issues of Internet availability. These students reported that their parents set certain parameters regarding the frequency of their Internet use and amount of time they are able to spend on the computer. In addition, the low-tech savvy group reported computer sharing in their households with parents and siblings. Thus, their Internet access was somewhat limited by these factors. Finally, the low-tech savvy group discussed elements of Internet connection speed. All of these students reported broadband Internet access at home. The discussion focused on how slow the Internet connection was at school in comparison.

The high-tech savvy group reported additional elements of Internet access inside school that included teachers' use of a projection device in the classroom as well as a portable laptop cart. In addition, participation in an after school computer club was also discussed by several participants in the high tech-savvy group. These variables showed an increased level of Internet access inside school by the high tech-savvy group.

Table 4.23 illustrates the themes that emerged from the focus group discussions in economically disadvantaged school districts. Both groups of students, low tech-savvy and high tech-savvy groups, reported Internet access inside school. They also noted teachers' use of SMART BoardsTM in their classrooms to show subject-specific websites.

Table 4.23

Themes Related to Internet Access in Economically Disadvantaged Districts

Focus groups	Inside school	Outside school
Low tech-savvy group	-Portable SMART Board™	-Computer sharing -Family -Friends -Laptops (parent) -Library -No Internet access at home
High tech-savvy group	-Portable SMART Board™ -Teacher has laptop	-Computer sharing -Family -Home -Library

Both groups also reported Internet access was available outside school; however, this access is obtained through various Internet access points. Two low-tech savvy students reported no Internet access at home. They obtain access from family members, friends, or the public library. Even though high tech-savvy students reported having home access to the Internet, they also discussed how they access the Internet through family members as well as the public library. When discussing elements of Internet availability, all students reported computer sharing was required with other members of their family.

The results of the analyses for elements of a primary level digital divide (i.e. Internet access) indicated differential patterns of students' Internet access between economically privileged and economically disadvantaged districts. Students attending schools in economically privileged districts were shown to have increased levels of Internet access both inside and outside school compared to students in economically disadvantaged districts. An example of this pattern, emerging from focus group discussions, appears below.

[At this point in the discussion, the researcher asked students about the number of computers they have that are used with the Internet.]

High DRG, High tech-savvy group

R: How many computers do you have at home that are used with the Internet on a regular basis?

S2: We have like seven

S4: Are you serious?

S2: Cause I have a laptop, my sister has a laptop, both my parents have a laptop, my dad has another one for work, and we've got one stationary computer that we've had for like five years

S5: We have two but we usually use one normally

S1: We have two

S4: We had a laptop but it broke

S2: Well, my dad has a computer in his office and then, no... we have eight, we have this really old, old one.

S3: Um, well, I have my own laptop so I have to be really careful what I do on it because my parents don't want any viruses or stuff on it.

(School B, Focus Group 3)

Low DRG, High tech-savvy group

R: Now, how many computers do you have at your house that are used with the Internet on a regular basis?

S2: Um, one

S3: I have like one that, it's like stationary, and then my Dad's laptop is usually, well, sometimes it's at home, and I use it because it's faster, but pretty much that's it.

(School F, Focus Group 11)

Both of these groups consisted of high tech-savvy students. As can be seen from these data, home access to the Internet is available for both groups. However, students in economically privileged school districts reported greater numbers of computers in their homes that are connected to the Internet compared to those in economically disadvantaged school districts.

Secondary level digital divide: Internet use. During the focus group discussions, students were prompted to talk about their use of the Internet both inside and outside school. Through this discussion, various themes related to Internet use emerged. In general, these themes depicted Internet use for educational and entertainment purposes, attainment of knowledge about something, as well as communication and/or social networking both inside and outside school.

Table 4.24 illustrates the themes that emerged from the discussions about Internet use in economically privileged school districts. Some similarities were shown between the two groups

of students, high tech-savvy and low tech-savvy. As was expected, the vast majority of Internet use reported inside school by both groups of students was for educational purposes. Students' Internet use outside school focused on the use of the Internet for entertainment purposes and social networking for both groups. In addition, both groups reported near equal numbers of Internet use activities when comparing their Internet use inside school to their Internet use outside school.

Table 4.24

Themes Related to Internet Use in Economically Privileged Districts

Focus Groups	Inside school	Outside school
Low tech-savvy group	-Blog (teacher created)	-Download music
	-Educational games	-Games
	-Email	-Email
	-Find pictures	-Find pet dogs
	-Internet publishing	-Instant Messenger
	-Language translators	-Internet journals
	-Look up information	-Look up information
	-Read specific websites	-School projects
	-Research projects	-Shopping
	-Teacher websites	-Teacher websites
	-Webquest	-VoIP (Skype)
	-YouTube	-Watch videos
High tech-savvy group		-Webcam
		-YouTube
	-Assessments (math)	-Download music
	-Blog (teacher created)	-Email (personal use)
	-Citation makers	-Email (homework)
	-Create video games	-Find pictures
	-Databases (iConn.org)	-Games
	-Educational games	-Instant Messenger
-Email	-Internet journals	

(Table continues)

Focus Groups	Inside school	Outside school
High tech-savvy group	-Find pictures	-Look up information
	-Key pals (French class)	-Math study site
	-Internet scavenger hunt	-Podcasts
	-Look up information	-Read news
	-Quiz site (Quia.com)	-School projects
	-Read specific websites	-Shopping
	-Reference resources	-Surfing
	(dictionary)	-Teacher websites
	-Research projects	-Textbook sites
	-Teacher websites	-VoIP (Skype)
	-Textbook sites	-Watch videos
	-Video editing	-Xbox Live
	-Watch videos (educational)	-YouTube
	-Webquest	-Webcam
	-Website development	
-YouTube		

There were several differences between these two groups of students as well. There was a difference between the numbers and types of Internet use activities that high tech-savvy students reported compared to low tech-savvy students, both inside and outside school. High tech-savvy students reported 22 different Internet use activities inside school, whereas low tech-savvy students reported 12. Another distinct difference in Internet use inside school between these two groups of students was the use of the Internet for entertainment purposes. This was a result of students in the high tech-savvy group who participated in an after school computer club that provided opportunities for video game creation, website development, and video editing. When looking at Internet use outside school, high tech-savvy students reported 21 different Internet use activities compared to 14 reported by low tech-savvy students. The types of Internet use activities differed between these two groups as well. High tech-savvy students reported greater numbers of

Internet use activities for educational and entertainment purposes compared to low tech-savvy students.

Table 4.25 illustrates the themes that emerged from the discussions about Internet use in economically disadvantaged school districts. Some similarities exist between the two groups of high tech-savvy and low tech-savvy students. Most of the Internet use activities reported inside school by both groups of students was for educational purposes or the attainment of knowledge. Overall, students' Internet use outside school focused on activities related to entertainment or social networking as reported for both groups.

Table 4.25

Themes Related to Internet Use in Economically Disadvantaged Districts

	Inside school	Outside school
Low tech-savvy group	-Look up information	-Chat rooms
	-Research projects	-Email
	-Textbook sites	-Find pictures
		-Download music
		-Games
		-Instant Messenger
		-Internet journals
		-Learn magic tricks
		-Look up information
		-Wikipedia
	-YouTube	
High tech-savvy group	-Educational games	-Chat rooms
	-Email	-Download music
	-Look up information	-Download ring tones
	-Reference resources (dictionary)	-Email
	-Research projects	-Find pictures
	-Textbook sites	-Games
	-Watch videos (educational)	-Instant Messenger

(Table continues)

	Inside school	Outside school
High tech-savvy group		<ul style="list-style-type: none"> -Internet journals -Look up information -Read news -Rent videos -Rent video games -School projects -Shopping -Wikipedia -Xbox Live -YouTube

There were several differences between these two groups of students as well. There was a difference between the numbers and types of Internet use activities that high tech-savvy students reported compared to low tech-savvy students. In relation to Internet use inside school, high tech-savvy students reported 7 different Internet use activities whereas low tech-savvy students reported only 3. Another distinct difference in Internet use inside school between these two groups of students was the use of the Internet for social networking. Several of the high tech-savvy students reported that they check their email when at school even though this activity is reportedly “not allowed” in school.

When looking at Internet use outside school, high tech-savvy students reported 17 different Internet use activities compared to 12 reported by low tech-savvy students. Some similarities were noted. For example, the Internet use activities related to social networking for both groups were the same, including the use of chat rooms, email, Instant Messenger, and Internet journals (e.g. MySpace or Live Journal). However, high tech-savvy students reported greater numbers of Internet use activities for entertainment purposes (e.g. downloading music and ring tones, renting videos and video games, and shopping).

The results of the analyses for elements of a secondary level digital divide (i.e. Internet use) indicated differential patterns of students’ Internet use between economically privileged and

economically disadvantaged school districts. Those students attending schools in economically privileged districts were shown to have increased levels of Internet use both inside and outside school compared to students in economically disadvantaged districts. The greatest difference was shown by Internet use inside school. Students in economically privileged districts reported more than twice as many Internet use activities compared to those that from economically disadvantaged districts. Also, the Internet use activities identified by students in economically privileged school districts included many more Internet-based activities, such as the use of blogs, webquests, Internet projects, Internet scavenger hunts, Internet publishing, and YouTube. An example of one of these activities is described below:

[Students were discussing an activity that their language arts teacher did with them that included the use of a music video (by the group Nickelback) hosted on YouTube and a blog that their teacher had created.]

High DRG, High tech-savvy group

S3: We watched the “If Everyone Cared” music video and we had to comment on, because it was like doing a bunch of things.

R: Okay

S5: And it was like asking about what we wanted to do

S3: Yeah, like to help the community or something

S2: Yeah, how school could help

R: And what else are you doing with that project? She showed you that on YouTube, what’s that connected to?

S3: Well, we have to write

S2: It’s like a blog message about what kind of thing you’d want to do like that to, like show people that you can make a difference, and she wanted us to write about what we want, what we would want to do to make a difference in our community and like as a school and stuff.

S1: And now she’s like trying to figure out a way how like, um to blog like on other people’s comments

S1: Yeah

S3: Like to say something like to have a bake sale for like Katrina victims or something and you would like comment, “oh I’d like to do that” or something like that

S1: Like basically blog each other

S3: Like blogging each other

(School A, Focus Group 1)

In contrast, most of the Internet use activities reported by students in economically disadvantaged school districts focused on research projects, as the following excerpt describes.

[The researcher made an initial prompt for students to share about Internet use activities used inside school.]

Low DRG, Low tech-savvy group

R: Can you tell me about some of the different things that you use the Internet for here at school?

S3: Well, like, sometimes we do like projects.

S1: Yeah, projects

S4: Mostly projects

S2: Research

S3: Like, especially like in social studies

Group: (agreement)

S1: Research work

S5: Current events we do for social studies

S3: Yeah, stuff like that

S2: Kind of like, yeah

S3: We had to do this thing for science

S4: What thing for science?

S3: The alien thing

Group: (recognition)

S2: We had to research planets.

(School F, Focus Group 12)

These two examples showed that the Internet activities described by students in high DRG districts included more elements of integrating the Internet in instruction (i.e. YouTube and blogs) than what was described by students in low DRG districts.

When it comes to Internet use outside school, the differences were less noticeable. Both groups of students reported the use of the Internet outside school to work on school projects. However, students in economically privileged schools appeared to use the Internet outside school for educational purposes more, including the use of teacher websites, textbook sites, and emailing homework to teachers. An example of students' use of teacher websites outside school, as discussed by a low tech-savvy focus group in an economically privileged school district, is provided below.

[At this point in the discussion, students are explaining their use of teachers' web sites outside school.]

High DRG, Low tech-savvy group

S3: We go to SchoolNotes a lot, which is like where they put all the homework

S5: Yeah

S2: We go on that a lot

R: Okay, SchoolNotes. Now, you said all of your teachers have web pages?

S3: Yeah
S5: Yeah
S6: Well, most of them. Like, our music teachers don't have web sites
S3: Yeah, but like all of our team teachers
S6: Our academic teachers, yeah
S3: And then you can send them like emails and stuff
R: And you can do that through the SchoolNotes site?
S3: yeah
S6: You can click on website or email the teachers on the teachers name
R: And what kinds of things do your teachers have on the school notes?
S3: They just have like homework
S5: Homework
S3: and some links
S6: and some have extra credit
S2: and then they have like websites that they think are good and then
S1: yeah
S3: yeah, and then like attachments
S6: We like use rubrics a lot and, say if you use a rubric for a book report you can just go home and print it off from SchoolNotes and there's like due dates and... and it shows you the dates that, which day you're presenting
(School B, Group 4)

[Note: Education World hosts SchoolNotes (<http://www.schoolnotes.com>). A search of the SchoolNotes site returned 40 websites from this school. Of those websites, 38 belonged to teachers]

This discussion illustrated one example of how students in economically privileged school districts use the Internet outside school for educational purposes. There were no similar discussions with students in economically disadvantaged (i.e. low DRG) school districts. The only use of the Internet for educational purposes outside school reported by students from low DRG districts was to look up information for their school projects.

Tertiary level digital divide: Internet reading skill. During the focus group discussions, students were prompted to identify specific skills or strategies that they had been taught for online reading, including skills for locating information and critical evaluation of information specifically. Through this discussion, various themes related to online reading emerged. Those related to locating information included specific search strategies, reading search engine results, and locating information within a webpage. Themes related to critical evaluation included elements of information accuracy, website authorship, issues of reliability, and currency of information.

Table 4.26 illustrates the themes that emerged from the discussions about online reading comprehension with students in economically privileged school districts. There were three themes that both groups reported: (a) accuracy of information, (b) authorship of websites, and (c) strategies for locating information. This was the only similarity between high tech-savvy and low tech-savvy students from economically privileged school districts.

Table 4.26

Themes Related to Online Reading in Economically Privileged Districts

	Inside school	Outside school
Low tech-savvy group	<ul style="list-style-type: none"> -Accuracy of information -Authorship of websites -Look at address bar (URL) -No wikipedia -Reliability of information -Research skills -Search strategies 	
High tech-savvy group	<ul style="list-style-type: none"> -Accuracy of information -Assessment of knowledge -Authorship of websites -Big 6 research skills -Currency of information -Different sources (compare) -Evaluating websites -Fake images and photos -Website links history -Read search engine results -Scroll and skim for information -Search strategies -URL characteristics -Website features 	<ul style="list-style-type: none"> -Lessons from parents

The results of these analyses indicated that high tech-savvy students reported nearly twice as many elements of online reading comprehension compared to low tech-savvy students. Additionally, elements of online reading comprehension reported by high tech-savvy students were much more specific than those reported by low tech-savvy students. For example, high tech-savvy students mentioned specific critical evaluation techniques for checking the reliability of information, such as comparing different sources and knowing how to detect fake images and photos. In contrast, the low tech-savvy group used a more general statement to express that evaluating the reliability of information was an important element of online reading comprehension. Only one student reported learning about skills for online reading comprehension outside school. This high tech-savvy student indicated that his father taught him how to use quotation marks and the plus and minus signs while searching for information on the Internet.

Table 4.27 illustrates the themes that emerged from the discussions about online reading comprehension with students in economically disadvantaged school districts. Interestingly, the low tech-savvy students reported more elements of online reading comprehension, including skills for locating information and critical evaluation of information, than the high tech-savvy students. The high tech-savvy group only reported learning about strategies for reading search engine results. None of the students from economically disadvantaged districts reported incidents of learning online reading comprehension strategies outside school.

Table 4.27

Themes Related to Online Reading in Economically Disadvantaged Districts

	Inside school	Outside school
Low tech-savvy group	-Accuracy of information -Scroll and skim for information -Search strategies	
High tech-savvy group	-Read search engine results	

The results of the analyses for elements of a tertiary level digital divide (i.e. Internet reading skill) indicated differential patterns of students' knowledge of skills for online reading comprehension. Students in economically privileged school districts (i.e. high DRG) identified three times as many elements of online reading comprehension compared to those in economically disadvantaged districts (i.e. low DRG). Students in high DRG districts spoke at great length about lessons on critical evaluation of Internet sites. In contrast, students in low DRG districts did not report any specific strategies related to locating or critically evaluating information. Instead, they indicated that their teachers most often provide them with websites to use when they are working on a research project. An example of this pattern, emerging from focus group discussions appears below.

High DRG, High tech-savvy group

R: Do your teachers ever give you hints for searching or talk about the information you find on the Internet?

S1: We got taught to put the quotation marks

S4: Quotation marks and stuff

S1: and then like splashes and dashes

S2: "not" and don't like use "and" or something like that because there's half

S1: because they're like, if you go on Google they'll like look for all the words you're looking for and it's really hard to figure out

[pause]

S3: One time we had to like evaluate websites

S4: Right, yeah

S2: Yeah, that wasn't fun.

R: Okay. Tell me a little bit about evaluating websites.

S3: Um...

S2: I hate it.

S3: Um, we had to go on a website

S4: and it's kind of like going through the works cited process

S2: yeah

S3: The website was on evaluating websites so it was like, first it like, it like

S4: URL

S3: Yeah, it gave suggestions like you could do, like you could look at the URL.

What else? Is there an author and you can contact them and stuff.

S2: Or like an organization

S3: Yeah

S1: We talked about stuff

S4: Um, they, there was different sites, like she gave us a section on like made up ones like the tree octopus or something and then she, um, she would show us and we had to get a piece of paper and like find ideas of why it was wrong like spelling or grammar was off. And, like, uh, there...it wasn't organized. So, she gave us specific details like that.

R: Okay. Any other web sites she showed you besides the tree octopus?
 S4: Yeah, there was like a whole section. There was like the anatomy of Barney and there was like some made up dog that was, uh, posted and then,
 S1: Don't go to wikipedia
 S2: Mrs., our teacher, she went on it and she changed like the birth date of some really important person in history
 S3: Then she changed it back
 S2: And then she changed it back but it like shows that you can change
 S1: You can hack on it
 S2: And change all the stuff and she wasn't happy, I don't know
 S1: You can change it
 S3: Like, it's not reliable because people can make up like a random person and like make them president
 S2: Yeah
 S1: That's actually not a bad idea
 Group: (laughing)
 S1: [*Student's name removed*], president of the United States
 Group: (Laughing)
 (School C, Focus Group 5)

Low DRG, High tech-savvy group

R: Do your teachers ever give you hints for searching or talk about the information you find on the Internet?
 S1: I just go to like Google and type in like what I want usually.
 R: Is that the first thing you go to?
 S4: Usually he gives us websites to go to
 S2: Remember that planet research that we did?
 S3: Yeah, planet research, we had to do a lot of stuff with that
 S4: But he like suggested all the websites though
 S1: Yeah, we didn't have to look for anything for that
 S4: He gave us like three to choose from
 S3: yeah cause half the sites like we would normally go to sometimes are like blocked here because
 S1: like you can't even go on You Tube. It's bad!
 S3: Remember that blocking thing?
 Group: (acknowledgement)
 S1: It was all protected and everything.
 R: Do your teachers ever talk about the accuracy or reliability of information on the Internet?
 Group: (negative response)
 (School E, Focus Group 9)

As can be seen from these data, students from economically privileged school districts had extensive knowledge and specific examples to share about locating information and critical evaluation of websites. Those in economically disadvantaged school districts were not able to share any elements of online reading comprehension that they had learned from their teachers.

Other contextual themes that emerged. During the analyses of the focus group transcripts, additional themes emerged from the data. Three of these themes were specific to Internet use inside school, including plagiarism, filtering, and cyber bullying. Two themes were specific to Internet use outside school, including viruses and rules. One final theme, Internet safety, was included in discussions of Internet use both inside school and outside school.

Table 4.28 illustrates the additional themes that emerged from the focus group discussions in economically privileged school districts. As can be seen from the table, both low tech-savvy and high tech-savvy students were very similar in their discussions about these different topics.

Table 4.28

Other Themes Related to the Internet in Economically Privileged Districts

	Inside school	Outside school
Low tech-savvy group	-Plagiarism -Filtering	-Internet safety -Rules -Viruses
High tech-savvy group	-Cyber bullying -Plagiarism	-Internet safety -Rules -Viruses

Results indicated that the only difference that occurred was with Internet use inside school. Low tech-savvy students discussed the school’s filtering system and how it blocks inappropriate websites. In contrast, the high tech-savvy group talked about incidents of cyber bullying that they had heard about from their teachers and administrators.

Table 4.29 illustrates the additional themes that emerged from the focus group discussions in economically disadvantaged school districts. High tech-savvy students reported a total of four elements that emerged from the analyses whereas low tech-savvy students only reported two.

Table 4.29

Other Themes Related to the Internet in Economically Disadvantaged Districts

	Inside school	Outside school
Low tech-savvy group	-Internet safety -Plagiarism	
High tech-savvy group	-Cyber bullying -Filtering -Internet safety	-Viruses

The results showed that there were differences between low tech-savvy students and high tech-savvy students on both Internet use inside school and outside school. High tech-savvy students discussed incidents of cyber bullying as well as issues with the school’s filtering system. High tech-savvy students also discussed that Internet users should be careful of viruses when receiving email to safeguard their computer. Low tech-savvy students talked about Internet safety and issues of plagiarism.

The results of the analyses for additional elements that emerged from the transcript documents indicated similarities and differences between students in economically privileged and economically disadvantaged school districts. The existence of the themes related to plagiarism, Internet safety, filtering, and cyber bullying that occurred during the discussions of Internet use inside school were very similar. When looking at Internet use outside school, there were stark differences between students in economically privileged school districts (i.e. high DRG) and those in economically disadvantaged districts (i.e. low DRG). For example, students in high DRG districts discussed Internet safety, viruses, and parental rules for using the Internet outside school, whereas students in economically disadvantaged districts only talked about issues associated with viruses when using the Internet outside school. The following excerpt illustrates examples of rules that parents imposed on their children for Internet use as documented in the discussion with a group of low tech-savvy students in a high DRG school district.

[At this point in the discussion about Internet use outside of school, students began to talk about Internet safety and what they are and are not allowed to do on the Internet.]

High DRG, Low tech-savvy group

S3: So, I'm not allowed to go to any like bad website so

S2: You wouldn't in the first place

Group: (laughing)

S3: I mean there's things that you can do on it like make websites but it's protected and stuff so you wouldn't give out your random name and stuff, like, they don't give your information out

R: Right. And where do you make the website?

S3: Pixel or something like that?

R: All right. Do any of you use IM?

S2: Well, I used to but I'm not allowed

R: You used to but you're not allowed to any more?

S2: I've had like some bad experiences on AIM and stuff so my parents don't let me go on it any more.

S3: I, I only chat with my friends

S1: I'm not allowed until 7th grade

R: Do any of you have a MySpace?

S1: No

R: Is that your choice or do your parents say no?

S1: Well, my parents say no, but I wouldn't want to make one anyway

S2: I just use email

S1: I don't get email until I'm in high school

(School D, Focus Group 8)

This discussion indicated that there are concerns about Internet safety by these students' parents. One student mentioned using a protected website and that you should not give out personal information. Another student described clear boundaries that had been set by her parents regarding at what age she would be allowed to use certain social networking tools (i.e. instant messenger and email). Focus group discussions with students in economically disadvantaged school districts did not include any elements of Internet safety or parental rules that guided Internet use outside school.

Summary of focus group data analyses. The focus group data revealed three main contextual factors that appear to contribute to a tertiary level digital divide between economically privileged (i.e. high DRG) districts and economically disadvantaged (i.e. low DRG) districts. First, students in high DRG districts reported greater access to the Internet both inside and outside school than students from low DRG districts. Second, students in high DRG districts reported

more extensive uses of the Internet both inside and outside school compared to students in low DRG districts, including increased use of the Internet for educational purposes outside school. Third, students in high DRG districts recounted specific lessons related to the development of online reading comprehension achievement, which were not reported by students in low DRG districts. These three factors corroborate what teachers and administrators reported in the interviews that were conducted.

Classroom Observations

Informal classroom observations were conducted at each research site to provide a better depiction of computer and Internet integration. Field notes were collected to document how technology was being used throughout the school building on the day of the visit. The observation was scheduled on a “drop in” basis during a stipulated two week time period to ensure the technology use observed was not a contrived lesson created solely for the purpose of an observation.

Four general patterns emerged from the observational field notes that further indicated contextual factors were at play across all three levels of the digital divide. First, schools in economically disadvantaged (i.e. low DRG) districts had less computer availability than those in economically privileged (i.e. high DRG) districts, which contributes to a primary level digital divide. Second, computers were used primarily for the development of basic reading and math skills and general computer literacies in low DRG districts, not the higher level, critical reading and research skills that were emphasized in high DRG districts. Thus, a difference was illustrated between high and low DRG districts that play a part in a secondary level digital divide, which is focused on issues of Internet use. Finally, lessons in high DRG districts focused on the development of research and information searching skills as well as critical evaluation of web sources, which was not found in schools in low DRG districts.

Primary level digital divide: Internet access. During on-site observations, evidence was found that there were contextual factors in high and low DRG districts that contributed to a

primary level digital divide (i.e. Internet access). In both high DRG districts, computers and the Internet were readily available throughout the school buildings. Every instructional classroom had at least one Internet-connected computer and in many cases two or three were available within each classroom. Also, in three of the four schools in high DRG districts (Schools A, B, and D), an Internet-connected computer was interconnected to a large, 36-inch monitor mounted in the front corner of every instructional room. This system allowed teachers to display a web page or streaming video within the classroom at any time. Finally, all four of the schools in high DRG districts had open computer labs that teachers could reserve for their classes.

In contrast, three of the schools in low DRG districts (School F in Urbantown and Schools H and I in Urbanville) did not have an Internet-connected computer available in every instructional room. In Urbanville, computer labs in two of the schools (School H and I) had been closed due to vandalism of the equipment. Also, none of the schools in Urbanville had computer teachers on staff due to budgetary cuts. Urbantown schools did have open computer labs, but teachers reported that they were unfairly scheduled with the same few teachers using them on a regular basis.

Secondary level digital divide: Internet use. Elements of a secondary level digital divide (i.e. Internet use) were apparent when comparing observations in high DRG districts to low DRG districts. In high DRG districts, observations found students engaged in Internet-based research activities that included the development of higher-level reading and writing skills. In School A located in Suburbantown, sixth grade students worked on a set of laptop computers located in the Library Media Center as they engaged in a science-related activity using a weather website (<http://www.accuweather.com>). Students used this website to collect data about weather in ten different locations around the world. Then, they were required to write a script using this data to present a weather report to the rest of the class. Students took turns providing an oral weather report in which the weather in their ten locations was compared. In School C located in Suburbanville, a sixth grade science class was using the KidsHealth website sponsored by the

Nemours Foundation (<http://www.kidshealth.org>). Students wrote two-column notes to answer a set of six research questions. They were required to read specific articles on the website and take notes in order to respond to the set of questions.

Conversely, activities in low DRG districts focused on basic skill and drill activities. For example, in School F located in Urbantown, the Library Media Center had been set up as a reading intervention lab. Targeted seventh and eighth grade students utilized the lab to improve their reading skills. The Stanford Diagnostic Test was used as a pre- and post-assessment measure. Students worked on the computers independently using the Read Naturally program (<http://www.ReadNaturally.com>). Two reading tutors staff this lab. They used data printouts from the program to conference with students about their progress. The lab reportedly services approximately 200 students on a rotating cycle. In School G located in Urbanville, the lab was filled with “noise” from the sound effects embedded in the educational games. During the observation period, the classroom teacher sat at the teacher workstation correcting papers, completing lesson plans, and reading the newspaper. The teacher workstation computer was never turned on. At the end of the observation period, the teacher indicated that he is scheduled for one hour per week in the computer lab. A three-ring notebook was positioned at the teacher workstation in both labs. Within the notebooks was a list of suggested Internet sites that could be used to build math and reading skills, all of which were associated with textbook publishing companies.

Tertiary level digital divide: Internet reading skill. Factors associated with a tertiary level digital divide (i.e. online reading comprehension achievement) were also discovered during the on-site observations. One example was discovered in School A located in Suburbanville. Sixth grade students in the computer lab were using an interactive persuasion map from the ReadWriteThink website (<http://www.readwritethink.org>), which is sponsored by the International Reading Association (IRA) and National Council of Teachers of English (NCTE). Students were using the persuasion maps to document essential questions and points as part of a

Big 6 research project (Eisenberg & Berkowitz, 1990). Information searching skills while reading to locate information on the Internet were emphasized. In School B, also located in Suburbantown, a seventh grade science class worked on laptop computers in the Library Media Center (LMC). Students were following a teacher created Webquest on earthquakes and hurricanes housed on the school's network. Activities in the Webquest required students to locate websites that provided information about earthquakes and hurricanes. A website evaluation guide developed by Cathy Schrock (<http://kathyschrock.net/abceval/>) was used to aid students with the selection of websites. In Suburbanville, an eighth grade U.S. History class in School D was found in one of the open computer labs. The students were working on a Webquest sponsored by Scholastic that focused on the women's suffrage movement. The students had a hard copy of a study guide template that the teacher developed with guiding questions to follow. As they read information on web pages to locate the answers to the questions, they documented what they learned on the study guide. The teacher indicated that the study guide would be used later for students to prepare for a quiz or test on the topic.

In low DRG districts, only one observation found similar activities taking place. In School E located in Urbantown, observations in the open computer lab showed three students enrolled in an enrichment program engaged in several different activities. One student was working on an Internet scavenger hunt about totem poles. A second student was looking up facts on wild and scenic rivers using the National Park Service website (<http://www.nps.gov/rivers>). A third student was looking for facts on the Liberty Bell. The enrichment teacher was working with the first student doing the scavenger hunt on totem poles. The other two students worked independently. Even though the student researching the Liberty Bell was provided with a website address to locate the facts, she was using Google to try to find the information she needed. After about fifteen minutes, she still had not located any of the information that she was seeking. Most of the observations in low DRG schools showed students engaged in using particular computer programs, not the Internet. For example, in School F located in Urbantown, students were

working on Microsoft PowerPoint presentations for the upcoming Career Day. This project was a multi-step process. First, two column notes were used to summarize information found within a database that provided characteristics about various careers. An MLA citation template was completed to document the database resource where information was obtained. Then, a hardcopy PowerPoint template was completed with the relevant information for each slide. Finally, students used the hardcopy template as a guide while creating their presentations on computers. For this activity, students only used information from the database to create their presentations.

Summary from observations. In the economically disadvantaged (i.e. low DRG) school districts, the availability of computers, especially within instructional classrooms, was much lower than in economically privileged (i.e. high DRG) schools districts, thus indicating a primary level digital divide. Also, the majority of the computers in low DRG districts seemed to be used to develop basic reading and math skills through preloaded software programs or the development of general computer literacies in the use of specific software programs (e.g. Microsoft Word, Excel, PowerPoint, and Publisher). Conversely, activities in economically privileged school districts seemed to focus more on the integration of the Internet in the content areas. These vastly different uses of the available technology point to a secondary level digital divide. Finally, there was an emphasis on developing research and information searching skills in the high DRG districts that was not found in the low DRG districts, which may be a key factor contributing to a tertiary level digital divide.

Artifact Documents

Two different content analysis techniques, a conceptual analysis and a proximity map analysis, were used to analyze school artifacts. Conceptual analysis is a quantitative analysis technique that identifies the number of times a word or concept appears within a text (Krippendorf, 1980; McCormack, 1982). Proximity map analyses focus on networks of connected concepts or the relationship between concepts found within a text (Carley, 1993). Carley argues that by utilizing both procedures, it becomes possible to see differences in the distribution of

concepts across texts as well as insights into the content and structure of texts that is not possible by employing a conceptual content analysis alone.

Both a conceptual content analysis and a proximity map analysis were used to analyze the content of the artifacts that were collected from each school district. These analyses were conducted in two distinct stages. In the first stage, conceptual content analyses were conducted. In stage two, proximity map analyses were completed. The purpose of these analyses was to further explore the factors of interest along with the results of the HLM analyses to determine what impact, if any, school context played in relation to the elements associated with the three levels of the digital divide.

Results of the content and map analyses indicated that economically privileged (i.e. high DRG) districts appear to have greater technology integration across the curriculum than economically disadvantaged (i.e. low DRG) districts. This is shown in the comparison of both language arts curricula and technology plan documents. School improvement plans were analyzed for the two low DRG districts, which showed a very slight integration of literacy and technology in both districts. These documents showed an emphasis on the development of computer skills and computer-based assessments. Overall, the documents from high DRG districts emphasized critical reading and research skills in relation to technology and the Internet, which was often omitted from documents from low DRG districts.

