The Second Digital Divide: The Effects of Ethnicity and Socioeconomic Status on Student Technology Access and Use Outside the School Day

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Abstract

The digital divide, the gap between the technology "haves" and "have-nots," is well documented in our nation's homes, communities, and classrooms. Despite evidence that the divide is shrinking, it is more likely that the divide has become even more insidious: a nation with a substantial reliance on online content and entire populations that still lack meaningful access. The digital divide can no longer be measured in simple terms of computer ownership, and understanding the digital divide requires us to understand new devices, new users, and new ways to access content. This study analyzed data from a recent student technology survey to determine whether ethnicity and income impacted the frequency with which students had access to computers and the Internet outside of school, and the likelihood that students owned mobile technology such as laptops, smartphones, tablets, iPads, and netbooks.

Nine research questions were used to guide the study, and 12 hypotheses were designed for statistical testing. Chi-square tests of equal percentages were conducted to determine whether students owned computers and/or mobile technology and how often they accessed the Internet. Chi-square tests of independence were conducted to determine whether ethnicity or socioeconomic status (SES) impacted the likelihood that a student would report owning one or more devices or accessing the Internet.

The results of the hypothesis tests illustrate that minority and lower-SES students did not have the same level of access to or ownership of computers, broadband Internet, or mobile laptops or tablets. Although minority students were as likely to own a smartphone as non-minority students, lower-SES students were less likely to own a smartphone than higher-SES students.

Dedication

This work is dedicated to my parents, Maureen and G. Robert Anderson. My mother taught me to embrace learning and laughing, and my father taught me to embrace hard work and discipline. It is also dedicated to my brother, Ryan, who inspires me to dream bigger than I think I should, and to my sister, Mea, whose heart and soul runs deeper than I have ever been able to understand.

This work is dedicated to Sally Shipley who inspired me to be a teacher, and to Cathy Smith and Gwen Poss who taught me to be a better teacher. It is dedicated to my students, past, present, and future, all of whom have shaped me and continue to inspire me to embrace learning and laughing through hard work and discipline.

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Chapter One

Introduction

The social and academic integration of technology in and out of the classroom has evolved significantly in the past few decades, and it is no longer considered a novel supplement to traditional learning (Belo, 2012; Brunner, 2013; Norris & Soloway, 2012). As more platforms, websites, and devices enter the education market, educators are discovering new and exciting ways to use technology to engage students in the learning process (Norris & Soloway, 2011), but they are also discovering that teaching and learning with technology is often divided along traditional lines of "haves" and "have-nots" (Dexter, Anderson, & Becker, 1999; Revenaugh, 2001; Robinson, 2005).

"Digital divide" has evolved into a term of art to describe groups of people who are disadvantaged by a lack of adequate access to technology and/or Internet connectivity (Attewell & Battle, 1999; Poole, 1996), and the consequences for this divide have significant social and academic implications for children in the United States (Attewell, 2001; Carvin, 2000; Hargittai, 2002; Warschauer & Matuchniak, 2010). Given our societies' increasing reliance on technology and our push for rigor in contemporary curricula, it may no longer be adequate for teachers to offer the public or school libraries as alternatives to at-home Internet and computer access (Talley, 2012; Vail, 2003). Indeed, closing the digital divide is less about acquiring more classroom resources and more about acquiring new paradigms of teaching and learning (Burkhardt et al., 2013; Cascio, 2004; Lenhart, Madden, Macgill, & Smith, 2007; Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013; Yowell, 2008).

Background and Conceptual Framework

The purpose of this section is to provide context for the focus of the study, to explain why the topic is relevant and timely, and to build a case for the problem and purpose statements (Lunenburg & Irby, 2008, p. 113). The context and argument for this study begins with a brief review of the recent history of schools, communities, and technology. Computers have been in classrooms for several decades, but the distribution and usage has not always been consistent.

The National Telecommunications and Information Administration (NTIA) published the earliest formal report on the digital divide in 1995, titled "Falling Through the Net." By combining data from the U.S. Census Bureau and the Federal Communications Commission (FCC), the NTIA determined that the lowest level of information penetration for personal computers was for rural areas and central cities, particularly for the young and less educated (NTIA, 1995, p. 4). Less than a year later, President Clinton signed into law the Telecommunications Act of 1996 guaranteeing funds for school and library telecommunications and technology purchases at deeply discounted rates through a "Universal Service Fund" collected from all telecommunication services. The discount rate program, known as "E-Rate," has offered discounts ranging from 20% to 90% based on poverty factors. Although the 2013 cap was set at $2.4 billion, the total requested amount exceeded $4.9 billion ("Universal Service Program," 2013).

The E-Rate program remains one of Clinton's legacies, but Martin (2003) described President George W. Bush's administration as "largely dismissive" (p. 2) of the digital divide. Warschauer (2010) attributed this dismissal to FCC Chairman Michael

Powell who believed that access to technology and online services were better solved through market forces.

Student access to the Internet in the classroom has grown steadily since 1995. The National Center for Education Statistics (NCES) reported that the overall ratio of students to computers in American classrooms has dropped from 6.6 students per computer in 2000 to 3.1 in 2008 with rural communities having the lowest ratio at 2.9 computers per student (n.d., Table 109). The NCES also reported data from 2003 (the latest available as of 2013) showing that 70.7% of students had access to a computer at home ("Number and Percentage," n.d., table 18). While the number of computers in America's homes and schools continues to grow each year, the digital divide appears to be closing fast. However, researchers have discovered an important distinction between the ability to access a computer and the ability to use the computer for meaningful tasks.

Robinson (2010) defined a conceptual framework as a construct or theory that includes the key factors, research perspectives, and variables that narrow the focus of the study (p. 129). The conceptual framework used for this study is the sociological phenomenon known as the "second digital divide" (Attewell, 2001; Hargittai, 2002; Natriello, 2001). Attewell (2001) described the first digital divide as whether or not people have access to Information and Communication Technology (ICT) and the second digital divide as "social differences in the ways computers are used at school and at home" (p. 253). If the first divide has been about computer access, the second divide is about computer usage. Attewell (2001) also posed an important question about the second digital divide: "Whether the digital divide constitutes a caste-like division in society or is a temporary feature of the rapid diffusion of computers, the question

remains, Does the lack of access to computing seriously affect children's life chance?" (p. 253).

Understanding this second digital divide requires more complex variables that include social development and a broader perspective (Warschauer, 2010, p. 1552). As Jackson et al. (2008) noted, "today, *digital divide* has new meaning. It refers to the gap in the intensity and nature of IT [Information Technology] use rather than to the gap in access to it" (p. 437). As America's schools continue to gain access to more technology, the distribution and use of that technology may mirror the inequity that marked the first digital divide.

Statement of the Problem

The problem statement "should tell the story behind the research intent. It should provide the background to the purpose statement and research questions" (Roberts, 2010, p. 24). The second digital divide is problematic for educators who seek to better understand their students and their students' technology use and access. Understanding and measuring student use of technology requires a keen awareness of specific student populations using state-of-the-art instruments. As educators in individual institutions (such as high schools) prepare to meet the needs of the 21st century learner, their preparation must include an understanding of the extent to which students can meaningfully access online content using technology outside the classroom (Brunner, 2013; Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008; Thomas, 2008).

Given the depth and breadth of the digital divide as discussed in chapter two, educational decisions should be made using institutional data gathered by the educators themselves (Becker, 1994; Becker & Ravitz, 1999; Warschauer, 2007). Institutional data

is preferable to generalized data (e.g. national surveys, studies on similar populations) because variations in student populations, culture and climate, and technology resources can vary even between two high schools in the same school district. However, the canon of instruments available to measure student access to technology outside the classroom at the institutional level is largely based on older, outdated paradigms. Connie Yowell, Director of Education for the John D. and Catherine T. MacArthur Foundation (2008) argued that digital media cannot be assessed using traditional instruments with traditional paradigms:

> If anyone thinks a classroom of 25 kids with a teacher at the front is the paradigm that will result in the most effective use of digital media, that result is not going to happen. We can't be using the same kinds of standards and measures or think that we're simply going to move digital media into schools as they currently exist. We will only find that they have no impact. And then we'll miss one of **the** [author's emphasis] most important opportunities for advancing our kids' learning that we have had in over a century. I can't express this with enough emotion and importance; we are in a moment, and if we ask the wrong questions, if we stick with our questions from the 20th century, and hold the new digital media accountable to things we've been holding accountable in the same ways for decades, we're going to miss this opportunity. (para. 8)

Problematic is that literature (e.g. student surveys, questionnaires, inventories, etc.) is often based on older paradigms and does not factor in modern theories such as leapfrogging, which occurs when a population of people (usually in developing nations) skips one or more generations of technology and adopts state-of-the-art devices such as

smartphones and tablets (Cascio, 2004; Fong, 2009; Napoli & Obar, 2013). In a nation where Blacks and Hispanics are more likely to own a smartphone than Whites ("Broadband and Smartphone," 2013, para. 1), state-of-the-art measurement and pedagogy are required, and researchers must design instruments that accurately measure Internet access across multiple devices (personal computers, laptops, tablets, smartphones, and other emerging technologies). Likewise, practitioners must be careful when interpreting that data to design and use pedagogy that accurately reflects student access. Without effective instruments to collect data from students, and without contemporary instruments to measure a broad range of technology and access, teachers and administrators may find it challenging to adapt their policies, procedures, and pedagogy to the academic and social needs of the students they teach. Such data collection tools are difficult to find in the literature and warrant frequent updating.

Purpose Statement

The purpose statement is a declaration of how the study attempts to solve the problem posed in the previous section (Lunenburg & Irby, 2008, p. 116). The purpose of this study was to analyze data collected from students at one Midwest suburban high school to determine the extent to which students have access to computer and internet access outside the school day and the extent to which socioeconomic status and ethnicity impact the likelihood that students have computer and internet access outside the school day.

Significance of the Study

According to Lunenburg and Irby (2008), the significance of the study is the argument that "the study makes a significant contribution to the field" (p. 117). The data

collected and analyzed in this study contribute to the larger body of knowledge on student access and technology. Additionally, some researchers and educators may find value in the instrument used to measure student access and technology. Most importantly, the data collected and analyzed in this study potentially impacts classroom instruction and decision-making at the building and district levels.

Delimitations

Lunenburg and Irby (2008) wrote that delimitations are "self-imposed boundaries set by the researcher on the purpose and scope of the study" (p. 134). The boundaries of this study with respect to time, location, and population are:

1. All respondents took the survey at the same time during a building-wide seminar period in the fall semester at a Midwest suburban high school with a 9-12 grade level configuration.
2. All students attending on that day were asked to participate in the survey.

This study did not measure whether or how the school's culture and climate influenced the students' desire or capacity to access technology outside of school. Such factors may be important in evaluating students' motivation to purchase and use technology outside of school (Dexter et al., 1999; Hew & Brush, 2007; Norris & Soloway, 2011). However, the purpose of this study was not to determine why students have accessed technology but whether they did so.

Assumptions

Lunenburg and Irby (2008) defined assumptions as the parameters around which the study was conducted, including the "nature, analysis, and interpretation of the data" (p. 135). This study was conducted with the research assumptions that (a) the students

understood all of the words and phrases used on the instrument; (b) the students provided accurate and honest responses to the best of their ability; (c) the instrument used to collect data purports to measure what it is intended to measure when the proper analysis is applied; and, d) the institution reported accurately and with integrity the data provided by the institution.

Research Questions

Roberts (2010) wrote that the "research questions/ hypotheses guide the study and usually provide the structure for presenting the results of the research" (p. 136).

1. To what extent do students report having computer and Internet access outside the school day?

2. To what extent does socioeconomic status impact the frequency that students report having Internet and computer access outside the school day?

3. To what extent does ethnicity impact the frequency that students report having computer and Internet access outside the school day?

4. To what extent do students report owning a smartphone?

5. To what extent does socioeconomic status impact the likelihood that students report owning a smartphone?

6. To what extent does ethnicity impact the likelihood that students report owning a smartphone?

7. To what extent do students report owning a mobile computing device such as a laptop or tablet?

8. To what extent does socioeconomic status impact the likelihood that students report owning a mobile computing device such as a laptop or tablet?

9. To what extent does ethnicity impact the likelihood that students report owning a mobile computing device such as a laptop or tablet?

Definition of Terms

Digital Divide. The digital divide refers to the *"*social differences in the ways computers are used at school and at home" (Attewell, 2001, p. 253).