Stage one: Conceptual content analyses. During stage one, a conceptual analysis of the content within the artifacts collected from each school was conducted. The purpose of this analysis was to look at the frequency of concepts that occurred in the documents that related to two broad categories, literacy and technology, in order to determine the contextual factors that might effect online reading comprehension development. Once the conceptual content analysis was completed, frequency counts were calculated for each concept to make comparisons and report results. Table 4.30 shows the number of unique concepts that were extracted from the text

documents as well as the total number of concepts analyzed broken down by the two broad themes.

Table 4.30

Number of Concepts Analyzed Across Each Text Document

Category	# of concepts analyzed		Name of analyzed text
	Unique	Total	
<i>Economically privileged districts</i>			
Literacy terms	53	167	Suburbantown language arts curriculum
Technology terms	7	18	
Literacy terms	0	0	Suburbanville technology curriculum
Technology terms	21	30	
Literacy terms	27	313	Suburbanville language arts curriculum
Technology terms	0	0	
Literacy terms	15	24	Suburbanville technology plan
Technology terms	402	1,449	
<i>Economically disadvantaged districts</i>			
Literacy terms	5	10	Urbantown technology plan
Technology terms	187	524	
Literacy terms	21	71	Urbantown language arts curriculum
Technology terms	12	116	
Literacy terms	56	107	Urbantown improvement plan
Technology terms	15	22	
Literacy terms	20	33	Urbanville improvement plan
Technology terms	27	50	

As expected, general comparisons indicated that technology plans contained a larger number of technology terms, and language arts curriculum documents contained more terms related to literacy. When making cross-district comparisons, several differences were noted. First, in comparing language arts curricula between districts, two documents showed signs of literacy and technology integration (i.e. Suburbantown and Urbantown) and one showed no signs of integration (i.e. Suburbanville). During interviews with participants from Suburbantown and Urbantown, it was reported that these two districts do not utilize a separate technology curriculum. The language arts curriculum from Suburbantown contained a total of 60 unique concepts with 88.3 percent as literacy terms and 11.7 percent as technology terms. In comparison, the language arts curriculum for Urbantown contained 33 unique concepts with 63.7 percent as literacy terms and 36.4 percent as technology terms. From this analysis, it appears that the curriculum from Urbantown is more fully integrated in regard to literacy and technology than the curriculum from Suburbantown. An analysis of the documents from Suburbanville, which reported separate language arts and technology curriculum, showed 100 percent of the coded concepts in the language arts curriculum were literacy terms, and 100 percent of the coded concepts in the technology curriculum were technology terms. These two curriculums were shown to be completely separate with no occurrence of an overlap between literacy and technology terms.

The comparison between improvement plans showed that Urbanville had a relatively balanced document. Of the 47 uniquely coded concepts, 42.6 percent were unique literacy terms and 57.4 percent were unique technology terms. In contrast, Urbantown showed a total of 71 uniquely coded concepts with 21.1 percent unique literacy terms and 57.4 percent unique technology terms. This would indicate that the school improvement plan for Urbantown placed a larger emphasis on technology than literacy. This may be a result of the district's plans to acquire electronic administration systems for grading and attendance as reported by participants during the interviews.

The two technology plans (from Suburbanville and Urbantown), appeared to contain similar manifest content. Both documents showed more than 95 percent of the total number of uniquely coded concepts as technology terms. The main difference between these two documents was in the number of uniquely coded concepts. Suburbanville's technology plan consisted of a total of 417 unique concepts related to literacy and technology whereas Urbantown's plan contained only 192 unique concepts, thus indicating that Suburbanville has a more thoroughly constructed technology plan.

In summary, the conceptual content analyses showed four main distinctions in the artifact documents. First, the analysis of the language arts curricula showed that Urbantown seemed to have greater literacy and technology integration compared to Suburbantown and Suburbanville. Second, the analysis of improvement plans showed Urbantown to have a greater emphasis on technology than literacy, and Urbanville had a fairly equal emphasis on literacy and technology. Third, the analysis of the technology plans from Suburbanville and Urbantown showed that they contained similar content, but the plan from Suburbanville was more thorough than the plan from Urbantown based on the total number of concepts examined. Finally, the language arts and technology curriculum from Suburbanville showed no signs of literacy and technology integration.

Stage two: Proximity map analyses. A proximity map analysis was completed that looked at where the concepts associated with the two broad categories, literacy and technology, appeared in relation to each other in each of the texts (Palmquist, et al., 1997). Proximity analysis allowed for the comparison of semantic connections across texts through a map analysis technique (Carley & Palmquist, 1992). Since frequency counts focused on isolated concepts by simply providing the number of times a concept occurred in a text, more extensive content analysis techniques were desirable to obtain additional insights. Carley (1993) demonstrated that two texts could appear identical when frequency counts were the only mode of analysis even though the texts differed extensively in meaning. With that in mind, proximity map analyses were conducted to further

explore similarities and differences between the artifact documents from each research site. The language arts curriculum from Suburbanville was omitted from this analysis, because there was no occurrence of unique technology terms within the text document as determined by the stage one conceptual content analyses.

The generalized concepts that were developed as part of the original analysis protocol were used to identify proximity relationships during this stage of the analysis. Carley and Palmquist (1992) argue that the use of generalizations increases the level of comparability across maps as fewer unique concepts may appear across multiple texts. Table 4.31 identifies the generalized concepts related to literacy that were developed for the purpose of the proximity map analyses. Two examples of the extracted concepts are provided for each of the generalized concepts for illustrative purposes.

Table 4.31

Example of Extracted Concepts Identified as Generalized Concepts Related to the General Literacy Category

Extracted concepts	Generalized concepts
Book swaps	Activities
Read aloud	
Developmental Reading Assessment	Assessments
Connecticut Mastery Test	
Critical stance	Critical reading
Compare/contrast accuracy	
Across the curriculum	Curriculum
Curricular goals and objectives	
Family literacy	Literacy
Improving literacy skills	

(Table continues)

Extracted concepts	Generalized concepts
Information gathering	Research
Research and information searching	
Prediction	Strategies
Reading strategies	
Print sources	Texts
Variety of genre	
High order thinking competencies	Thinking skills
Use of strategic thinking	

The generalized concepts related to the technology category that were developed for the purpose of the proximity map analyses are shown in Table 4.32. Two examples of the extracted concepts are provided for each of the generalized concepts for illustrative purposes.

Table 4.32

Example of Extracted Concepts Identified as Generalized Concepts Related to the General Technology Category

Extracted concepts	Generalized concepts
Computers	Computers
Computer lab	
Keyboarding skills	Computer skills
Technology competencies	
Distance learning capabilities	Distance learning
Telecommunications services	
Digital resources	Electronic resources
Video disc collection	

(Table continues)

Extracted concepts	Generalized concepts
State infrastructure grant	Funding
Technology funding	
Integration of computers	Integration
Points of integration	
Internet use	Internet
District web page	
Library automation system	Media center
Media Center	
Infrastructure	Network
Student database systems	
Technology Leadership Team	Personnel
Technology specialist	
Technology plan	Planning
Vision of technology	
Kidspiration	Software
School administration software	
ISTE standards	Technology standards
State technology standards	
Use of varied technologies	Technology use
Use technology effectively	
Technology professional development	Training
Training to utilize technology	

Before beginning a map analysis, it is customary to develop a question of focus (Carley, 1993). The question of focus for the map analysis in this study was: *How is technology being*

integrated into reading/language arts curriculum? The previously coded samples of text were used to conduct the proximity analyses (Danowski, 1982). A proximity map analysis technique was appropriate for this study because the researcher was concerned with the explicit concepts that appeared within the texts and not emotional considerations or interpretations of the author(s). A windowing technique was utilized for locating physically proximal words, which identified a specific section of text in which concepts were analyzed for their proximity to one another (Danowski, 1982, 1988). One page of each document was identified as the window for analysis. Concepts that appeared on the same page were identified as having a proximal relationship. A graphic representation of the proximal relationships between concepts associated with literacy and technology was developed to aid in the interpretation of the relationships. Three separate map analyses were conducted to make comparisons of similar text documents collected from the research sites. Since there was only one technology curriculum collected, this artifact was omitted from the map analysis, as a similar document was not available for comparison purposes.

Analyses of language arts curriculum documents. The two-stage analysis process began by analyzing the results of a conceptual content analysis of the reading/language arts curricula for Suburbantown and Urbantown. The results of the stage one conceptual content analysis based on frequency counts of literacy and technology concepts for these two documents are presented in Table 4.33. The results of the conceptual content analysis suggested that the language arts curriculum from Urbantown had an increased emphasis on technology integration (36.4% of the concepts were unique technology concepts) compared to Suburbantown (11.7% of the concepts were unique technology concepts) based on the number of technology concepts that were present in each of the two documents.

Table 4.33

Conceptual Comparison of Reading/Language Arts Curricula

Category	# of concepts analyzed		Name of analyzed text
	Unique	Total	
Literacy terms	53	167	Suburbantown language arts curriculum
Technology terms	7	18	
Literacy terms	21	71	Urbantown language arts curriculum
Technology terms	12	116	

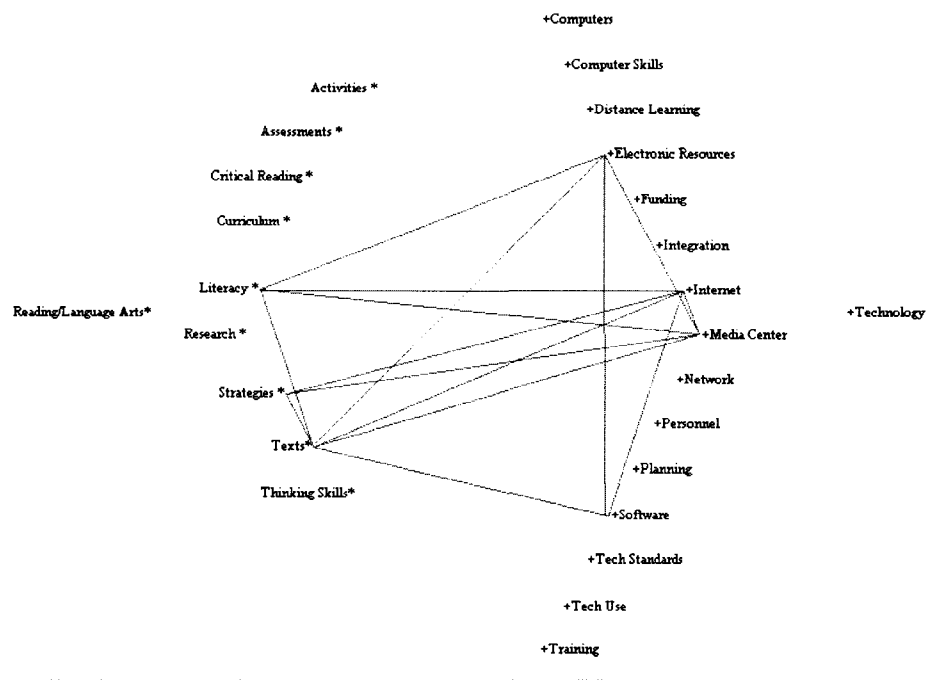
The second stage of the analysis included proximity map analyses of each of these two language arts curriculum documents. Figure 7 displays the results of the map analysis for the language arts curriculum for Suburbantown. As can be seen from this figure, 6 out of 9 (66.7%) generalized concepts related to literacy showed a proximal relationship to 4 out of 15 (26.7%) generalized concepts related to technology. Additionally, there were 16 occurrences of cross-category proximal relationships.

Figure 7. Relational map of language arts curriculum for Suburbantown



Figure 8 displays the results of the relational map of the language arts curriculum for Urbantown. As can be seen from this map analysis, only 3 out of 9 (33.3%) generalized concepts related to literacy showed a proximal relationship to 4 out of 15 (26.7%) of the generalized concepts related to technology. Additionally, there were only 9 occurrences of cross-category proximal relationships.

Figure 8. Relational map of language arts curriculum for Urbantown



The two visual representations of the map analyses show the language arts curriculum for Suburbantown to be more dense (i.e. more relational lines are present) with more cross connections between literacy and technology terms than the curriculum from Urbantown.

The results of the map analyses (see Figures 7 and 8) provide additional insights into these two language arts curriculum documents not provided by the conceptual content analyses. In contrast to the results of the content analysis, the relational maps showed that technology integration was emphasized more in the curriculum document from Suburbantown where there were 16 cross-category connections as opposed to only 9 cross-category connections that were present in the map of the curriculum document from Urbantown. The map from Suburbantown

also showed more associations between concepts of literacy learning with *electronic sources* and *Internet* than Urbantown. Additionally, Suburbantown's curriculum appeared to emphasize *critical reading* and *research* skills in relation to technology integration in their curriculum, which were not present in the curriculum document from Urbantown.

Analyses of technology plan documents. The second set of analyses compared the technology plans from Suburbanville and Urbantown. The results of the stage one conceptual content analysis based on frequency counts of literacy and technology concepts are shown in Table 4.34. These analyses indicated that the technology plans for Suburbanville and Urbantown appeared to be very similar in content. The document for Suburbanville contained a ratio of unique technology to unique literacy concepts of approximately 37 to 1. The document for Urbantown showed a ratio of unique technology to unique literacy concepts of approximately 27 to 1. When looking at the ratio of the total number of technology concepts to the total number of literacy concepts, Suburbanville showed a ratio of approximately 52 to 1 and Urbantown's was approximately 60 to 1. One distinct difference between these two technology plans was the total number of technology concepts found in the document from Suburbanville ($n = 1,449$) compared to the document from Urbantown ($n = 524$). The occurrence of technology concepts within Suburbanville's technology plan was nearly three times the rate of those found in the plan from Urbantown. The results of the conceptual content analysis suggested that the technology plan from Suburbanville was more thorough and contained a greater level of literacy and technology integration compared to the technology plan from Urbantown.

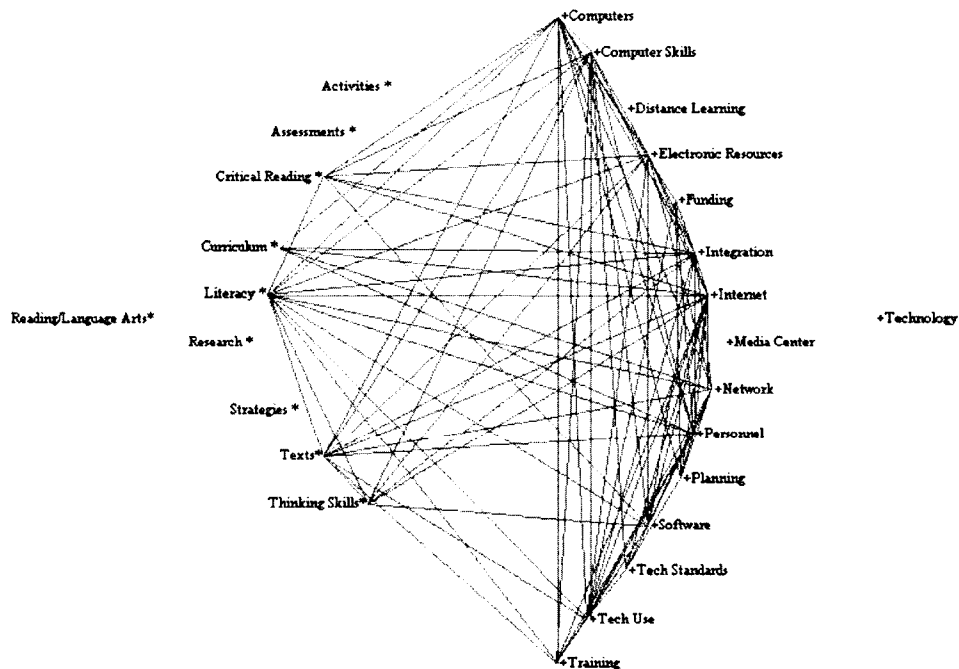
Table 4.34

Conceptual Comparison of Technology Plans

Category	# of concepts analyzed		Name of analyzed text
	Unique	Total	
Literacy terms	15	24	Suburbanville technology plan
Technology terms	402	1,449	
Literacy terms	5	10	Urbantown technology plan
Technology terms	187	524	

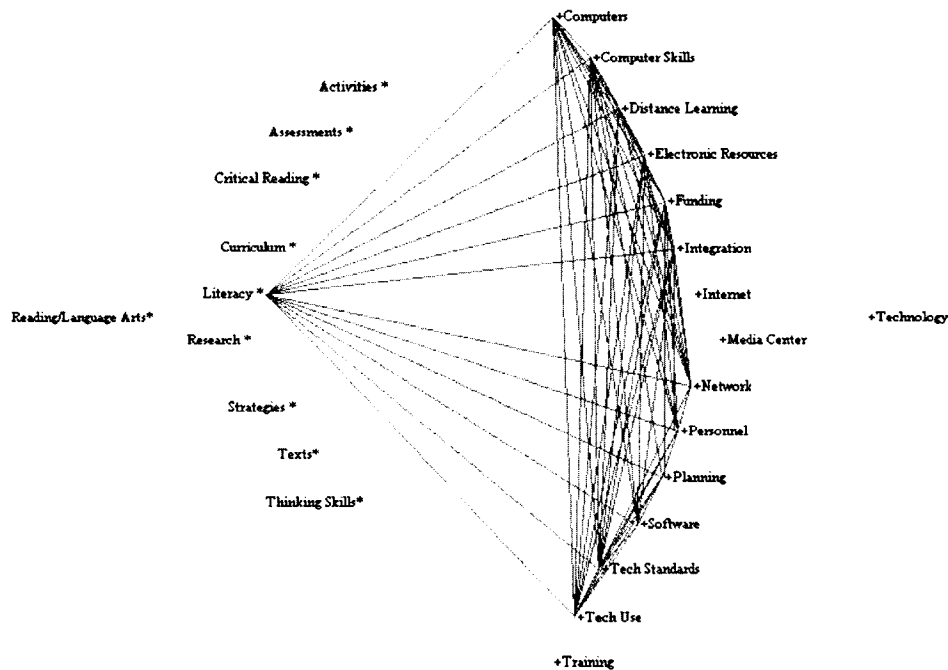
Following the conceptual content analysis, the stage two proximal map analyses were conducted for the two technology plans. Figure 9 displays the results of the map analysis of the technology plan for Suburbanville (DRG B). As can be seen from this map analysis, 5 out of 9 (55.5%) generalized concepts related to literacy show a proximal relationship to 13 out of 15 (86.7%) generalized concepts related to technology. Additionally, there are 35 occurrences of cross-category proximal relationships.

Figure 9. Relational map of technology plan for Suburbanville



The result of the map analysis of the technology plan from Urbantown is displayed in Figure 10. This analysis shows only 1 out of 9 (11.1%) generalized concepts related to literacy with a proximal relationship to 12 out of 15 (80%) generalized concepts related to technology. Additionally, there are only 12 occurrences of cross-category proximal relationships.

Figure 10. Relational map of technology plan for Urbantown



The results of the map analyses (see Figures 9 and 10) provided a more thorough depiction of these two documents than the conceptual content analysis alone. The technology plan for Suburbanville was shown to be much more complex and contained many more cross-category connections between literacy and technology terms. The technology plan from Urbantown contained very dense technology content but only one generalized literacy concept was present. In contrast, the document from Suburbanville included five different literacy concepts, which indicated a higher rate of literacy and technology integration. Another distinct difference between these two documents was the absence of the technology concept *Internet* in Urbantown's technology plan. The relational map for Suburbanville showed connections between *Internet* and

five different literacy concepts, *critical reading, curriculum, literacy, texts, and thinking strategies*. Thus, the technology plan for Suburbanville contained a much richer depiction of technology and literacy integration than the technology plan from Urbantown.

Analyses of improvement plan documents. The third and final set of analyses compared the district and/or school improvement plans from Urbantown and Urbanville. The results of the stage one conceptual content analyses based on frequency counts of literacy and technology terms in these two documents are shown in Table 4.35. These analyses indicated that the improvement plans from Urbantown and Urbanville contained very different content. The results showed that the improvement plan from Urbantown included a larger proportion of unique technology terms (78.9%) compared to literacy terms (42.6%). The document from Urbanville showed more of a balance between unique literacy concepts (42.6%) and unique technology concepts (57.4%).

Table 4.35

Conceptual Comparison of Improvement Plans

Category	# of concepts analyzed		Name of analyzed text
	Unique	Total	
Literacy terms	56	107	Urbantown improvement plan
Technology terms	15	22	
Literacy terms	20	33	Urbanville improvement plan
Technology terms	27	50	

Following the stage one conceptual content analysis, proximal map analyses were completed during stage two for the two improvement plans. Figure 11 displays the results of the map analysis of the improvement plan from Urbantown. As can be seen from this map analysis, 2 out of 9 (22.2%) generalized concepts related to literacy showed a proximal relationship to 6 out of 15 (40.0%) generalized concepts related to technology. There were 8 occurrences of cross-category proximal relationships.

Figure 11. Relational map of District Improvement Plan for Urbantown

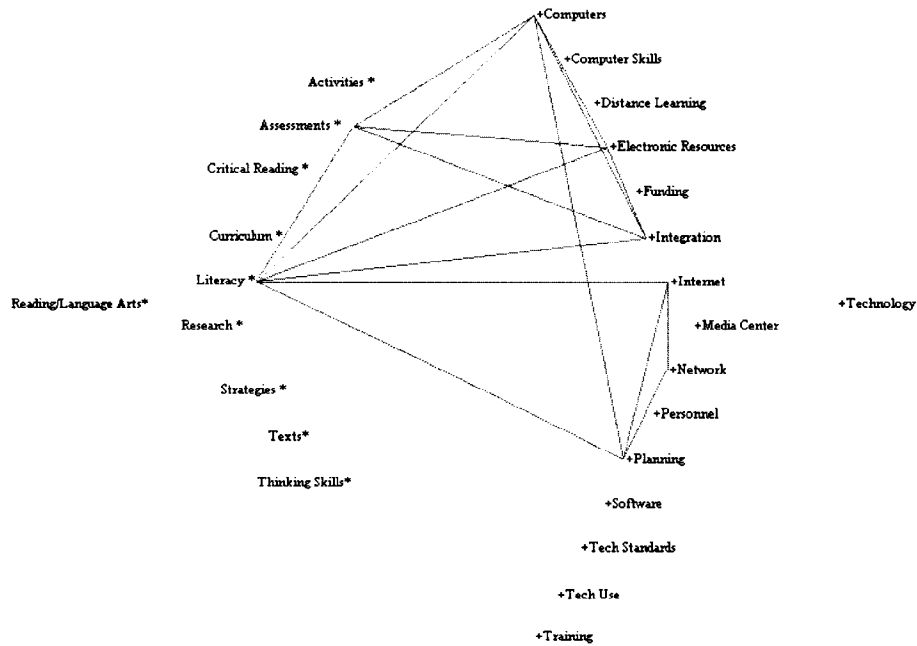


Figure 12 displays the results of the relational map of the improvement plan from Urbanville. As can be seen from this map analysis, 3 out of 9 (33.3%) generalized concepts related to literacy showed a proximal relationship to 5 out of 15 (33.3%) generalized concepts related to technology. There were 5 occurrences of cross-category proximal relationships.

Figure 12. Relational map of Strategic Plan for Urbanville



The results of these map analyses (see Figures 11 and 12) indicated relatively small patterns of literacy and technology integration for both improvement plans. The relational maps showed that technology integration was emphasized more in the improvement plan from Urbantown where there were 7 cross-category connections as opposed to only 4 cross-category connections present in the map of the improvement plan from Urbanville. The improvement plan document from Urbanville had an emphasis on *technology use, training, and computer skills*, whereas the document from Urbantown had a stronger emphasis on networked technologies as shown by the concepts *electronic resources, Internet, and network*. The improvement plan from Urbantown also had an emphasis on *literacy and assessments*, as these are the only two literacy concepts that were identified. The improvement plan from Urbanville showed an emphasis on skills with the inclusion of the concepts *thinking skills and computer skills*.

Summary of conceptual content and map analyses. The analyses that were conducted to look at the artifact documents provided further insights into the contextual factors that may contribute to the three levels of the digital divide. First, documents from economically privileged (i.e. high DRG) districts clearly showed a greater emphasis on literacy and technology and Internet integration compared to documents from economically disadvantaged (i.e. low DRG) districts. This finding helps explain why schools in high DRG districts may show increased use of the Internet compared to schools in low DRG districts. Low DRG districts appear to emphasize basic computing skills with little integration between technology and literacy. This supports what was found in the observational data with low DRG schools using computers primarily for the development of basic reading and mathematics skills or “how to” activities designed to learn features of specific computer programs. Critical reading, research, and an emphasis on using the Internet or other electronic resources were a strong theme in the documents from high DRG districts but rarely mentioned in documents from low DRG districts. This finding suggests that the curriculum documents, technology plans, and improvement plans found in high DRG districts and low DRG districts may be contributing to a tertiary level digital divide.

Chapter Summary

Phase One: Measurement Scale Development

The purpose of the procedures in this phase of the research design was to develop two measurement scales that would be adequate measures of three levels of the digital divide that included elements of Internet access, Internet use, and Internet reading skill (i.e. online reading comprehension achievement). The two scales, Digital Divide Measurement Scale for Students (DDMS-S) and Digital Divide Measurement Scale for Teachers (DDMS-T), were both shown to be psychometrically sound instruments following the scale development procedures. Reliability estimates indicated satisfactory reliability for both measurement scales. Exploratory factor analysis procedures were conducted and indicated that the items measuring Internet use inside and outside school on both the DDMS-S and DDMS-T were adequate measures of the factors of interest in this study. Finally, content validation procedures and item analyses showed that the items developed to measure online reading comprehension achievement were good measures for this construct.

Phase Two: Measurement Scale Administration

The results of the measurement scale administration for the DDMS-S and DDMS-T indicated that the majority of both student and teacher populations (more than 80% overall) had Internet access at home. Results also showed that students use the Internet more frequently outside school, whereas teachers reported about an equal amount of Internet use both inside and outside school. In relation to online reading comprehension achievement, students performed better on items that measured elements of reading to locate information compared to reading to critically evaluate information. Students appeared to be most skilled when using a keyword strategy for reading to locate information and the least skilled with reading to critically evaluate information for bias. Teachers also performed better on elements of reading to locate information than on reading to critically evaluate information. They appeared to be most skilled at reading to locate information within a website. Teachers also appeared to be the least skilled with the critical

evaluation of information for bias. It may be interesting to note that students outperformed teachers on several items that measured elements of locating information. However, teachers outperformed students on all of the items related to the critical evaluation of information.

Phase Three: Quantitative Methods

The quantitative data analyses indicated that there were significant differences for both teachers' and students' online reading comprehension scores relative to District Reference Group (DRG) classification as indicated by the ANOVA tests for mean differences. The HLM tests further explored these differences and showed different elements of the digital divide that effect students' and teachers' online reading comprehension achievement.

For students, it was determined that students' access to the Internet both inside and outside school had an effect on their online reading comprehension achievement. Both of these variables are associated with the primary level digital divide, which focuses on issues of Internet access. In addition, students' use of the Internet outside school was also shown to have an effect on students' online reading comprehension achievement. This factor is associated with the secondary level digital divide, which focuses on issues of Internet use. Finally, two school level factors were shown to have an effect on students' online reading comprehension achievement. These included the school's average reading score on a measure of traditional reading comprehension and teachers' online reading comprehension achievement scores. Surprisingly, District Reference Group (DRG) classification was not a significant predictor of students' online reading comprehension achievement.

For teachers, it was determined that teachers' Internet access outside school had an effect on their online reading comprehension achievement. This variable is associated with the primary level digital divide, which focuses on issues of Internet access. In addition, teachers' use of the Internet outside school was also shown to have an effect on their online reading comprehension achievement. This factor is associated with the secondary level digital divide, which focuses on

issues of Internet use. Finally, District Reference Group (DRG) classification was shown to have a significant effect on teachers' online reading comprehension achievement.

These results indicated that a tertiary level digital divide (i.e. difference in online reading comprehension achievement) exists between students and teachers from economically privileged school districts and economically disadvantaged school districts. Results also showed that some elements of the primary level digital divide (i.e. Internet access) and the secondary level digital divide (i.e. Internet use) were significant predictors of the tertiary level digital divide for both students and teachers.

Phase Four: Qualitative Methods

The qualitative analyses identified specific contextual factors within schools that seemed to effect the development of online reading comprehension for both teachers and students. These contextual factors included elements of all three levels of the digital divide at the center of this research. Both interview and focus group data showed several differences between economically privileged (i.e. high DRG) and economically disadvantaged (i.e. low DRG) school districts. In relation to a primary level digital divide, data showed that high DRG districts have greater accessibility to technology, and the Internet, on a regular basis inside school compared to low DRG districts. When looking at issues associated with the secondary level digital divide, results indicated differential patterns of Internet use between high DRG and low DRG districts. In high DRG districts students reported more than twice as many Internet-based activities inside school than those in low DRG districts. Additionally, students in high DRG districts were shown to have increased levels of Internet use both inside and outside school compared to students in low DRG districts. Relative to a tertiary level digital divide, all participants from high DRG districts reported instances of specific skills and strategies for online reading that are intentionally taught, whereas none of the participants in low DRG districts reported this type of instruction taking place in their schools. The results from the analyses of artifact documents combined with observational field notes showed that schools in high DRG districts appeared to provide more

opportunities and support for the integration of literacy and technology compared to low DRG districts. Although several schools in low DRG districts have state of the art computer labs and other digital technologies readily available, professional development opportunities, training activities, and the presence of a support staff to assist with literacy and technology integration appears to be lacking. Finally, the No Child Left Behind legislation was shown to have an impact on low DRG schools, which may compound the problem of a tertiary level digital divide. The result of pressures from this legislation seem to put an emphasis on using computers for rote drill and skill practices in lieu of the higher level reading strategies that are required for reading on the Internet. This effect was not found in high DRG districts.

CHAPTER FIVE: DISCUSSION

This study explored differential patterns in Internet access, Internet use, and Internet reading skill among middle school students and teachers in both economically privileged and economically disadvantaged school districts. There were three main purposes for this research. First, this study sought to investigate differences in students' online reading comprehension achievement (i.e. Internet reading skill) between students attending schools in economically privileged school districts and those attending schools in economically disadvantaged school districts. Second, it sought to investigate differences in teachers' online reading comprehension achievement (i.e. Internet reading skill) between teachers employed by economically privileged school districts and those employed by economically disadvantaged school districts. Third, it sought to explore a more complex definition of the digital divide that includes elements of Internet access, Internet use, and Internet reading skill. This final chapter discusses the results of this research study with a brief summary of the findings that were presented in chapter four and the implications of these findings for future research, classroom practice, and public policy.

Summary of Findings from Measurement Scale Development

This research study required the development of two measurement scales that were designed to investigate factors related to a more complex conception of the digital divide. The two measurement scales (i.e. Digital Divide Measurement Scale for Students [DDMS-S] and Digital Divide Measurement Scale for Teachers [DDMS-T]) were developed to measure instances of a primary level digital divide (i.e. Internet access), a secondary level digital divide (i.e. Internet use), and a tertiary level digital divide (i.e. Internet reading skill) among middle school students and teachers from economically privileged and economically disadvantaged school districts.

Similar to previous studies (Becker, 1999; Kleiner & Farris, 2002; Kleiner & Lewis, 2003; Parsad & Jones, 2005), the two measurement scales developed for this study included elements of the digital divide at both the primary level and the secondary level in that Internet

access and Internet use were two of the central constructs measured. While a small research base exists that looks at teachers' Internet access at home (Becker, 1999) and at school (Becker, 1999; Lazarus, et al., 2005; Williams, et al., 2000), a measurement scale specific to teachers' Internet use both inside and outside school appears to be a new aspect of the digital divide not previously reported in the research. Additionally, none of the previous studies focused on a tertiary level digital divide that sought to measure differences in Internet reading skill among middle school students and teachers, which was the third construct of interest in this study. A few studies have focused on developing assessments to measure online reading comprehension (Coiro, 2007; Coiro & Dobler, 2007; Leu, et al., 2005; Leu & Reinking, 2005); however, these assessments were performance-based assessments designed to engage middle school students in active reading on the Internet followed by a series of open-ended questions and responses. The measurement scales in the current study used forced-response items to measure online reading comprehension achievement; hence, the instruments were much simpler to administer and could be used on a large-scale basis.

One instrument, which laid the foundation for the measurement scales in the current research study, included similar elements of the digital divide in that it sought to measure Internet access, Internet use, and Internet reading skill (Carter & Henry, 2006; Henry, et al., 2006). However, this instrument was designed specifically for a population of middle school students, not teachers. Additionally, the items related to Internet reading skill focused more on the new literacies of the Internet in general and included open-ended responses as well. Although this instrument provided a good starting point, considerable revisions were required to develop two reliable measurement scales for the purposes of this study.

Two parallel measurement scales were developed to gather data from sample populations of middle school students and middle school teachers. Items related to measuring the primary level digital divide (i.e. Internet access) were demographic-style variables. Items related to measuring the secondary level digital divide (i.e. Internet use) consisted of a parallel set of Likert-

style items that included various Internet use activities. One set of items was related to Internet use activities inside school with a parallel set of items related to Internet use activities outside school. Finally, items related to measuring a tertiary level digital divide (i.e. Internet reading skill) consisted of forced-choice response style items. Reliability estimates were computed for the Likert-style questions for each of the two measurement scales to test for internal consistency. Satisfactory reliability was shown for both measures with coefficients greater than .80 (Green & Salkind, 2003). An exploratory factor analysis was conducted for the Likert-style items on each scale independently to ensure the items were measuring the factors of interest. Finally, an item analysis showed that the forced response items measuring online reading comprehension achievement were “good” questions as indicated by a test discrimination value greater than .25 (Varma, n.d.). The results of these analyses showed that the two measurement scales were psychometrically sound instruments, thus indicating that they were adequate measures of the factors of interest in this study.

Limitations

There were several main limitations to the development of the Digital Divide measurement Scale for Teachers (DDMS-T). First, the sample size for conducting exploratory factor analyses was smaller than desired. In measurement scale development, the sample size is critically important. Research suggests that sample populations of five participants per item or a participant population of at least 300 are desirable to develop a scale (Netemeyer, et al., 2003; Pett, et al., 2003). The first of these two parameters would suggest a sample size of 385 for the Digital Divide Measurement Scale for Teachers (DDMS-T). The total number of respondents for this scale was 282, which could be problematic in conducting statistical analyses for scale development. However, the Kaiser-Meyer-Olkin measure of sampling adequacy suggested that the sample size was adequate.

Second, due to time constraints, piloting was not conducted on the DDMS-T. Since this scale was based on another instrument that was shown to be psychometrically sound, the smaller

than desired sample size and lack of piloting was not a large concern. However, using the data collected with the DDMS-T in this study as pilot data, along with the results of the exploratory factor analysis, this measurement scale should be further refined and then administered to an additional sample population. Although results of the psychometric tests indicated adequate validity for scores on the DDMS-T, there is room for improvement to the overall validity of scores on this measure.

Third, the measure of online reading comprehension in this study was narrowly focused on two elements of Internet reading skill. While this study does provide important insights to online reading comprehension, only focusing on two of these functions may impede the interpretability of the results. Leu and colleagues (2004) describe five main elements or functions of the new literacies of online reading comprehension, which include: (a) identifying important questions, (b) locating information, (c) critical evaluation of information, (d) synthesis of information from multiple sources, and (e) communicating information using digital technologies. The measurement scales in this study evaluated only two of these elements of online reading comprehension, reading to locate information and reading to critically evaluate information. While it may be a good measure of these two elements of the new literacies of online reading, the assessments do not include the other elements of online reading comprehension, including identifying important questions, synthesis of information from multiple sources, and communicating information to others using digital technologies. Although it was argued that these are the two most important aspects of online reading comprehension, they do not represent the totality of the processes associated with online reading comprehension. Leu and colleagues (2004) argue that the five functions of the new literacies are very much intertwined with multiple functions of online reading occurring at the same time. A measure of critical evaluation conducted in isolation of other aspects of online reading may show an individual succeeding when they may not have been able to locate the information. Conversely, a measure of locating information conducted in isolation of other aspects of online reading may show individuals

succeeding when they might not be able to evaluate, synthesize, or communicate that information successfully.

Finally, this instrument weighted items that measured reading to locate information on the Internet equally to reading for critical evaluation of information. Perhaps the most important among the new literacies of digital technologies are the skills and strategies that are required to effectively read while searching for and locating information on the Internet (Eagleton & Guinee, 2002; Eagleton, et al., 2003; Henry, 2006a, 2006b). “Efficient searching is one of the most difficult reading skills for students to develop as it incorporates the ability to locate, critically evaluate, and synthesize information” (Henry, 2006a, p. 617). All other reading activities on the Internet stem from the decisions that are made during the information search process. Hence, reading to locate information on the Internet has been identified as a gatekeeper skill; information is either easily located or it becomes inaccessible based on the users’ ability to read while locating information (Henry, in press). During online reading, reading to locate tasks may determine success or failure more than any other online reading strategy. For these reasons, the reading to locate information and reading to critically evaluate information elements of online reading comprehension may have benefited from the use of a weighting procedure during the analyses.

Summary of Findings from Analysis of Variance Tests: Evidence of a Tertiary Level Digital Divide as Determined by Differences in Internet Reading Skill

Discussion of Research Question One

The first research question investigated whether there were significant differences in students’ online reading comprehension achievement according to District Reference Group (DRG) classification. It was hypothesized that students from economically privileged (i.e. high DRG) school districts would present higher scores than students from economically disadvantaged (i.e. low DRG) school districts as a result of a preliminary study that showed students attending schools in affluent communities performed better than student attending schools in poorer communities on several elements of Internet reading (Lentini, 2006).

The results of an analysis of variance (ANOVA) indicated that students attending schools in high DRG districts and low DRG districts differed significantly on the measure of online reading comprehension achievement. That is, students attending schools in high DRG districts scored significantly higher (mean=6.06) on the measure of online reading comprehension achievement than those from low DRG districts (mean=4.92). This finding shows that students attending schools in high DRG school districts appear to have better skills for reading to locate information and reading to critically evaluate information on the Internet, the two elements of online reading comprehension measured in this study, compared to middle school students attending schools in low DRG school districts. Additional analyses also suggested that critical reading tasks involving critical evaluation of the accuracy of an image on a website and critical evaluation of information for bias are especially challenging for students in both high DRG and low DRG districts. The results of this study also showed that, overall, students struggled with both elements of online reading comprehension that were measured. The total mean score for students was 5.40, which indicated that, on average, students responded correctly to less than half of the items as the total possible score was 14 points.

Discussion of Research Question Two

The second research question investigated whether there were differences in teachers' online reading comprehension achievement according to District Reference Group (DRG) classification. It was hypothesized that teachers from economically privileged (i.e. high DRG) school districts would present higher scores than teachers from economically disadvantaged (i.e. low DRG) school districts as a result of research that indicated teachers who serve poor and minority students are more likely to be less skilled with integrating technology in the classroom than those who serve students in more affluent communities (Attewell, 2001).

The results of an ANOVA showed that teachers employed in high DRG districts and teachers employed in low DRG districts differ significantly on the measure of online reading comprehension. Thus, teachers employed in schools in high DRG districts scored significantly

higher (mean=8.29) on the measure of online reading comprehension achievement than those from low DRG districts (mean=6.83). The results of this analysis showed that teachers employed by schools from high DRG school districts appear to have better skills for reading to locate information and reading to critically evaluate information on the Internet compared to middle school teachers from low DRG school districts. Additional analyses also suggest that critical reading tasks involving critical evaluation of information for bias are especially challenging for teachers in both high DRG and low DRG districts. The results of this study showed that teachers struggled overall with both elements of online reading comprehension that were measured. The total mean score for teachers was 7.51, which indicated that on average teachers responded correctly to only about half the items, as the total possible score was 14 points.

Discussion of Previous Research

The findings presented here are consistent with previous research that reported poor and minority students are more likely to have teachers who are less skilled with using technology (Attewell, 2001). But, the research in this area focused on teachers' skill with technology use in general along with aspects of technology integration in the classroom, not the skills and strategies for online reading comprehension achievement that are the focus of the current study. Research studies that explore Internet reading skill specifically are minimal (Coiro, 2007; Coiro & Dobler, 2007; Leu, et al., 2005; Leu & Reinking, 2005), and studies that look at differences in Internet reading skill between teachers in economically privileged districts compared to economically disadvantaged districts are non-existent. Only one study has looked specifically at this issue with populations of students, which was a small-scale, initial study conducted with a sample of convenience (Lentini, 2006). The findings in the current study confirm what Lentini (2006) found in her research that explored the performance of students in economically privileged school districts and economically disadvantaged school districts with data from a previously developed instrument (Leu & Reinking, 2005; see also Carter & Henry, 2006; Henry, et al., 2006). No study to date has looked specifically at differences in online reading comprehension achievement

between populations of middle school students and teachers from economically privileged and economically disadvantaged school districts. This investigation was conducted to fill this gap in the research literature and further extend the conceptualization of the digital divide.

Limitations

The items developed for the measure of online reading comprehension achievement may place certain limitations on the results. First, unlike previous research that centered on the measurement of online reading comprehension through complex, performance-based tasks (Coiro, 2007; Coiro & Dobler, 2007; Leu, et al., 2005; Leu & Reinking, 2005), the measurement scales developed in this study utilized forced choice responses to single screen items. The design of these items may draw more upon offline reading comprehension than performance-based tasks that contain greater complexities.

Second, a volunteer sample of convenience was used, which may cause bias in the results (Fraenkel & Wallen, 1996). It is unknown whether the responses garnered from the samples in this study would match schools or districts with similar demographic descriptions that did not participate. Also, the participants who volunteered to respond to the measurement scale may be more comfortable with using technology than those who did not. This is especially problematic with the small samples that participated from Urbanville, especially in regard to student and teacher participants from School I. This study should be replicated with a number of similar samples to decrease the likelihood that the results are isolated to the participating districts.

Summary of Findings from Hierarchical Linear Modeling

Hierarchical linear modeling (HLM) was used to determine what factors best predict the significant differences in online reading comprehension achievement that was found among middle school students and middle school teachers in the ANOVA tests. The purpose of this was to extend the conceptualization of the digital divide into a more complex definition. It was predicted that variables related to both a primary level digital divide (i.e. differences in Internet

access) and a secondary level digital divide (i.e. differences in Internet use) would contribute to the tertiary level digital divide (i.e. differences in Internet reading skill) that was found.

Discussion of Research Question Three

The third research question investigated what variables accounted for the most variability in students' online reading comprehension achievement in terms of a more complex conception of the digital divide, which included elements of Internet access, Internet use, and Internet reading skill. A multilevel analysis, or hierarchical linear modeling (HLM), was used to explore what variables accounted for differences in online reading comprehension achievement between students in economically privileged school districts compared to those in economically disadvantaged school districts. The HLM analyses revealed a number of important findings. Five independent variables were identified as statistically significant predictors for students' online reading comprehension achievement at the .05 level, including: (a) students' access to the Internet inside school, (b) students' access to the Internet outside school, (c) students' Internet use outside school, (d) average school score for reading comprehension as measured by the Connecticut Mastery Test, and (e) average school score for teachers' online reading comprehension achievement.

Interpretation of Significant Predictor Variables Related to Students' Online Reading Comprehension Achievement Scores

Elements of a primary level digital divide (i.e. Internet access), a secondary level digital divide (i.e. Internet use), and a tertiary level digital divide (i.e. Internet reading skill) emerged as significant predictors for students' online reading comprehension achievement. Additionally, a measure of traditional reading comprehension was also found to be a good predictor for students' online reading comprehension. Each of these significant predictor variables is discussed in the following sections.

Students' access to the Internet inside school. Students' access to the Internet inside school, a factor associated with a primary level digital divide, was shown to be the strongest

significant predictor for students' online reading comprehension achievement; therefore it is an important factor to pay attention to. The results of this study indicate that differential patterns in Internet access between economically privileged (i.e. high DRG) schools and economically disadvantaged (i.e. low DRG) schools may indeed contribute to differential patterns in Internet reading skill. That is, decreased levels of Internet access inside school would result in decreased levels of Internet reading skill, thus contributing to a tertiary level digital divide.

Previous research indicates that wealthier schools are twice as likely to have Internet access compared to poorer schools (Mack, 2001). Additional studies also showed schools that serve the poorest, largely minority populations of students have less computer equipment available and slower Internet connections than schools that serve more affluent populations (Attewell, 2001; Goslee & Conte, 1998; Williams, et al., 2000). This trend was also found in the current study. Schools in low DRG districts reported fewer moderate to high-powered computers than schools in high DRG districts (CSDE, 2006b). Results from the interviews and focus groups also documented this difference. Teachers and students in low DRG districts reported lower levels of access to Internet-connected computers and other digital technologies compared to teachers and students in high DRG districts. Additionally, issues regarding the speed of the Internet and age of the equipment by individuals in low DRG districts were markedly different than what was reported by participants from high DRG districts in which these issues were absent from interviews and focus group discussions. Data from the observations confirmed these reports. The availability and accessibility of Internet connected computers in high DRG districts was much greater than in low DRG districts, especially within instructional classrooms.

Recent reports indicate that 98 percent of the public schools in Connecticut and 100 percent of high poverty schools in Connecticut are connected to the Internet (CABE, 2005; EPE Research Center, 2003). Reports also show that 90 percent of instructional rooms nationwide have Internet connections (Kleiner & Lewis, 2003). These reports may provide accurate data points, but the findings from the current study illustrate that issues of Internet access are more

complex than simply having an Internet connection available. For example, School F located in Urbantown reportedly has an Internet connection in every classroom, but interviews with administrators and teachers in that school revealed that every classroom did not have a functioning computer. Also, in Urbanville, staffing cuts have eliminated access to the Internet in two schools in which the computer labs were closed. In the third school in Urbanville, SMART Boards™ are provided in every classroom, yet they remain untouched because the teachers have not been trained to use them. These findings reveal that access to an Internet connection inside school can be a complex issue compounded by many different variables.

Students' access to the Internet outside school. In regard to Internet access outside school, many studies have looked at differences in Internet access between economically privileged and economically disadvantaged households (Attewell, 2001; Bronack, 2006; Compaine, 2001; Hoffman & Novak, 1998; NTIA, 1999; Lazarus, et al., 2005; Lenhart, et al., 2003; US Department of Commerce, 1995, 1998, 1999, 2000, 2002). Research has documented that poorer households have lower penetration rates of computers and the Internet compared to more affluent households (Attewell, 2001; Compaine, 2001; Hoffman & Novak, 1998; US Department of Commerce, 1995, 1998, 1999, 2000, 2002). The current study echoes these findings. In this study, 97.9 percent of the students from economically privileged (i.e. high DRG) school districts reported a computer at home compared to 83.4 percent of the students from economically disadvantaged (i.e. low DRG) school districts. This may not appear to be a significant difference; however, providing “on demand” access to the Internet is increasingly important for today’s youth. Internet access provided by public locations, such as libraries and community centers, is not the same as being able to access the Internet from home whenever it is needed (Norris, 2001). Access to digital technologies and the Internet at home has emerged as a critical factor for children to take full advantage of their education since students are using computers and the Internet to complete homework and research projects (Lazarus, et al., 2005).

The results from this study also found another dimension to issues of Internet access at home. A more distinct difference in regard to Internet access outside school between students from high DRG and low DRG districts may be in the numbers of Internet connected computers that students have access to at home. Students from high DRG districts reported greater numbers of computers in their homes compared to students from low DRG districts. Results from the DDMS-S showed 32.4 percent of the students in high DRG districts and only 7.6 percent of students in low DRG districts reported *3 or more* Internet connected computers at home. The majority of students from low DRG districts (63.6%) reported only one Internet connected computer at home, whereas the majority of students from high DRG districts (62.4%) reported at least two Internet connected computers at home. The lower numbers of Internet connected computers at home for students in low DRG districts may be compounded by an additional contextual factor discovered during the focus group discussions. This factor was described as *computer sharing*. Students in low DRG districts reported higher levels of computer sharing at home with parents and siblings than those from high DRG districts. Thus, Internet access for students in low DRG districts was restricted further.

Students Internet use outside school. Students' use of the Internet outside school was a significant predictor of students' online reading comprehension. The findings in this study showed differential Internet use patterns between students from high DRG and low DRG districts, which indicates a secondary level digital divide that may contribute to the tertiary level digital divide that was discovered. Data from the DDMS-S showed a larger proportion of students from low DRG districts who reported that they *never* use the Internet outside school (7.2%) compared to students from high DRG districts (less than 1.0%). Additionally, nearly half of the students from high DRG districts (47.9%) reported that they use the Internet *several times a day* outside school compared to only 28.2 percent of the students from low DRG districts. Aside from these differences in the frequency of Internet use, differences were also discovered in relation to the types of Internet activities students engage in outside school.

Previous research has shown that teenagers use the Internet most often for email, playing online games, and visiting websites about movies, TV shows, music groups, or sports stars (Lenhart, et al., 2005). Similar patterns were documented in this study by the DDMS-S and during the focus group discussions. However, a distinct difference was shown between students in high DRG districts and those in low DRG districts in regard to using the Internet for educational purposes. More students from high DRG districts reported using the Internet outside school to complete research projects and homework assignments as well as accessing teacher's web sites. These findings are supported by previous research that indicates the way in which students use the Internet is largely driven by the activities and assignments that their teachers create (Levin & Arafeh, 2002). The interviews and focus groups in this study indicated that teachers from high DRG districts use the Internet for more diverse Internet based activities than teachers from low DRG districts, who often rely on computers for the development of basic reading and math skills, not Internet-based activities. In addition, students from high DRG districts were expected to use the Internet outside school since homework assignments, rubrics, and other such documents were provided to students through the use of teacher web sites. These findings show that Internet use outside school by students is largely an extension of Internet use inside school. Thus, a chain-reaction effect may be realized to decrease the tertiary level digital divide. By changing the differential patterns for Internet use inside school, the differential patterns for Internet use outside school may follow. Increased levels of Internet use outside school might then result in an increase in online reading comprehension scores since Internet use outside school was found to be a significant predictor for students' online reading comprehension achievement scores.

Measure of traditional reading comprehension. Average school scores for reading comprehension as measured by the Connecticut Mastery Test, a traditional measure of reading comprehension, were shown to be significant predictors of online reading comprehension. Historically, research has shown an achievement gap in our nation between economically

privileged students and economically disadvantaged students, especially in literacy achievement (Anderson, 1993; Kleiner & Lewis, 2003; Kozol, 1991; Lee & Croninger, 1994; Rothstein, 2004). Since traditional reading strategies are still required to provide a basic foundation for online reading comprehension (Coiro, 2003; IRA, 2001; Leu, et al., 2004; RAND Reading Study Group, 2002), it was predicted that traditional reading comprehension would have an effect on a measure of online reading comprehension.

Teachers' online reading comprehension achievement. Since this research study was the first to measure teachers' online reading comprehension achievement, it was difficult to determine whether teachers' scores on this measure would have an effect on students' online reading comprehension achievement scores. A positive correlation was expected between students' and teachers' Internet reading skill that would show higher online reading comprehension achievement scores for teachers correlated with higher online reading comprehension achievement scores for students. However, results of the HLM analyses showed evidence of an unexpected, negative effect between teachers' and students' online reading comprehension achievement scores. Follow-up analyses did indicate a positive correlation between teachers' and students' online reading comprehension achievement scores in economically privileged (i.e. high DRG) school districts. But, there was a negative correlation between teachers' and students' online reading comprehension achievement scores in economically disadvantaged (i.e. low DRG) school districts. Additional exploration found that differences between teachers' online reading comprehension achievement scores from both high DRG districts, Suburbantown and Suburbanville, and scores for teachers' from Urbanville were non-significant. Conversely, differences between students' online reading comprehension achievement scores from both high DRG districts, Suburbantown and Suburbanville, and scores for students' in Urbanville were significant. In other words, teachers in Urbanville appear to have online reading comprehension achievement scores that are similar to the scores for teachers in high DRG districts, but students in Urbanville do not have similar online reading comprehension

scores to the scores for students in high DRG districts. In fact, the students from Urbanville had the lowest mean scores overall.

A number of factors may contribute to this finding. First, interviews with teachers and administrators indicated that the computer labs in the schools in Urbanville are no longer staffed due to budget cuts. In two of the schools, the labs have been closed altogether because of issues with vandalism. In the third school, which houses brand-new, state of the art technology equipment, the primary use of the labs is for rote reading and mathematics practice using various software programs and textbook publisher websites. Also, teachers reportedly have not been trained to use the technology that is present within their classrooms or the computer labs (e.g. SMART Boards™). Therefore, it seems that students have little access to and minimal uses for the technology in their schools. Secondly, the results of the interviews and focus group discussions indicated that schools in low DRG districts are not teaching the online reading comprehension strategies that are required when using the Internet, which was also seen in the analyses of the artifact documents. Very little literacy and technology integration was found within the documents from the low DRG districts.

These factors still do not explain why the teachers in Urbanville have similar Internet reading skills to teachers in the two high DRG districts. There are several possible explanations for this. First, participation rate by teachers in Urbanville was low compared to the other three districts. The teachers who did respond to the measurement scale may be atypical of the teachers from low DRG districts. Also, the measurement scale did not include demographic variables related to age or years of teaching experience. It is possible that the teachers who participated in this study from Urbanville are newer teachers who might be considered “digital natives” and, therefore, are more accustomed to using the Internet on a regular basis. Finally, neither the measurement scale nor the interviews approached the topic of teacher preparation programs or teacher certification in relation to technology standards. All of these unexplored variables could help explain the performance level of the teachers from Urbanville.

Interpretation of Non-significant Predictor Variables Related to Students' Online Reading Comprehension Achievement Scores

Additional variables that were expected to be good predictors of students' online reading comprehension achievement were not significant in the models that were tested. These variables included: (a) students' access to a broadband Internet connection, (b) students' Internet use inside school, and (c) district reference group (DRG) classification. Possible explanations for these results are presented and discussed.

Students' access to a broadband Internet connection. In relation to students' access to a broadband connection, research has indicated that this is an important element of a primary level digital divide that deserves attention (Cooper, 2004; Nielsen/Net Ratings, 2006). The lack of significance for this variable may be explained in two ways. First, the item on the measurement scale that measured students' access to a broadband connection included an option for students who were not sure of whether they had broadband Internet access or not. Nearly a third of all students (31.7%) reported *I Don't Know* when asked what type of Internet connection they have at home. Also, during the administration of the measurement scale, students frequently asked for clarification in regard to this item. Students often did not recognize the terminology for *Telephone Dial Up*, which often required an explanation by the administrator of the measurement scale to the respondents. Secondly, more recent research that shows the penetration rate of home broadband access in the United States increased by 40 percent over the course of one year, March, 2005 to March, 2006 (Horrigan, 2006) may provide insight into the lack of significance for this variable. Horrigan also reported that home broadband penetration grew by 121 percent for African Americans. For these two reasons, the absence of a significant effect from broadband Internet access on students' online reading comprehension achievement seems plausible.

Students' Internet use inside school. The second variable that was not a significant predictor of students' online reading comprehension achievement was students' Internet use inside school. There may be two reasons why this finding was discovered. First, previous

research indicates that Internet use inside school does not remotely resemble the type of activities that students engage in outside school (Gross, 2004; Hay, 2000; Levin & Arafeh, 2002). In fact, students in one study reported that Internet-based assignments from their teachers were boring (Levin & Arafeh, 2002). Secondly, focus group discussions with students in this study indicated that the majority of school-based Internet use focused on research projects. In conducting research, students reported that teachers most often provide them with websites to use to gather information about the topic they are researching. With teachers providing links to specific websites, students are not required to use strategies for locating information or critically evaluating information from the Internet. So, although students may indicate they use the Internet inside school, they type of Internet use obviously plays a role in the development of online reading comprehension achievement.

District Reference Group classification. Finally, the third variable that did not show a significant effect on students' online reading comprehension achievement was most surprising. The expectation was that district reference group classification (DRG) would have the largest effect on the outcome variable, students' online reading comprehension achievement. The unequal participant rate for the two school districts designated as low DRG districts may be the reason for this result. The low participation rate of students from Urbanville may have contributed to this lack of effect. Classroom observation and interview data from Urbanville showed that technology is rarely used in the building due to budget constraints and vandalism of computer equipment. Conversely, classroom observations and interview data from Urbantown indicated that technology integration was included in many aspects of instruction throughout the school building whenever possible. Since the majority of the respondents from low DRG districts were from Urbantown, the results of the measurement scale in relation to Internet use inside school may be somewhat inflated. Even so, a post hoc analysis did show significant differences between high DRG and low DRG districts in relation to Internet use.

Discussion of Research Question Four

The fourth research question investigated what variables accounted for the most variability in teachers' online reading comprehension achievement in terms of a more complex conception of the digital divide, which included elements of Internet access, Internet use, and Internet reading skill. A multilevel analysis, or hierarchical linear modeling (HLM), was used to explore what variables account for differences in online reading comprehension achievement between teachers in economically privileged school districts compared to those in economically disadvantaged school districts. Using 2-level HLM models, three independent variables were identified as statistically significant predictors of teachers' online reading comprehension achievement at the .05 level and include: (a) teachers' access to the Internet outside school, (b) teachers' Internet use outside school, and (c) district reference group classification.

Interpretation of Significant Predictor Variables Related to Teachers' Online Reading Comprehension Achievement Scores

Teachers' access to the Internet outside school. Teachers' access to the Internet outside school was a significant predictor for teachers' online reading comprehension scores. As previously reported, many studies have looked at differences in Internet access between affluent and poorer households (Compaine, 2001; Hoffman & Novak, 1998; Norris, 2001). However, the home residency of the teacher participants in this study is unknown. It is possible that some of the teachers who are employed in economically privileged school districts reside in affluent communities. This lack of information makes it difficult to draw generalizations from previous research. The research literature is void of studies that look specifically at teachers' access to the Internet outside school. The current study provides a starting point for research in this area. Since this aspect of a primary level digital divide is shown to be a significant predictor for students' online reading comprehension achievement scores, it is a research area worthy of future exploration.

Teachers' Internet use outside school. Teachers' Internet use outside school was also shown to be a significant predictor for teachers' online reading comprehension achievement scores. This finding may provide important insights about the tertiary level digital divide. To date, there have been no research studies that look specifically at teachers' use of the Internet outside school making this finding difficult to interpret. The results of interviews and focus group discussions showed that teachers in high DRG districts are utilizing more Internet based activities inside school compared to teachers from low DRG districts. Also, on the DDMS-T, greater numbers of teachers from high DRG districts indicated that they use the Internet to help them prepare for lessons compared to teachers from low DRG districts. These results may suggest that teachers in high DRG districts are using the Internet at home more for lesson preparation.

District Reference Group classification. District Reference Group classification was expected to be a significant predictor for teachers' online reading comprehension achievement as previous studies have shown inequalities in the availability of computers and the Internet between schools located in affluent communities compared to those in poorer communities (Attewell, 2001; Goslee & Conte, 1998; Mack, 2001; Lazarus, et al., 2005). District reference group classification turned out to be the strongest predictor for teachers' online reading comprehension achievement scores. Results of the interviews and focus group discussions indicated that schools in low DRG districts do not focus on teaching strategies for the development of Internet reading skills; therefore, this result is not surprising. If teachers in low DRG districts are not required to teach Internet reading skills, then they are most likely not going to develop online reading skills themselves. In contrast, teachers in high DRG districts are teaching their students strategies for reading on the Internet, which would indicate that they are developing these skills themselves. Until all schools begin to focus on instruction that includes Internet reading skills, a tertiary level digital divide may be inevitable.

Interpretation of Non-significant Predictor Variables Related to Teachers' Online Reading Comprehension Achievement

Additional variables that were expected to be good predictors of teachers' online reading comprehension achievement were not significant in the models that were tested. These variables included: (a) teachers' access to the Internet inside school, (b) teachers' access to a broadband Internet connection, and (c) teachers' Internet use inside school. Possible explanations for these results are presented and discussed.

Teachers' access to the Internet inside school. In relation to teachers' Internet access inside school, interviews with teachers indicated that Internet access was the most inhibiting factor to Internet integration across all the research sites. There was no difference reported between teachers from high DRG and low DRG districts. This finding may be the reason that Internet access inside school was not a significant predictor for teachers' online reading comprehension scores. Another possible explanation for this lack of significance may be in the design of the measurement scale. Unlike the measure for Internet access outside school, access to the Internet inside school was measured using a more general interpretation for access, whereas Internet access outside school was more specific.

Teachers' access to a broadband Internet connection. In relation to teachers' access to a broadband Internet connection, research has indicated that this is an important element of a primary level digital divide as previously mentioned (Cooper, 2004; Nielsen/Net Ratings, 2006). Contrary to the results of the students' access to a broadband Internet connection, only a small proportion of teachers (1.8%) reported *I Don't Know* when asked what type of Internet connection they have at home. The number of teachers who reported they do have access to a broadband connection at home may explain the lack of significance for this variable. Results of the DDMS-T showed that 92.1 percent of the teacher respondents reported access to a broadband Internet connection. Since the majority of teachers reported this access, it is unlikely that a significant effect for this variable on teachers' online reading comprehension achievement would be found. Secondly, as previously presented, the increased penetration rate of home broadband

access in the United States (Horrigan, 2006) seems to be illustrated by the results of this study in the number of teachers who reported access to a broadband Internet connection.

Teachers' use of the Internet outside school. Since there is no research base that looks specifically at teachers' use of the Internet outside school, the third variable that did not show significant effects on teachers' online reading comprehension achievement may be more difficult to explain. One might claim that teachers' use of the Internet outside school is likely to focus on more personal and social purposes that do not include aspects of online reading comprehension. Results from the DDMS-T indicated that 74.5 percent of teachers in this study use the Internet outside school at least once per day. The most frequent activity they report on the Internet is using email with 73.7 percent of teachers reporting that they use email at least once per day. The next two most frequent activities reported by teachers are reading about things that interest me (33.8%) and reading online newspapers (29.5%). Less than 5 percent of the teachers reported they read about information related to specific school subjects at least once per day. Hence, conclusions may be drawn that teachers use the Internet outside school for different purposes that do not require the elements of online reading comprehension that were focused on in this study resulting in a non-significant effect of teachers' Internet use outside school.

Limitations

Two main limitations were documented in relation to the results of the HLM analyses. First, the two measurement scales did not ask specifically whether Internet access was available at school as they did in regard to home Internet access. The items related to Internet access in school were more general in nature. For example, one item provided a checklist of several places in which respondents indicated where they use the Internet. Within this checklist, *school* was one of several options that could be selected. The second item that measured an element of Internet access at school required respondents to indicate where they use the Internet most often among three options, *home*, *school*, or *someplace else*. Both measurement scales would be more useful if they contained questions that focused directly on the availability of Internet access at school. For

example, two questions that may provide more useful data in relation to Internet access inside school include: (a) Can you access the Internet at school? and (b) Can you access the Internet in your classroom?

Second, although participant populations for both students and teachers were nearly equal from high DRG (about 52 percent) and low DRG districts (about 47 percent), the response rates by district were somewhat unequal. For example, students from Suburbantown comprised 16.8 percent of the responses for high DRG districts with more than twice as many participants from Suburbanville enrolled in the study (35.8%). Similarly, students from Urbantown included 36 percent of the participants from low DRG with Urbanville providing less than half that participation rate at 11.4 percent. Teachers from Suburbantown comprised 21.2 percent of the high DRG teacher participants with Suburbanville teachers making up 31.7 percent of the sample population from high DRG districts. Finally, teachers from Urbantown represented 42.1 percent of those from low DRG districts with only 5 percent of the teachers from Urbanville, which may explain the inverse effect of teachers' online reading comprehension achievement on students' online reading comprehension achievement scores. Since both student and teacher responses on the measurement scales from Urbanville were minimal, the results should be carefully interpreted until additional data that supports the findings reported here can be substantiated.

Summary of Findings from the Qualitative Analyses

Discussion of Research Question Five

The final research question investigated the contextual factors that appear to contribute to the pattern of factors that effect online reading comprehension for both students and teachers. A content analysis of interview and focus group transcripts along with a semantic map analysis of the artifacts collected from each district indicated that several contextual factors are important to consider when looking at literacy and technology integration in middle schools.

Contextual Variables that Contribute to a Primary Level Digital Divide

Results showed that issues of access to computers and the Internet were the most critical factors for the integration of the Internet in classroom instruction. This seems to be especially true for teachers in economically disadvantaged school districts where Internet access in the classroom is sometimes non-existent as discovered in one of the schools in Urbantown. This finding is supported by previous research that identifies Internet access in classrooms as one of the biggest challenges for technology integration facing teachers (Attewell, 2001; Goslee & Conte, 1998; Mack, 2001; Williams, et al., 2000).