ICT. ICT stands for "Information and Communication Technologies" and commonly refers to all variations of computers that provide access to telecommunications ("ICT," 2010).

Leapfrog. The leapfrogging effect occurs when a population of people (often in developing nations or underserved communities) skips one or more generations of technology and adopts state-of-the-art devices such as smartphones and tablets (Cascio, 2004; Fong, 2009; Napoli & Obar, 2013).

Mobile device. A mobile device is "a portable, wireless computing device that is small enough to be used while held in the hand" ("Mobile Device," 2013).

Socioeconomic Status (SES). Defined by the American Psychological Association, "Socioeconomic status is commonly conceptualized as the social standing or class of an individual or group . . . Examinations of socioeconomic status often reveal inequities in access to resources, plus issues related to privilege, power and control" ("Socioeconomic Status," 2013). This study relied on socioeconomic information supplied from the school district to determine socioeconomic status of study participants.

Overview of the Methodology

The data used for this study were collected from a student survey administered in December 2012 at a Midwestern high school. The survey collected student responses to a variety of questions regarding their access to various technologies outside the school day. Results were quantitatively analyzed using chi-square tests of independence and chi-squared tests of equal percentages.

Organization of the Study

Chapter one of this study presented an introduction to the problem and defined the scope and context of the study. Chapter two delves into a review of the existing literature on five key deconstructions of the digital divide. Chapter three is an analysis of the methodology of the study and describes the specific tests used to measure the data against the research questions. Chapter four reveals the results of the hypothesis testing. Chapter five offers an analysis and summary of the study as well as recommendations for further research and implications for further action.

Chapter Two

Review of the Literature

Computers have been in America's classrooms and homes for many decades. Although their use, value, and definition has evolved over time, the evolution and distribution of technology has not always been consistent, fair, or equal (Bourgeois, 2007; Warschauer, 2003a, 2003b). Substantial gaps impact large populations based on a variety of factors including socioeconomic, ethnicity, and gender (Blanchard, Metcalf, Degney, Herrman, & Burns, 2008; Ritzhaupt, Feng, Dawson, & Barron, 2013). These gaps have included access to high-speed Internet, engagement with online content, computer literacy skills, classroom instruction, and community demographics (Carvin, 2000). The purpose of this literature review is to examine the available research that defines and describes the size and scope of this "digital divide" for millions of children and their families.

One consistent drumbeat emanating from the available literature is that the digital divide cannot be measured by simple ratios of users to computers; rather, it is a complex sociological phenomenon that impacts several different populations for many different reasons (Attewell & Battle, 1999). Carvin (2000) defined the digital divide as "one of the most important civil rights issues facing our modern information economy" and deconstructs the divide into five distinct puzzle pieces: access, content, literacy, pedagogy, and community (pp. 2-3). This literature review is organized around Carvin's five puzzle pieces.

Access. Gaps in access to broadband markets had been largely resolved by 2001, but secondary gaps may have emerged and continue to divide entire populations, thus

creating a second digital divide (Attewell, 2001; Hargittai, 2002; Natriello, 2001). Access to technology in 2001 was, according to Attewell (2001), the first of two digital divides (p. 253), and the availability of current broadband access in and out of America's schools appears at first glance to be nearly universal. The Congressional Digest (2012) reported that according to the FCC's National Broadband Plan, 95% of the US population had access to broadband Internet of at least 4Mbps in 2011, leaving a gap of 14 million people or 7 million households, mostly in rural areas in 2012 (pp. 2-3). The National Telecommunications and Information Administration reported in 2013 that 98% of all Americans have access to broadband Internet of at least 3Mbps (p. 1). Ninety-nine percent of schools owned computers and had Internet access since 2004 (Valadez & Duran, 2007, p. 1), but the literature does not specify the quality or quantity of computers, or the reliability or speed of the Internet.

The Pew Research Center reported in 2013 that 15% of Americans do not go online. Of these non-users, 19% of non-Internet users cited cost or expense as a prohibitive factor, 7% cite lack of access, 34% believed the Internet is just not relevant to them, and 32% said that using the Internet was too difficult (Zickuhr, 2013, p. 2). Among those who were offline, only 2% were 18-29 years old, 8% were 30-49 years old, 17% were 50-64 years old, and 44% were older than 65. Whites and Blacks were offline in nearly equal percentages (15% and 14% respectively), and Hispanics comprised the largest group of non-users at 24% (Zickuhr, 2013, p. 5).

Worth noting has been the trend occurring among traditionally divided groups with respect to preferred devices. In a separate study by the Duggan and Brenner (2013), Blacks (78%) and Hispanics (68%) were much more likely to go online using their cell

phones than Whites (59%) (p. 5). The study did not suggest why some users preferred cell phones over computers. Compared to 2012, these numbers represent a 7% increase for Whites, a 10% increase for Blacks, and no increase for Hispanics (Duggan & Brenner, 2013, p. 7). Such growth could be the result of what some researchers have referred to the leapfrog effect, which occurs when a traditionally disadvantaged population skips a generation of technology and purchases emerging technology faster than their non-disadvantaged counterpart. (Cascio, 2004; Fong, 2009; Napoli & Obar, 2013)

At face value, America seems to have come very close to closing Attewell's first digital divide. However, researchers have noted a disconnect in the literature that portends a second digital divide. Specifically, "much of the existing literature on the digital divide - the differences between the 'haves' and 'have-nots' regarding access to the Internet - limits its scope to a binary classification of technology use" and measures only whether someone does or does not have the Internet (Hargittai, 2002, p. 2). Similarly, most governments and scholars present a limited view of literature "as a simplified binary divide, which can lead to immature academic conclusions" (Lei, Weizhen, Gibbs, & Chang, 2008, p.1). Such bifurcation creates a distinct shift in the literature marked by time as well as by paradigm: those who see access as an economic and market-driven issue (ratio of users to computers) versus those who see access as a civil rights issue (nature and intensity of access).

The consequences of misunderstanding the second digital divide "unintentionally lead those attempting to deal with the technological inequities down the wrong path" (Warschauer, 2003b, p. 44). Federal leadership has reflected these two paths. Martin

(2003) summarized the historical effort to close the gap, "the United States has shifted from a Clinton administration strongly focused on a digital divide to a Bush administration largely dismissive of it" (2). Warschauer (2010) shared an illustrative story:

> Michael Powell, chairman of the U.S. Federal Communications Commission from 2001 to 2004, compared the digital divide to a "Mercedes divide," suggesting that ICT represented a consumer product that people could purchase or not depending on their wealth and desire and that government had little interest in promoting equitable ICT access. (p. 1552)

The Clinton and Bush administrations represent opposing paths toward closing the digital divide. The Obama administration announced in June of 2013 its policy position on closing the digital divide, including broadband access for 99% of students in schools, training for teachers, and public-private investment partnerships (House, 2013). The Obama policy represents a leap forward from 2004 when 99% of schools had Internet access to 2013 when 99% of students have Internet access in school. The Obama policy has also been coupled with the National Technology Education Plan released in 2010 that established five goals (learning, assessment, teaching, infrastructure, and productivity) but relies heavily on state and local funding (United States Department of Education, 2010, pp. 13-14). The recently renewed federal investment is a sign that policymakers and researchers embrace the need to prepare future adults for a rapidly changing technological world.

Laptops, tablets, and smartphones are replacing traditional desktops as the preferred devices, and this device shift also creates a shift in access among various

groups of users. The Pew Research Center reported in a national survey conducted of more than 800 teenagers in 2013 that 37 % of all teens now own a smartphone (a 14% jump from 2011), 23% have a tablet computer (comparable to the percentage of adults who own a tablet), and 93% of teens have a computer (however 71% of all teens share their computer with a family member). Teens in lower socioeconomic groups are "just as likely and in some cases more likely than those living in higher income and more highly educated households to use their cell phone as a primary point of access" (Madden et al., 2013, p. 5). These trends have a profound impact on the perception of access. Emerging technology is changing the way people access content, and it also changes the way in which people engage with content: the second of Carvin's puzzle pieces.

Content. If access is the on-ramp to the information highway, then content is the destination: software, websites, media, and information. Few would be surprised to learn that students in economically disadvantaged communities have far less access to far less content. However, digital divides also exist among ethnicity and income levels even after access is equalized at home and at school. Jackson et al. (2008) surveyed more than 500 middle school students in lower Michigan and found that there are race and gender differences in the nature and use of information technology. She also found that parental sociodemographic differences predict the nature and intensity of information technology usage, and that the nature and intensity of information technology usage impacts academic performance (p. 441).

Ethnicity. The literature is consistent regarding how African-Americans of all ages use computers. Black children and adults are generally less engaged with technology and use it less often, for shorter periods of time, and for different tasks

(Bourgeois, 2007; Jackson et al., 2008). Jackson et al. (2008) reported that although the access gap has decreased dramatically for Blacks, the intensity and nature of use differs from other racial groups even after other factors such as income and education were controlled. Black adults were more likely to use the Internet to access religious/spiritual information and less likely to use the Internet for communication (pp. 437-438). Kim and Bagaka (2005) report in a study of more than 1,000 middle school students that "the adjusted classroom average usage of productivity tools was . . . negatively related to [the] percentage of minority students in the classroom" (p. 8). Ritzhaupt, Feng, Dawson, and Barron (2013) studied more than 5,000 school age children in Florida and observed: "white middle school students [were] performing significantly better on ICT related tasks" (p. 301). Robinson (2005) studied students in a school where every students was issued a computer and discovered that Black students used email, web browsers, and word processing programs less than White students but were more likely to use drill/skill programs at home (pp. 125-126). Vigdor and Ladd (2010), researching students across North Carolina, discovered that "the impact of increased broadband access is significantly more negative for black students than for others." Additionally, the "initial introduction [of high speed Internet service] has a concentrated negative impact on Black students' reading scores while having no significant impact on others" (p. 27).

Gender. The literature is far less convincing on the topic of a possible digital divide between males and females. Subramanyan et al. (2000) asserted through meta-analysis that "with the narrowing of the gender gap in home computer use, early fears that girls are turned off by computer technology appear unfounded" (p. 127). Bourgeois (2007) suggested that "the divide is mainly a result of income disparities between men

and women" (p. 16). Minskey (2005) claimed that "gender is a variable for which the Digital Divide has significantly narrowed over the years. As early as 1986, studies showed there is not a significant difference in the computer knowledge or literacy between males and females" (p. 18). Ritzhaupt, Feng, Dawson, and Barron (2013) found inconclusive results; showing that, overall, girls may be more proficient whereas boys may be more proficient with specific content such as games (p. 300). Kim and Bagaka (2005) reported that although there is no substantial difference in how boys and girls use the computer in primary grades, boys start spending more time on the computer after fourth grade (p. 2). Imhof, Vollmeyer, and Beierlein (2006) studied computer habits of college students and found that "results [showed] that the gender gap is closing as far as computer access and self-efficacy are concerned. Also, female and male students [reported] comparable amounts of computer usage for their studies" (p. 1).

Many authors have suggested that the digital divide as it relates to gender is more about career fields than it is about engagement in and out of school (Kim and Bagaka, 2005; Matwhyshyn, 2004). Others have suggested that gender is a factor in the online presence of men and women largely because the content on the Internet is biased toward men (Bimber, 2000; Jackson et al., 2008). Whether a possible gender divide is a pre- or post-graduation gap is still up for debate, but the available research has demonsrated no definitive gender-specific digital divide among America's students.

Income. Several studies presented findings that income is a primary determinant of access, use, and digital literacy. The Corporation for Public Broadcasting (2003) reported that "more than ethnicity, the income of a child's family is a significant determining factor on whether or not he or she has access to the Internet at home."

Furthermore, “children from high-income families are more than twice as likely to have home Internet access than children from low-income households” based on a sampling of more than 1,000 parents (p. 5). Thomas (2008) found that students attending Title 1 schools had lower access to computers than their non-Title 1 peers (p. 13). Becker (2000) analyzed national survey data and reported that access to a computer was a possibility for 22% of students in families earning less than $22,000 per year, and a possibility for 91% of students in families earning more than $75,000 per year (p. 44). Minskey (2005) noted a similar correlation between income and access (p. 14) as did Attewell and Battle (1999), Kim and Bagaka (2005), and Ritzhaupt, Feng, Dawson, and Barron (2013).