Contextual Variables that Contribute to a Secondary Level Digital Divide

Internet use appeared to vary greatly between schools where some schools, those in economically privileged (i.e. high DRG) districts, focused on meaningful Internet activities as part of the curriculum and others, in economically disadvantaged districts (i.e. low DRG), used the Internet primarily for skill and drill type activities. During interviews with teachers, those in high DRG districts discussed Internet activities that they created for their students including Internet web quests and scavenger hunts. Data from classroom observations in high DRG districts confirmed these reports in that one group of students was engaged in a webquest about women's suffrage as part of a social studies class, and a science class was finishing up a research project that included the evaluation of websites to determine good Internet resources. In contrast, classroom observations in low DRG schools showed students using computers to play math games located on a publisher's website for the district's math series, and one entire computer lab was dedicated to students using the Accelerated Reader program to develop traditional reading comprehension skills.

Additional themes that appeared to have a small impact on elements of Internet use included Internet safety, cyberbullying, and plagiarism. These three inter-related factors were common between economically privileged (i.e. high DRG) and economically disadvantaged (i.e. low DRG) school districts. Issues associated with Internet safety were addressed more in the

forefront in high DRG districts compared to low DRG districts. Flyers and posters related to Internet safety donned the hallways of schools in high DRG districts. During focus group discussions, students in high DRG schools discussed specific lessons that were taught in relation to Internet safety. These lessons appeared to be absent from instruction in low DRG districts. Focus group discussions also provided information about cyberbullying. All of the students (from both high and low DRG districts) reported examples or awareness of cyberbullying that had occurred between students within their school. This seemed to be a prevalent theme in all of the schools in this study. Finally, students from high DRG schools reported that their teachers provide specific guidelines to prevent plagiarism from the Internet. Although students from low DRG districts indicated that plagiarism was something they should be aware of, they did not report that teachers provided specific examples or ways to prevent plagiarism.

Contextual Variables that Contribute to a Tertiary Level Digital Divide

Internet reading skill level was another factor that had implications for literacy and technology integration with differences between economically privileged and economically disadvantaged school districts. Teachers and students in economically privileged (i.e. high DRG) districts reported that skills for using the Internet as an information resource are directly taught, whereas they were not reported to be part of instruction in economically disadvantaged (i.e. low DRG) districts. During interviews and focus group discussions, both teachers and students from high DRG districts reported that strategies for critically evaluating websites were part of the curriculum. Also, specific search strategies were taught to help students with their proficiency at locating information on the Internet. Interviews and focus group discussions in low DRG districts indicated that no specific skills were taught in relation to using the Internet. This factor appeared to be directly related to professional development opportunities that provide training for teachers. In high DRG districts, during interviews with teachers it was discovered that the district provided previous professional development that focused on the new literacies of online reading

comprehension. Professional development that focused on Internet integration was found to be absent in low DRG districts.

Public policy, the No Child Left Behind legislation specifically, had varied implications for Internet integration between economically privileged (i.e. high DRG) and economically disadvantaged (i.e. low DRG) districts. Interviews with administrators and teachers in low DRG districts indicated that NCLB legislation required them to focus wholly on meeting adequate yearly progress. This fact prevented them from being able to look at technology or Internet integration in the curriculum. In contrast, administrators and teachers from high DRG districts indicated that NCLB legislation had no impact whatsoever on their ability to integrate the Internet into classroom instruction. Effects of NCLB also seemed to be related to student assessments that were a common theme in low DRG districts but not in high DRG districts. For example, teachers in low DRG districts reported that computers were often used to evaluate students' math and reading skills using specific software programs. Then, reports from these programs were used to inform instruction and remedial services for these students. None of the teachers in high DRG districts reported that computers were being used for computer-based assessments.

Limitations

Two main limitations may impede the generalizability of the results of the qualitative analyses. First, the participation rate for teacher interviews and student focus groups in Urbanville are problematic. Only one teacher participated in the interviews from Urbanville. Although three administrators completed interviews, having only one teacher interview makes it difficult to validate the results. The results of the one teacher interview may not be indicative of the context within the other two schools in this district. Also, focus groups were not conducted in Urbanville due to lack of participation. Therefore, interpretations of these results should be cautionary.

Second, analyses of the artifact documents using a windowing technique may have skewed the results. By limiting the proximity map analyses to concepts on a single page, connections between concepts at the bottom of one page and the top of the next page would not

be documented. Thus, important connections between literacy and technology may have been overlooked.

Implications for Future Research

The results of this study have important implications for future research. First, research to further validate the two measurement scales could be conducted. Although the psychometric properties of these scales may be improved through further refinement, they provide a useful starting point to begin to think about the implications that factors associated with primary level (i.e. Internet access), secondary level (i.e. Internet use), and tertiary level (i.e. online reading comprehension achievement) digital divides may have for students and teachers around the nation. Further research that collects additional data with these two measurement scales would provide an opportunity to conduct further analyses (e.g. confirmatory factor analysis) and validate these measurement scales for populations outside the participants enrolled in this study. That line of research would result in two solid measurement scales that seek to measure three aspects of the digital divide in middle school contexts that could be used in additional studies.

Many past studies have focused on measuring elements of Internet access and the use of information communication technologies (ICT) among various populations as indicators of a primary level digital divide (e.g. Barzilai-Nahon, 2006; Cooper, 2004; Fairlie, 2005; Lazarus, et al., 2005; Norris, 2001; U.S. Department of Commerce, 1995, 1998, 1999, 2000, 2002). Additional studies have focused on differential patterns of Internet use, referred to as a secondary level digital divide (e.g. Attewell, 2001; Dewan & Riggins, 2005; Hargittai, 2002a, 2002b). Finally, numerous studies have also looked at the use of digital technologies within schools (e.g. Anderson & Ronnkvist, 1999; Becker, 1999; Bronack, 2006; Coley, et al., 1997; Collis & Lai, 1996; Kleiner & Farris, 2002; Kleiner & Lewis, 2003; Levin & Arafah, 2002; Metiri, 2006; Murray, 2002; Parsad & Jones, 2005; Rowand, 2000; Smerdon, et al., 2000). The measurement scales developed for this study may very well be the first of their kind and useful to other researchers.

Although many studies have looked at the implications for teachers' use of computers in the classroom (Collis & Lai, 1996; Kleiner & Farris, 2002; Lenhart, et al., 2005; Levin & Arafeh, 2002; Metiri Group, 2006), a measurement scale specific to teachers' Internet access and use appears to be a new aspect of measuring elements of the digital divide not previously studied. No measurement scale has appeared in the research literature that seeks to measure both students' and teachers' online reading comprehension achievement in relation to issues associated with the digital divide. Only a few studies have looked at online reading comprehension achievement among students (Coiro, 2007; Coiro & Dobler, 2007; Leu, et al., 2005; Leu & Reinking, 2005). However, as reported previously, there are no studies to date that look specifically at differences in online reading comprehension achievement between students and teachers from economically privileged and economically disadvantaged school districts. This study sought to fill that void and provide a springboard for additional research studies in the future.

Finally, this research was designed as an exploratory study to provide a more complex conception of the digital divide, which includes elements of Internet access, Internet use, and Internet reading skill. Although significant findings were reported on these three levels of the digital divide in Connecticut, a replication of this study in other states would provide data to show whether this is an issue specific to the state of Connecticut or if issues of a tertiary divide exist throughout our nation.

The qualitative portion of this mixed-method study sought to provide insights regarding the contextual factors that might impede or enhance the development of online reading comprehension achievement in both middle school students and teachers. However, the current study provides merely a snapshot of the contextual factors that appear to effect online reading comprehension. Research that would provide a more in-depth understanding of the digital divide in relation to the teacher population would be beneficial. A case study approach that focuses on comparisons between a school located in a high DRG district to one located in a low DRG district may provide additional insights into the contextual factors that contribute to or impede literacy

and technology integration and the development of online reading comprehension achievement. This type of study would allow documentation of teacher skill level and integration of technology on a regular basis to better understand the role of the teacher as well as additional contextual factors that appear to create differences in students' online reading comprehension achievement resulting in a tertiary level digital divide.

Implications for Classroom Practice

The results from this research study have important implications for classroom practice. The two measurement scales developed for this study may be useful tools for schools in three different ways. First, the measurement scales could be used to assist with technology planning and school improvement plans. Second, they could provide insights for curriculum development. And, finally, they could be used to help inform classroom instruction.

Technology Planning and School Improvement Plans

Administration of both the DDMS-S and DDMS-T would provide schools with invaluable data about students' and teachers' Internet access, Internet use, and online reading comprehension achievement. The results of these two measurement scales could be used to help inform the development of technology plans and school improvement plans.

The results of the measurement scales would indicate the extent to which both teachers and students rely on Internet access at school. Research has shown that more than 90 percent of schools report an Internet connection in every instructional room (Kleiner & Lewis, 2003). However, teachers report access to computers and the Internet as the most inhibiting factors for technology integration (Henry, 2005; Lazarus, et al., 2005; Williams, et al., 2000). The results from teacher interviews in this study showed that accessibility of technology was a problem for all the participants regardless of their district classification. In several schools, computer labs, laptops, and projection devices were available on a "first come, first served" basis and often were reserved several weeks in advance. Thus, access to the Internet was limited. By having a better

grasp on students' and teachers' reliance of the Internet at school, technology plans and school improvement plans could be revised to meet their current needs.

Data from the measurement scales would also provide schools with guidance in making decisions about professional development opportunities. Based on the results of the teachers' online reading comprehension achievement scores, schools would be able to determine what type of training teachers required to develop their own skills with technology integration and elements of online reading comprehension specifically. Since research has shown that only one-third of teachers felt adequately prepared to integrate computers and the Internet into classroom instruction (Smerdon, et al., 2000), this is an important skill area for schools to pay attention to. Additionally, results from teacher interviews in this study showed that schools have not offered professional development opportunities specific to technology and Internet integration in the past two years. The majority of the professional development has focused on training for specific software programs that focus on administrative tasks such as attendance and grading. Professional development focused on skills and strategies for developing online reading comprehension would better prepare teachers to integrate technology in their lessons thus improving their students' skills in regard to online reading comprehension.

Curriculum Development

By looking at the data that reports students' and teachers' Internet use inside school, schools may be able to determine where holes exist in their curriculum in regard to technology and Internet integration. Schools would be able to determine where low levels of frequency occur (e.g. use of the Internet to read about science or math), and then revise their curriculum to include more Internet-based reading in those particular content areas. This would be especially helpful for districts that seek to integrate technology throughout the curriculum. Additionally, content area teachers that show high levels of Internet use could be paired with teachers that show low levels of Internet use to develop interdisciplinary units. This would help improve the level of Internet integration across all curricular areas.

Classroom Instruction

Knowing about students Internet access can help teachers better understand which of their students have ready access to the Internet outside school and which students do not. This is important information when teachers plan to have students complete a research project or other assignment that may require the use of the Internet as an information resource. With the information provided by the DDMS-S about students' Internet access outside school, teachers can be better informed about which students may need an increased level of Internet access at school. In a previous study (Leu & Reinking, 2005), teachers indicated that they did not assign homework that required the use of the Internet because they believed that the majority of their students did not have Internet access at home. Results showed that more than 50 percent of the students reported Internet access at home, which was a surprising result to the teachers (IRRG & NLRT, 2006a). Therefore, knowing about students' Internet access can help teachers make more informed decisions about classroom instruction.

Since the measurement scales are comprised of distinct sections, the 14 items that measure online reading comprehension could easily be separated into a useful measure to inform classroom instruction. Teachers could measure their students' online reading comprehension achievement to determine which aspects of locating information and critical evaluation of information should be the focus of classroom instruction. These 14 items could also be used as useful instructional tool in the classroom to teach these elements of online reading comprehension. Finally, the measure of online reading comprehension could be used as pre- and post- assessments to measure growth in student performance following instruction focused on elements of locating and evaluating information on the Internet.

Knowing how students use the Internet both inside and outside school can help teachers when assigning students to collaborative groups. In previous research, teachers reported that it was difficult to integrate technology when their students different levels of proficiency with using technology (Henry, 2005). The results from the DDMS-S would provide teachers with

information about which students were more skilled and which students were less skilled. Then, teachers could easily pair or group students together with high and low skill levels for reading on the Internet. This grouping technique would provide opportunities for students to support one another during the specific learning activity.

Implications for Public Policy

The No Child Left Behind (NCLB) Act of 2001 (DOE, 2002), which was designed in large part to close the achievement gap in reading in our nation, may unknowingly be increasing the achievement gap between students in economically privileged (i.e. high DRG) districts and those in economically disadvantaged (i.e. low DRG) districts (Leu, 2007). Previous research has argued that because of low patterns of offline reading performance in urban, largely minority districts, these districts face greater pressure to achieve adequate yearly progress on tests that have nothing to do with online reading (Leu, et al., 2002). As a result, they must focus complete attention on the instruction of traditional literacies, abandoning any instruction in the new types of reading comprehension skills required on the Internet. This study may provide initial data that point to these implications of NCLB legislation and the impact on students' and teachers' online reading comprehension achievement, what is being identified in this study as a tertiary level digital divide.

The results of this study show that there is a contrast between high DRG and low DRG districts in relation to the impact that NCLB legislation has on teachers' use of the Internet for instruction. Teachers and administrators from high DRG districts indicated that there was little or no impact on their ability to integrate the Internet into their classroom instruction. In contrast, teachers and administrators from low DRG districts indicated that the pressure of increasing test scores to meet adequate yearly progress has made technology integration less of a priority. This finding supports what The New Literacies Research Team (NLRT, in press) calls the "cruellest

irony of NCLB in that students who need to be prepared the most for an online age of information are precisely those who are being prepared the least” (p.2).

Although other legislation has been introduced (e.g. The National Digital Empowerment Act [NDEA, 2000] and The Department of Education Technology Plan [DOE, 2004]), these policies seem to be overshadowed by a focus on NCLB and the attainment of adequate yearly progress. What is needed is public policy that focuses on bridging the digital divide and improving education as a single issue (Carvin, 2002). Public policy initiatives need to help schools with the development of educational programs that include effective and meaningful integration of literacy and technology in the curriculum with a focus on the skills that are required to develop online reading comprehension achievement.

Since reading on the Internet requires higher levels of reading, it would be expected that the development of these higher-level reading skills would have positive effects on the development of traditional reading achievement (Leu, et al., 2005). In addition, learning opportunities that teach students how to use the Internet effectively will help prepare students with the reading and job skills that are required in the 21st century (Carvin, 2002; Gates, 2007). Public policy initiatives that ensure educators have the opportunity to take advantage of the technology available to them and the skills required to help their students develop the new literacies of online reading comprehension may be more critical than ever to close the achievement gap that continues to grow between economically privileged and economically disadvantaged students.

Concluding Remarks

Previous research has looked extensively at issues associated with differences in Internet access based on socioeconomic factors often referred to as a social digital divide (Norris, 2001). More recently, research has turned to issues associated with differences in Internet use between various populations that has become known as a secondary level digital divide (Attewell, 2001; Dewan & Riggins, 2005; Hargittai, 2002). Research has also looked at both Internet access and

technology use within school settings (Collis & Lai, 1996; Kleiman, 2000; Lazarus, et al., 2005; Levin & Arafeh, 2002; Malone, 2007).

This study was framed around three central issues: changing definitions of literacy, Internet use in schools, and a more complex definition of a digital divide. At their intersection is a complex trajectory for the direction education should move in the future. Unless these issues are addressed, our students may not reach their full potential and will not be prepared for their later roles in a knowledge economy. Our students are not being prepared with the skills that they will require to succeed as effective citizens, workers, and leaders in the 21st century (Gates, 2007; Mack, 2001; Partnership for 21st Century Skills, 2006). Our public schools still focus on an industrial-age learning model based on an agricultural timetable (Gates, 2007; Paige, 2002). Not only do our children need ready access to the Internet, but also they need the knowledge and skills for using the Internet to be productive, digital citizens.

It is an interesting irony that a century of educational research has yet to produce an adequate research base to systematically inform instruction, public policy, teacher education, and assessment (Donovan, Bransford, & Pellegrino, 1999; Bransford, Brown, & Cocking, 2000; Shavelson & Towne, 2002). Nowhere is this more visible than at the crossroads of literacy and technology. Over a billion dollars has been spent in the United States on developing a computer-based infrastructure in our education system (Jukes & McCain, 2005). However, to many observers our schools are not better equipped for including technology in the curriculum (Oppenheimer, 2003), our teachers do not possess adequate skills for integrating technology across all subject areas (CEO Forum on Education & Technology, 1999; Madden, Ford, Miller, & Levy, 2005), and our students are not developing the skills and strategies required to be successful consumers of information accessed through networked technologies (Cuban, 2001). This may be especially true for those students who require our support the most—those who have access to the Internet the least.

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Appendix A

The National Digital Empowerment Act

106th CONGRESS

2d Session

S. 2229

To provide for digital empowerment, and for other purposes.

IN THE SENATE OF THE UNITED STATES

March 9, 2000

Ms. MILULSKI (for herself, Mr. KENNEDY, Mr. BINGAMAN, Mr. LEVIN, Mr. SARBANES, Mrs. MURRAY, Mrs. LINCOLN, Mrs. BOXER, Mr. JOHNSON, Mr. KERRY, Mr. DURBIN, Mr. HOLLINGS, Mr. REID, Mr. ROCKEFELLER, Mr. BREAUX, Mr. DORGAN, Mr. TORRICELLI, Mr. BAUCUS, Mr. DODD, Mr. CLELAND, and Mrs. FEINSTEIN) introduced the following bill; which was read twice and referred to the Committee on Finance

A BILL

To provide for digital empowerment, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE- This Act may be cited as the 'Digital Empowerment Act'.

(b) TABLE OF CONTENTS- The table of contents of this Act is as follows:

Sec. 1. Short title; table of contents.

Sec. 2. Purposes.

Sec. 3. Findings.

Sec. 4. Definitions.

TITLE I--ONE-STOP SHOP FOR TECHNOLOGY EDUCATION

Sec. 101. One-stop shop for technology education.

Sec. 102. National repository of effective uses of educational technology.

TITLE II--DIGITAL EDUCATION

Sec. 201. National challenge grants for technology in education.

Sec. 202. Local uses of funds.

Sec. 203. Additional requirement for local applications.

Sec. 204. Teacher training.

TITLE III--EXPANSION OF UNIVERSAL SERVICE ASSISTANCE

Sec. 301. Additional uses of universal service assistance by educational providers.

Sec. 302. Eligibility for universal service assistance of head start agencies and organizations that receive Federal job training funds.

TITLE IV--E-CORPS PROGRAMS

Sec. 401. E-corps.

TITLE V--COMMUNITY TECHNOLOGY CENTERS

Sec. 501. Community technology centers.

TITLE VI--NEIGHBORHOOD NETWORKS FOR PUBLIC HOUSING

Sec. 601. Computer access for public housing residents.

TITLE VII--INCENTIVES FOR TECHNOLOGY ASSISTANCE

Sec. 701. Enhanced deduction for corporate donations of computer technology.

TITLE VIII--DEMONSTRATION PROJECT IN K-12 EDUCATION TECHNOLOGY

Sec. 801. Demonstration project.

SEC. 2. PURPOSES.

The purposes of this Act are the following:

- (1) To enable every child in America to cross the digital divide by ensuring that all children have access to technology and technology education.
- (2) To ensure that every child is computer literate by the time the child finishes 8th grade, regardless of the child's race, ethnicity, gender, income, geography, or disability.

SEC. 3. FINDINGS.

Congress makes the following findings:

- (1) A digital divide exists in America. Low-income, urban, and rural families are less likely to have access to the Internet and computers. Black and Hispanic families are only

2/5 as likely to have Internet access as white families.

- (2) The Digital divide for the poorest Americans has grown by 29% since 1997.
- (3) Over 50 percent of schools lack the infrastructure needed to support new technology.
- (4) While 51 percent of classrooms nationally are wired to the Internet, only 39 percent of classrooms with high levels of poverty are connected to the Internet.
- (5) Predominantly white schools are almost twice as likely to be linked to the Internet than are schools that have predominately minority children.
- (6) Approximately 4 out of 10 teachers have had no training in using the Internet.
- (7) Hispanics and African-Americans rely less on home or work sites and more on schools and libraries for Internet access.
- (8) Regardless of income level, Americans living in rural areas are lagging behind in Internet access. At the lowest income levels, those in urban areas are more than twice as likely to have Internet access than those in rural areas.
- (9) In the digital economy, access to technology is a fundamental civil right.
- (10) To ensure that no child is left behind, all children must have access to computers, the Internet, and teachers trained in the use of computers and the Internet in their schools, libraries, and communities.

SEC. 4. DEFINITIONS.

The terms used in this Act have the meanings given the terms in section 14101 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 8801).

TITLE I--ONE-STOP SHOP FOR TECHNOLOGY EDUCATION

SEC. 101. ONE-STOP SHOP FOR TECHNOLOGY EDUCATION.

Section 216 of the Department of Education Organization Act (as added by Public Law 103-227) (20 U.S.C. 3425) is amended--

(1) in subsection (a)--

(A) by striking 'Director' each place the term appears and inserting 'Assistant Secretary'; and

(B) by adding at the end the following: 'The Office shall be a one-stop shop for all technology education programs within the Department, provide schools and community groups with information with respect to technology education programs and sources of funds, and serve as a clearinghouse with respect to information on public and private efforts to bring technology to areas underserved by technology.';

(2) in subsection (b), by striking 'Director' each place the term appears and inserting

`Assistant Secretary';

(3) in subsection (c), by striking `Director' and inserting `Assistant Secretary'; and

(4) by redesignating such section (as so amended) as section 218 of such Act.

SEC. 102. NATIONAL REPOSITORY OF EFFECTIVE USES OF EDUCATIONAL TECHNOLOGY.

Section 3122(c) of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6832(c)) is amended--

(1) in paragraph (15), by striking `and' at the end;

(2) by redesignating paragraph (16) as paragraph (17); and

(3) by inserting after paragraph (15) the following:

`(16) the development of a national repository of information on the effective uses of educational technology and the dissemination of that information nationwide; and'.

TITLE II--DIGITAL EDUCATION

SEC. 201. NATIONAL CHALLENGE GRANTS FOR TECHNOLOGY IN EDUCATION.

Section 3132 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6842) is amended--

(1) in subsection (a)(2), by adding at the end the following:

`(C) In awarding grants under subparagraph (A), each State educational agency shall give priority to local educational agencies that have--

(i) the highest numbers or percentages of children in poverty; and

(ii) a substantial need for assistance in acquiring and using technology.'; and

(2) by adding at the end the following:

`(c) AUTHORIZATION OF APPROPRIATIONS- There are authorized to be appropriated to carry out this section \$850,000,000 for fiscal year 2001 and such sums as may be necessary for each of the 4 succeeding fiscal years.'

SEC. 202. LOCAL USES OF FUNDS.

Section 3134 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6844) is amended--

(1) in paragraph (5), by striking `and' at the end;

(2) in paragraph (6), by striking the period and inserting a semicolon; and

(3) by adding at the end the following:

`(7) providing intensive training in the use of technology to school librarians and library media specialists; and

`(8) providing technical support and services to assist schools in maintaining their educational technology.'.

SEC. 203. ADDITIONAL REQUIREMENT FOR LOCAL APPLICATIONS.

Section 3135 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6845) is amended--

(1) in paragraph (3), by striking `and' at the end;

(2) in paragraph (4), by striking the period and inserting `; and'; and

(3) by adding at the end the following:

`(5) describe how the local educational agency will ensure that school libraries and media centers possess equipment and trained personnel that enables them to provide access to information in formats made possible by new information and communication technologies.'.

SEC. 204. TEACHER TRAINING.

(a) TEACHER TECHNOLOGY PREPARATION ACADEMIES-

(1) GRANTS AUTHORIZED- The Secretary of Education is authorized to award grants under subsection (b) to State educational agencies to enable the State educational agencies to establish Teacher Technology Preparation Academies within the State that--

(A) provide teachers, librarians, and library media specialists with training to acquire or upgrade technology skills in order to use technology effectively in the classroom;

(B) have training plans developed by a local educational agency; and

(C) encourage teachers, librarians, and library media specialists trained at the academies to return to their schools and act as technology instructors for other teachers, librarians, and library media specialists.

(2) FORMULA- The Secretary of Education shall award grants to State educational agencies under subsection (a) in the same manner as the Secretary awards grants to State educational agencies under sections 3131 and 3132 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6841, 6842).

(3) AUTHORIZATION OF APPROPRIATIONS- There are authorized to be appropriated to carry out this subsection \$250,000,000 for fiscal year 2001 and such sums as may be necessary for each of the 4 succeeding fiscal years.

(b) NEW TEACHER TRAINING-

(1) GRANTS AUTHORIZED- The Secretary of Education is authorized to award grants, on a competitive basis, to institutions of higher education to enable the institutions to train students entering the teaching workforce to use technology effectively in the classroom.

(2) AUTHORIZATION OF APPROPRIATIONS- There are authorized to be appropriated to carry out this subsection \$150,000,000 for fiscal year 2001 and such sums as may be necessary for each of the 4 succeeding fiscal years.

(c) LIBRARIES-

(1) GRANTS AUTHORIZED- The Secretary of Education is authorized to award grants to State educational agencies to enable the State educational agencies to provide school library technology and training for school librarians and library media specialists.

(2) AUTHORIZATION OF APPROPRIATIONS- There are authorized to be appropriated to carry out this subsection \$250,000,000 for fiscal year 2001 and such sums as may be necessary for each of the 4 succeeding fiscal years.

TITLE III--EXPANSION OF UNIVERSAL SERVICE ASSISTANCE

SEC. 301. ADDITIONAL USES OF UNIVERSAL SERVICE ASSISTANCE BY EDUCATIONAL PROVIDERS.

(a) STRUCTURED AFTER-SCHOOL ACTIVITIES- Subparagraph (B) of section 254(h)(1) of the Communications Act of 1934 (47 U.S.C. 254(h)(1)) is amended by inserting '(including structured after-school activities)' after 'for educational purposes'.

(b) MAINTENANCE AND REPAIR OF TECHNOLOGY- Section 254(h)(1) of the Communications Act of 1934 (47 U.S.C. 254(h)(1)) is amended--

(1) by designating the third sentence of subparagraph (B) as subparagraph (E) and inserting at the beginning of such subparagraph (E) the following:

'(E) OFFSET- '; and

(2) in subparagraph (B)--

(A) by striking '(B) EDUCATIONAL PROVIDERS AND LIBRARIES- All telecommunications carriers' and inserting the following:

'(B) EDUCATIONAL PROVIDERS AND LIBRARIES-

'(i) IN GENERAL- All telecommunications carriers';

(B) by designating the second sentence as clause (ii) and inserting at the beginning of such clause the following:

'(ii) AMOUNT OF DISCOUNT- '; and

(C) by adding after clause (ii), as designated by subparagraph (B), the following:

`(iii) MAINTENANCE AND REPAIR OF TECHNOLOGY- An elementary school or secondary school that receives funds under this subparagraph in lieu (whether in whole or in part) of discounts under this subparagraph may use such funds for purposes of the maintenance and repair of technology necessary for the utilization of services for which discounts are available under this subparagraph.'.

SEC. 302. ELIGIBILITY FOR UNIVERSAL SERVICE ASSISTANCE OF HEAD START AGENCIES AND ORGANIZATIONS THAT RECEIVE FEDERAL JOB TRAINING FUNDS.

(a) **ELIGIBILITY OF HEAD START AGENCIES-** Section 254(h)(1) of the Communications Act of 1934 (47 U.S.C. 254(h)(1)), as amended by section 301 of this Act, is amended by inserting after subparagraph (B) the following:

`(C) **HEAD START AGENCIES-** A Head Start agency shall be provided services under this paragraph to the same extent, and subject to the same conditions and limitations, as elementary schools, secondary schools, and libraries are provided services under subparagraph (B).'

(b) **ELIGIBILITY OF ORGANIZATIONS RECEIVING FEDERAL JOB TRAINING FUNDS-** Section 254(h)(1) of the Communications Act of 1934 (47 U.S.C. 254(h)(1)) is amended by inserting after subparagraph (C), as inserted by subsection (a) of this section, the following:

`(D) **ORGANIZATIONS RECEIVING FEDERAL JOB TRAINING FUNDS-** An organization that receives Federal funds to provide job training services shall be provided services under this paragraph the same extent, and subject to the same conditions and limitations, as elementary schools, secondary schools, and libraries are provided services under subparagraph (B).'

(c) **HEAD START AGENCY DEFINED-** Section 254(h)(5) of the Communications Act of 1934 (47 U.S.C. 254(h)(1)) is amended by adding at the end the following:

`(D) **HEAD START AGENCY-** The term `Head Start agency' means an agency designated under section 641 of the Head Start Act (42 U.S.C. 9836).'

(d) **CONFORMING AMENDMENTS-** Section 254 of the Communications Act of 1934 (47 U.S.C. 254) is amended--

(1) in subsection (b)(6)--

(A) in the paragraph heading by striking `AND LIBRARIES' and inserting `LIBRARIES, HEAD START AGENCIES, AND CERTAIN OTHER ORGANIZATIONS'; and

(B) by striking `and libraries' and inserting `libraries, Head Start agencies, and organizations that receive Federal job training funds';

(2) in subsection (c)(3), by striking `and health care providers' and inserting `health care providers, Head Start agencies, and organizations that receive Federal job training

funds'; and

(3) in subsection (h)(2)(A), by striking `and libraries' and inserting `libraries, Head Start agencies, and organizations that receive Federal job training funds'.

TITLE IV--E-CORPS PROGRAMS

SEC. 401. E-CORPS.

(a) PROGRAMS- Section 122(a) of the National and Community Service Act of 1990 (42 U.S.C. 12572(a)) is amended--

(1) by redesignating paragraph (15) as paragraph (16); and

(2) by inserting after paragraph (14) the following new paragraph:

`(15) An E-Corps program that involves participants who are proficient in technology and who provide service in a community by developing and assisting in carrying out technology programs in elementary schools, secondary schools, and community centers.'.

(b) RULES- Section 122 of the National and Community Service Act of 1990 (42 U.S.C. 12572) is amended by adding at the end the following:

`(d) IMPLEMENTATION- In carrying out this title, and in particular in establishing priorities as described in subsection (c), in distributing funding as described in section 129, and in applying the criteria, considerations, and rules of emphasis described in subsections (c) through (e) of section 133, the Corporation shall ensure that none of the funds described in section 501(a)(2)(B) is used for a purpose other than carrying out programs described in subsection (a)(15).'.

(c) AUTHORIZATION OF APPROPRIATIONS- Section 501(a)(2)(B) of the National and Community Service Act of 1990 (42 U.S.C. 12681(a)(2)(B)) is amended--

(1) by striking `fiscal year, up to 15' and inserting the following: `fiscal year--
` (i) up to 15';

(2) by striking the period and inserting `; and'; and

(3) by adding at the end the following:

`(ii) \$25,000,000 shall be made available to carry out programs described in section 122(a)(15) and provide national service educational awards under subtitle

D of title I to participants in such programs.'.

TITLE V--COMMUNITY TECHNOLOGY CENTERS

SEC. 501. COMMUNITY TECHNOLOGY CENTERS.

Part A of title III of Elementary and Secondary Education Act of 1965 (20 U.S.C. 6811-6871) is amended by adding at the end the following:

`Subpart 5--Community Technology Centers

`SEC. 3161. `PURPOSE; PROGRAM AUTHORITY.

`(a) PURPOSE- The purpose of this subpart is to assist eligible applicants to--

`(1) create or expand community technology centers that will provide disadvantaged residents of economically distressed urban and rural communities with access to information technology and related training; and

`(2) provide technical assistance and support to community technology centers.

`(b) PROGRAM AUTHORITY-

`(1) IN GENERAL- The Secretary is authorized, through the Office of Educational Technology, to award grants, contracts, or cooperative agreements on a competitive basis to eligible applicants in order to assist them in--

`(A) creating or expanding community technology centers; or

`(B) providing technical assistance and support to community technology centers.

`(2) PERIOD OF AWARD- The Secretary may award grants, contracts, or cooperative agreements under this subpart for a period of not more than 3 years.

`SEC. 3162. ELIGIBILITY AND APPLICATION REQUIREMENTS.

`(a) ELIGIBLE APPLICANTS- In order to be eligible to receive an award under this subpart, an applicant shall--

`(1) have the capacity to expand significantly access to computers and related services for disadvantaged residents of economically distressed urban and rural communities (who would otherwise be denied such access); and

`(2) be--

`(A) an entity such as a foundation, museum, library, for-profit business, public or private nonprofit organization, or community-based organization;

`(B) an institution of higher education;

`(C) a State educational agency;

`(D) a local education agency; or

`(E) a consortium of entities described in subparagraph (A), (B), (C), or (D).

`(b) APPLICATION REQUIREMENTS- In order to receive an award under this subpart, an eligible applicant shall submit an application to the Secretary at such time, and containing such information, as the Secretary may require. Such application shall include--

`(1) a description of the proposed project, including a description of the magnitude of the need for the services and how the project would expand access to information technology and related services to disadvantaged residents of an economically distressed urban or rural community;

`(2) a demonstration of--

`(A) the commitment, including the financial commitment, of entities such as institutions, organizations, businesses, and other groups in the community that will provide support for the creation, expansion, and continuation of the proposed project; and

`(B) the extent to which the proposed project establishes linkages with other appropriate agencies, efforts, and organizations providing services to disadvantaged residents of an economically distressed urban or rural community;

`(3) a description of how the proposed project would be sustained once the Federal funds awarded under this subpart are expended; and

`(4) a plan for the evaluation of the program, which shall include benchmarks to monitor progress toward specific project objectives.

`(c) MATCHING REQUIREMENTS- The Federal share of the cost of any project funded under this subpart shall not exceed 50 percent. The non-Federal share of such project may be in cash or in kind, fairly evaluated, including services.

`SEC. 3163. USES OF FUNDS.

`(a) REQUIRED USES- A recipient shall use funds awarded under this subpart for--

`(1) creating or expanding community technology centers that expand access to information technology and related training for disadvantaged residents of distressed urban or rural communities; and

`(2) evaluating the effectiveness of the project.

`(b) PERMISSIBLE USES- A recipient may use funds awarded under this subpart for activities described in its application that carry out the purposes of this subpart, such as--

`(1) supporting a center coordinator, and staff, to supervise instruction and build community partnerships;

`(2) acquiring equipment, networking capabilities, and infrastructure to carry out the project;

`(3) developing and providing services and activities for community residents that provide access to computers, information technology, and the use of such technology in support of preschool preparation, academic achievement, lifelong learning, and workforce development, such as--

- `(A) after-school activities in which children and youths use software that provides academic enrichment and assistance with homework, develops their technical skills, and allows them to explore the Internet and participate in multimedia activities, including webpage design and creation;
- `(B) adult education and family literacy activities through technology and the Internet, including--
 - `(i) General Education Development, English as a Second Language, and adult basic education classes or programs;
 - `(ii) introduction to computers;
 - `(iii) intergenerational activities; and
 - `(iv) lifelong learning opportunities;
- `(C) career development and job preparation activities, such as--
 - `(i) training in basic and advanced computer skills;
 - `(ii) resume writing workshops; and
 - `(iii) access to databases of employment opportunities, career information, and other online materials.
- `(D) small business activities, such as--
 - `(i) computer-based training for basic entrepreneurial skills and electronic commerce; and
 - `(ii) access to information on business startup programs that is available online, or from other sources;
- `(E) activities that provide home access to computers and technology, such as assistance and services to promote the acquisition, installation, and use of information technology in the home through low-cost solutions such as networked computers, web-based television devices, and other technology.

`SEC. 3164. AUTHORIZATION OF APPROPRIATIONS.

`There is authorized to be appropriated to carry out this subpart, \$100,000,000 for fiscal year 2001 and such sums as may be necessary for each of the 4 succeeding fiscal years.'.

TITLE VI--NEIGHBORHOOD NETWORKS FOR PUBLIC HOUSING

SEC. 601. COMPUTER ACCESS FOR PUBLIC HOUSING RESIDENTS.

(a) USE OF PUBLIC HOUSING CAPITAL AND OPERATING FUNDS- Section 9 of the United States Housing Act of 1937 (42 U.S.C. 1437g) is amended--

(1) in subsection (d)(1)(E), by inserting before the semicolon the following: `, including the establishment and initial operation of computer centers in and around public housing through a Neighborhood Networks initiative, for the purpose of enhancing the self-sufficiency, employability, and economic self-reliance of public housing residents by providing them with onsite computer access and training resources';

(2) in subsection (e)(1)--

(A) in subparagraph (I), by striking the `and' at the end;

(B) in subparagraph (J), by striking the period and inserting'; and'; and

(C) by adding after subparagraph (J) the following:

`(K) the costs of operating computer centers in public housing through a Neighborhood Networks initiative described in subsection (d)(1)(E), and of activities related to that initiative.'; and

(3) in subsection (h)--

(A) in paragraph (6), by striking the `and' at the end;

(B) in paragraph (7), by striking the period and inserting `; and'; and

(C) by inserting after paragraph (7) the following:

`(8) assistance in connection with the establishment and operation of computer centers in public housing through a Neighborhood Networks initiative described in subsection (d)(1)(E).'

(b) **DEMOLITION, SITE REVITALIZATION, REPLACEMENT HOUSING, AND TENANT-BASED ASSISTANCE GRANTS FOR PROJECTS-** Section 24 of the United States Housing Act of 1937 (42 U.S.C. 1437v) is amended--

(1) in subsection (d)(1)(G), by inserting before the semicolon the following: `, including a Neighborhood Networks initiative for the establishment and operation of computer centers in public housing for the purpose of enhancing the self-sufficiency, employability, and economic self-reliance of public housing residents by providing them with onsite computer access and training resources'; and

(2) in subsection (m)(2), in the first sentence, by inserting before the period the following: `, including assistance in connection with the establishment and operation of computer centers in public housing through the Neighborhoods Networks initiative described in subsection (d)(1)(G).'

TITLE VII--INCENTIVES FOR TECHNOLOGY ASSISTANCE

SEC. 701. ENHANCED DEDUCTION FOR CORPORATE DONATIONS OF COMPUTER TECHNOLOGY.

(a) EXPANSION OF COMPUTER TECHNOLOGY DONATIONS TO HEAD START CENTERS, STRUCTURED AFTER-SCHOOL PROGRAMS, AND CERTAIN PUBLIC LIBRARIES AND COMMUNITY CENTERS-

(1) IN GENERAL- Paragraph (6) of section 170(e) of the Internal Revenue Code of 1986 (relating to special rule for contributions of computer technology and equipment for elementary or secondary school purposes) is amended by striking 'qualified elementary or secondary educational contribution' each place it occurs in the headings and text and inserting 'qualified computer contribution'.

(2) EXPANSION OF ELIGIBLE DONEES- Subclause (II) of section 170(e)(6)(B)(i) of such Code (relating to qualified elementary or secondary educational contribution) is amended by striking 'or' at the end of subclause (I) and by inserting after subclause (II) the following new subclauses:

'(III) a Head Start agency designated under section 641 of the Head Start Act (42 U.S.C. 9836),

'(IV) a structured after-school program,

'(V) a public library (within the meaning of section 213(2)(A) of the Library Services and Technology Act (20 U.S.C. 9122(2)(A)), as in effect on the date of the enactment of the New Millennium Classrooms Act, established and maintained by an entity described in subsection (c)(1) and located in an empowerment zone or enterprise community designated under part I of subchapter U or a population census tract within which the poverty rate is not less than 20 percent (as determined under part I of subchapter U), or

'(VI) a community center located in such a zone, community, or census tract,'.

(b) DONATIONS OF COMPUTER TRAINING AND MAINTENANCE ALLOWED- Subparagraph (B) of section 170(e)(6) of the Internal Revenue Code of 1986 is amended by inserting '(including training or maintenance services with respect to such technology or equipment)' after 'computer technology or equipment'.

(c) CONFORMING AMENDMENTS-

(1) Section 170(e)(6)(B)(iv) of the Internal Revenue Code of 1986 is amended by striking 'in any grades K-12'.

(2) The heading of paragraph (6) of section 170(e) of such Code is amended by striking 'ELEMENTARY OR SECONDARY SCHOOL PURPOSES' and inserting 'EDUCATIONAL PURPOSES'.

(d) EXTENSION OF DEDUCTION- Section 170(e)(6)(F) of the Internal Revenue Code of 1986 (relating to termination) is amended by striking 'during any taxable year beginning after December 31, 2000' and inserting 'after June 30, 2004'.

(e) EFFECTIVE DATE- The amendments made by this section shall apply to contributions made after December 31, 2000.

TITLE VIII--DEMONSTRATION PROJECT IN K-12 EDUCATION TECHNOLOGY

SEC. 801. DEMONSTRATION PROJECT.

(a) REQUIREMENT TO UNDERTAKE PROJECT-

(1) IN GENERAL- The Secretary of Education (referred to in this section as the 'Secretary') shall conduct a demonstration project that--

(A) delivers a highly flexible educational system designed for kindergarten through grade 12, or a component thereof, that includes hardware, software, training and ongoing support and professional development;

(B) implements an Internet-based, one-to-one pilot project that specifically targets the educational needs of students in grade 3 through grade 12 who reside in low-income school districts; and

(C) is conducted by an organization with proven expertise in the research and development of education technology designed for kindergarten through grade 12.

(2) REQUIREMENTS- The demonstration project shall provide for the following:

(A) A rugged notebook computer for every student participating in the project.

(B) An infrared wireless connection to the school's local area network.

(C) A low-cost, high-speed Internet connection.

(D) Customized, professional development for technical and instructional staff.

(E) An academic information system that provides alignment between curricula, state standards, assessment, and teacher resources.

(F) A parental training component.

(3) USE OF EXISTING PROGRAMS- The Secretary may contract with a private company or organization to carry out a demonstration under this section.

(4) COORDINATION WITH LOCAL EDUCATIONAL AGENCIES- Where practicable, the Secretary shall coordinate project implementation and oversight with a local educational agency and a private company, if such a company is used in the project.

(5) PREFERENCE FOR LOCATION- To maximize results, but only to the extent practicable, the demonstration project should be conducted in a location where a similar program is already at least partially underway.

(6) REPORT-

(A) IN GENERAL- Not later than 2 years after the date of the enactment of this Act, the Secretary shall submit a report to the Committee on Education and the Workforce of the

House of Representatives that describes the results of the pilot project, the feasibility and costs of implementing the pilot project in the entire public school system, and recommendations for the further deployment of similar educational technology.

(B) REQUIREMENTS- The report shall include a description of--

(i) any agreement entered into by the Secretary with other Federal agencies, local educational agencies, or private organizations to complete the project;

(ii) the number and location of similar programs;

(iii) data on student improvement in meeting state standards and assessment exams; and

(iv) the number, if any, of lost or stolen laptops during the pilot project, and causes thereof, as reported by the local educational agency.

(b) AUTHORIZATION OF APPROPRIATIONS- There are authorized to be appropriated to the Secretary not more than \$20,000,000 for fiscal year 2001 to carry out the demonstration project required under this section.

Appendix B

Enhancing Education Through Technology Act of 2001

NO CHILD LEFT BEHIND TITLE II PART D SEC. 2402. PURPOSES AND GOALS.

(a) **PURPOSES-** The purposes of this part are the following:

(1) To provide assistance to States and localities for the implementation and support of a comprehensive system that effectively uses technology in elementary schools and secondary schools to improve student academic achievement.

(2) To encourage the establishment or expansion of initiatives, including initiatives involving public-private partnerships, designed to increase access to technology, particularly in schools served by high-need local educational agencies.

(3) To assist States and localities in the acquisition, development, interconnection, implementation, improvement, and maintenance of an effective educational technology infrastructure in a manner that expands access to technology for students (particularly for disadvantaged students) and teachers.

(4) To promote initiatives that provide school teachers, principals, and administrators with the capacity to integrate technology effectively into curricula and instruction that are aligned with challenging State academic content and student academic achievement standards, through such means as high-quality professional development programs.

(5) To enhance the ongoing professional development of teachers, principals, and administrators by providing constant access to training and updated research in teaching and learning through electronic means.

(6) To support the development and utilization of electronic networks and other innovative methods, such as distance learning, of delivering specialized or rigorous academic courses and curricula for students in areas that would not otherwise have access to such courses and curricula, particularly in geographically isolated regions.

(7) To support the rigorous evaluation of programs funded under this part, particularly regarding the impact of such programs on student academic achievement, and ensure that timely information on the results of such evaluations is widely accessible through electronic means.

(8) To support local efforts using technology to promote parent and family involvement in education and communication among students, parents, teachers, principals, and administrators.

(b) **GOALS-**

(1) **PRIMARY GOAL-** The primary goal of this part is to improve student academic achievement through the use of technology in elementary schools and secondary schools.

(2) **ADDITIONAL GOALS-** The additional goals of this part are the following:

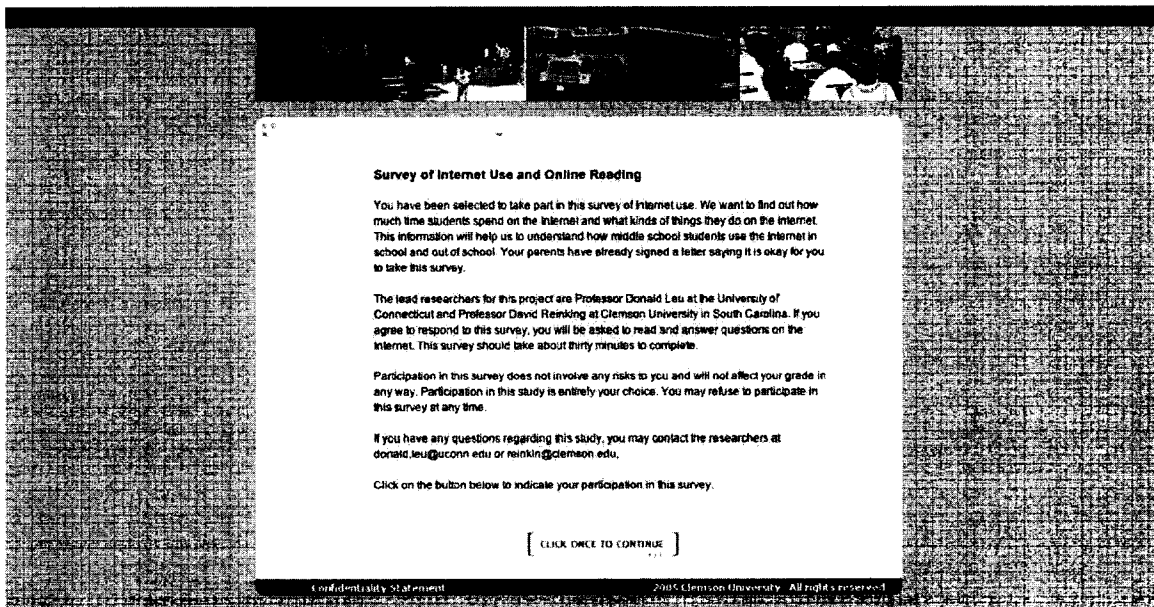
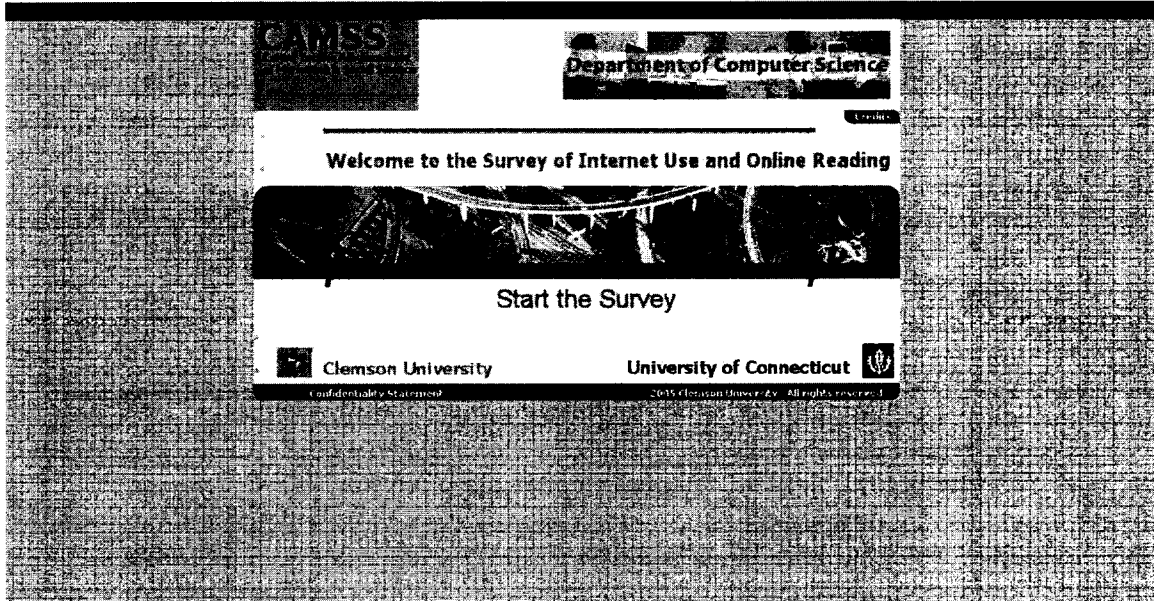
(A) To assist every student in crossing the digital divide by ensuring that every student is technologically literate by the time the student finishes the eighth grade, regardless of the student's race, ethnicity, gender, family income, geographic location, or disability.

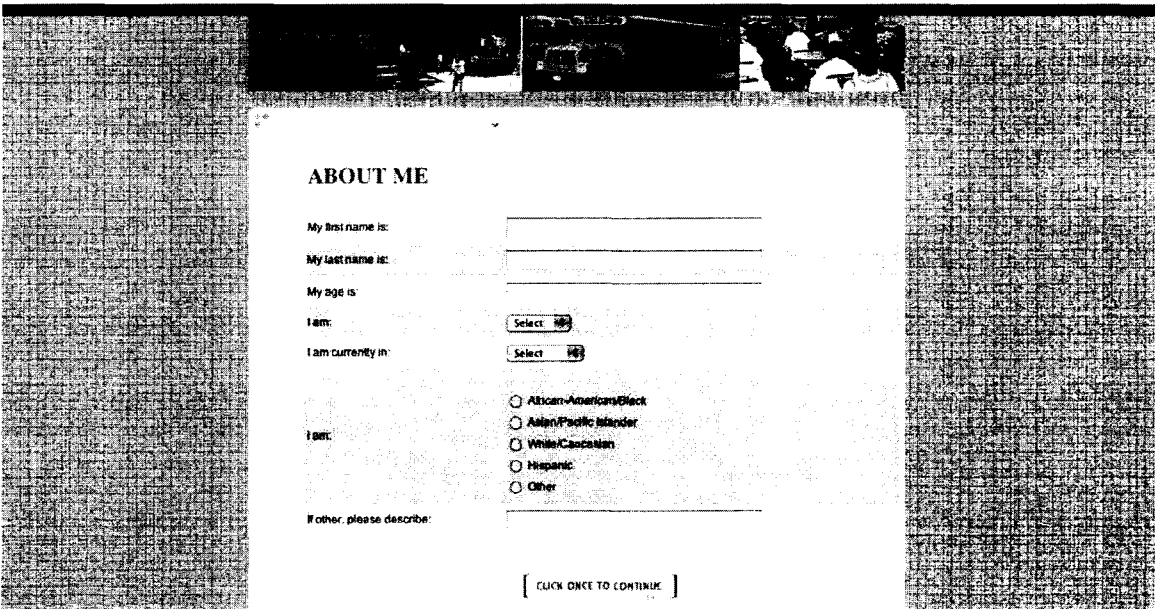
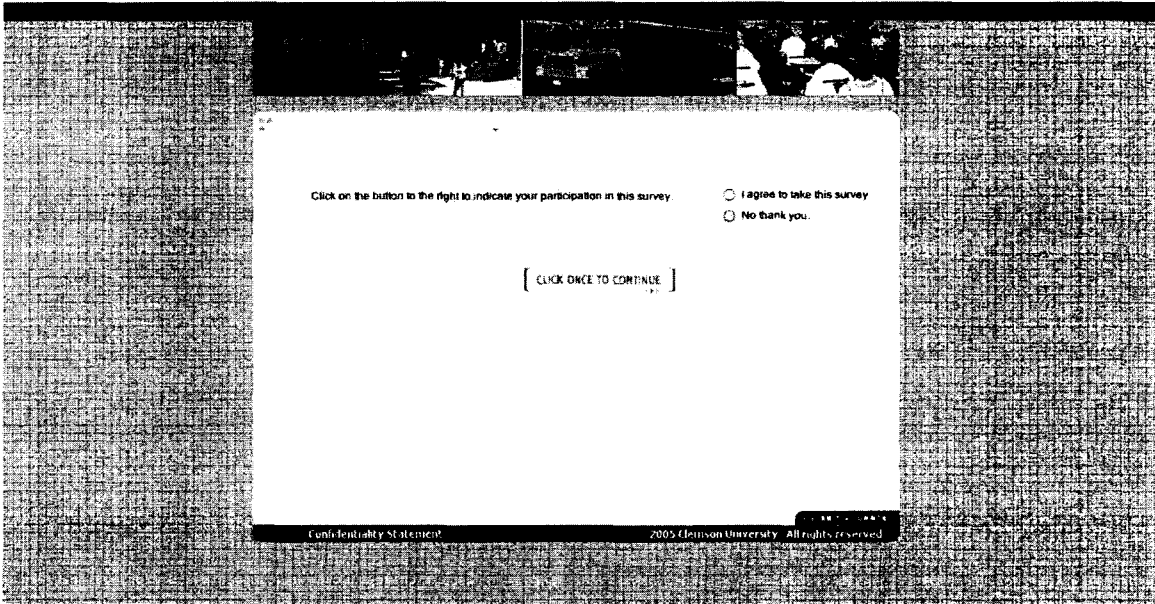
(B) To encourage the effective integration of technology resources and systems with teacher training and curriculum development to establish research-based instructional methods that can be widely implemented as best practices by State educational agencies and local educational agencies.

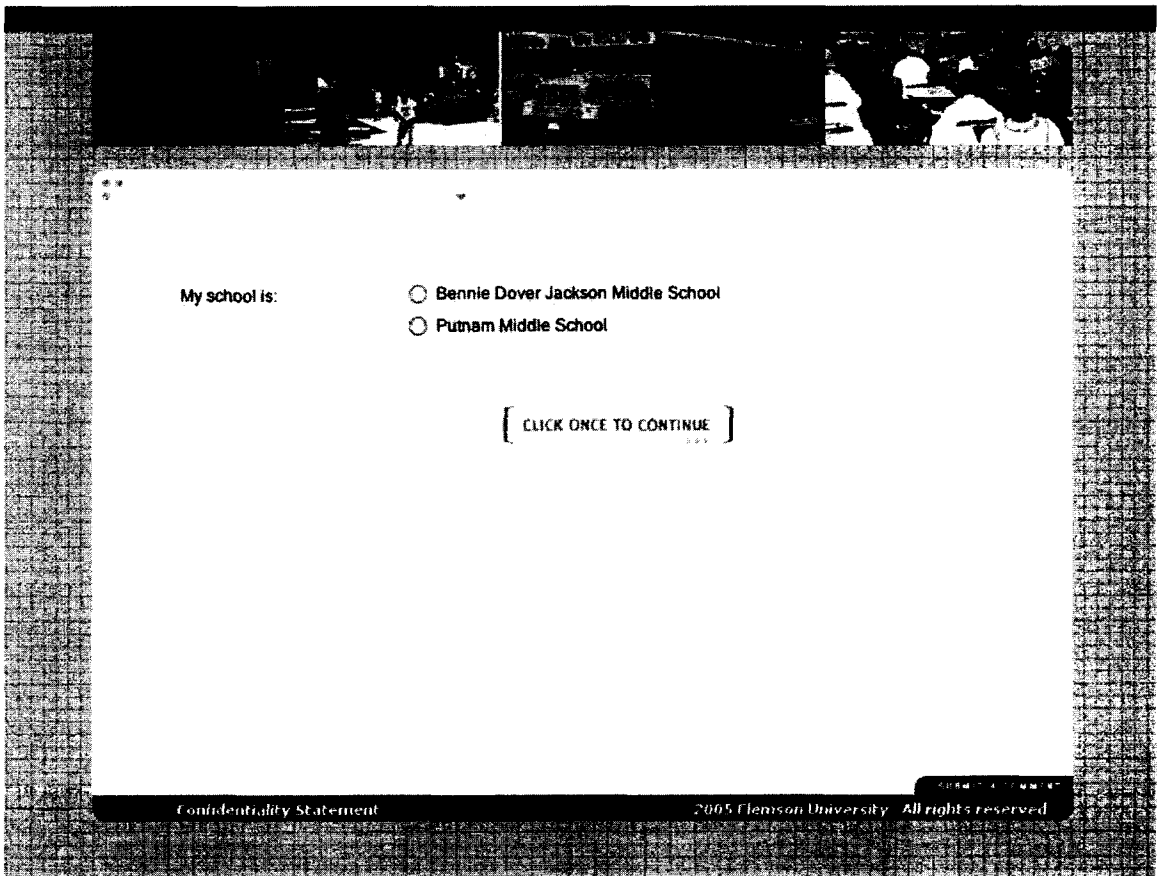
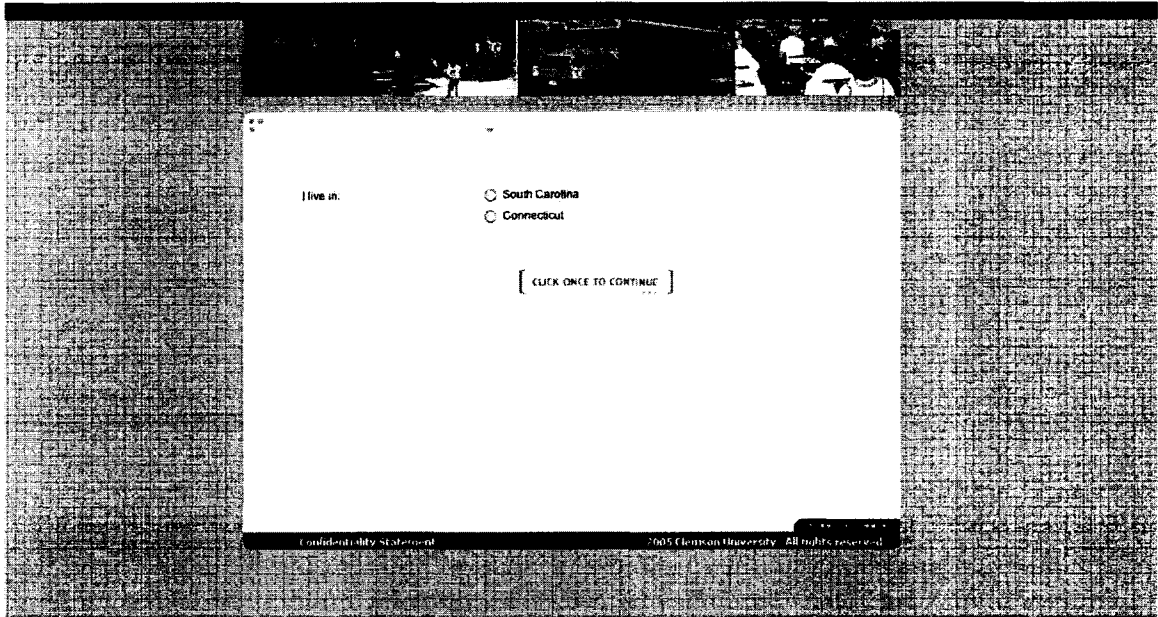
Appendix C

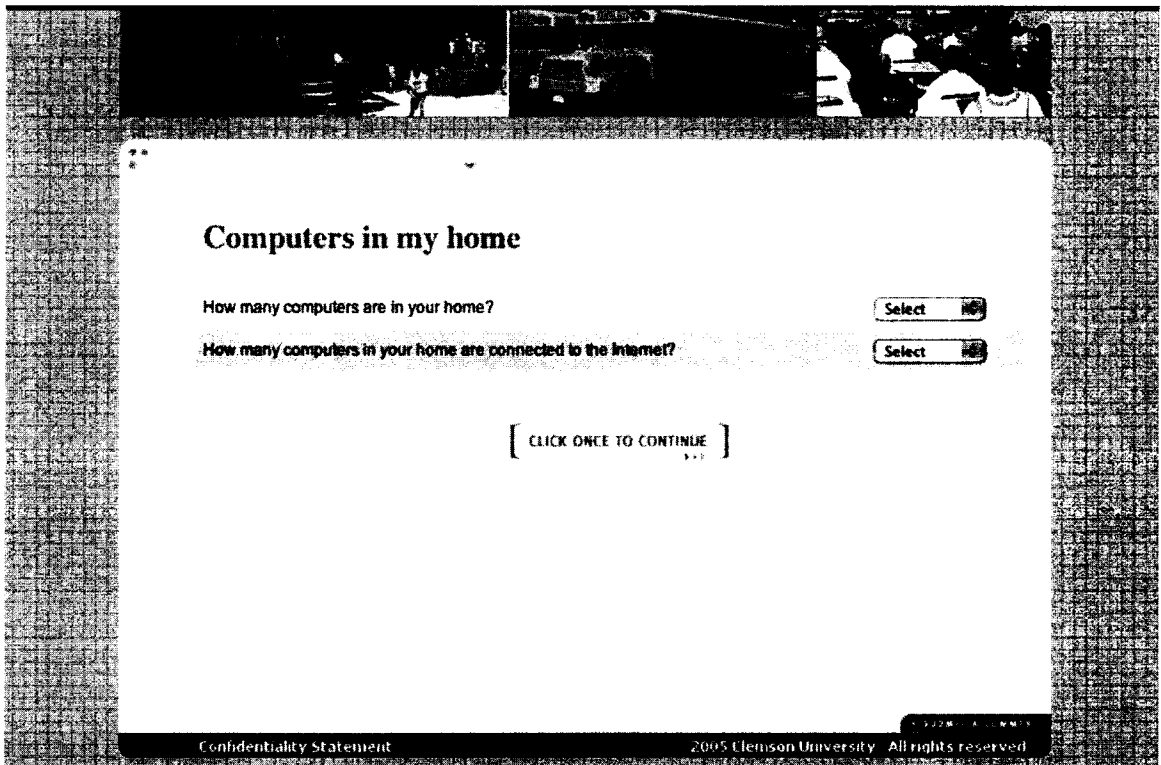
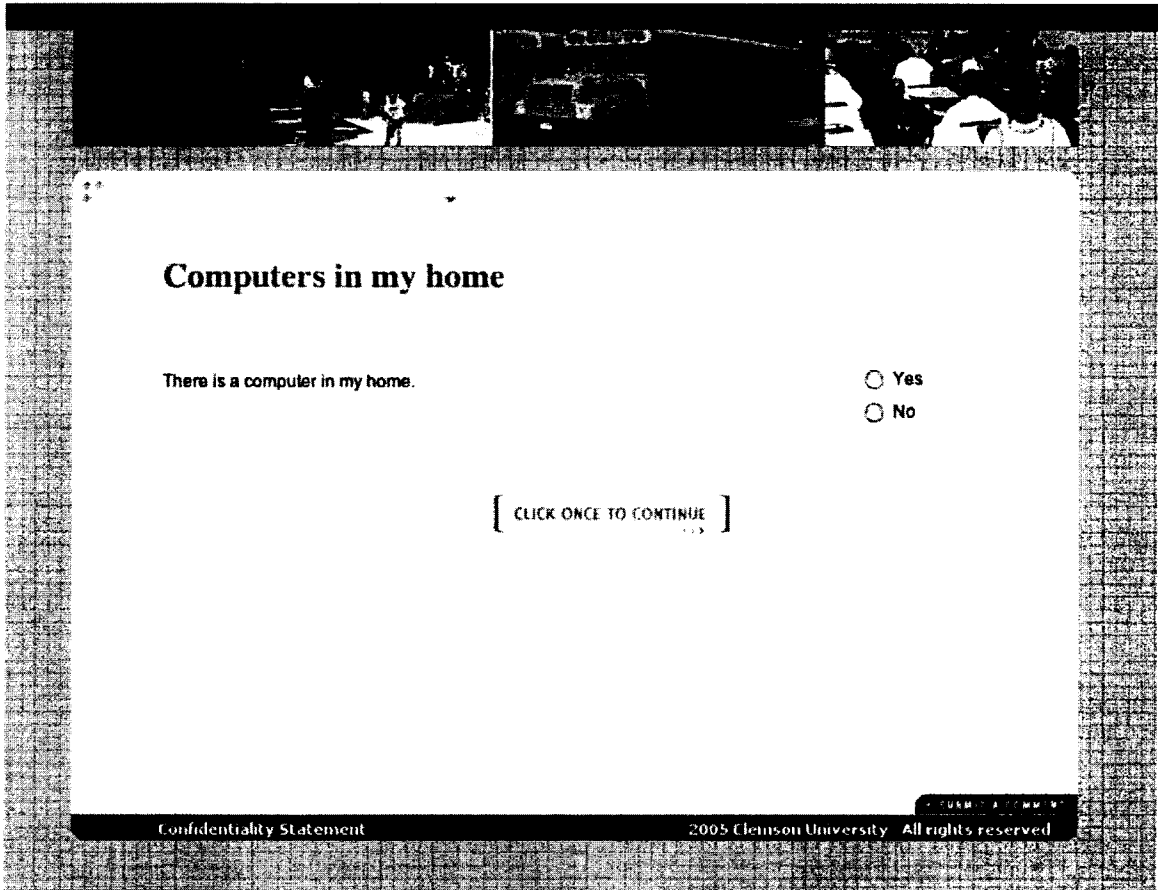
The Survey of Internet Use and Online Reading


View online at: <http://camss.clemson.edu/READING>












Computers in my home

What kind of internet connection do you have in your home?