The access to content is not just a proposed limitation to students; it impacts teachers as well. Warschauer, Knobel, and Stone (2004) found that teachers in higher-SES schools in California had more access to professional development, more training and support, and more consistent communication among all staff about digital content. By contrast lower-SES schools had less faith in their technology and were more reluctant to include existing technology into their lesson plans (p. 190). Similarly “teachers in these schools may not have the knowledge and skills to use technology in effective ways or may be using other strategies to improve student achievement” according to Talley (2012, p. 122). Valdez and Duran (2007) demonstrated that teachers in higher-SES schools in California were more likely to assign higher-level tasks such as problem solving, creativity, critical thinking, and productivity (p. 38). Rentie (2008) repeated a study from 2000 of teachers in one low SES school and discovered that while the teachers had a wide range of access to new and emerging technologies, the technologies

were not being used (p. 109). Consequently, more than ethnicity or gender, income appears to be the most significant variable in the nature and intensity of access both at school (for teachers and students) and at home.

The nature and intensity with which America's students access online content is largely determined by their digital literacy. When students have a defined purpose for going online, they do so more frequently and for longer periods of time. This digital literacy is the third puzzle piece in Carvin's deconstruction of the digital divide (2000).

Digital Literacy. Digital literacy, like all forms of literacy, does not exist on a bipolar divide in which a person is either literate or illiterate. It occurs on many levels and for many purposes which include: function, vocation, civic, literary, and scholastic (Warschauer, 2003a, p. 47). It is not enough to have access to a computer; a student must also have access to the digital skills necessary to use the computer for meaningful purposes.

O'Brien and Scharber (2008) defined digital literacy as "socially situated practices supported by skills, strategies, and stances that enable the representation and understanding of ideas using a range of modalities enabled by digital tools" (pp. 66-67). Their definition includes the production of ideas using digital tools, and "digitally literate people not only represent an idea by selecting modes and tools but also plan how to spatially and temporally juxtapose multimodal texts to best represent ideas" (p. 67). A corporate report from enGauge (2013) expands the definition of digital-age literacy to include basic literacy, scientific literacy, economic literacy, technological literacy, visual literacy, information literacy, multicultural literacy, and global awareness (Burkhardt et

al., 2013, p. 15). In short literacy skills are a measure of what a student can do and does with technology to understand and represent ideas in an expanding world.

Adults often assume that children intuitively know how to use technology, but this belief is only partially true: children possess the technology skills needed for the tasks they find worthwhile. Often, students lack the skills required for academic achievement, especially those tools used for producing and representing ideas (Gu, Zhu, & Guo, 2013, p. 398). The CDW-G commissioned a national study in 2011 on the opinions of students, teachers, and IT professionals. Although 94% of students believe that learning and mastering computer skills were necessary for a future career, only 39% believed that their high schools met their expectations (p. 10). Eighty-six percent of students reported using more technology outside the school day than during school (p. 4). Likewise, students expressed a stronger preference, by nearly double, for using mobile devices such as smartphones and iPods than did teachers or IT professionals (p. 9). A gap is apparent in what and how students are learning versus what and how they feel they should be learning.

Ritzhaupt, Feng, Dawson, and Barron (2013) published the results of their instrument, the ST^2L, administered to students in thirteen Florida middle schools. They discovered that girls were better users of ICT despite being less comfortable. Students in lower-SES families had less access and therefore less opportunity to use ICT for personal empowerment. White students performed significantly better at ICT tasks (pp. 300-301). Interestingly the students performed best in the Digital Citizenship portion of the assessment and worst at the ability to construct and demonstrate knowledge using ICT resources (p. 301). Given these results it appears that the students were well versed in the

ethical boundaries of computer usage, but not on how to use the computer itself. In other words, students knew about digital literacy, but they did not know it.

One unfortunate trend in digital literacy that must be reversed is that "minority students are more likely to use technology for drill and practice, whereas White students have higher level experiences designing Web sites and presentations" (Talley, 2012, p. 26). Warschauer (2007) reported "overall, students who are black, Hispanic, or low-income are more likely to use computers for drill and practice, whereas students who are white or high-income are more likely to use computers for simulations or authentic applications" (p. 148).

The answer to this piece of the digital divide may be on the horizon. Though too new to produce results, the Common Core State Standards (Initiative, 2012) are partially aimed at transforming the digital skills of students nationwide, and the goals and outcomes of these new standards are laudable:

> Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals. (p. 1)

If successful, Common Core State Standards have the potential to reverse the steady trend of under-utilized, under-taught, and under-learned digital literacy skills in the 21st century.

No analysis of the literature on access, content, and digital literacy is complete without also understanding that "the solution lies in public acknowledgment that yesterday's education is not sufficient for today's learner. Academic excellence must be acquired within the context of today's technological environment in order to fully prepare students to thrive in the Digital Age" (Burkhardt et al., 2013, p. 1). Together, the puzzle pieces of access, content, and literacy are largely at the mercy of larger constructs of pedagogy and community. What is done in and out of the classroom determines what students and teachers do on the computer.

Pedagogy. Cuban wrote in 1984, "teachers take from the computing world what they find immediately useful and jettison the rest, often relying on low-level drill and practice strategies that fit easily within their existing pedagogical approaches" (as cited in Valdez & Duran, 2007, p. 33). Cuban, Kirkpatrick, and Peck repeated this admonishment in 2001:

> After almost two decades of intense promotion of information technologies by business leaders, policy makers, and parents, most teachers and students now have far more access to machines and software both in school and at home than ever before. Yet, nationally, most teachers and students are occasional to rare users (at least once a month) or they are nonusers of these machines in classrooms for instruction. Furthermore, when teachers do use computers for instruction, another discrepancy arises. When teachers adopt technological innovations, these changes maintain rather than alter existing classroom practices. (p. 815)

The National Education Association (2008) published findings of teacher and support personnel opinions on technology in schools and classrooms. The major findings

are that there are not enough computers, support, or training (pp. 2-5). Hew and Brush (2007) classified barriers to effective technology integration and enumerated them based on order of relative frequency as follows: (a) resources, (b) knowledge and skills, (c) institution, (d) attitudes and beliefs, (e) assessment, and (f) subject culture (p. 186).

Norris, Sullivan, Poirot, and Soloway (2003) surveyed more than 4,000 teachers and inquired about the teachers' use of and access to technology in the classroom. By far, the teachers listed lack of access as the primary reason why they did not use more technology (p. 25). The authors observe that this was an unsurprising result. Likewise, Norris, Topp, and Soloway (2000) conducted research and discovered an unsurprising truth about teachers and technology. The more benefit teachers find in technology outside their day, the more likely they are to use it during the day (p. 25).

The NMC Horizon Report K-12 Edition (2013) is an annual publication sponsored in part by International Society of Technology in Education (ISTE). Its most recent report presented the findings of an advisory board responsible for combing through thousands of articles, reports, studies, and published research. The report articulated key trends and core deficits in the status quo. The key trends identified by the NMC advisory board after reviewing all available literature include:

- Education paradigms were shifting to include online learning, hybrid learning, and collaborative models.
- Social media was changing the way people interact, present ideas and information, and communicate.

- Openness — concepts like open content, open data, and open resources along with notions of transparency and easy access to data and information — were becoming a value.
- As the cost of technology dropped and school districts revised and opened their access policies, it was more common for students to bring their own mobile devices.
- The abundance of resources and relationships made easily accessible via the Internet challenged teachers to revisit their roles as educators. (pp. 7-8)

The report discovered the following significant challenges as well:

- Ongoing professional development must be valued and integrated into the culture of the schools.
- Too often it was education's own practices that limit broader uptake of new technologies.
- New models of education were bringing unprecedented competition to traditional models of schooling.
- K-12 must address the increased blending of formal and informal learning.
- The demand for personalized learning was not adequately supported by current technology or practices.
- Educators were not using digital media for formative assessment the way they could and should. (pp. 9-10)

The NMC report is a key piece in understanding how America's schools can eliminate the factors that researchers identify as contributing to the digital divide. The NMC report

is consistent with nearly all other findings and worthy of additional reading by those interested in administrative opportunities for school improvement.

The literature on teachers and technology is troubling, yet the data are clear on only one matter: teachers do not or have not always used technology to the full that extent they could or should. Unsettled is the debate about whether the lack of use is a manifestation of lack of interest or lack of access. Quite settled is the question of whether students have adequate access to quality content using digital literacy: they do not, at least in the classroom. Outside the classroom, however, digital literacy conditions are much different.

Community. The final puzzle piece of Carvin's five pieces of the digital divide is community. Carvin (2000) defined community in terms of online relationships, communication, and created and sustained bonding experiences (p. 4). Iconic is the image of the texting teen, but the questions is whether this image is just a stereotype or a reality for everyone. Does any one group experience a lesser or greater sense of a cyber-community?

Authors are quick to note the important relationship between access and the social community. Henry Louis Gates, Jr. wrote about "cybersegregation" in his 1999 New York Times editorial (p. 1). He worried that the digital divide establishes a new frontier based on old paradigms – that disadvantaged communities would be separated from each other and shut out of the opportunity to share, learn, and communicate among and between other communities, just as they had during the times of sharecropping and slavery. Warschauer (2003b) suggested that "if access to ICT is provided in a way that enhances social capital, then this will likely promote access to the "information society,"

in other words fuller opportunities for social, political, cultural, and or economic participation" (p. 4). Revenaugh (2001) extended FCC Chairman Michael Powell's "Mercedes" metaphor into a social construct – that electricity and the telephone were once a commodity only for the privileged few, but soon became a necessity for all. So too, claims Revenaugh, is access to Internet-based knowledge that can inform and empower (p. 1). Whether Gates, Warschauer, and Revenaugh were right to be concerned depends upon the extent to which technology and access has permeated America's social lives.

Cascio (2004) explained that "'leapfrogging" is the notion that areas which have poorly-developed technology or economic bases can move themselves forward rapidly through the adoption of modern systems *without going through intermediary steps"* (para 2). It is this leapfrogging effect that may best describe the impact of mobile technology on the digital divide, particularly among previously disadvantaged demographics. Entire communities that were once "cybersegregated" (Gates, p. 1) by lack of access to or ownership of desktop computers and wired broadband may have now leapfrogged the technology and the majority culture that once stood on the other side of the divide.

In a technological world where the desired device often matters less than the desired content, recent findings in the literature revealed in 2013 that although Whites still had broadband at home more often (74% as compared to 64% of Blacks and 53% of Hispanics), Blacks and Hispanics were more likely to own a smartphone (64% and 60% respectively as compared to 53% of Whites). Additionally smartphone ownership decreased as education, age, and income levels increased ("Broadband and Smartphone," 2013, para. 1). Smartphone ownership may decrease with age since smartphones may

represent the cheapest option for someone who's age and subsequent earning power has not increased.

Washington (2011) viewed the increased use of smartphones as an important social construct for African-Americans that offers a necessarily tight connectedness stemming from the roots of slavery, the need to protect family, and to the need to reach out to other "brothers or sisters" who were often broken up during slavery and Jim Crow (pp. 1-2). Still Washington cautioned that smartphones have limitations that desktop personal computers do not have, such as interfacing with employment websites that require one to fill out an application or upload a resume (p. 1). She also noted that owning a smartphone does not automatically mean that users are engaged in productive discussions or reaching out to share ideas with others (pp. 1-2).

Such concerns are mitigated by recent information published by the Pew Research Center based on surveys of thousands of respondents. Younger users are much more likely to use social media for civic purposes such as candidacy or issue advocacy. Whites and Blacks are equally likely to follow civic leaders on social media sites (although Hispanics were far less likely to follow civic leaders, and Whites were more likely to belong to civic groups than both Blacks and Hispanics) (Rainie, Smith, Schlozman, & Brady, 2012, p. 4). Lenhart, Madden, Macgill, and Smith (2007) also surveyed thousands of respondents and discovered that owning a smartphone does not automatically exclude using a personal computer, even among those most susceptible to the digital divide. They noted that "fully 79% of black online teens say they use the internet to look up information about colleges and universities, compared to 51% of white online teens" (p. 26). The literature is not clear on whether smartphones or desktops are a better path

toward social-mobility resources such as job or college applications. However, there is evidence that some minority populations may be following those paths to close the digital divide.