- Telephone Dial up
- High Speed Internet/Broadband (Cable, DSL, Satellite dish)
- I don't know

[CLICK ONCE TO CONTINUE]

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How I Use the Internet

I use the internet in the following places (select all that apply):

- I don't use the internet
- School
- Home
- Public Library
- Internet cafe or community center
- Relative's house
- Friend's house
- Other

If other, please describe:

[CLICK ONCE TO CONTINUE]

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Where do you use the Internet most often?

- Home
- School
- Someplace else

During the past year, the amount of time I have spent using the Internet has:

- Increased
- Decreased
- Stayed the same

{ CLICK ONCE TO CONTINUE }

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	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
How often have you been REQUIRED to use the Internet for a school assignment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often have you been GIVEN THE OPTION to use the Internet for a school assignment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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USING THE INTERNET: AT SCHOOL

FOR THE NEXT SECTION, PLEASE RESPOND TO ITEMS ABOUT HOW YOU USE THE INTERNET WHEN YOU ARE AT SCHOOL.

[CLICK ONCE TO CONTINUE]

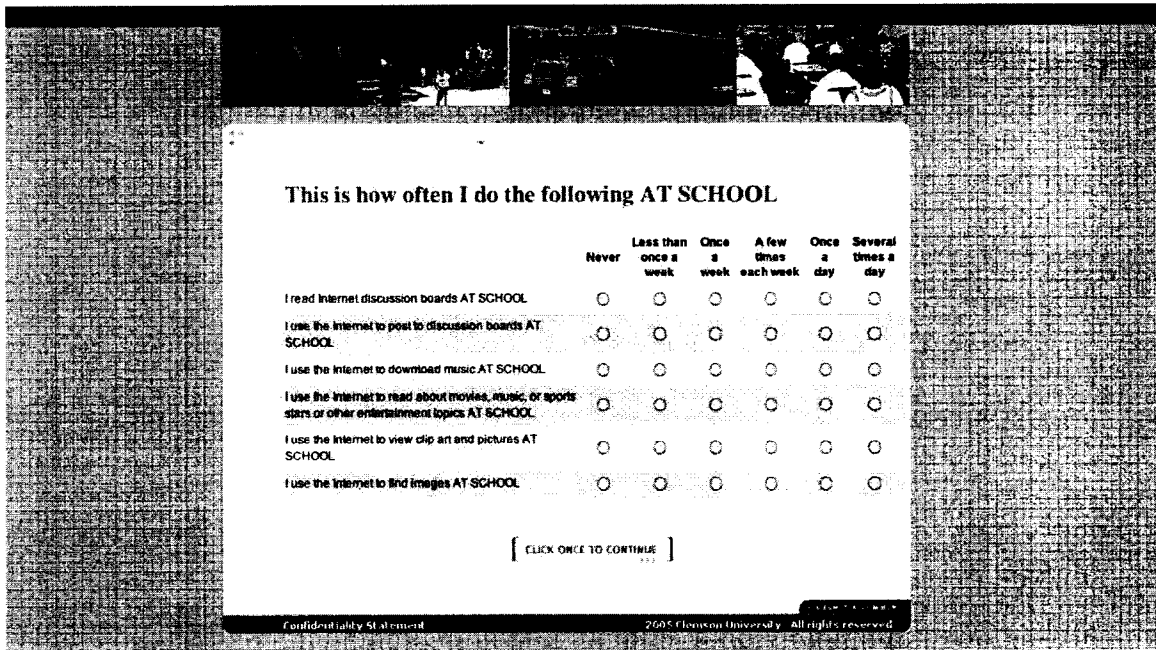
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This is how often I do the following AT SCHOOL:

	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
I use the Internet AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use search engines AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I read email AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I send email AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use Instant Messenger (IM) AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I read blogs (like LiveJournal or MySpace) AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I post to blogs (like LiveJournal or MySpace) AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use chat rooms AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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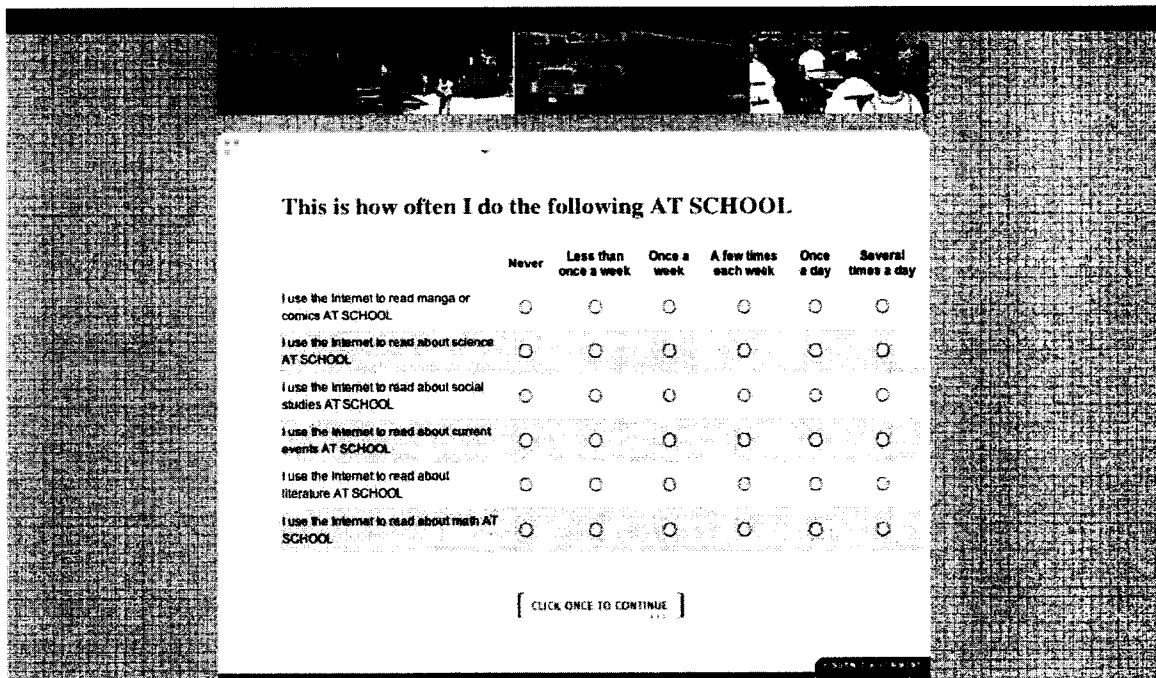


This is how often I do the following AT SCHOOL

	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
I read Internet discussion boards AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to post to discussion boards AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to download music AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about movies, music, or sports stars or other entertainment topics AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to view clip art and pictures AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to find images AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

{ CLICK ONCE TO CONTINUE }

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This is how often I do the following AT SCHOOL

	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
I use the Internet to read manga or comics AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about science AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about social studies AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about current events AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about literature AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about math AT SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

{ CLICK ONCE TO CONTINUE }

This is how often I do the following AT SCHOOL.

	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
I use the Internet to read information about other school subjects AT SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read information about my hobbies AT SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet for school-related assignments AT SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet for things other than school assignments AT SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet AT SCHOOL to help me decide what to buy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to play online games AT SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to create websites AT SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

{ CLICK ONCE TO CONTINUE ... }

This is how often I do the following AT SCHOOL.

	Never	Once in a while	About half of the time	Most of the time	Always
I check the accuracy of information I read on the Internet AT SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look at who created information I am reading on the Internet AT SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

{ CLICK ONCE TO CONTINUE ... }

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USING THE INTERNET: OUTSIDE OF SCHOOL

FOR THE NEXT SECTION, PLEASE RESPOND TO ITEMS ABOUT HOW YOU USE THE INTERNET **OUTSIDE OF SCHOOL**.

[CLICK ONCE TO CONTINUE]

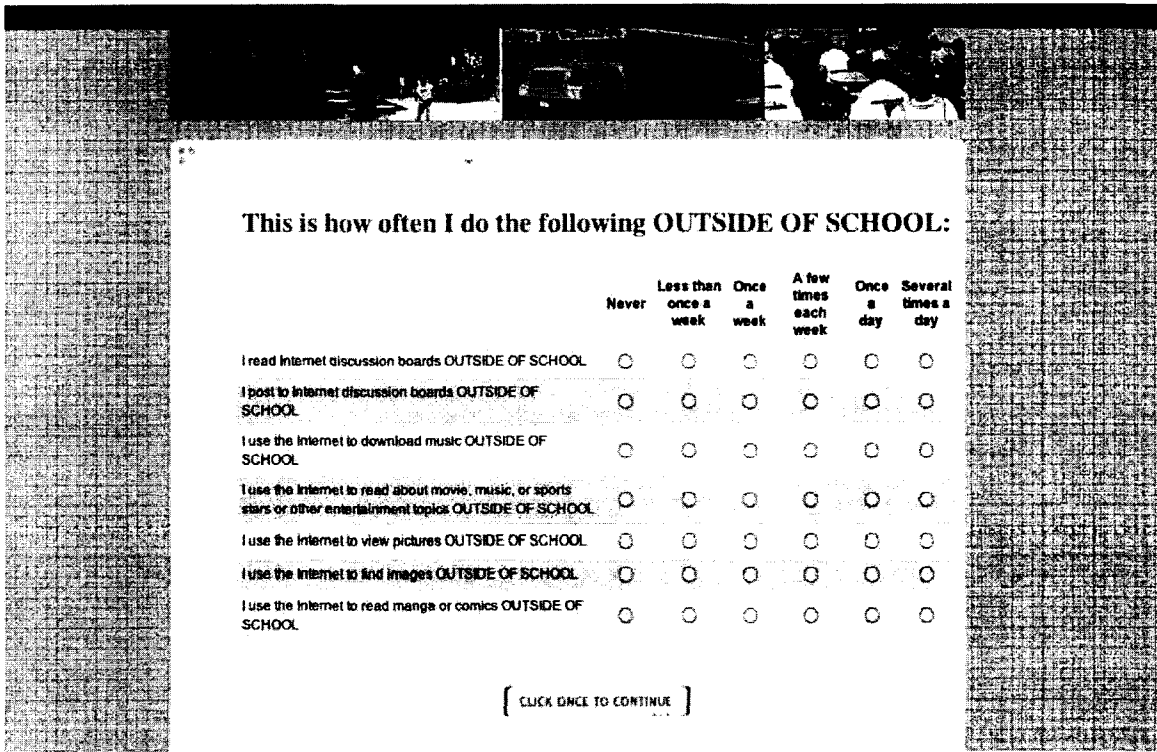
Confidentiality Statement

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This is how often I do the following **OUTSIDE OF SCHOOL**:

	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
I use the Internet OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use search engines OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I read email OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I send email OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use Instant Messenger (IM) OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I read blogs (like LiveJournal or MySpace) OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I post to blogs (like LiveJournal or MySpace) OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use chat rooms OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

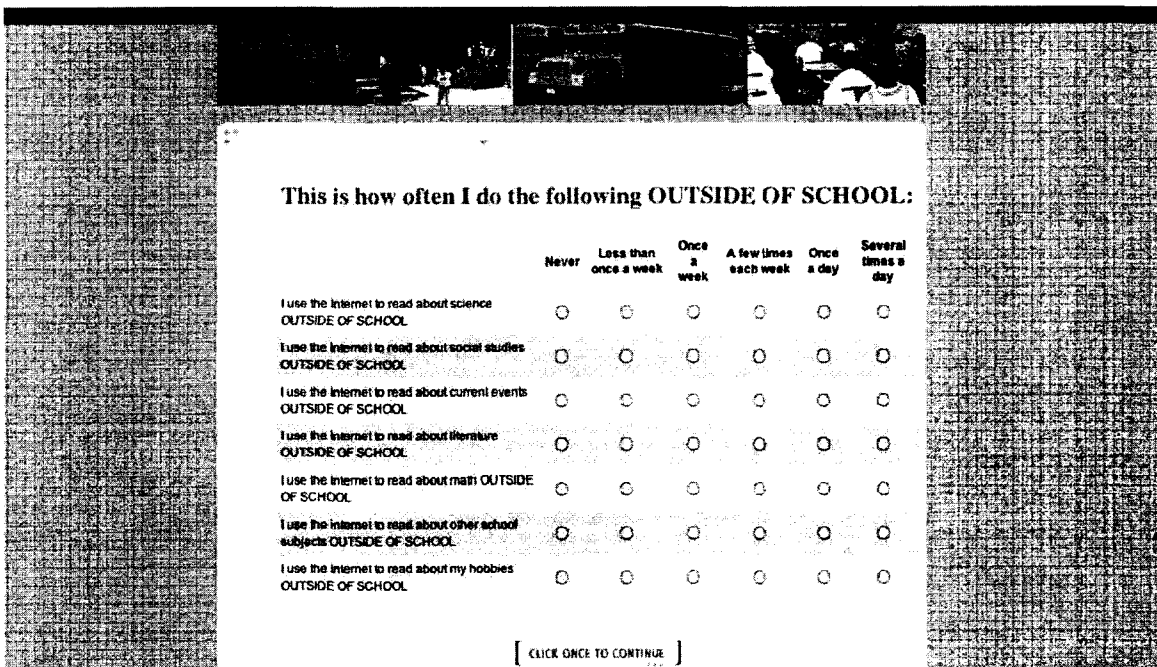
[CLICK ONCE TO CONTINUE]



This is how often I do the following OUTSIDE OF SCHOOL:

	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
I read Internet discussion boards OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I post to Internet discussion boards OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to download music OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about movie, music, or sports stars or other entertainment topics OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to view pictures OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to find images OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read manga or comics OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>


[CLICK ONCE TO CONTINUE]



This is how often I do the following OUTSIDE OF SCHOOL:

	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
I use the Internet to read about science OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about social studies OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about current events OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about literature OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about math OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about other school subjects OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about my hobbies OUTSIDE OF SCHOOL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[CLICK ONCE TO CONTINUE]




This is how often I do the following OUTSIDE OF SCHOOL:

	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
I use the Internet for school-related assignments OUTSIDE OF SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet for things other than school assignments OUTSIDE OF SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet OUTSIDE OF SCHOOL to help me decide what to buy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to play online games OUTSIDE OF SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to create websites OUTSIDE OF SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[CLICK ONCE TO CONTINUE]

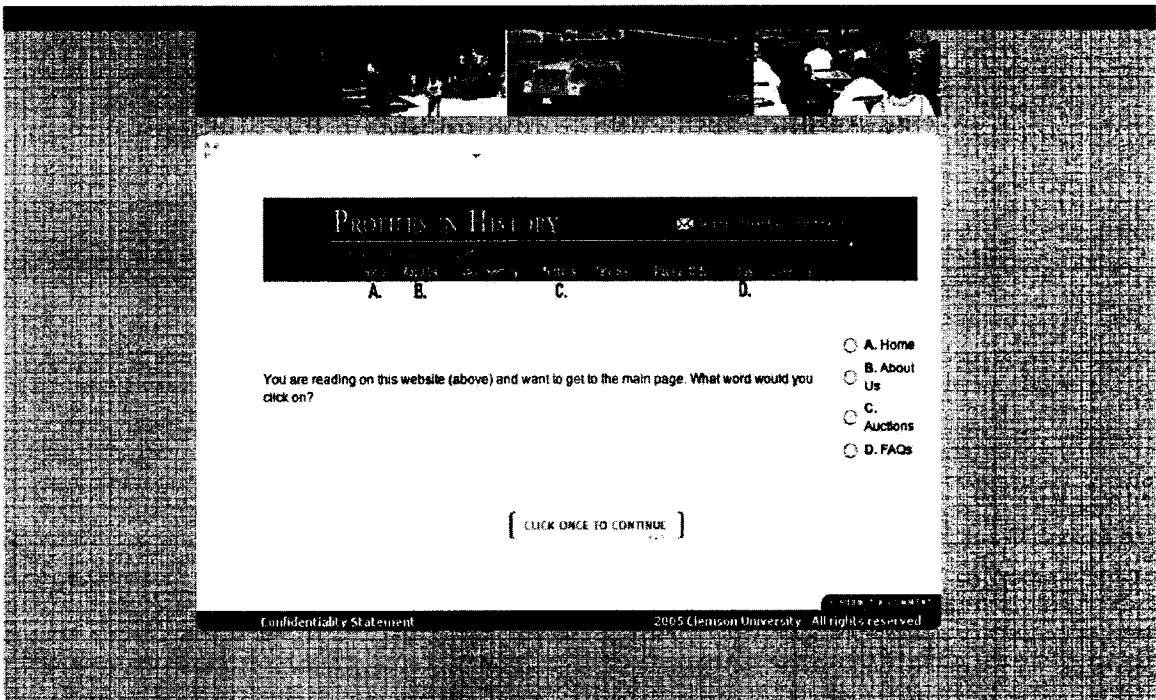
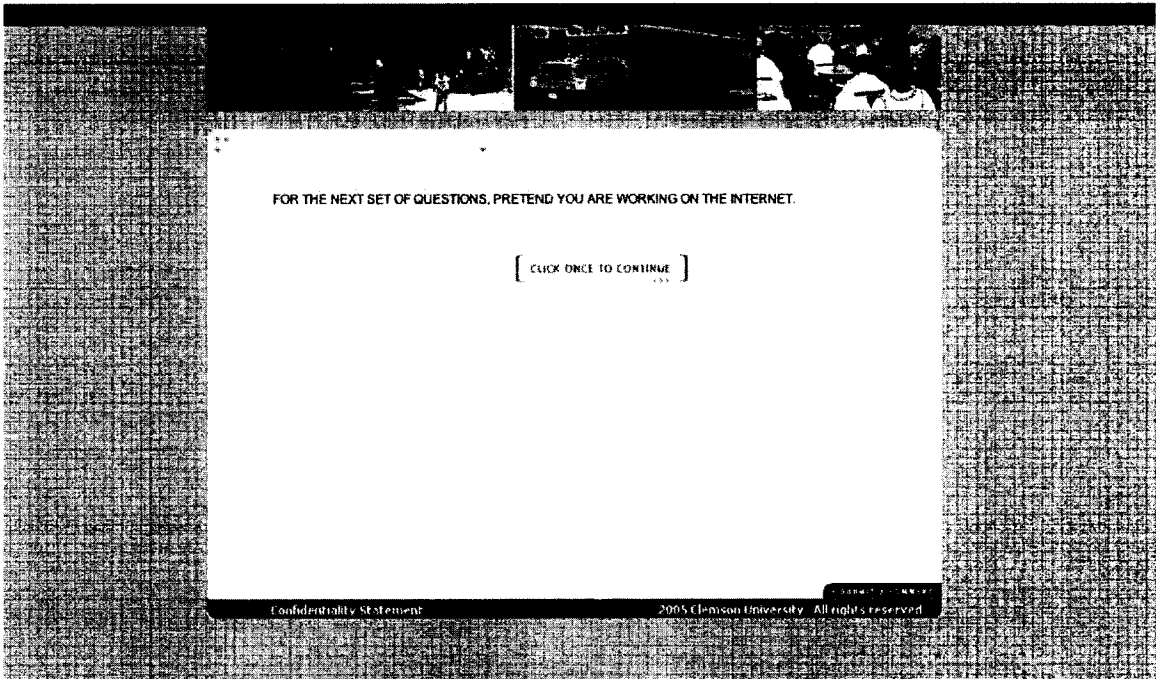
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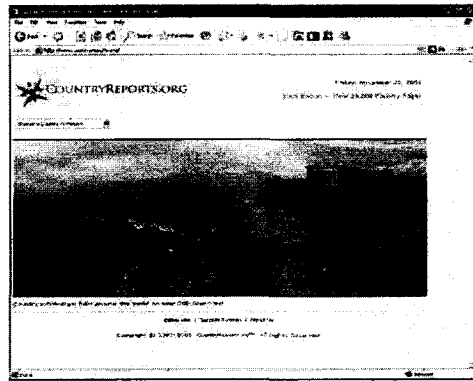


	Never	Once in a while	About half of the time	Most of the time	Always
I check the accuracy of information I read on the Internet OUTSIDE OF SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look at who created information I am reading on the Internet OUTSIDE OF SCHOOL.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[CLICK ONCE TO CONTINUE]

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You find this website (above) and your teacher asks, 'What is the URL?'
Your teacher wants to know...

- the copyright date on the website
- the title of this website
- the number of people who have visited this website
- the Internet address of this website
- I don't know

{ CLICK ONCE TO CONTINUE }



This window (above) appears on your computer screen. It is telling you ...

- To answer a pop-up ad.
- A security filter won't let you view information.
- To download software.
- To connect hardware to your computer.
- I don't know

{ CLICK ONCE TO CONTINUE }

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A. Tour Egypt Travel. Tours, Vacations, Ancient Egypt, History and ...

Meet the ancient pharaohs, gods, kings, queens, monuments; dive the Virtual Red Sea; or use the hieroglyphics converter. Official site of the Egyptian ...
www.touregypt.net/ - 33k - Nov 21, 2005 - [Cached](#) - [Similar pages](#)

B. Ancient Egypt Thematic Unit

Collaborative Thematic Unit. Theme: Ancient Egypt. by Colette Elliott and Paige Smoak.
Focus: Students will become familiar with Ancient Egypt and expand ...
www.libsci.sc.edu/miller/Egypt.htm - 18k - [Cached](#) - [Similar pages](#)

C. The Ancient Egypt Site

The history, language and culture of Ancient Egypt by Egyptologist Jacques Kinnaer.
www.ancient-egypt.org/ - 11k - [Cached](#) - [Similar pages](#)

D. Ancient Egypt Web

More than a dozen illustrated reports written by primary students.
www.hit-chams.suffolk.sch.uk/egypt/ - 12k - [Cached](#) - [Similar pages](#)

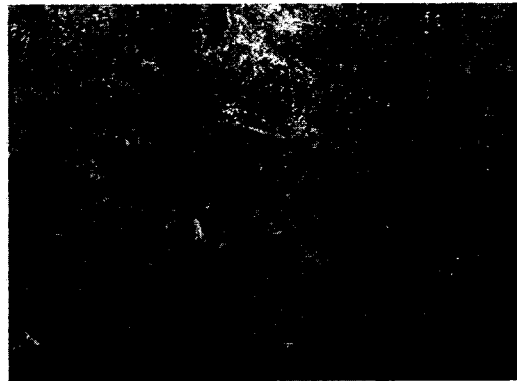
E. I don't know

You are writing a report about ancient Egypt. You are looking for information that is useful and reliable. Which site (above) would you go to first?

- Tour Egypt Travel
- Ancient Egypt Thematic Unit
- The Ancient Egypt Site
- Ancient Egypt Web
- I don't know

Why did you pick this answer?

[CLICK ONCE TO CONTINUE]




You are looking for reliable websites about the rain forest. Your friend has sent you this list of four website addresses with no other information. If you had to predict which link would lead to the MOST reliable information about rainforests, which link would you pick?

- http://www.davesite.com/rainforest
- http://www.rainforest-australia.net
- http://www.usmih.edu/rainforest/~peters/saveforest.htm
- http://www.rain-tree.com/schoolreports.htm

Why did you choose this answer?

[CLICK ONCE TO CONTINUE]



Your teacher asks you to use the Internet for a research project about the presidents of the United States. Please write one question about what you'd like to discover about the presidents.


What is one word or phrase that you would type into a search engine (Google, Yahoo, Dogpile, Ask) to find information to answer your question?

Search phrase: _____

If that did not give you any results, what is another word or phrase that you could try? _____

[CLICK ONCE TO CONTINUE]

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Explain how you would search for information about the state bird of Wyoming on the Internet. Make a list of the steps you would use. (You may not need all 8 steps below.)

Step one: Turn the computer on.

Step two: Connect to the Internet.

Step three: _____

Step four: _____


Step five: _____

Step six: _____

Step seven: _____

Step eight: _____

[CLICK ONCE TO CONTINUE]



The Pacific Northwest Tree Octopus

with David the Tree Octopus and the Tree Octopus


from The Tree Octopus and the Tree Octopus

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What are some different ways you could check if the information on this webpage (above) is correct?

[CLICK ONCE TO CONTINUE]

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Your teacher wants you to send your report as an attachment in an email. Make a list of the steps you would use to attach and send it. (You may not use all 10 steps below.)

Step one: Open your email account on the computer.

Step two: _____

Step three: _____

Step four: _____

Step five: _____

Step six: _____

Step seven: _____

Step eight: _____

Step nine: _____

Step ten: _____

[CLICK ONCE TO CONTINUE]

How Good I am at Using the Internet

Rate your skill level for each of the following by selecting where you feel your skill level falls between being an expert or beginner.

	1	2	3	4	5	6	7
	beginner						expert
Searching for general information on the Internet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Searching for specific information on the Internet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Searching on the Internet for topics related to school subjects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Searching on the Internet for topics of personal interest.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading information on the Internet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sending email messages.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keyboarding (typing quickly and accurately).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the Internet to answer a question.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the Internet in general.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[CLICK ONCE TO CONTINUE]

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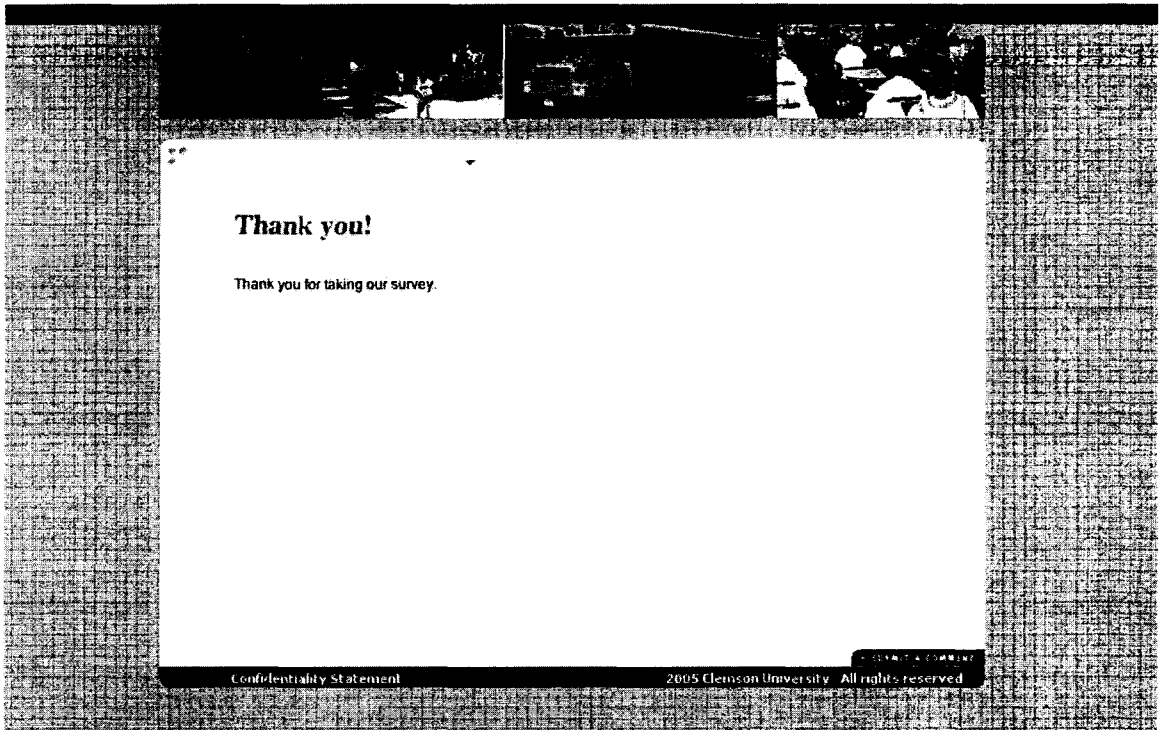
Rate how comfortable you would be explaining to an adult (or thinking aloud) about where you go and how you read on the Internet.

- Very comfortable
- Somewhat comfortable
- A little comfortable
- Not at all comfortable

[CLICK ONCE TO CONTINUE]

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Appendix D

Digital Divide Measurement Scale for Student (DDMS-S)

View online at: <http://www.surveymonkey.com/s.asp?u=317882719686>

Information Sheet

The screenshot shows the top of a survey page. At the top left is the University of Connecticut logo. To the right is a black button labeled "Exit this survey >>". Below the logo is the title "Survey of Internet Use and Online Reading (Student Version)". The main content area contains an "Information Sheet" with the following text:

Information Sheet for Participation in a Survey

Your parents have asked if you should take part in a research study. Your Professor, Lou and Mrs. Henry are doing. They want to learn more about how middle school students spend their time using the Internet. You can ask all sorts of questions as you like about the study and anything you explain it to you in a way that you can understand.

You will be asked to do some things. The survey will ask you questions about how you use the Internet. If you have any questions about the survey, it will have the effect on your results.

You don't have to do it if you don't want to and no one will be told if you do. You choose not to be in the study or if you change your mind, you should let one of the researchers or your teacher know and you won't have to be in the study any more.

If you agree to take the survey, sign your name on your consent form and then click the button below to begin.

* Click on the button below to begin the survey:

- I agree to take the survey.
- No thank you.

Next >>

Items 1 – 4

The screenshot shows a survey page with the University of Connecticut logo and "Exit this survey >>" button. The title is "Survey of Internet Use and Online Reading (Student Version)". The main content area is titled "Please enter the following information:" and contains the following fields and options:

First name: _____ Last name: _____

* I am:

- Male
- Female

* Where were you born? (Select one)

- American Indian
- Asian American
- Black
- Hispanic
- White
- Other (Please specify): _____

* My school is:

- MS
- JHS
- MHS
- HS
- SS
- Other

Item 5

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

1. Which grade level best describes you?

9th grade
 10th grade
 11th grade
 12th grade

[<< Go Back](#) [Next >>](#)

Item 6

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

1. Which grade level best describes you?

9th
 10th

[<< Go Back](#) [Next >>](#)

Items 7 – 8

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

1. How often do you use the Internet?

Frequency: times per week

Number of hours per week: hours

[<< Go Back](#) [Next >>](#)

Item 9

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

11. What kind of library connection do you have at your school?

- Traditional library
- Library with Internet access, but no computer access
- Other (specify below)

<< Go Back Next >>

Item 10

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

12. How do you access the Internet at school (check all that apply)?

- Traditional library
- Other
- Home
- Public library
- Home with no community access
- School's library
- Other (specify below)

<< Go Back Next >>

Items 11 – 12

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

11. Which do you use the most often?

- Library
- Home
- Other (specify below)

12. During the past year, the amount of time I have spent

- Reading
- Other (specify below)

<< Go Back Next >>

Items 13 – 14

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

For this section, please respond to the items about how you use the Internet AT SCHOOL.

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13. I use the Internet to find information for my schoolwork.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. I use the Internet to communicate with my classmates.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[<< Go Back](#) [Next >>](#)

Section Break

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

For this section, please respond to the items about how you use the Internet AT SCHOOL.

[<< Go Back](#) [Next >>](#)

Items 15 – 19

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

For this section, please respond to the items about how you use the Internet AT SCHOOL.

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15. I use the Internet to find information for my schoolwork.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. I use the Internet to communicate with my classmates.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. I use the Internet to find information for my schoolwork.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. I use the Internet to communicate with my classmates.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. I use the Internet to find information for my schoolwork.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[<< Go Back](#) [Next >>](#)

Items 20 – 25

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

1. Think of how often you use the following **AT SCHOOL**:

Item	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
1. I use the Internet to look up information I need for my classes AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I use the Internet to look up information I need to do my homework AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I use the Internet to look up information I need to do my research AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I use the Internet to look up information I need to do my assignments AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I use the Internet to look up information I need to do my projects AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[<< Go Back](#) [Next >>](#)

Items 26 – 30

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

2. Think of how often you use the following **AT SCHOOL**:

Item	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
1. I use the Internet to look up information I need to do my classes AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I use the Internet to look up information I need to do my homework AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I use the Internet to look up information I need to do my research AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I use the Internet to look up information I need to do my assignments AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I use the Internet to look up information I need to do my projects AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Items 31 – 34

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

3. Think of how often you use the following **AT SCHOOL**:

Item	Never	Less than once a week	Once a week	A few times each week	Once a day	Several times a day
1. I use the Internet to look up information I need to do my classes AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I use the Internet to look up information I need to do my homework AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I use the Internet to look up information I need to do my research AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I use the Internet to look up information I need to do my assignments AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I use the Internet to look up information I need to do my projects AT SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Items 35 – 36

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Student Version)

This is item 35 of 41 items showing 81.25000%

Item	Response	Percentage	Count	Percentage	Count
1. I check my e-mail at least once a day.	Strongly Disagree	10.00%	1	10.00%	1
	Disagree	10.00%	1	10.00%	1
	Neutral	10.00%	1	10.00%	1
	Agree	10.00%	1	10.00%	1
	Strongly Agree	10.00%	1	10.00%	1

[<< Go Back](#) [Next >>](#)

Section Break

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Student Version)

This is item 36 of 41 items showing 87.50000%

Item	Response	Percentage	Count	Percentage	Count
2. I check my e-mail at least once a day.	Strongly Disagree	10.00%	1	10.00%	1
	Disagree	10.00%	1	10.00%	1
	Neutral	10.00%	1	10.00%	1
	Agree	10.00%	1	10.00%	1
	Strongly Agree	10.00%	1	10.00%	1

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Items 37 – 41

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Student Version)

This is item 37 of 41 items showing 93.75000%

Item	Response	Percentage	Count	Percentage	Count
3. I check my e-mail at least once a day.	Strongly Disagree	10.00%	1	10.00%	1
	Disagree	10.00%	1	10.00%	1
	Neutral	10.00%	1	10.00%	1
	Agree	10.00%	1	10.00%	1
	Strongly Agree	10.00%	1	10.00%	1

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Items 42 – 47

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

1. How often do you use the following **OUTSIDE SCHOOL** activities?

Activity	Never	Less than once a week	Once a week	Two or three times a week	Once a day	Several times a day
I use the Internet to read about current events OUTSIDE SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about social issues OUTSIDE SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about health OUTSIDE SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Items 48 – 52

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

1. How often do you use the following **OUTSIDE SCHOOL** activities?

Activity	Never	Less than once a week	Once a week	Two or three times a week	Once a day	Several times a day
I use the Internet to read about current events OUTSIDE SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about social issues OUTSIDE SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the Internet to read about health OUTSIDE SCHOOL .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Items 53 – 56

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Student Version)

* This is how often I do the following (PLEASE CHECK)

Never	Once a week	Once a month	A few times a week	Every day	Several times a day
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Items 57 – 58

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Student Version)

* This is how often I do the following (PLEASE CHECK)

Never	Once a week	Once a month	A few times a week	Every day	Several times a day
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Section Break

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Student Version)

* This is how often I do the following (PLEASE CHECK)

Never	Once a week	Once a month	A few times a week	Every day	Several times a day
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Item 59

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Student Version)


* This is how often I do the following (PLEASE CHECK)

Never	Once a week	Once a month	A few times a week	Every day	Several times a day
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Item 60

Exit this survey >>

 **University of Connecticut**

Survey of Internet Use and Online Reading (Student Version)

A **Ancient Egypt Travel & Vacation Tours**
You see the most outstanding attractions of **Ancient Egypt**. Cairo, Nile Cruise experience between Luxor & Aswan, Abu Simbel. ...
www.afnicapoint.com/tours1/egyptour.htm - 27k - Cached - Similar pages

B **Ancient Egypt Thematic Unit**
Focus: Students will become familiar with **Ancient Egypt** and expand their ... Collection of books relating to **Ancient Egypt** (See Related Literature at the ...
www.libsci.sc.edu/miller/Egypt.htm - 18k - Cached - Similar pages

C **The Ancient Egypt Site**
The history, language and culture of **Ancient Egypt** by Egyptologist Jacques Kinnaer.
www.ancient-egypt.org/ - 5k - Cached - Similar pages


D **Ancient Egypt Web**
More than a dozen illustrated reports written by primary students.
www.hitchams.suffolk.sch.uk/egypt/ - Similar pages

You are viewing a survey about Ancient Egypt. You are viewing a survey about Ancient Egypt. Which site would you like to visit?

- A. Ancient Egypt Travel & Vacation Tours
- B. Ancient Egypt Thematic Unit
- C. The Ancient Egypt Site
- D. Ancient Egypt Web

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Item 61



You are viewing a survey about Ancient Egypt. You are viewing a survey about Ancient Egypt. Which site would you like to visit?

- A. Ancient Egypt Travel & Vacation Tours
- B. Ancient Egypt Thematic Unit
- C. The Ancient Egypt Site
- D. Ancient Egypt Web

[<< Go Back](#) [Next >>](#)

Survey of Internet Use and Online Reading (Student Version)

A The Planet Jupiter

The planet Jupiter is shown in the adjacent Hubble Space Telescope true-color image (Ref). Jupiter is by far the largest of the planets. ...
csep10.phys.utk.edu/astr161/lect/jupiter/jupiter.html - 4k - Cached - Similar pages

Jupiter - MSN Encarta

B Great books about your topic, Jupiter (planet), selected by Encarta editors ... Jupiter (planet), fifth planet from the Sun and the largest planet in the ...
encarta.msn.com/encyclopedia_761564261/Jupiter_(planet).html - 44k -
Cached - Similar pages

C Jupiter, planet Jupiter, discover planet Jupiter, Jupiter the ...

Space.com explains Jupiter, planet Jupiter, discover planet Jupiter, Jupiter the planet, the planet Jupiter.
www.space.com/jupiter/ - 26k - Cached - Similar pages

StarChild: The planet Jupiter


D This planet is made mostly of hydrogen and helium gases. Jupiter gives off two times more heat than it gets from the Sun. It shines very brightly in the ...
starchild.gsfc.nasa.gov/docs/StarChild/solar_system_level1/jupiter.html - 8k -
Cached - Similar pages

You are looking for information about Jupiter's atmosphere.
You are using the Internet and the search engine Google.
Here are the top three engine results that came up.
What are the best sources?

- A. The Planet Jupiter
- B. Jupiter - MSN Encarta
- C. Jupiter, planet Jupiter, discover planet Jupiter, Jupiter the ...
- D. StarChild: The planet Jupiter

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Survey of Internet Use and Online Reading (Student Version)




WIKIPEDIA
The Free Encyclopedia

[Sign in / create account](#)

article | discussion | edit this page | history A

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 \$885,119.59

Tax-deductibility of donations | FAQ | Financial statements | Live list of donations

The High King

From Wikipedia, the free encyclopedia

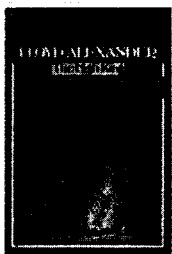
The **High King** is the last in the Chronicles of Prydain series of books by Lloyd Alexander. Much darker than the previous installations in the series, it is sometimes held as one of the most influential fantasy books written. It was awarded the Newbery Medal for excellence in American children's literature in 1969.

Plot summary [edit]

Spoiler warning: Plot and/or ending details follow.

The story begins as the Assistant Pig-Keeper Taran, his companion Gurgi, and the raven Kaw return to Caer Dallben in time to find that Princess Eilonwy, the love of his life, has returned to him. After Taran's adventure of self-discovery in Taran Wanderer, he realized that all he wants to do now is be with Eilonwy, even if he isn't of noble blood.

Before he confesses his feelings to her, however, he is interrupted by his old comrades in arms, the bard-king Fflewddur Fflam and Gwydion, Prince of Don. Gwydion is badly injured and seeks refuge in Caer Dallben. It is later determined that Arawn, using Taran's form as a guise, lured Fflewddur and



Recent US paperback cover

Author Lloyd Alexander **D**

Cover Artist Jody Lee

Country United States

Language English

Series The Chronicles of Prydain

What links here **C**

- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link
- Cite this article

In other languages

- 日本語

* You may wish to see other books by the author of The Chronicles of Prydain.

- A. Prydain
- B. Children's Magazines
- C. What Links Here
- D. Lloyd Alexander

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Survey of Internet Use and Online Reading (Student Version)

- This is the website for the Anne Frank Center, USA. If you visited the Anne Frank Center, what would you click on to view the website?
- A. About Us
 - B. Our Exhibits
 - C. News & Media Center
 - D. Anne Frank Center USA

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Survey of Internet Use and Online Reading (Student Version)

Burger King® - 7:22am
A TM & © 2007 Burger King Brands, Inc. (USA only). TM & © 2007 Burger King Corporation (outside USA). All rights reserved. ...
www.burgerking.com/ - 3k - Jan 4, 2007 - Cached - Similar pages

Burger King - Wikipedia, the free encyclopedia
B Hungry Jack's is a franchisee of Burger King that owns, operates and franchises over 300 ... As a result of Burger King's actions, Hungry Jacks Pty. ...
en.wikipedia.org/wiki/Burger_King - 135k - Cached - Similar pages

Burger King - Phoenix, AZ, 85004 - Citysearch
C Come to Citysearch to get information, directions, and reviews on Burger King and other Restaurants in Phoenix.
phoenix.citysearch.com/profile/32310306?landing=1&query=&brand=synd_flightview - 34k - Cached - Similar pages

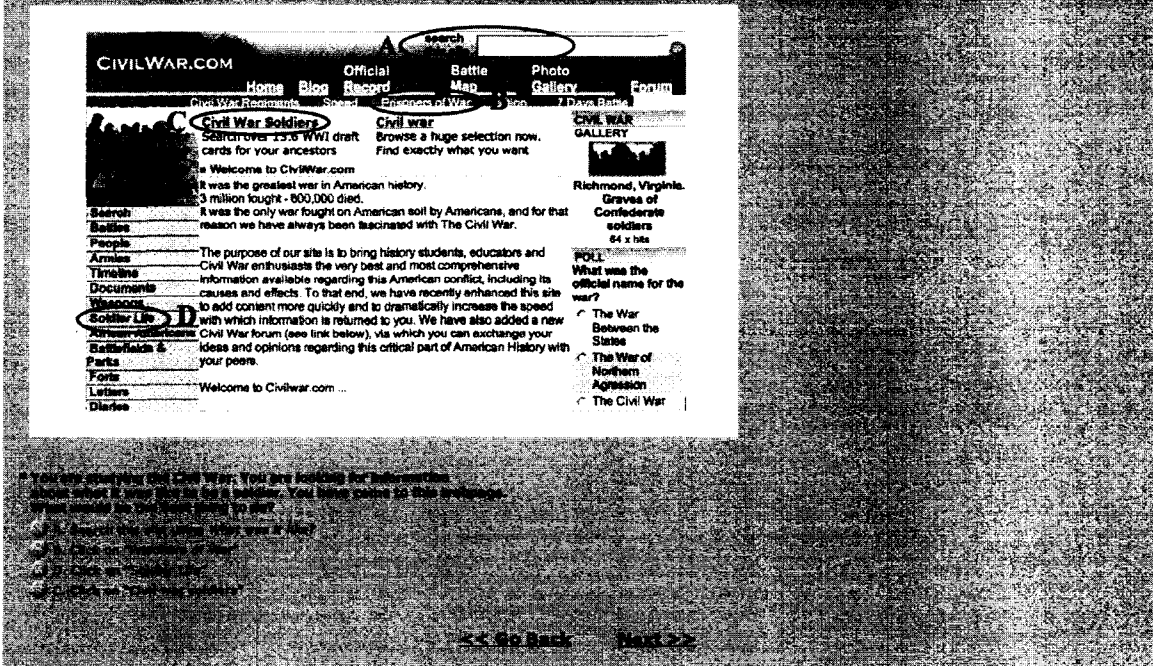
Burger King Calories and Calorie Counter
D Burger King Menu (Web Address: <http://www.bk.com/>) (Please click on a menu item below to view the nutritional breakdown) ...
www.chowbaby.com/fastfood/fast_food_nutrition.asp?ff_resid=1011 - 141k - Cached - Similar pages

You need to find the name of the person in charge of the Burger King company. Which would be the most reliable site to visit to find out the name of the person?

- A. Burger King
- B. Burger King - Wikipedia, the free encyclopedia
- C. Burger King - Phoenix, AZ, 85004 - Citysearch
- D. Burger King Calories and Calorie Counter

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Survey of Internet Use and Online Reading (Student Version)



Survey of Internet Use and Online Reading (Student Version)

Help Save The Pacific Northwest Tree Octopus From Extinction!

Information About The Pacific Northwest Tree Octopus

Cephalopod News

- 2007-01-05 A...
2006-12-22...
2006-12-15...

The Pacific Northwest tree octopus (Diosepeus poseidoni) can be found in the temperate rainforests of the Olympic Peninsula on the west coast of North America...

An intelligent and inquisitive being (it has the largest brain-to-body ratio for any mollusk), the tree octopus explores its arboreal world by both touch and sight...

Reaching out with one of her eight arms, each covered in sensitive suckers, a tree octopus might grab a branch to pull herself along in a form of locomotion called tentacle-shuffling...

Tree octopuses have eyesight comparable to humans. Besides allowing them to see their prey and environment, it helps them in inter-octopus relations...

The reproductive cycle of the tree octopus is still linked to its roots in the waters of the Puget Sound from where it is thought to have originated. Every year, in Spring, tree octopuses leave their homes in the Olympic National Forest...

- What do you think about the article?
Check if all the information...
Check if the information is correct...

<< Back Next >>

Survey of Internet Use and Online Reading (Student Version)

Atlantis

www.Atlantis.com Visit Atlantis - the Caribbean's most unique resort experience!

Atlantis - Crystalinks

Francis Bacon - The New Atlantis Mesoamerican Scholars Helena Blavatsky Rudolf Steiner ...

ATLANTIS REVISITED - ISIS AND OSIRIS - CYCLES OF TIME ...

www.crystalinks.com/atlantis.html - 4k - Cached - Similar pages

Atlantis Adventures

Dive locations in the Caribbean and South Pacific taking 48-64 passengers to excursions of 100 feet. Features company history, tour schedules, sales, ...

www2.atlantisadventures.com/ - 10k - Cached - Similar pages

Home site of Atlantis Word Processor

Download Atlantis Word Processor, add-on spellcheckers, Sound Schemes, sample documents and templates from our Downloads page. ...

atlantiswordprocessor.com/ - 15k - Cached - Similar pages

Discovery of Atlantis Website

Website supporting a book, which argues Atlantis was on Cyprus. Includes excerpt, VRML models and animations.

www.discoveryofatlantis.com/ - 17k - Cached - Similar pages

WHOI Marine Operations - R/V Atlantis

The Woods Hole Oceanographic Institution (WHOI) is the largest independent oceanographic research institution in the United States.

www.whoi.edu/marops/research_vessels/atlantis/index.html - 15k - Cached - Similar pages

Sponsored Link

Sponsored Links

Atlantis

Find Great Deals on Top Hotels With Orbitz Low Price Guarantee!

www.ORBITZ.com

Atlantis Vacation Package

6 days/5 nights in a one-bedroom deluxe villa with full kitchen.

www.harborsideresort.com

Atlantis

Hotel Photos, Info & Virtual Tours

Book with Expedia and Save.

www.Expedia.com

Atlantis Paradise Island

Atlantis Towers Royal, Coral, Beach

All-suite Cove Tower open April 07

www.atlantisresort-bahamas.com

Atlantis Paradise Island

Inside Info By Frequent Travellers

20-30% Discounts on Villa Rental

www.atlantisfamilyfun.com

Navigation and search options including Home, Previous, Next, and Search.

<< Go Back Next >>



Online Banking

Online Account Locked !

Due to the number of incorrect login attempts, your Bank of America Online Banking Account has been locked for your security on 11/07/2006 . You must reset your Passcode before you can enter Online Banking. You can reset your Passcode just with one click on the link below

At Bank of America we care about your security so, for your protection we are proactively notifying you of this activity.

Want to confirm this email is from Bank of America? Log in to Online Banking, select Manage Alerts and Alerts History to view all alerts sent from Bank of America. Your Alerts History is updated every 2 hours.

<https://www.bankofamerica.com/signin/>


Because E-Mail Is Not A Secure Form Of Communication, This E-Mail Box Is Not Equipped To Handle Replies.

- You have a bank account with Bank of America.
You received this message either as email
or text message (see below)
- Contact Bank of America regarding
- Call the number for the account
- Go to the bank and check your balance
- Send a reply to the correct message

[Go Back](#) [Next >>](#)


University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)




- President
- News
- History
- Links
- Appointments
- Public Comment
- Workshop
- Contact
- Text
- Help

Search



THE WHITE HOUSE



America's 43rd President, George W. Bush, and First Lady Laura Bush welcome you to the White House.

In Focus

- White House to rent billboard space on lawn.
To help fund the Tax Cut, the White House will begin renting advertising space, including banner ads on the web page, corporate sponsorship of the White House letterhead, and billboards on the lawn. For rates, please inquire.
- ExxonMobil company to fund White House energy plan
In a bold public/private partnership, the ExxonMobil company will contribute one billion dollars to fund exploratory drilling in the Alaskan wildlife preserves, a key component of the President's strategy to combat the growing energy crisis. To cement the partnership, the Lincoln Bedroom will be renamed the ExxonMobil Bedroom.

What did you find that you probably cannot trust this website?

- It has a search engine
- It has a public comment area
- It has a link to photos
- It says something about the White House energy plan

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Item 71

Survey of Internet Use and Online Reading (Student Version)

CANADIAN MAN PASSES ENGLISH TO 20-YEAR-OLD CAT




Instructions: You will read the news story in this column.

- Read the story.
- Read the story.
- Read the story.
- Read the story.

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

Main Title: *My Dream*
A True Historical Examination



I have a dream...

Bring the Dream to life in your town!
Do without flyers to guess out all your schools.

4 years being a student in the North American continent

You have found the place where you should live and

- A. From your town
- B. The University
- C. The school you are at in your school
- D. The school you are at

[<< Go Back](#) [Next >>](#)

Survey Completion Message

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Student Version)

Thank you for taking the survey.

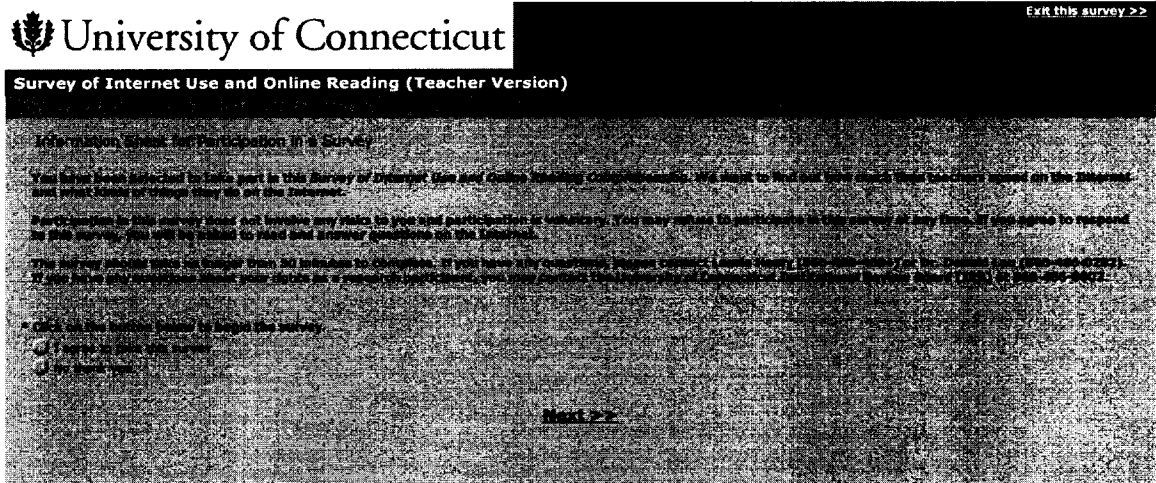
[<< Go Back](#) [Done >>](#)

Appendix E

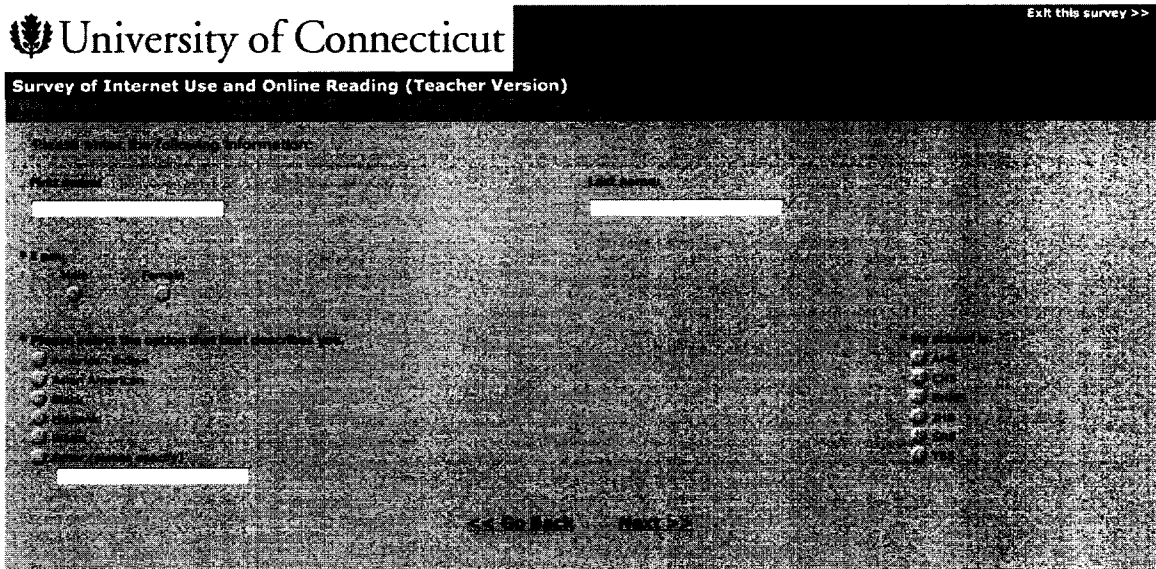
Digital Divide Measurement Scale for Teachers (DDMS-T)

View online at: <http://www.surveymonkey.com/s.asp?u=861443179659>

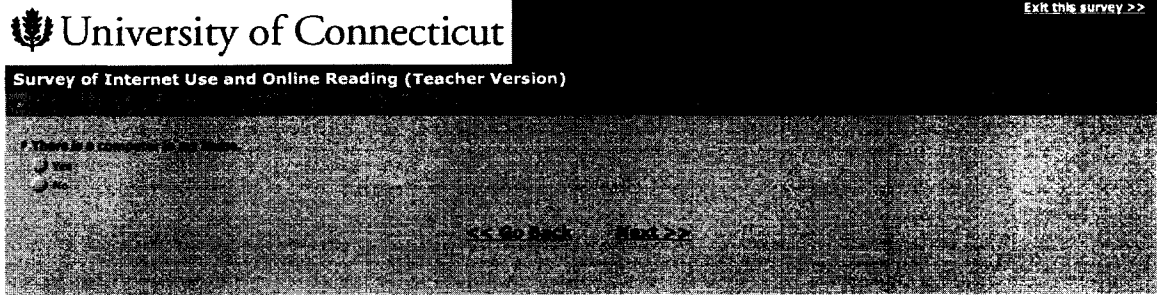
Information Sheet



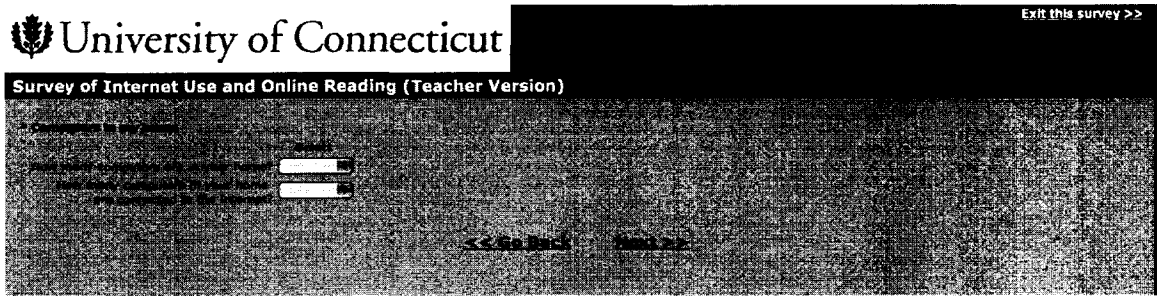
Items 1 – 6



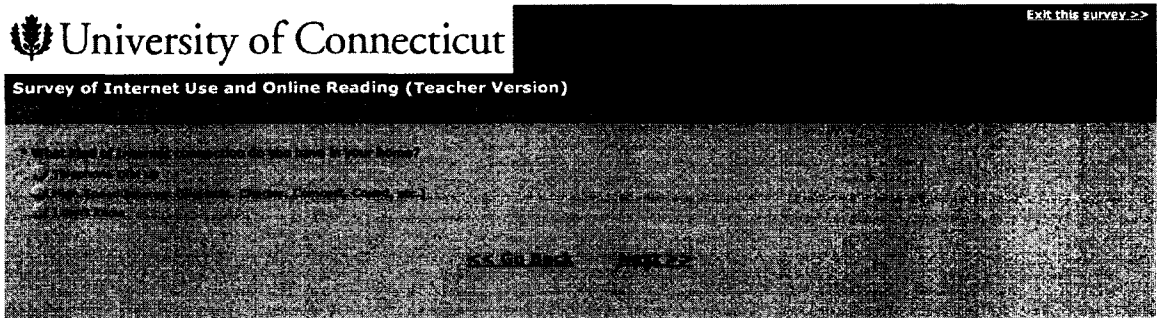
Item 7



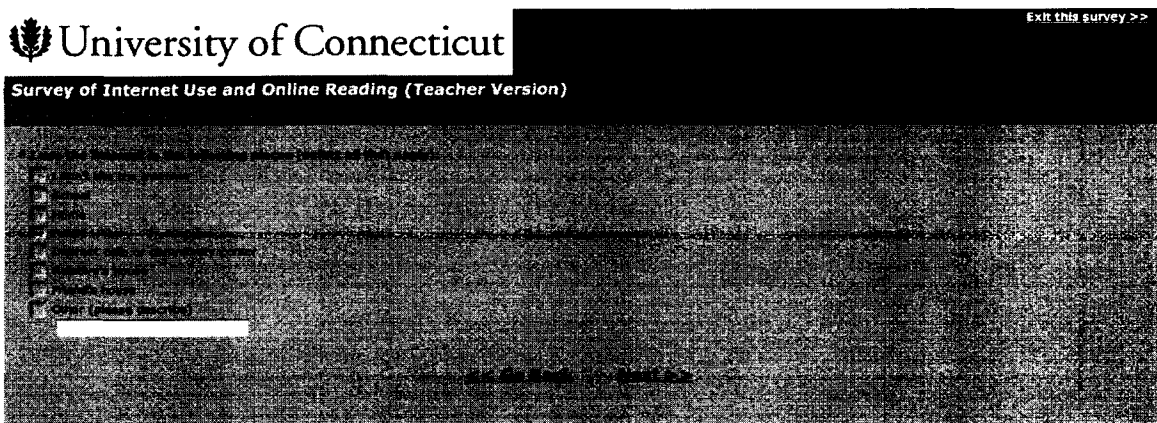
Items 8 – 9



Item 10



Item 11



Items 12 – 13

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

12. Where do you use the Internet most often?

Home

School

Somewhere else

13. During the past year, how often do you use the Internet to read?

Never

Sometimes

Often

Several times

Several times a week

[<< Go Back](#) [Next >>](#)

Items 14 – 19

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

14. Select the best response to the following items.

	Never	Less than once a week	Once a week	2-3 times a week	Once a month	Several times a month
How often do you check e-mail accounts in your classroom?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often do you check e-mail accounts in your classroom?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often do you check e-mail accounts in your classroom?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often do you check e-mail accounts in your classroom?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Section Break

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

15. How often do you use the Internet to read?

Never

Sometimes

Often

Several times

Several times a week

[<< Go Back](#) [Next >>](#)

Items 20 – 24

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Teacher Version)

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Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I use the Internet frequently.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I use the Internet to find information for my teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I use the Internet to communicate with my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I use the Internet to communicate with my colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I use the Internet to find information for my research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<< Back Next >>

Items 25 – 30

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Teacher Version)

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Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6. I use the Internet to find information for my teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I use the Internet to communicate with my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I use the Internet to communicate with my colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I use the Internet to find information for my research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I use the Internet to find information for my personal interests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<< Back Next >>

Items 31 – 35

University of Connecticut Exit this survey >>

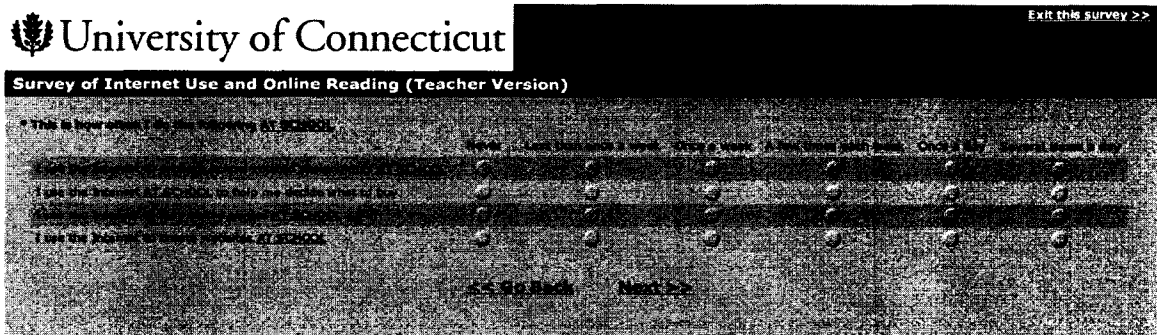
Survey of Internet Use and Online Reading (Teacher Version)

© 2000 by the University of Connecticut. All rights reserved.

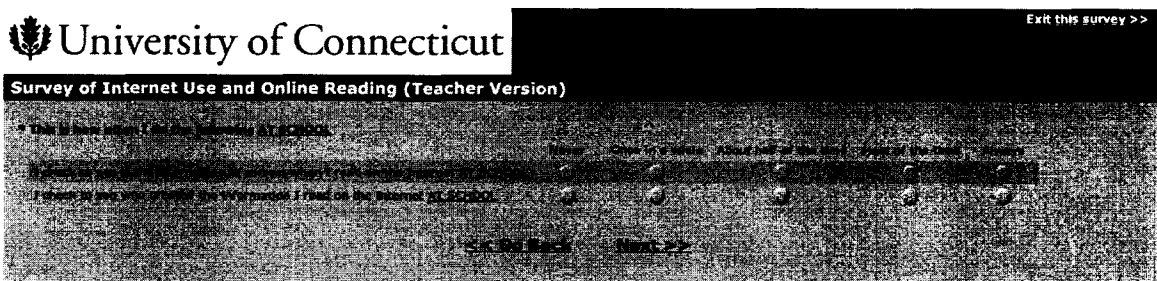
Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11. I use the Internet to find information for my teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. I use the Internet to communicate with my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. I use the Internet to communicate with my colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. I use the Internet to find information for my research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I use the Internet to find information for my personal interests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<< Back Next >>

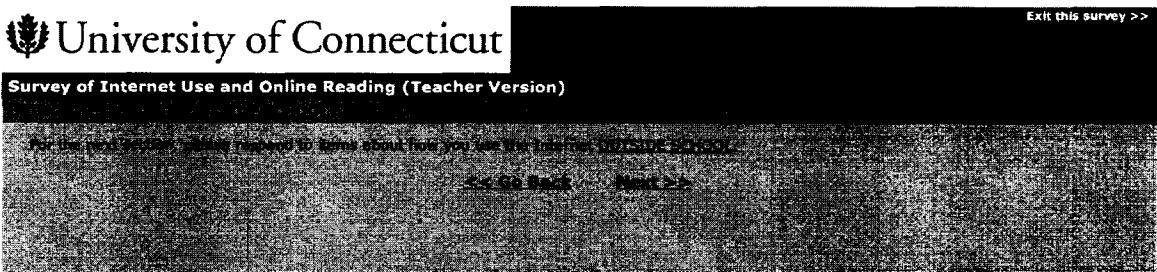
Items 36 – 39



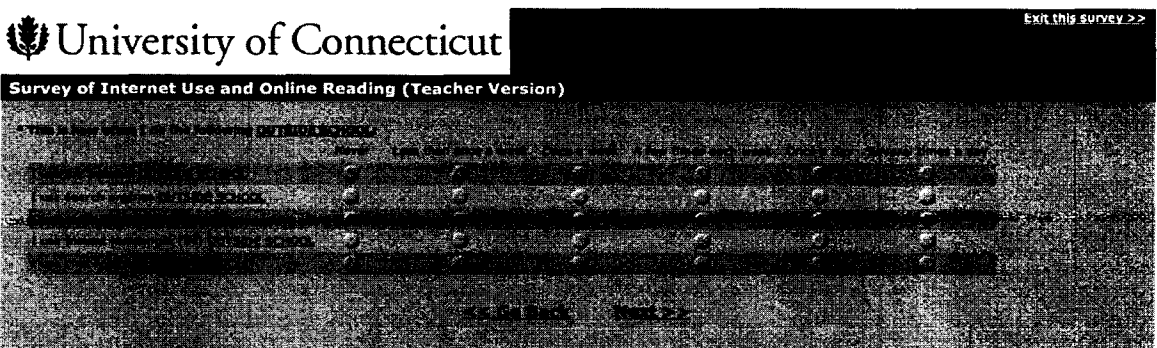
Items 40 – 41



Section Break



Items 42 – 46



Items 47 – 52

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

* Please select the best response for each item.