Duggan and Brenner (2013) explored the demographics of social networking on behalf of the Pew Research Center and reported that the most frequent users of social networking sites are Hispanic (72%), followed by Blacks (68%), and then Whites (65%). More women (71%) used Twitter than men (62%) to socially network (Duggan & Brenner, 2013, p. 3). Black males are the most frequent users of Twitter, White females are the largest users of Pinterest. Black females are the most frequent users of Instagram. Hispanic men and women are tied for the largest users of Tumblr. Urban women are the most frequent users of Facebook (Duggan & Brenner, 2013, pp. 4-8). Few of the Pew Research findings showed a gap sizeable enough to suggest that any one social networking size was dominated by any type of users to the exclusion of any other group. Rather, all sites seem to enjoy participation across the board from all demographics except for men on Pinterest at 5% (Duggan & Brenner, 2013, p. 4).

In a separate research project by the Pew Research Center (2013) the trends for tablet computers as an alternative to desktop and smartphones also shows a narrowing of the gap for some populations. Fifty percent of Asians own a tablet followed by 37% of Hispanics, 35% of Whites, and 29% of Blacks. The 16-17 year old population is 11% more likely to own a tablet than those aged 18-29, but only 2% more likely than those aged 30-49. Urban and suburban residents as well as men and women were almost equally likely to own a tablet (Madden et al., 2013, p. 3).

Although the academic digital divide may remain open, the social digital divide seems to have narrowed, closed, or even flipped for some or all of the population. Concerns may still linger about whether any particular device allows lesser or greater access to the full bounty of online content. However, the matter may only be temporary as the cyberspace marketplace continues to favor compatibility between devices and content.

Community as a puzzle piece in Carvin's definition of the digital divide may have once been a focus of concern for Gates, Warschauer, and Revenaugh. The arc of mobile socialization, however, seems to favor entire populations that were once marginalized by technology. Those who were once "cybersegregated" (Gates, p. 1) and disconnected by technology appear to have leapfrogged the divide and now use the technology to form communities.

Conclusion

Carvin (2000) deconstructed the digital divide into five distinct puzzle pieces: access, content, literacy, pedagogy, and community (pp. 2-3). This review of literature was organized around these five pieces. Viewed independently each piece provides a very different perspective about the digital divide. Viewed collectively the puzzle itself is a picture of a nation still struggling to close the divide inside the classroom but rapidly closing the divide outside the classroom. Perhaps the digital divide is not so much a chasm but a schism, and the gap is not a resource gap but a pedagogical gap.

The gaps between variables such as ethnicity, gender, and income appear magnified when in the context of the classroom. The research from inside the classroom has illustrated a clear divide with winners and losers along many demographic lines. The

research from outside the classroom has shown a significant narrowing of the gap for those same variables. Some of these differences may be due to research variables that are less relevant now than only a few years ago. For example, researchers counting the number of desktop computers in a classroom may not have considered the leapfrog effect and may have been under-reporting the degree to which students and teachers have access to mobile devices. Similarly many researchers have continued to rely on certain ICT tasks to measure computer skills (notably word processing, spreadsheets, and presentation software), but these tasks may no longer be the most appropriate metrics of digital literacy. As Connie Yowell (2008) said on behalf of the MacArthur Foundation, "we cannot measure what they're doing or understand the learning that is happening in context with our old measures – our old paradigms for learning, and frankly, our old understandings of learning that are based on models of consumption" (para. 7).

The digital divide itself is narrowing, while there are still gaps at all levels, access to content has become less a privilege for only a few and more a way of life for all. An ethical approach to educating children demands that every child be allowed to participate equally. As schools and communities work to close this divide, the technology itself seems to evolve faster than school resources. For these reasons it is important for educators to measure and evaluate their students' access to technology at the local institutional level rather than relying on national data.

Chapter Three

Methods

The purpose of this study was to analyze data collected from students at one Midwest high school to determine the extent to which students have access to a computer and the internet outside the school day and the extent to which socioeconomic status and ethnicity impacts access to and ownership of computing technology. Chapter three describes the research design and specific procedures used to conduct the study. This chapter is presented in several parts: research design, population and sample, sampling procedures, instrumentation, measurement, validity, reliability, data collection procedures, data analysis and hypothesis testing, and limitations.

Research Design

The research design section establishes the method of research used in the study and provides a rationale for the design selection and the variables identified (Roberts, 2010, p. 148). This study was executed using archived data provided by a school district to conduct quantitative analyses of the perceptions of a student population using several different variables. The causal-comparative method was used to analyze student use of and access to technology outside the school day and to compare use and access based on ethnicity and socioeconomic status. The researcher selected ethnicity and socioeconomic status for analysis based on the evidence in chapter two that these variables were among the most necessary and significant factors with which to understand the digital divide.

Population and Sample

The purpose of this section is to "describe (a) who participated in the study including their characteristics (e.g., age, gender, race/ethnicity), (b) sampling, and (c)

how many participated in the study" (Lunenburg & Irby, 2008, p. 167). The specific population to be studied was comprised of 9th through 12th graders in Midwestern high schools.

Sampling Procedures

Roberts (2010) wrote, "sampling is the process of selecting a number of individuals for a study in such a way that the individuals represent the larger group from which they were selected" (p. 149). The sampling was purposive, and the population to be studied was comprised of 14-18 year olds at Midwestern, suburban high schools. The specific sample was chosen because this researcher had access to this group of students. The sample (N = 1,703) included all students who attended school and completed or partially completed a survey on the day it was administered. Of the 1,703 participating students, 236 (13.9%) were designated as lower-SES, 1312 (77%) were White, 172 (10.1%) were Hispanic, 87 (5.1%) were Asian, 6 (.4%) were American Native, 49 (2.9%) were Multi-ethnic, and 77 (4.5%) were African-American.

Instrumentation

The instrumentation section provides detailed information about the actual survey instrument to be used in the proposed study (Creswell, 2009, p. 149). Members of the high school technology leadership team, of which this researcher served as chair, wrote the instrument used for this survey. Surveys are "a form of descriptive research that involves collecting information about research participants' beliefs, attitudes, interests, or behavior through questionnaires, interviews, or paper-and-pencil tests" (Gall, Gall, & Borg, 2005, p. 180). The survey titled "2012 [High School Name] Student Technology Survey" contained thirty questions. Each question had between two and five

answer choices including: multiple choice, Likert-type scale, and yes/no answer choices (see Appendix A). Within the thirty questions were several categories of question areas including: access and ownership of technology, perceived skills, usage at school (by students and teachers), and student perception of building-wide educational policies related to technology access and usage. The questions about access and ownership of technology were used in this study, and all other questions were excluded from the study in an effort to focus the study on access and ownership of technology.

Students were given a paper copy of the survey and a personalized optical scan form printed and coded by district staff on which students recorded their responses using a pencil. The district coding for each optical scan form included name, grade level, gender, ethnicity, SPED, Migrant, 504 Plan, SES, ELL, and Title 1 designations. Students were unable to determine the nature or purpose of the coding on the optical scan form except for the student's name; however, the introductory narration on the survey instrument indicated that student responses would be analyzed by grade, gender, and so on.

The data were collected from all respondents within the same 30-minute timeframe on the same day. Teachers were provided a set of printed questions for each student and a set of optical scan response forms coded by student name. Extra pencils were provided to each teacher to ensure that all students were prepared to take the survey. At the designated time, the principal provided survey instructions through the use of a building-wide intercom system. The principal explained the purpose of the survey and asked students to give honest and thoughtful responses to all questions. The principal instructed all teachers to distribute assessment materials to students and to begin a 20

minute uninterrupted block of survey time. When the time elapsed the principal used the intercom to ask teachers to collect the materials, sort the optical scan forms alphabetically, and to be ready to provide the materials to staff members assigned to retrieve the materials from each classroom.

Measurement

The measurement section describes how the instrument used to collect data was an appropriate tool for this study and how the survey items were used to measure variables from the research questions. Creswell (2009) contended that surveys could be a preferred type of data collection procedure because of the economy of design and rapid turnaround in data collection (p. 146). From the 30 questions asked on the district survey, four questions were analyzed in an effort to examine the research questions from chapter one. Twenty-six questions on the survey were not used in this study because they were not pertinent to the focus of this study. The four questions selected for further study, along with their response options and associated research questions are included in the Data Analysis and Hypothesis Testing section.

Validity and Reliability

Roberts (2010) defined validity as "the degree to which [the] instrument truly measures what it purports to measure" and reliability as "the degree to which [the] instrument consistently measures something from one time to another" (p. 151). For this survey and upon creating the first draft, two teachers administered the draft questions to approximately 50 students in two classrooms. To establish validity the school reported that two teachers reviewed the word choice, answer choices, and construction of each item with their students in a classroom discussion to determine whether each item

measured what it intended to measure. Students provided input based on how they defined and understood the question and how they interpreted the answer choices, and revisions were made to improve clarity and accuracy.

Roberts (2010) further defined reliability as "the degree to which the instrument consistently measures something from one time to another" (p. 151). Although reliability is important for instruments administered multiple times, this survey included low-inference questions that focused on concrete behaviors unlikely to vary from one administration of the survey to the next.

Data Collection Procedures

The data collection procedures section "describes in detail all of the steps taken to conduct [the] study and the order in which they occurred" (Roberts, 2010, p. 156). The appended items associated with data collection procedures include written request and district authorization to use the archived survey data, (Appendices B and C), and the approved Baker University Institutional Review Board (IRB) request form and approval letter (Appendices D and E). The archived data was collected from spreadsheet data provided by the host school district administration via email. The spreadsheet was arranged in columns to represent demographic designations and individual responses, and rows to represent individual students.

Data Analysis and Hypothesis Testing

According to Roberts (2010) the data analysis and hypothesis testing section "includes an explanation of how [the researcher] analyzed the data as well as [the] rationale for selecting a particular analysis method" (p. 158). Likewise, the type and rationale for each statistical analysis is explained. Raw data received from the host

school district excluded student names but included the following variables: grade level, gender, ethnicity, special education, migrant, 504 Plan, SES, ELL, and Title 1 designations. Only ethnicity and socioeconomic status were used for statistical analysis because the unused variables were not identified in the literature as being significant factors in the first or second digital divides. After removing any incomplete responses from the raw data set received from the host school district, this researcher identified 1,602 valid responses from the 1,742 students surveyed.

Response data from four survey questions used in the conduct of chi-square tests of independence and chi-square tests of equal percentages. Determinations were made about (a) the extent to which students had computer and Internet access, (b) whether socioeconomic status or ethnicity impacted the frequency with which students reported having computer and Internet access outside the school day, and (c) whether socioeconomic status and ethnicity impacted the likelihood that students reported owning a mobile device. The research questions, survey questions, response options, statistical tests, and hypotheses follow:

Research question one. To what extent do students report having computer and Internet access outside the school day? The response to this research question required data from two different survey questions and two different hypothesis tests. The first survey question (question 2): "How often do you have access to a reliable, working computer outside of the school day?" had four answer choices: (a) never, (b) rarely, (c) sometimes, and (d) often. The second survey question (question 3): "How often do you have access to broadband Internet (e.g. cable modem or wifi) outside the school day?" also had four answer choices: (a) never, (b) rarely, (c) sometimes, and (d) often. Two

chi-square tests of equal percentages were conducted to address H1 and H2. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H1: Students often have access to a reliable computer outside the school day.

H2: Students often have access to broadband Internet outside the school day.

Research question two. To what extent does socioeconomic status impact the frequency that students report having Internet and computer access outside the school day? The response to this research question required survey data from the same two survey questions used in research question one as well as the demographic data provided by the host school district to indicate which student responses were coded as low-socioeconomic status and which were not. Two chi-square tests of independence were conducted to address H3 and H4. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H3: Socioeconomic status impacts the frequency with which students report having access to a reliable computer outside the school day.

H4: Socioeconomic status impacts the frequency with which students report having students often have access to broadband Internet outside the school day.

Research question three. To what extent does ethnicity impact the frequency that students report having computer and Internet access outside the school day? The response to this research question required survey data from the same two survey questions used in research question one as well as demographic data provided by the host school district to determine student ethnicity for each set of responses. Two chi-square

tests of independence were conducted to address H5 and H6. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H5: Ethnicity impacts the frequency with which students report having access to a reliable computer outside the school day.

H6: Ethnicity impacts the frequency with which students report having access to broadband Internet outside the school day.

Research question four. To what extent do students report owning a smartphone? The response to this research question required data from survey question 20: "Can you browse the web on your current cell phone?" The survey question had two answer choices: (a) yes, and (b) no. Web-based browsing is a feature unique to smartphones; therefore, the data from question 20 can be used to answer the research question. A chi-square test of equal percentages was conducted to address H7. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H7: Students report owning a smartphone.