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I use the Internet frequently.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I use the Internet to find information for my lessons.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I use the Internet to communicate with my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I use the Internet to communicate with my colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I use the Internet to find information for my personal life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[<< Go Back](#) [Next >>](#)

Items 53 – 57

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

* Please select the best response for each item.

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6. I use the Internet to find information for my lessons.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I use the Internet to communicate with my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I use the Internet to communicate with my colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I use the Internet to find information for my personal life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I use the Internet to find information for my research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[<< Go Back](#) [Next >>](#)

Items 58 – 61

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

* Please select the best response for each item.

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11. I use the Internet to find information for my lessons.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. I use the Internet to communicate with my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. I use the Internet to communicate with my colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. I use the Internet to find information for my personal life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I use the Internet to find information for my research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Items 62 – 63

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

* Please select the best answer for each of the following questions.

1. How often do you use the following resources in your classroom?

Never	Once in a while	Most days of the week	Every day
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<< Go Back Next >>

Section Break

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

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Item 64

University of Connecticut [Exit this survey >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

* Please select the best answer for each of the following questions.

2. How often do you use the following resources in your classroom?

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<< Go Back Next >>

Item 65

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Teacher Version)

A Ancient Egypt Travel & Vacation Tours
You see the most outstanding attractions of Ancient Egypt. Cairo, Nile Cruise experience between Luxor & Aswan, Abu Simbel. ...
www.africapoint.com/tours1/egyptour.htm - 27k - Cached - Similar pages

B Ancient Egypt Thematic Unit
Focus: Students will become familiar with Ancient Egypt and expand their ... Collection of books relating to Ancient Egypt (See Related Literature at the ...
www.libsci.sc.edu/miller/Egypt.htm - 18k - Cached - Similar pages

C The Ancient Egypt Site
The history, language and culture of Ancient Egypt by Egyptologist Jacques Kinnaer.
www.ancient-egypt.org/ - 5k - Cached - Similar pages

D Ancient Egypt Web
More than a dozen illustrated reports written by primary students.
www.hitchams.suffolk.sch.uk/egypt/ - Similar pages

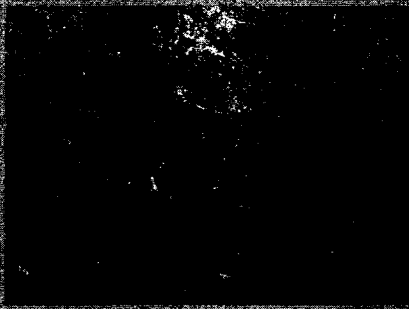
[1. The Ancient Egypt Travel & Vacation Tours](#)
[2. Ancient Egypt Thematic Unit](#)
[3. The Ancient Egypt Site](#)
[4. Ancient Egypt Web](#)

[<< Go Back](#) [Next >>](#)

Item 66

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Teacher Version)



[1. The Ancient Egypt Travel & Vacation Tours](#)
[2. Ancient Egypt Thematic Unit](#)
[3. The Ancient Egypt Site](#)
[4. Ancient Egypt Web](#)

[<< Go Back](#) [Next >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

A The Planet Jupiter

The planet Jupiter is shown in the adjacent Hubble Space Telescope true-color image (Ref). Jupiter is by far the largest of the planets. ...
csep10.phys.utk.edu/ast161/lect/jupiter/jupiter.html - 4k - Cached - Similar pages

Jupiter - MSN Encarta

B Great books about your topic, Jupiter (planet), selected by Encarta editors ... Jupiter (planet), fifth planet from the Sun and the largest planet in the ...
encarta.msn.com/encyclopedia_761564261/Jupiter_(planet).html - 44k - Cached - Similar pages

C Jupiter, planet Jupiter, discover planet Jupiter, Jupiter the ...

Space.com explains Jupiter, planet Jupiter, discover planet Jupiter, Jupiter the planet, the planet Jupiter.
www.space.com/jupiter/ - 26k - Cached - Similar pages

StarChild: The planet Jupiter

D This planet is made mostly of hydrogen and helium gases. Jupiter gives off two times more heat than it gets from the Sun. It shines very brightly in the ...
starchild.gsfc.nasa.gov/docs/StarChild/solar_system_level1/jupiter.html - 8k - Cached - Similar pages

- You may wish to print out these pages for your students.
- You may wish to print out these pages for your students.
- You may wish to print out these pages for your students.
- You may wish to print out these pages for your students.
- You may wish to print out these pages for your students.
- You may wish to print out these pages for your students.

[<< Go Back](#) [Next >>](#)

Survey of Internet Use and Online Reading (Teacher Version)

article discussion edit this page **history** A Sign in / create account

You can give the gift of knowledge by donating to the Wikimedia Foundation!

1985,119.53
Tax-deductibility of donations | FAQ | Financial statements | Live list of donations

The High King

From Wikipedia, the free encyclopedia

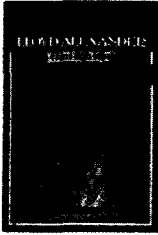
The High King is the last in the *Chronicles of Prydain* series of books by Lloyd Alexander. Much darker than the previous installments in the series, it is sometimes held as one of the most influential fantasy books written. It was awarded the Newbery Medal for excellence in American children's literature in 1969.

Plot summary [edit]

Spoiler warning: Plot and/or ending details follow.

The story begins as the Assistant Pig-Keeper Taran, his companion Gurgi, and the raven Kaw return to Caer Dalben in time to find that Princess Eilonwy, the love of his life, has returned to him. After Taran's adventure of self-discovery in Taran Wanderer, he realized that all he wants to do now is be with Eilonwy, even if he isn't of noble blood.

Before he confesses his feelings to her, however, he is interrupted by his old comrades in arms, the bard-king Fflewddur Fflam and Gwydion, Prince of Don. Gwydion is badly injured and seeks refuge in Caer Dalben. It is later determined that Arawn, using Taran's form as a guise, lured Fflewddur and



Recent US paperback cover

Author Lloyd Alexander **D**

Cover Artist Jody Lee

Country United States

Language English

Series The Chronicles of Prydain

navigation

- Main page
- Community portal
- Featured content
- Current events
- Recent changes
- Random article
- Help
- Contact Wikipedia
- Donations

search

toolbox

- What links here** **C**
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link
- Cite this article

in other languages

- 日本語

You may be interested in books by the author of *The Chronicles of Prydain*, which list several good choices:

- The Hobbit*
- The Lord of the Rings*
- The Hobbit*
- The Lord of the Rings*

<< Go Back Next >>

Survey of Internet Use and Online Reading (Teacher Version)

The screenshot displays a survey question with four radio button options:

- A. search
- B. resources
- C. links
- D. home page

The website content shown includes:

- A search bar with the text "Anne Frank Center USA Online".
- A navigation menu with items: "Home Page", "About Us", "Links", and "Resources".
- A section titled "The 10th Annual Spirit of Anne Frank Awards".
- A "PRESENTATION NEWSLETTER OF THE ANNE FRANK CENTER USA" with a small photo of a woman.
- A "A FAMILY SECRET" section.
- Small text at the bottom: "Anne Frank Center USA is a 501(c)(3) non-profit organization. All rights reserved." and "All quotes from the diary of Anne Frank have been extracted with permission from 'The Diary of a Young Girl: The Definitive Edition' published by Doubleday, 1995. © 1995 by The Anne Frank House, Basel, Switzerland. Copyright © 1995 by Doubleday, a division of Simon & Schuster, Inc. All rights reserved."

At the bottom of the survey interface, there are navigation buttons: "<< Go Back" and "Next >>".

Survey of Internet Use and Online Reading (Teacher Version)

Burger King® - 7:22am
A TM & © 2007 Burger King Brands, Inc. (USA only). TM & © 2007 Burger King Corporation (outside USA). All rights reserved. ...
www.burgerking.com/ - 3k - Jan 4, 2007 - Cached - Similar pages

Burger King - Wikipedia, the free encyclopedia
B Hungry Jack's is a franchisee of Burger King that owns, operates and franchises over 300 ... As a result of Burger King's actions, Hungry Jacks Pty. ...
en.wikipedia.org/wiki/Burger_King - 135k - Cached - Similar pages

Burger King - Phoenix, AZ, 85004 - Citysearch
C Come to Citysearch to get information, directions, and reviews on Burger King and other Restaurants in Phoenix.
phoenix.citysearch.com/profile/32310306?landing=1&query=&brand=synd_flightview - 34k - Cached - Similar pages

Burger King Calories and Calorie Counter
D Burger King Menu (Web Address: <http://www.bk.com/>) (Please click on a menu item below to view the nutritional breakdown) ...
www.chowbaby.com/fastfood/fast_food_nutrition.asp?fi_restid=1011 - 141k - Cached - Similar pages

You must select the choice of the picture in terms of the Burger King Company, which would be the most suitable one. It does not find the name of the picture.

- A. Burger King
- B. Burger King - Wikipedia, the free encyclopedia
- C. Burger King - Phoenix, AZ, 85004 - Citysearch
- D. Burger King Calories and Calorie Counter

<< Go Back Next >>

Survey of Internet Use and Online Reading (Teacher Version)

CIVILWAR.COM Search

Home Blog Official Record Battle Map Photo Gallery Forum

Civil War Records Search Battleships & Navies Parks Letters Diaries

Civil War Soldiers
Search over 250 WWI draft cards for your ancestors

Civil War
Browse a huge selection now. Find exactly what you want

CIVIL WAR GALLERY
Richmond, Virginia. Graves of Confederate soldiers 64 x hits

POLL
What was the official name for the war?
 The War Between the States
 The War of Northern Aggression
 The Civil War

Welcome to CivilWar.com
It was the greatest war in American history. 3 million fought - 600,000 died. It was the only war fought on American soil by Americans, and for that reason we have always been fascinated with The Civil War.

The purpose of our site is to bring history students, educators and Civil War enthusiasts the very best and most comprehensive information available regarding this American conflict, including its causes and effects. To that end, we have recently enhanced this site to add content more quickly and to dramatically increase the speed with which information is returned to you. We have also added a new Civil War forum (see link below), via which you can exchange your ideas and opinions regarding this critical part of American History with your peers.

Welcome to Civilwar.com ...

Search
Battles
People
Armies
Timeline
Documents
Weapons
Soldier Life
Battleships & Navies
Parks
Letters
Diaries

Home >> Site Back Next >>

Survey of Internet Use and Online Reading (Teacher Version)

Help Save The Pacific Northwest Tree Octopus From Extinction!

Information

About The Pacific Northwest Tree Octopus

The Pacific Northwest tree octopus (*Octopus pokobii*) can be found in the temperate rain forests of the Olympic Peninsula on the west coast of North America. Their habitat lies on the Eastern side of the Olympic mountain range, adjacent to Hood Canal. These solitary cephalopods reach an average size (measured from arm tip to mantle tip) of 30-33 cm. Unlike most other cephalopods, tree octopuses are amphibious, spending only their early life and the period of their mating season in their arboreal aquatic environment. Because of the malice of the rain forest and specialized skin adaptations, they are able to keep from becoming dehydrated for prolonged periods of time, but given the chance they would prefer resting in pooled water.

An intelligent and inquisitive being (it has the largest brain-to-body ratio for any mollusk), the tree octopus explores its arboreal world by both touch and sight. Adaptations its ancestors originally evolved in three dimensional environment of the sea have been put to great use in the vastly complex maze of the Olympic rain forest. The challenges and richness of this environment (and the intricate way in which it interacts with it) may account for the tree octopus's advanced behavioral development. (Some evolutionary theorists suppose that "arboreal adaptation" is what laid the groundwork in primates for the evolution of the human mind.)

Reaching out with one of her eight arms, each covered in sensitive suckers, a tree octopus might grab a branch to pull herself along in a form of locomotion called tentacle crawl, or she might be preparing to strike at an insect or small vertebrate, such as a frog or rodent, or steal an egg from a bird's nest, or she might even be examining some object that caught her fancy, instinctively desiring to manipulate it with her dexterous limbs (really covering the body sensory organs, more than mere "limbs") in order to better know it.

Tree octopuses have eyesight comparable to humans. Besides allowing them to see their prey and environment, it helps them in inter-octopus relations. Although they are not social animals like us, they display to one another their emotions through the ability to change the color of their skin: red indicates anger, white fear, while they normally maintain a mottled brown tone to blend in with the background.

The reproductive cycle of the tree octopus is difficult to track as its roots in the waters of the Puget Sound from where it is thought to have originated. Every year, in Spring, tree octopuses leave their homes in the Olympic National Forest and migrate towards the shore and, eventually, their spawning grounds in Hood Canal. There, they congregate (the only real wild fire in the rain forest) and find mates. After the male has deposited his sperm, he returns to the forests, leaving the female to find an aquatic larva in which to attach her strands of egg clusters. The female will guard and care for her eggs until they hatch, releasing them to drift and usually dying from her selflessness. The young will spend the first month or so drifting through Hood Canal. Amazingly, they, and as far as North Puget Sound before, eventually moving out of the water and basking in their adult tree habitats.

Cephalopod News

- 2007-01-05: [Bizarre Octopus Behavior](#) - [Commonly Known as 'Rabbit' Fish](#) - A cephalopod whose color has been known to change as it reacts to its environment.
- 2006-12-22: [Octopus in the Rain](#) - A Japanese octopus has survived through a earthquake and tsunami in the Pacific Ocean.
- 2006-12-15: [Pac Northwest Tree Octopus](#) - [Help Save The Pacific Northwest Tree Octopus](#)

1. Name of the person who completed this survey: _____

2. Date of completion: _____

3. School: _____

4. Grade: _____

5. How often do you use the internet? _____

6. How often do you read online? _____

Survey of Internet Use and Online Reading (Teacher Version)

Atlantis

www.Atlantis.com Visit Atlantis - the Caribbean's most unique resort experience!

Sponsored Link

Sponsored Links

Atlantis - Crystalinks

Francis Bacon - The New Atlantis Mesoamerican Scholars Helena Blavatsky Rudolf Steiner ...
ATLANTIS REVISITED - ISIS AND OSIRIS - CYCLES OF TIME ...
www.crystalinks.com/atlantis.html - 4k - Cached - Similar pages

Atlantis

Find Great Deals on Top Hotels With Orbitz Low Price Guarantee!
www.ORBITZ.com

Atlantis Adventures

Dive locations in the Caribbean and South Pacific taking 48-64 passengers to excursions of 100 feet. Features company history, tour schedules, sales, ...
www2.atlantisadventures.com/ - 10k - Cached - Similar pages

Atlantis Vacation Package

6 days/5 nights in a one-bedroom deluxe villa with full kitchen.
www.harborsideresort.com

Home site of Atlantis Word Processor

Download Atlantis Word Processor, add-on spellcheckers, Sound Schemes, sample documents and templates from our Downloads page. ...
atlantiswordprocessor.com/ - 15k - Cached - Similar pages

Atlantis

Hotel Photos, Info & Virtual Tours Book with Expedia and Save.
www.Expedia.com

Discovery of Atlantis Website

Website supporting a book, which argues Atlantis was on Cyprus. Includes excerpt, VRML models and animations.
www.discoveryofatlantis.com/ - 17k - Cached - Similar pages

Atlantis Paradise Island

Atlantis Towers Royal, Coral, Beach All-suite Cove Tower open April 07
www.atlantisresort-bahamas.com

WHOI Marine Operations - R/V Atlantis

The Woods Hole Oceanographic Institution (WHOI) is the largest independent oceanographic research institution in the United States.
www.whoi.edu/marops/research_vessels/atlantis/index.html - 15k - Cached - Similar pages

Atlantis Paradise Island

Inside Info By Frequent Travellers 20-30% Discounts on Villa Rental
www.atlantiafamilyfun.com

- ▶ [The New Atlantis](#) - The New Atlantis Mesoamerican Scholars Helena Blavatsky Rudolf Steiner ...
- ▶ [ATLANTIS REVISITED - ISIS AND OSIRIS - CYCLES OF TIME ...](#)
- ▶ [Atlantis - Crystalinks](#)
- ▶ [Atlantis Adventures](#)
- ▶ [Home site of Atlantis Word Processor](#)
- ▶ [Discovery of Atlantis Website](#)
- ▶ [WHOI Marine Operations - R/V Atlantis](#)

[Go Back](#)

[Next Page](#)

Bank of America  Higher Standards

Online Banking

Online Account Locked !

Due to the number of incorrect login attempts, your Bank of America Online Banking Account has been locked for your security on 11/07/2006 . You must reset your Passcode before you can enter Online Banking. You can reset your Passcode just with one click on the link below

At Bank of America we care about your security so, for your protection we are proactively notifying you of this activity.

Want to confirm this email is from Bank of America? Log in to Online Banking, select Manage Alerts and Alerts History to view all alerts sent from Bank of America. Your Alerts History is updated every 2 hours.

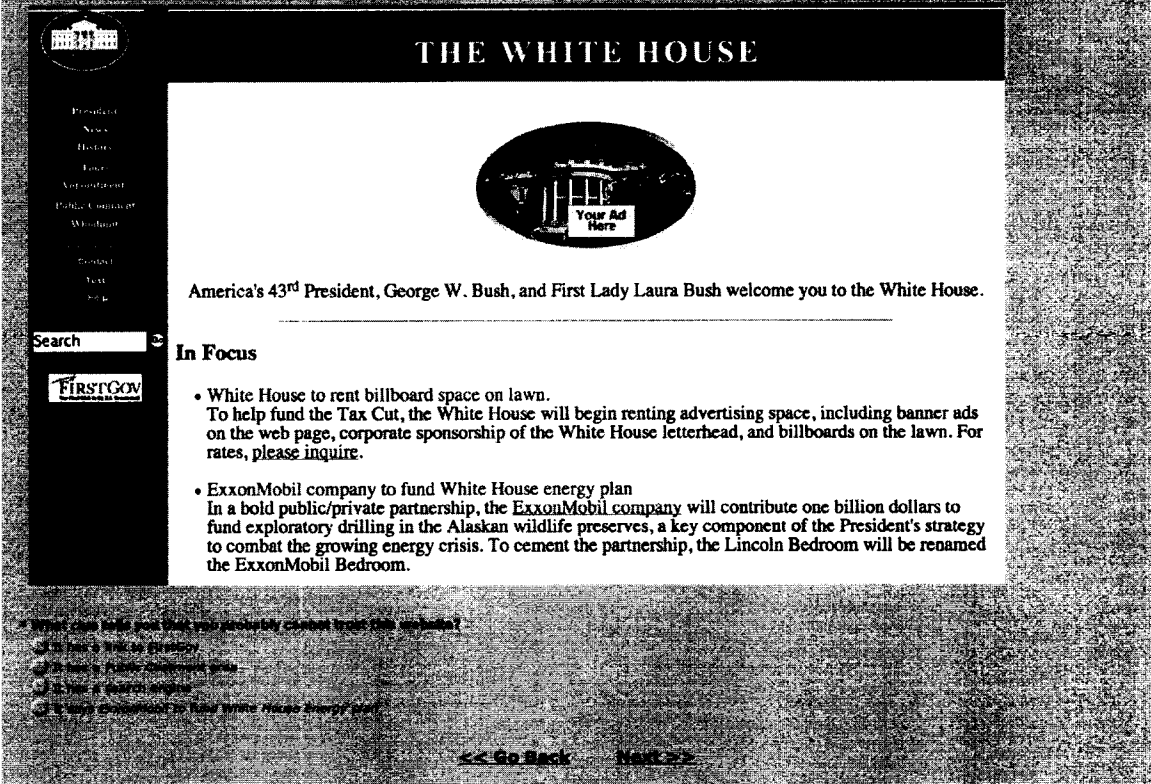
<https://www.bankofamerica.com/signin/>

Because E-Mail Is Not A Secure Form Of Communication, This E-Mail Box Is Not Equipped To Handle Replies.

* You have a Bank account with Bank of America
You authorize the following usage per email.
Please select this use:

- Receive Bank of America e-mailing
- Check on my Bank of America account
- Send a message to my Bank of America
- To or from my Bank of America check your balance

<< Go Back Next >>



The screenshot shows a web browser window displaying the White House website. The page title is "THE WHITE HOUSE". The main content area features a large oval image of the White House with a sign that says "Your Ad Here". Below the image, a text block reads: "America's 43rd President, George W. Bush, and First Lady Laura Bush welcome you to the White House." To the left of the main content is a navigation menu with links for President, News, History, Tour, Appointment, Public Comment, and Website. Below the menu is a search bar and a "FIRSTGOV" logo. The "In Focus" section contains two bullet points: "White House to rent billboard space on lawn. To help fund the Tax Cut, the White House will begin renting advertising space, including banner ads on the web page, corporate sponsorship of the White House letterhead, and billboards on the lawn. For rates, please inquire." and "ExxonMobil company to fund White House energy plan. In a bold public/private partnership, the ExxonMobil company will contribute one billion dollars to fund exploratory drilling in the Alaskan wildlife preserves, a key component of the President's strategy to combat the growing energy crisis. To cement the partnership, the Lincoln Bedroom will be renamed the ExxonMobil Bedroom." At the bottom of the page, there are navigation buttons: "<< Go Back" and "Next >>".

Survey of Internet Use and Online Reading (Teacher Version)

CANADIAN MAN RAISES ENORMOUS 80-lb. 40-inch CAT



Where would you go to see if this news story is true or false?

- www.foxnews.com
- www.fox.com
- www.fox.com
- www.fox.com


[Back](#) [Next](#)

Item 77

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Teacher Version)

Virtual Learning
A True Historical
Examination



I have a dream...

Bring the Dream to life in your town!
Download the story and presentation at [www.uconn.edu](#)

What type of presentation about the March 1968 election history
did you see most often? (Select all that apply)

- TV News
- TV Documentaries
- Educational Websites
- Other

[Back](#) [Next >>](#)

Survey Completion Message

University of Connecticut Exit this survey >>

Survey of Internet Use and Online Reading (Teacher Version)

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Appendix F

HLM Equations for Students' Online Reading Comprehension Outcome

Level-1 model.

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}(\text{SACCOU})_{1jk} + \pi_{2jk}(\text{SACCIN})_{2jk} + \pi_{3jk}(\text{SBAND})_{3jk} + \pi_{4jk}(\text{SUSEOUT})_{4jk} + \pi_{5jk}(\text{SUSEIN})_{5jk} + e_{ijk}$$

Where:

Y_{ijk} is the models' standardized estimate of the students' online reading comprehension score (SORCS), holding the other characteristics constant.

SACCOU indicates whether the student has Internet access outside school (1) or not (0).

SACCIN indicates whether the student has Internet access in school (1) or not (0).

SBAND indicates whether the student has broadband access to the Internet at home (1) or not (0).

SUSEOUT is the standardized score for out of school use of the Internet for the student for whom the model is predicting the outcome (SORCS).

SUSEIN is the standardized score for in school use of the Internet for the student for whom the model is predicting the outcome (SORCS).

Level-2 model.

$$\pi_{pjik} = \beta_{p0k} + \beta_{p1k}(\text{DRG})_{1jk} + \beta_{p2k}(\text{READING})_{2jk} + \beta_{p3k}(\text{TORCS})_{3jk} + r_{pjik}$$

Where:

π_{pjik} is the intercept for school

DRG indicates whether the school is categorized as a high DRG (1) or high DRG (0).

READING is a standardized score for the school's performance on the reading subset of the 2006 administration of the Connecticut Mastery Tests (CMTs).

TORCS is a standardized score for the teachers' online reading comprehension score as determined by the online reading comprehension sub score from the survey instrument.

Appendix G

HLM Equations for Teachers' Online Reading Comprehension Outcome

Level-1 model.

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}(\text{TACCOUT})_{1jk} + \pi_{2jk}(\text{TACCIN})_{2jk} + \pi_{3jk}(\text{TBAND})_{3jk} + \pi_{4jk}(\text{TUSEOUT})_{4jk} + \pi_{5jk}(\text{TUSEIN})_{5jk} + e_{ijk}$$

Where:

Y_{ijk} is the models' standardized estimate of the teachers' online reading comprehension score (TORCS), holding the other characteristics constant.

TACCOUT indicates whether the teacher has Internet access outside school (1) or not (0).

TACCIN indicates whether the teacher has Internet access in school (1) or not (0).

TBAND indicates whether the teacher has broadband access to the Internet at home (1) or not (0).

TUSEOUT is the standardized score for out of school use of the Internet for the teacher for whom the model is predicting the outcome (TORCS).

TUSEIN is the standardized score for in school use of the Internet for the teacher for whom the model is predicting the outcome (TORCS).

Level-2 model.

$$\pi_{pjk} = \beta_{p0k} + \beta_{p1k}(\text{DRG})_{1jk} + r_{pjk}$$

Where:

π_{pjk} is the intercept for school

DRG indicates whether the school is categorized as a high DRG (1) or high DRG (0).

Appendix H

Semi-structured Interview Protocol for Administrators

Introduction

I'm going to ask you some questions about technology and Internet integration in your school building.

Questions and Prompts

1. To begin, can you tell me about the school's vision in regard to technology and Internet integration?
2. Where would you like to see the school five years from now in regard to technology integration?
3. How is the accessibility of technology and the Internet in your building?
 - a. Tell me a little bit about the availability of the Internet for teachers? Where in the building can teachers access the Internet?
4. Can you tell me about the inclusion of the Internet in classroom instruction? Are a lot of teachers using it?
5. Do you have a separate, stand-alone technology curriculum or is it integrated across the content areas?
6. What specific skills and strategies are taught in relation to using the Internet?
7. Can you tell me about email use in your building?
 - a. What kinds of things are communicated through email?
 - b. Do you communicate with parents using email?
 - c. What about students' use of email? Are students allowed to use email at school?
 - d. Would you like to see students using email in the building?
8. What about school procedures like grading, taking attendance, and those kinds of things? Are any of those done through a school-wide network?

9. Can you tell me about your school policies for using the Internet with students?
 - a. Do you often have parents who do give permission for their students to use the Internet?
 - b. Do teachers sign an acceptable use policy?
10. What do you think some of the biggest challenges are when it comes to Internet and technology integration?
11. What about any of the public policy requirements like No Child Left Behind or IDEA? Do you see that they have an impact on technology integration?
12. Can you tell me a little bit about the availability of other resources? Do you feel that your school has an adequate amount of software for what teachers want to be doing with their students?
 - a. Is there anything in particular you would like to see in the building that you don't have?
13. How is your technical support?
14. What are your teachers' perspectives about using the Internet during instruction?
 - a. What about your teachers' abilities to integrate the Internet during instruction?
15. What do you think about your students' abilities in using the Internet? Do you think they have good skills in using the Internet?
 - a. What about their use of the Internet for searching and doing research?
16. What types of professional development opportunities have you been involved with that focus on technology integration?
 - a. Have you attended anything specific to Internet integration?
17. What types of professional development opportunities have been available for your teaching staff in regard to technology integration?
 - a. Was anything specific to Internet integration?

18. What kinds of professional development opportunities would you like to see offered in the future?

19. Do you know if any of your teachers have looked for or attended professional development opportunities outside the district that focus on technology integration?

Conclusion

Those are all the questions I have for you today. Is there anything else that you would like to add?

Appendix I

Semi-structured Interview Protocol for Teachers

Introduction

I'm going to ask you some questions about technology and Internet integration in your school building.

Questions and Prompts

1. To begin, can you tell me what you know about the school's vision in regard to technology and Internet integration?
2. Where would you like to see the school five years from now in regard to technology integration?
3. How is the accessibility of technology and the Internet in your building?
 - a. Tell me a little bit about the availability of the Internet? Where in the building can you access the Internet?
4. Can you tell me about your use of the Internet during classroom instruction?
 - a. Are there any specific examples that you can share?
 - b. Can you tell me a little bit about how other teachers are using the Internet during instruction?
5. Do you have a separate, stand-alone technology curriculum or is it integrated across the content areas?
6. What specific skills and strategies are taught in relation to using the Internet?
7. Can you tell me about email use in your building?
 - b. What kinds of things are communicated through email?
 - c. Do you communicate with parents using email?
 - d. What about students' use of email? Are students allowed to use email at school?
 - e. Would you like to see students using email in the building?

8. What about school procedures like grading, taking attendance, and those kinds of things?
Are any of those done through a school-wide network?
9. Can you tell me about your school policies for using the Internet with students?
 - f. Do you often have parents who do give permission for their students to use the Internet?
 - g. Do teachers sign an acceptable use policy?
10. What do you think some of the biggest challenges are when it comes to Internet and technology integration?
11. What about any of the public policy requirements like No Child Left Behind or IDEA?
Do you see that they have an impact on technology integration?
12. Can you tell me a little bit about the availability of other resources? Do you feel that your school has an adequate amount of software for what you would like to do with your students?
 - h. Is there anything in particular you would like to see in the building that you don't have?
13. How is your technical support?
14. What are your teachers' perspectives about using the Internet during instruction?
 - i. What about your teachers' abilities to integrate the Internet during instruction?
15. What do you think about your students' abilities in using the Internet? Do you think they have good skills in using the Internet?
 - j. What about their use of the Internet for searching and doing research?
16. What types of professional development opportunities have been provided by the district for technology integration?
 - k. Was anything specific to Internet integration?
 - l. What would you like to see the district offer in the future?

17. Have you looked for or attended professional development opportunities outside the district that focus on technology or Internet integration?

18. Have any of your administrators participated in professional development for technology or Internet integration?

Conclusion

Those are all the questions I have for you today. Is there anything else that you would like to add?

Appendix J

Topics for Focus Group Discussions

- I. First Meeting Topic: In school use of the Internet
 - a. Manner in which the Internet is used (types of activities)
 - b. Frequency of Internet use (for academic purposes)
 - c. Teachers' use of the Internet in school (related to instruction)
 - d. Location where the Internet is used (classroom vs. lab)
 - e. Frequency of Internet use by teachers (related to instruction)
 - f. Types of school assignments that require Internet use (in-class vs. homework)
 - g. Formal instruction related to new literacies skills and strategies
 - h. Use of Internet for answering questions
 - i. Strategies for locating information
 - j. Encounters or experiences with bogus sites or information
 - k. Strategies for evaluating information for accuracy
 - l. Strategies for determining author stance or bias
 - m. Strategies to determine authorship and sponsorship of website
 - n. Experiences with forms of online communications (blog, wiki, IM, etc.)

- II. Second Meeting Topic: Out of school use of the Internet
 - a. Manner in which the Internet is used (types of activities)
 - b. Frequency of Internet use (non-academic purposes)
 - c. Location where the Internet is used (family room vs. bedroom)
 - d. Reading on the Internet
 - e. Experiences with forms of online communications (blog, wiki, IM, etc.)
 - f. Family's use of the Internet (parents, siblings, others)