Research question five. To what extent does socioeconomic status impact the likelihood that students report owning a smartphone? The response to this research question required survey data from survey question 20 and demographic data provided by the host school district. A chi-square test of independence was conducted to address H8. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H8: Socioeconomic status impacts the likelihood that students report owning a smartphone.

Research question six. To what extent does ethnicity impact the likelihood that students report owning a smartphone? The response to this research question required survey data from survey question 20 and demographic data provided by the host school district. A chi-square test of independence was conducted to address H9. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H9: Ethnicity impacts the likelihood that students report owning a smartphone.

Research question seven. To what extent do students report owning a mobile computing device such as a laptop or tablet? The response to this research question required data from survey question 21: "Which of the following devices do you currently own that you use daily or almost daily?" Question 21 had four answer choices: (a) laptop or netbook, (b) iPad or tablet, (c) A and B, and (d) neither. A chi-square test of equal percentages was conducted to address H10. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H10: Students report owning one or more mobile computing devices such as a laptop or tablet.

Research question eight. To what extent does socioeconomic status impact the likelihood that students report owning a mobile computing device such as a laptop or tablet? The response to this research question required the survey data from question 21 and the demographic data supplied by the host school district to determine which student responses were coded as low-socioeconomic status. A chi-squared test of independence was conducted to address H11. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H11: Socioeconomic status impacts the likelihood that students report owning one or more mobile computing devices such as a laptop or tablet.

Research question nine. To what extent does ethnicity impact the likelihood that students report owning a mobile computing device such as a laptop or tablet? The response to this research question required the survey data from question 21 and the demographic data supplied by the host school district. A chi-squared test of independence was conducted to address H12. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H12: Ethnicity impacts the likelihood that students report owning one or more mobile computing devices such as a laptop or tablet.

Limitations

Limitations are "particular features of [the] study that [the researcher] know may negatively affect the results or [the researcher's] ability to generalize" (Roberts, 2010, p. 162). This researcher identified the following limitations to this study:

1. Student participation in the survey was voluntary. Some students may have provided responses that did not fully reflect an honest response. Examples include failure to accurately describe ownership or access to technology, misunderstanding certain words or phrases, and possible negative reactions to the personal nature of the questions.

2. Given the rapid evolution of technology, the survey data is time-bound to what was true for this population of students in December of 2012. To generalize beyond that date is speculative.

3. To the extent that teachers need to be aware of the technological capacities of their students, they must be aware of how this knowledge influences lesson planning, technological engagement, and expectations for academic use of technology outside of school. This study focused on analyzing the extent to which students accessed and owned technology, but this study does not extend to include the impact of professional development or collaboration needed to translate the data into meaningful pedagogy.

4. The culture and climate of a school and its administrative and teaching staff plays an outsized role in determining the extent to which students and their families perceive the need for technology. Other schools with nearly identical populations and resources may have vastly different outcomes when replicating this study due to variances in teacher expectations, knowledge, and pedagogy.

Summary

Chapter three described the methodology used to conduct this study. This study was a quantitative, causal-comparative study that used archived data from a student survey at one high school to determine the extent to which ethnicity and socioeconomic status influenced ICT access and usage. Chapter four provides the results of the statistical analysis to determine if there is a significant difference in the variables identified and the students' ICT access and usage.

Chapter Four

Results

This chapter provides descriptive statistics, presents the results of the statistical data analysis, and summarizes the results of the hypothesis tests. The hypothesis testing section summarizes the results for each of the 9 research questions and the 12 associated tests. Chapter four also establishes the framework for further analysis and recommendations in chapter five. The purpose of this study was to analyze data collected from students at one Midwest high school to determine the extent to which students have access to a computer, smartphone, mobile device, and the internet outside the school day and the extent to which socioeconomic status and ethnicity impacts access to and ownership of computing technology.

Descriptive Statistics

The population to be studied was comprised of 14-18 year olds at Midwestern, suburban high schools. The sample (N = 1,703) included all students who attended school and completed or partially completed a survey on the day it was administered. After removing the incomplete responses from the raw data set received from the district, the researcher identified 1,602 valid responses from the 1,703 students surveyed. Of the 1,703 participating students, 236 (13.9%) were designated as lower-SES, 1312 (77%) were White, 172 (10.1%) were Hispanic, 87 (5.1%) were Asian, 6 (.4%) were American Native, 49 (2.9%) were Multi-ethnic, and 77 (4.5%) were African American. The data provided by the district was coded for ethnicity and socioeconomic status. The data codes for ethnicity included 00 (White), 01 (American Native), 02 (Asian), 03 (Hispanic), 04 (African American), and 99 (Multi-racial). The researcher grouped codes 00 (White)

and 02 (Asian) to categorize the White (Caucasian) responses, and codes 01 (American Native), 03 (Hispanic), 04 (African American), and 99 (Multi-racial) to categorize the non-White responses. The data codes for socioeconomic status included R3 (students who receive reduced lunch prices), F3 (students who receive free lunch), and no code (students who receive no lunch discount). These commonly used, district-determined designations are based on standardized federal guidelines established by the United States Department of Agriculture. Specifically, "children from families with incomes at or below 130 percent of the poverty level are eligible for free meals. Those with incomes between 130 percent and 185 percent of the poverty level are eligible for reduced-price meals" (USDA, 2014, p. 1-2). The researcher grouped R3 (reduced lunch) and F3 (free lunch) to categorize the lower-SES responses and categorized all other responses as higher-SES.

Hypothesis Testing

Ethnicity and socioeconomic status were identified in the literature as significant factors that influenced access and ownership. Those variables were included in several hypothesis tests. Twelve hypothesis tests were conducted to determine the extent to which students owned or had access to a variety of technologies and the Internet outside the school day. The results of the hypothesis tests are included in this section and are further analyzed in chapter five.

Research question one. To what extent do students report having computer and Internet access outside the school day? Two chi-square tests of equal percentages were conducted to address H1 and H2. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H1: Students often have access to a reliable computer outside the school day. The results of the χ^2 test of equal percentages indicated a statistically significant difference between the observed and expected values, $\chi^2 = 3{,}026.23$, $df = 3$, $p = .000$. The observed frequency ($n = 1346$) was higher than the expected frequency ($n = 400$) for students who reported often having computer access (see Table 1). The results of the χ^2 test support the hypothesis that students often have access to a reliable computer outside the school day.

Table 1

Observed and Expected Frequencies for Hypothesis 1

Response Category	Observed	Expected
Never	19	400
Rarely	44	400
Sometimes	191	400
Often	1346	400

H2: Students often have access to broadband Internet outside the school day. The results of the χ^2 test of equal percentages indicated a statistically significant difference between the observed and expected values, $\chi^2 = 3{,}103.92$, $df = 3$, $p = .000$. The observed frequency ($n = 1362$) was higher than the expected frequency ($n = 400.5$) for students who reported often having Internet access (see Table 2). The results of the χ^2 test support the hypothesis that students often have access to broadband Internet outside the school day.

Table 2

Observed and Expected Frequencies for Hypothesis 2

Response Category	Observed	Expected
Never	30	400.5
Rarely	47	400.5
Sometimes	163	400.5
Often	1362	400.5

Research question two. To what extent does socioeconomic status impact the frequency that students report having computer and Internet access outside the school day? Two chi-square tests of independence were conducted to address H3 and H4. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H3: Socioeconomic status impacts the frequency with which students report having access to a reliable computer outside the school day. The results of the χ^2 test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 92.368$, $df = 3$, $p = .000$. See Table 3 for the observed and expected frequencies. The observed frequency ($n = 10$) was higher than the expected frequency ($n = 2.6$) for lower-SES students who reported never having computer access. The observed frequency ($n = 17$) was higher than the expected frequency ($n = 5.9$) for lower-SES students who reported rarely having computer access. The observed frequency ($n = 52$) was higher than the expected frequency ($n = 25.8$) for lower-SES students who reported sometimes having computer access. The observed frequency ($n = 1,210$) was higher than the expected frequency ($n = 1,165.3$) for higher-SES students who reported often having

computer access. The results of the χ^2 test support the hypothesis that socioeconomic status impacts the frequency with which students report having access to a reliable computer outside the school day.

Table 3

Observed and Expected Frequencies for Hypothesis 3

		Socioeconomic Status	
Frequency of Computer Access		Higher-SES	Lower-SES
Never	Observed	9	10
	Expected	16.4	2.6
Rarely	Observed	27	17
	Expected	38.1	5.9
Sometimes	Observed	139	52
	Expected	165.2	25.8
Often	Observed	1210	137
	Expected	1165.3	181.7

Note: USDA defines lower-SES as family incomes at or below 185% of the poverty line.

H4: Socioeconomic status impacts the frequency with which students report have access to broadband Internet outside the school day. The results of the χ^2 test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 56.323$, $df = 3$, $p = .000$. See Table 4 for the observed and expected frequencies. The observed frequency ($n = 13$) was higher than the expected frequency ($n = 4.1$) for lower-SES students who reported never having Internet access. The observed frequency ($n = 17$) was higher than the expected frequency ($n = 6.4$) for lower-SES students who reported rarely having Internet access. The observed frequency ($n = 34$) was higher than the expected frequency ($n = 22.2$) for lower-SES students who reported sometimes having Internet access. The observed frequency ($n = 1,208$) was higher than

the expected frequency (n = 1,176.7) for higher-SES students who reported often having Internet access. The results of the χ^2 test support the hypothesis that socioeconomic status impacts the frequency with which students report having access to broadband Internet outside the school day.

Table 4

Observed and Expected Frequencies for Hypothesis 4

		Socioeconomic Status	
Frequency of Internet Access		Higher-SES	Lower-SES
Never	Observed	17	13
	Expected	25.9	4.1
Rarely	Observed	30	17
	Expected	40.6	6.4
Sometimes	Observed	129	34
	Expected	140.8	22.2
Often	Observed	1208	154
	Expected	1176.7	185.3

Research question three. To what extent does ethnicity impact the frequency that students report having computer and Internet access outside the school day? Two chi-square tests of independence were conducted to address H5 and H6. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H5: Ethnicity impacts the frequency with which students report having access to a reliable computer outside the school day. The results of the χ^2 test of independence indicated a statistically significant difference between the observed and expected values, χ^2 = 39.758, df = 3, p = .000. See Table 5 for the observed and expected frequencies.

The observed frequency (n = 7) was higher than the expected frequency (n = 3.3) for non-White students who reported never having computer access. The observed frequency (n = 17) was higher than the expected frequency (n = 7.7) for non-White students who reported rarely having computer access. The observed frequency (n = 54) was higher than the expected frequency (n = 33.4) for non-White students who reported sometimes having computer access. The observed frequency (n = 1,145) was higher than the expected frequency (n = 1,111.4) for White students who reported often having computer access. The results of the χ^2 test support the hypothesis that ethnicity impacts the frequency with which students report having access to a reliable computer outside the school day.

Table 5

Observed and Expected Frequencies for Hypothesis 5

		Ethnicity	
Frequency of Computer Access		White	Non-White
Never	Observed	12	7
	Expected	15.7	3.3
Rarely	Observed	27	17
	Expected	36.3	7.7
Sometimes	Observed	137	54
	Expected	157.6	33.4
Often	Observed	1145	202
	Expected	1111.4	235.6

H6: Ethnicity impacts the frequency with which students report having access to broadband Internet outside the school day. The results of the χ^2 test of independence indicated a statistically significant difference between the observed and expected values,

$\chi^2 = 25.669$, $df = 3$, $p = .000$. See Table 6 for the observed and expected frequencies. The observed frequency ($n = 11$) was higher than the expected frequency ($n = 5.2$) for non-White students who reported never having Internet access. The observed frequency ($n = 15$) was higher than the expected frequency ($n = 8.2$) for non-White students who reported rarely having Internet access. The observed frequency ($n = 42$) was higher than the expected frequency ($n = 28.5$) for non-White students who reported sometimes having Internet access. The observed frequency ($n = 1,150$) was higher than the expected frequency ($n = 1,123.9$) for White students who reported often having Internet access. The results of the χ^2 test support the hypothesis that ethnicity impacts the frequency with which students report having access to a broadband Internet outside the school day.

Table 6

Observed and Expected Frequencies for Hypothesis 6

		Ethnicity	
Frequency of Internet Access		White	Non-White
Never	Observed	19	11
	Expected	24.8	5.2
Rarely	Observed	32	15
	Expected	38.8	8.2
Sometimes	Observed	121	42
	Expected	134.5	28.5
Often	Observed	1150	212
	Expected	1123.9	238.1

Research question four. To what extent do students report owning a smartphone? A chi-square test of equal percentages was conducted to address H7. The

observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H7: Students report owning a smartphone. The results of the χ^2 test of equal percentages indicated a statistically significant difference between the observed and expected values, $\chi^2 = 544.03$, $df = 1$, $p = .000$. The observed frequency ($n = 1{,}251$) was higher than the expected frequency ($n = 788$) for students who reported owning a smartphone (see Table 7). The results of the χ^2 test support the hypothesis that students report owning a smartphone. Thus, students report owning a smartphone.

Table 7

Observed and Expected Frequencies for Hypothesis 7

Smartphone Ownership	Observed	Expected
Yes	1251	788
No	325	788

Research question five. To what extent does socioeconomic status impact the likelihood that students report owning a smartphone? A chi-square test of independence was conducted to address H8. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H8: Socioeconomic status impacts the likelihood that students report owning a smartphone. The results of the χ^2 test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 6.850$, $df = 1$, $p = .009$. See Table 8 for the observed and expected frequencies. The observed frequency ($n = 1{,}094$) was higher than the expected frequency ($n = 1{,}079.5$) for higher-SES students who reported owning a smartphone. The observed frequency ($n = 59$) was higher than the

expected frequency (n = 44.5) for lower-SES students who reported not owning a smartphone. The results of the χ^2 test support the hypothesis that socioeconomic status impacts the likelihood that students report owning a smartphone.

Table 8

Observed and Expected Frequencies for Hypothesis 8

		Socioeconomic Status	
Smartphone Ownership		Higher-SES	Lower-SES
Yes	Observed	1094	157
	Expected	1079.5	171.5
No	Observed	266	59
	Expected	280.5	44.5

Research question six. To what extent does ethnicity impact the likelihood that students report owning a smartphone? A chi-square test of independence was conducted to address H9. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H9: Ethnicity impacts the likelihood that students report owning a smartphone. The results of the χ^2 test of independence indicated no statistically significant difference between the observed and expected values, χ^2 = .190, df = 1, p =.663. See Table 9 for the observed and expected frequencies. The observed frequencies were not statistically different than the expected frequencies. The results of the χ^2 test do not support the hypothesis that ethnicity impacts the likelihood that students report owning a smartphone.

Table 9

Observed and Expected Frequencies for Hypothesis 9

		Ethnicity	
Smartphone Ownership		White	Non-White
Yes	Observed	1033	218
	Expected	1030.3	220.7
No	Observed	265	60
	Expected	267.7	57.3

Research question seven. To what extent do students report owning a mobile computing device such as a laptop or tablet? A chi-square test of equal percentages was conducted to address H10. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H10: Students report owning one or more mobile computing devices such as a laptop or tablet. The results of the χ^2 test of equal percentages indicated a statistically significant difference between the observed and expected values, $\chi^2 = 324.22$, $df = 3$, $p = .000$. The observed frequency ($n = 642$) was higher than the expected frequency ($n = 399.75$) for students who reported owning a laptop or netbook. The observed frequency ($n = 428$) was higher than the expected frequency ($n = 399.75$) for students who reported owning a laptop/netbook and an iPad/tablet (see Table 10). The results of the χ^2 test support the hypothesis that students report owning one or more mobile computing devices.

Table 10

Observed and Expected Frequencies for hypothesis 10

Mobile Device Ownership	Observed	Expected
Laptop/Netbook	642	399.75
iPad/Tablet	135	399.75
Both A and B	428	399.75
Neither/None	394	399.75

Research question eight. To what extent does socioeconomic status impact the likelihood that students report owning a mobile computing device such as a laptop or tablet? A chi-squared test of independence was conducted to address H11. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H11: Socioeconomic status impacts the likelihood that students report owning one or more mobile computing devices such as a laptop or tablet. The results of the χ^2 test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 11.384$, $df = 3$, $p = .010$. See Table 11 for the observed and expected frequencies. The observed frequency ($n = 563$) was higher than the expected frequency ($n = 554.5$) for higher-SES students who reported owning a laptop or netbook. The observed frequency ($n = 122$) was higher than the expected frequency ($n = 116.6$) for higher-SES students who reported owning an iPad or tablet. The observed frequency ($n = 375$) was higher than the expected frequency ($n = 369.6$) for higher-SES students who reported owning both a laptop/netbook and iPad/tablet. The observed frequency ($n = 73$) was higher than the expected frequency ($n = 53.7$) for lower-SES students who reported

owning none of the mobile devices listed. The results of the χ^2 test support the hypothesis that socioeconomic status impacts the likelihood that students report owning one or more mobile computing devices.

Table 11

Observed and Expected Frequencies for Hypothesis 11

		Socioeconomic Status	
Mobile Device Ownership		Higher-SES	Lower-SES
Laptop or Netbook	Observed	563	79
	Expected	554.5	87.5
iPad or Tablet	Observed	122	13
	Expected	116.6	18.4
Both A and B	Observed	375	53
	Expected	369.6	58.4
Neither/None	Observed	321	73
	Expected	340.3	53.7

Research question nine. To what extent does ethnicity impact the likelihood that students report owning a mobile computing device such as a laptop or tablet? A chi-squared test of independence was conducted to address H12. The observed frequencies were compared to those expected by chance. The level of significance was set at .05.

H12: Ethnicity impacts the likelihood that students report owning one or more mobile computing devices such as a laptop or tablet. The results of the χ^2 test of independence indicated a statistically significant difference between the observed and expected values, $\chi^2 = 8.464$, $df = 3$, $p = .037$. See Table 12 for the observed and expected frequencies. The observed frequency ($n = 539$) was higher than the observed frequency ($n = 529.6$) for White student ownership of a laptop or netbook. The observed frequency

(n = 113) was higher than the expected frequency (n = 111.4) for White student ownership of an iPad or tablet. The observed frequency (n = 361) was higher than the expected frequency (n = 353.1) for White student ownership of both a laptop/netbook and an iPad/tablet. The observed frequency (n = 88) was higher than the expected frequency (n = 69.0) for non-White student ownership of none of the mobile devices listed. The results of the χ^2 test support the hypothesis that ethnicity impacts the likelihood that students report owning one or more mobile computing devices.

Table 12

Observed and Expected Frequencies for Hypothesis 12

		Ethnicity	
Mobile Device Ownership		White	Non-White
Laptop or Netbook	Observed	539	103
	Expected	529.6	112.4
iPad or Tablet	Observed	113	22
	Expected	111.4	23.6
Both A and B	Observed	361	67
	Expected	353.1	74.9
Neither/None	Observed	306	88
	Expected	325.0	69.0

Summary

Chapter four provided descriptive statistics, presented the results of the statistical data analysis, and summarized the results of the hypothesis tests. The hypothesis testing section summarized the results of each of the 12 hypothesis tests that address the 9 research questions. Chapter four also established the framework for further analysis and recommendations in chapter five. Chapter five summarizes the study, presents major

findings, connects the findings to the literature, and concludes with action implications and recommendations for future research.

Chapter Five

Interpretation and Recommendations

The researcher examined student access to and ownership of a variety of technology outside the school day including computers, Internet, smartphones, laptops, netbooks, iPads, and tablets. Based on the literature, specific attention was given to ethnicity and socioeconomic status as factors that often relate to access and ownership. Chapter five summarizes the study, reviews the findings, connects the findings to the literature, and concludes the study.

Study Summary

The study was conducted using data from a student technology survey administered to Midwestern, suburban high school students in grades 9-12 in December of 2012. The review of literature revealed that there are two digital divides: one for ownership and one for access, and that these divides are amplified based on ethnicity (Ritzhaupt, Feng, Dawson & Barron, 2013; Vigdor & Ladd, 2010) and income (Becker, 2000; Minskey, 2005; Thomas, 2008). To determine whether these digital divides could be detected within the results from the student technology survey, 9 research questions and 12 hypotheses were constructed, and statistical tests were conducted to analyze the frequency of ownership and relationship between technology access and ownership for lower-SES and non-White students.

Overview of the problem. Understanding the digital divide is more complex than simple mathematics. Classifying the "haves" and the "have-nots" is not an easy task (Robinson, 2005). The older notions of a digital divide measured from binary definitions have been replaced by newer paradigms that require a finessed understanding of the type

of technology and the type of access (Hargittai, 2002; Lei, Weizen, Gibbs & Chang, 2008). As technology and access to it evolves, so too must the adaptation of how to define, measure, and interpret the digital landscape and its inherent divides.

Purpose statement and research questions. The purpose of this study was to measure student ownership of computers and access to the Internet by high school students, particularly ownership by minority and lower-SES students. The focus on minority and lower-SES students was guided by the consensus of literature that a greater divide exists for these populations. The nine research questions were aligned with questions from the student survey and included questions about ownership of computers (including general definitions of computers, tablets, laptops, and smartphones) and access to the Internet.

Review of the methodology. Data used for this study were collected from the archived data from the student survey administered in December 2012 at a Midwestern, suburban high school. The population to be studied was comprised of 14-18 year olds at Midwestern high schools. The sample (N = 1,703) included all students who attended school and completed or partially completed a survey on the day it was administered. This survey collected student responses to a variety of questions regarding their access to various technologies outside the school day. Twelve hypotheses were quantitatively tested using chi-squared tests of equal percentages and chi-square tests of independence.

Major findings. Results from the hypothesis tests support 11 of the 12 hypotheses. Not surprisingly most students often have access to a computer outside of school (H1) and often have access to broadband Internet outside of school (H2). Most students own smartphones (H7) and one or more mobile devices (H10). Lower-SES

students are less likely than expected by chance to have access to a computer (H3), have access to the Internet (H4), own a smartphone (H9), or own a mobile device (H12). Non-White students are less likely than expected by chance to have access to a computer (H5), have access to the Internet (H6), or own a mobile device (H11), but they are not less likely than White students to own a smartphone (H8).

Findings Related to the Literature

The major findings of this study support the common premise in the literature that ethnicity and socioeconomic status negatively impact students' ownership and access to traditional definitions of technology (e.g. a computer at home with broadband internet). The first, second, and third research questions focused on student access to computers and the Internet. Minority and lower-SES students are less likely to have a computer at home and access to broadband Internet.

There may still be a "purpose gap" between technology users. Several authors suggest that ethnicity and income negatively impact the type of usage when accessing a computer. These discrepancies may still apply to mobile technology. Jackson et al. (2008) reported that although the access gap has decreased dramatically for Blacks, the intensity and nature of use differs from other racial groups even after other factors such as income and education were controlled. Warschauer (2007) reported "overall, students who are black, Hispanic, or low-income are more likely to use computers for drill and practice, whereas students who are white or high-income are more likely to use computers for simulations or authentic applications" (p. 148). If the behaviors observed by Jackson and Warschauer are as true for mobile devices as they were for desktop computers, then the narrowing of the device gap may do little to resolve the purpose gap.

The fourth, fifth, and sixth research questions focused on student ownership of smartphones. Given that "teens in lower socioeconomic groups are just as likely and in some cases more likely than those living in higher income and more highly educated households to use their cell phone as a primary point of access" (Madden et al., 2013, p. 5), and given that African-Americans and Hispanics were much more likely to go online using their cell phones than Whites (Duggan & Brenner, 2013, p. 5), the divide between lower-SES / minority populations and higher-SES / White populations may be equalizing with respect to smartphone technology. Although this study found that income was still a factor in smartphone ownership, it did find that ethnicity was not a factor. Washington (2011) described smartphones as key tools to stay connected to the community, but noted that smartphones have limitations that desktops do not, and owning a smartphone does not guarantee that people are using it to increase their well-being (pp. 1-2). The device gap between smartphone ownership may be shrinking for students, but if smartphones limit the type of activity available to users, the purpose gap may remain unchanged.

The seventh, eighth, and ninth research questions examined the ownership of mobile devices such as laptops, netbooks, iPads, and tablets. The findings in this study showed statistically significant differences in mobile device ownership based on ethnicity or socioeconomic. The literature provides abundant evidence that the largest deficit in computer access for minority and lower-SES students is in the classroom, and it may be the classroom where the purpose gap is widest. The National Education Association (2008) published its findings of teacher and support personnel opinions on technology in schools and classrooms. The major findings were that there are not enough computers, support, or training (pp. 2-5). Hew and Brush (2007) identified the lack of resources as

the primary impediment to effective technology integration (p. 186). Moreover, teachers are reluctant to learn new technology (Cuban, 1984; Hew & Brush, 2007; Valdez & Duran, 2007), which means that even if schools added more computers to classrooms, either directly through school purchases or indirectly by allowing students to bring their own devices, the purpose gap may remain wide open.

The findings in this study are consistent with the findings in the literature. This consistency is somewhat discouraging because it illustrates the continued gap in home computer ownership, and somewhat encouraging because it demonstrates that some groups of students may be closing the gap elsewhere through mobile technology such as smartphones. Thus, closing the digital divide may not require us to provide more computers to students but instead to rethink how mobile technology can be used to close the purpose gap that remains open when traditionally disadvantaged students use technology in less meaningful ways than other students.

Conclusions

Implications for action. The research findings in this study demonstrate that non-White students may be closing the digital divide for mobile technology such as smartphones. If so, schools may be wise to consider new pathways toward effective classroom technology integration that rely less on traditional desktop computers and more on student-owned and student-preferred technology. An example of one pathway includes Bring Your Own Device (BYOD) in which schools open a designated wireless network for students to access with their own device. BYOD would offer profound savings for schools (minus the cost of providing devices at reduced or no charge for those

in need). Students would have one device to seamlessly blend between home, school, and the community.

The research findings in this study add to the body of evidence that teachers and administrators at the building level need to better understand their specific student population with respect to technology needs and assets. The culture and climate of a school has a profound impact on the way that students, teachers, and parents perceive technology. Survey results of one high school may be vastly different than another, even when all other demographic factors are equalized. It is important to understand that what is true for one high school cannot always be assumed for all similar high schools, especially without controlling for culture, climate, and perceptions of technology.

Recommendations for future research. Researchers interested in this subject area would benefit from examining whether digital literacy skills vary between mobile and desktop computing devices. These two components were not thoroughly analyzed in the current study. Many questions were raised by authors in the literature review regarding if and how well mobile devices can replace desktop computers as a primary means of accessing, using, and benefiting from online content (Tally, 2012; Valdez & Duran, 2007; Warschauer & Matuchniak, 2010). Similarly, if users are engaging in vastly different behaviors from one device to the next (e.g. using smartphones to play games and desktops to create presentations), there may remain a purpose gap that requires further understanding and analysis. Future research should also investigate other age groups beyond high school students, such as teachers, other adults, and elementary students.

Concluding remarks. This study examined high school students' ownership of and access to computers and the Internet. The digital divide in America is well documented, and there is evidence that as one aspect of the divide closes, another remains open. As consumers continue to gravitate toward technology that they believe will improve their quality of life, society will continue to be shaped by the ubiquitous impact of computers and the Internet.

The study was conducted to determine if students at one high school mirrored the nationwide trends. They did, for better and for worse. Ethnicity and income remain linked to the lack of ownership and access to computers and the Internet, but these variables may soon be less predictive of ownership and access to mobile devices. Teachers and classrooms must now decide whether to adapt to the changing technology landscape or to continue designing classrooms around an aging vision. Therein lies the future of effective technology integration.

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Appendices

Appendix A: 2012 [School Name] Student Technology Survey

2012 [SCHOOL NAME] Student Technology Survey

Dear Student,

Your feedback on today's survey helps us make our use of technology at [School Name] even better. We are excited about your feedback! Your answer sheet contains your name and other information so that we can group responses by grade, gender, etc. **Please make sure that you answer each question as it applies to you.** Since everyone will take this survey, it is not necessary for your answer to reflect what you think is true for most people.

1. Are you in a 21st Century Program (A&E / eComm)?
   A. Yes – A&E
   B. Yes - eComm
   C. No

2. How often do you have access to a reliable, working computer outside of the school day?
   A = never
   B = rarely
   C = sometimes
   D = often

3. How often do you have access to broadband internet (e.g. cable modem or wifi) outside the school day?
   A = never
   B = rarely
   C = sometimes
   D = often

4. I could probably learn more about **Microsoft Word** <u>if</u> . . . [*select the most accurate answer*]
   A = I had the chance to use it more often.
   B = my teachers taught me to use it rather than expecting me to know it already.
   C = I'm required by my teachers to use it more than I do.
   D = I decided to (I'm already much better than most students at using it).

5. I could probably learn more about **Microsoft Excel** <u>if</u> . . . [*select the most accurate answer*]
   A = I had the chance to use it more often.
   B = my teachers taught me to use it rather than expecting me to know it already.
   C = I needed to use it more than I do.

D = I decided to (I'm already much better than most students at using it).

6. I could probably learn more about **managing electronic files** if . . . [*select the most accurate answer – note that the phrase "managing electronic files" includes USB flash drives, Dropbox, Google Docs, email attachments, and other ways to move files from one computer to another, such as from home to school*]
   A = I had the chance to use it more often.
   B = my teachers taught me how to manage files rather than expecting me to know to do it already.
   C = I needed to manage files more than I do.
   D = I decided to (I'm already much better than most students at managing files).

7. Which of the following statements is most accurate? *(Note: the phrase "social media" includes online activities such as Facebook or Twitter, and "productivity software" includes Word or Excel).*
   A = I am very good at social media and very good at productivity software.
   B = I am not so good at social media and very good at productivity software.
   C = I am very good at social media and not so good at productivity software.
   D = I am not so good at social media and not so good at productivity software.

8. Which of the following statements is most accurate?
   A = I only check a personal email account if I know in advance there's an important email.
   B = I check my personal email account(s) about 1-3 times per week on average.
   C = I check my personal email account(s) daily or almost daily.
   D = I check my personal email account(s) multiple times per day.
   E = I do not have a personal email account.

9. Which of the following statements is most accurate?
   A = I only check my school email account if I know in advance there's an important email.
   B = I check my school email account(s) about 1-3 times per week on average.
   C = I check my school email account(s) daily or almost daily.
   D = I check my school email account(s) multiple times per day.
   E = I never check my school email account.

10. In general, your computer skills are _____ than most students in your classes:
    A = much worse
    B = worse
    C = about the same
    D = better
    E = much better

11. In general, your computer skills are _____ than the majority of your teachers:
    A = much worse
    B = worse
    C = about the same
    D = better
    E = much better

12. I would learn a lot more at [School Name] . . . (select the best answer)
    A = if someone taught me how to use a computer, not just assume I know how
    B = if I had better access to a computer at home
    C = if teachers had more access to technology (e.g. laptop carts, clickers, computer labs, etc.)
    D = no change needed

13. How often do you visit the library before or after school to use a computer for school work?
    A = never
    B = rarely
    C = sometimes
    D = often

14. How useful would it be for teachers to post coursework/announcements on social media feeds (like Twitter or Facebook)?
    A = Not at all useful
    B = Somewhat useful
    C = Very useful
    D = Extremely useful

15. Which of the following social media accounts do you check daily or almost daily?
    A = Twitter
    B = Facebook
    C = Both
    D = Neither

16. When it comes to Edmodo . . .
    A = I use it only when I absolutely have to.
    B = I like the idea, but too many teachers don't post enough content to make it worthwhile.
    C = It's actually nice to have a website where I can get reminders, coursework, announcements, etc.
    D = I like the idea, but too many teachers post too much content.
    E = I don't know what Edmodo is.

17. When it comes to Moodle . . .
    A = I use it only when I absolutely have to.
    B = I like the idea, but too many teachers don't post enough content to make it worthwhile.
    C = It's actually nice to have a website where I can get reminders, coursework, announcements, etc.
    D = I like the idea, but too many teachers post too much content.
    E = I don't know what Moodle is.

18. Does your current cell phone have unlimited texting?
    A = yes B = no

19. Does your current cell phone have apps / applications like Twitter or Facebook?
    A = yes B = no

20. Can you browse the web on your current cell phone?
    A = yes B = no

21. Which of the following devices do you currently own that you use daily or almost daily?
    A = laptop or netbook
    B = ipad or tablet
    C = A and B
    D = neither

22. If [School Name] provided building-wide, filtered WiFi that you could access with your personal devices, what would be the most likely response from you or your family?
    A = We wouldn't buy anything new because of the cost of these devices.
    B = We wouldn't buy anything new because I don't need, want, or desire access to school wifi.
    C = We would probably get one or more wireless devices that could access school wifi.
    D = We wouldn't buy anything new because we already have these devices.

23. Would you use the WiFi (filtered) with your personal device if it were made available at [School Name]?
    A = never
    B = rarely
    C = sometimes
    D = often

24. If [School Name] allowed students to use their cell phones as planners, hall passes, and organizers . . .
    A = I don't use my planner now, and I wouldn't use my cell phone for passes or as an organizer.
    B = I would prefer to use my planner just like I do right now.
    C = I would prefer my cell phone for some things and a paper planner for other things.
    D = I would prefer to switch to using my cell for nearly everything and not use the paper planner at all.

***Please note**: We want to get a snapshot of how our teachers use technology at* [School Name]. *In order to get an accurate picture, we need to include <u>all</u> students and <u>all</u> teachers, so we randomly chose to ask you about your 4th hour teacher – that's our way of making sure everyone is included. <u>We WILL NOT connect your specific answers to your specific teacher</u>.*

25. How often does your 4th hour teacher assign you school work that requires a computer, generally speaking?
    A = 0-1 times per week
    B = 2-3 times per week
    C = 4-5 times per week
    D = more than 5 times per week

26. How often does your 4th hour teacher generally use advanced classroom technology (clickers, unique software, wireless tablet, heart rate monitors, document camera, etc.). This would NOT apply to basic technology like the ceiling projector.
    A = rarely
    B = sometimes
    C = often
    D = daily

27. How often does your 4th hour teacher generally ask you to use classroom technology <u>during class</u>?
    A = rarely
    B = sometimes
    C = often
    D = daily

28. How often does your 4th hour teacher generally ask you to use your cell phone for academic reasons <u>during class</u>?
    A = rarely
    B = sometimes
    C = often
    D = daily

29. How often does your 4th hour teacher require you to complete or submit online assignments (homework, quiz, etc.)?
    A = never
    B = rarely
    C = sometimes
    D = often

30. Does your 4th hour classroom have 1 desktop computer per student? (e.g. every student has a computer every day)?
    A = yes B = no

Appendix B: District Request to Use Survey Data

[redacted]

Print Form

Research Application Request-Internal

INSTRUCTIONS:

Please provide the following information so that your project can be considered in relation to district criteria. Allow a minimum of two (2) weeks for completion of the review process.

PLEASE NOTE: Your final application should include submission of the following requirements:
(1) the on-line application,
(2) a copy of your Human Experimentation Committee project review and approval (if applicable), and
(3) a letter from your academic advisor/committee indicating that your research project has been reviewed and approved.

Requirements #2 and #3 can be scanned and sent through email to matthewm@olatheschools.org, inserted into the on-line application in word format, or sent in hard copy format to [redacted]

1. **Applicant(s)Name:** Joshua Anderson
2. **Position:** [redacted]
3. **School/Location:** [redacted]

   Other Location (please specify):
4. **Telephone:** [redacted]
5. **Email address:** jandersonon[redacted]
6. **Project Title:** The Second Digital Divide: The Effects of Ethnicity and Socioeconomic Status on Student Technology Access and Use Outside the
7. **The proposed research is for:** I am requesting permission to use archived data from the [redacted] "Student Technology Survey" administered by the building Technology Leadership Team in December of 2012. As the chair of the Tech Team, I already have the data I need, therefore, I am only asking for permission to use existing data.

   Other (please describe):
8. **Anticipated Dates:**

   Beginning Date: 2012/12/01 Ending Date: 2012/12/28 Date Final Report Available: 2014/04/15
9. **Participant Description:**

   Number of schools involved in the study: 1

   Number of teachers involved in the study: ~150

   Number of students involved in the study: 1604

10. Has the project been submitted to a Human Experimentation Committee?

- ○ No
- ◉ Yes

11. If no, please explain why your project has not been submitted to a committee on human experimentation.

The Baker University Institutional Review Board will approve the use of archived data owned by the [redacted] District Schools only after the [redacted] has authorized the use of the data.

12. Either paste a copy of the letter from the Human Experimentation Committee regarding your study (Word format) below, email a scanned copy to [redacted] or send a hard copy to [redacted] Resource Center.

Date:
School of education IRB PROTOCOL NUMBER _____
Graduate department (irb USE ONLY)

IRB Request
Proposal for Research
Submitted to the Baker University Institutional Review Board

I. Research Investigator(s) (Students must list faculty sponsor first)

Department(s) School of Education Graduate Department

Name Signature

1. Harold Frye _____, Major Advisor

2. Margaret Waterman Research Analyst

13. Brief review of the literature:

Computers have been in our nation's classrooms and homes for many decades, but their use, value, and definition has evolved over time. The evolution and distribution of technology has not always been consistent, fair, or equal (Bourgeois, 2007; Warschauer, 2003a, 2003b), and substantial gaps still impact large populations based on a variety of socioeconomic factors (Blanchard, Metcalf, Degney, Herrman, & Burns, 2008; Ritzhaupt, Feng, Dawson, & Barron, 2013). These gaps include access to high-speed Internet, engagement with online content, computer literacy skills, classroom instruction, and community demographics (Carvin, 2000). The purpose of this literature review is to examine the available research that defines and describes the size and scope of this "digital divide" for millions of children and their families.

One consistent drumbeat emanating from all of the available literature is that the digital divide cannot be measured by simple ratios of users to computers; it is a complex sociological phenomenon that impacts several different populations for many different reasons (Attewell & Battle, 1999; Hargittai, 2002; Natriello, 2001). Carvin (2000) defined the digital divide as "one of the most important civil rights issues facing our modern information economy" and deconstructs the divide into five distinct puzzle

14. Major research questions:

1. To what extent does socioeconomic status impact the likelihood that students report having Internet and ICT access outside the school day?
2. To what extent does ethnicity impact the likelihood that students report having Internet and ICT access outside the school day?
3. To what extent does socioeconomic status impact the likelihood that students report having their own mobile ICT device?
4. To what extent does ethnicity impact the likelihood that students report having their own mobile ICT device?

15. Methodology:

According to Roberts (2010) "this section includes an explanation of how you analyzed the data as well as your rationale for selecting a particular analysis method" (p. 158). The group statistics that were analyzed are included and the type and rationale for each statistical analysis is explained.
The raw data received from the district office excluded student names but included the following variables: grade level, gender, ethnicity, special education, migrant, 504 Plan, SES, ELL, and Title 1 designations. Only ethnicity and socioeconomic status were used to for statistical analysis since the unused variables were not identified in the literature as being significant factors in the first or second digital divides. After removing the incomplete responses from the raw data set received from the central office, the researcher identified 1,604 valid responses.
The data from four survey questions were used to conduct chi-square tests of independence to determine whether ethnicity and socioeconomic status increased the likelihood that students reported having access to ICT outside the school day. McDonald (2009) wrote that the chi-square test "may be used both as a test of goodness-of-fit (comparing frequencies of one nominal variable to theoretical expectations) and as a test of independence (comparing frequencies of one nominal variable for different values of a second nominal variable)" (p. 57). The four survey questions used for this study were:

16. Method Summary:

Chapter three described the methodology used to conduct this study. This study was a quantitative, causal-comparative study that used archived data from a student survey at one high school to determine the extent to which ethnicity and socioeconomic status influenced ICT access and usage. Chapter four provides the results of the statistical analysis to determine if there is a significant difference in the variables identified and the students' ICT access and usage.

17. Research Design/Data Analysis:

The research design section establishes the method of research used in the study and provides a rationale for the design selection and the variables identified (Roberts, 2010, p. 148). This study was conducted using archived data to perform quantitative analyses of student populations using several different variables. The archived data used for this study was collected from a cross-sectional survey administered to all students in attendance at the selected mid-western high school. Surveys are "a form of descriptive research that involves collecting information about research participants' beliefs, attitudes, interests, or behavior through questionnaires, interviews, or paper-and-pencil tests" (Gall, Gall, & Borg, 2005, p. 180). The causal-comparative method was used to compare student access to technology outside the school day based on ethnicity and socioeconomic status. The researcher selected ethnicity and socioeconomic status for further analysis based on the evidence in Chapter Two that these variables were among the most significant factors in understanding the digital divide.

18. Perceived Benefits of the Project:

According to Lunenburg and Irby (2008), the significance of the study is the argument that "the study makes a significant contribution to the field" (p. 117). The data collected and analyzed in this study contributes to the larger body of knowledge on student access and technology. Additionally, some researchers and educators may find value in the instrument used to measure student access and technology. This study also factors both desktop and mobile technology to account for the leapfrogging factor (Cascio, 2004; Fong, 2009; Napoli & Obar, 2013) that is not factored into most similar studies.

Appendix C: District Authorization to use Survey Data

Research Proposal "The Second Digital Divide: The Effects ... - Josh Anderson 3/2/14, 12:28 PM

Research Proposal "The Second Digital Divide: The Effects of Ethnicity and Status on Student Technology Access and Use Outside the School

[redacted] [redacted]

Thu 1/9/2014 11:43 AM

To: Josh Anderson [redacted]

Cc: [redacted]

Josh,

We are happy to approve your research proposal. When providing final results of your research proposal, you will need to refer to [redacted] as a district and a school in the Midwest. Please do not use the district name or school name no reference to [redacted] in your results. Please forward final results to our office for your file.

Thank You

[redacted]

Assessment Manager

[redacted]

[redacted]

Appendix D: Institutional Review Board (IRB) Application

SCHOOL OF EDUCATION
Baldwin City, Overland Park, Wichita, Topeka,
Kansas City and Lee's Summit

BAKER UNIVERSITY
Own Confidence

February 20, 2014

Dr. Thomas Peard, Chair
Institutional Review Board
Baker University

Dear Tom:

Attached please find the IRB for doctoral candidate Josh Anderson. In addition to his Proposal for Research is a [redacted] Research Application Request that has received district approval to conduct the study using data from [redacted] and the Student Technology Survey.

Sincerely,

Harold B. Frye, Ed.D., Chair
Graduate Department

UNDERGRADUATE CAMPUS | P.O. Box 65, Baldwin City, Kansas 66006
785.594.6451 | fax 785.594.2522 | www.bakerU.edu
GRADUATE CAMPUS | 8001 College Boulevard, Suite 100, Overland Park, Kansas 66210
913-491-4432 | fax 913-696-1997 | www.bakerU.edu

BAKER UNIVERSITY

SCHOOL OF EDUCATION
IRB PROTOCOL NUMBER _____
GRADUATE DEPARTMENT
(IRB USE ONLY)

IRB REQUEST
Proposal for Research
Submitted to the Baker University Institutional Review Board

I. Research Investigator(s) (Students must list faculty sponsor first)

Department(s) **School of Education Graduate Department**

	Name	Signature	
1.	Harold Frye	_____,	Major Advisor
2.	Margaret Waterman	_____,	Research Analyst
3.			University Committee Member
4.			External Committee Member

Principal Investigator: Joshua M. Anderson
Phone: XXX
Email: XXX
Mailing address: XXX

Faculty sponsor:
Phone:
Email:

Expected Category of Review: ___Exempt ___ Expedited _ __Full

II: Protocol: (Type the title of your study)

THE SECOND DIGITAL DIVIDE: THE EFFECTS OF ETHNICITY AND SOCIOECONOMIC STATUS ON STUDENT TECHNOLOGY ACCESS AND USE OUTSIDE THE SCHOOL DAY

Summary

In a sentence or two, please describe the background and purpose of the research.

The purpose of this study is to better understand the persistence of a second digital divide among high school students by analyzing archived data previously collected from students to determine the extent to which they have ICT access outside the school day and whether the access is divided between students based on ethnicity and family income.

Briefly describe each condition or manipulation to be included within the study.

This study is a quantitative, causal-comparative study that uses archived data from a student survey at one high school to determine the extent to which ethnicity and socioeconomic status influenced ICT access and usage.

Note that the remainder of the answers describe the previously administered survey. [see appended item] This information is provided to demonstrate that the survey itself was not administered under conditions that the IRB would find unethical or unreasonable.

What measures or observations will be taken in the study? If any questionnaire or other instruments are used, provide a brief description and attach a copy.
Will the subjects encounter the risk of psychological, social, physical or legal risk? If so, please describe the nature of the risk and any measures designed to mitigate that risk.

This study uses archived data previously gathered by a high school faculty technology leadership team. The district office conducted the survey and released the raw data to the researcher. The raw data received from the district office excludes student names and other personal information but includes the following variables: grade level, gender, ethnicity, special education, migrant, 504 Plan, SES, ELL, and Title 1 designations. Only ethnicity and socioeconomic status will be used to for statistical analysis since the unused variables are not identified in the literature as being significant factors in the first or second digital divides

Will any stress to subjects be involved? If so, please describe.

None. The survey was administered building-wide during a seminar period and took approximately 30 minutes to complete. The building principal led the administration of the surveys via building-wide intercom, and seminar teachers distributed, monitored, and collected the surveys.

Will the subjects be deceived or misled in any way? If so, include an outline or script of the debriefing.

No. The surveys asked 30 questions about the student's use of technology in and out of the classroom. Administration of the surveys was conducted under the auspices of the building principal, technology leadership team, and building faculty.

Will there be a request for information which subjects might consider to be personal or sensitive? If so, please include a description.

No. The district machine-coded each optical scan form to include name, grade level, gender, ethnicity, SPED, Migrant, 504 Plan, SES, ELL, and Title 1 designations. The students were unable to determine the nature or purpose of the coding on the optical scan form except for the student's name; however, the introductory narration on the survey instrument indicated that student responses would be analyzed by grade, gender, etc.

Will the subjects be presented with materials which might be considered to be offensive, threatening, or degrading? If so, please describe.

No. The survey titled "2012 [High School Name] Student Technology Survey" contained thirty questions, and each question had between two and five answer choices including: multiple choice, Likert-type scale, and yes/no answer choices (see Appendix A). Students were given a paper copy of the survey and a personalized optical scan form printed and coded by district staff on which students recorded their responses using a pencil.

Approximately how much time will be demanded of each subject?

The data were collected from all respondents within the same 30-minute timeframe during school hours on the same day.

Who will be the subjects in this study? How will they be solicited or contacted? Provide an outline or script of the information which will be provided to subjects prior to their volunteering to participate. Include a copy of any written solicitation as well as an outline of any oral solicitation.

The survey was completed by the entire population of the high school in attendance on the day the survey was administered. The narrative instructions on the survey included the following language:

"Your feedback on today's survey helps us make our use of technology at [School Name] even better. We are excited about your feedback! Your answer sheet contains your name and other information so that we can group responses by grade, gender, etc. **Please make sure that you answer each question as it applies to you.** Since everyone will take this survey, it is not necessary for your answer to reflect what you think is true for most people."

What steps will be taken to insure that each subject's participation is voluntary? What if any inducements will be offered to the subjects for their participation?

Except for a building-wide intercom announcement made by the principal encouraging each student to do his or her best, no additional inducement was provided to students. Students were not told that they were required to participate, and many surveys were returned blank with no consequence or follow-up to the student.

How will you insure that the subjects give their consent prior to participating? Will a written consent form be used? If so, include the form. If not, explain why not.

All student participation was voluntary. Completion of the survey was considered consent, and the district was operating within its authority to periodically survey students on academic matters.

Will any aspect of the data be made a part of any permanent record that can be identified with the subject? If so, please explain the necessity.

None. The names and other identifying information were excluded from the raw data set provided by the district office. The district reserves the right to retain the data set with student names, but such information has not and will not be released to the researcher or the university.

Will the fact that a subject did or did not participate in a specific experiment or study be made part of any permanent record available to a supervisor, teacher or employer? If so, explain.

None. See above.

What steps will be taken to insure the confidentiality of the data? Where will it be stored? How long will it be stored? What will be done with it after the study is completed?

No data released by the district to the researcher or university contains names or other identifying information. The raw data will not be published or released by the researcher or the university, only the summarized and statistically analyzed data will be released.

If there are any risks involved in the study, are there any offsetting benefits that might accrue to either the subjects or society?

None. It is not possible to triangulate or compare student names to student responses. No students were exposed to dangerous or unethical situations before, during, or after the survey.

Will any data from files or archival data be used? If so, please describe.
Yes. The district authorized the survey and released the data to this researcher.

Appendix E: Institutional Review Board (IRB) Approval

Feb, 28, 2014

Dear Mr. Anderson,

The Baker University IRB has reviewed your research project application and approved this project under Expedited Review. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

The Baker University IRB requires that your consent form must include the date of approval and expiration date (one year from today). Please be aware of the following:

1. At designated intervals (usually annually) until the project is completed, a Project Status Report must be returned to the IRB.
2. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
3. Notify the OIR about any new investigators not named in original application.
4. Any injury to a subject because of the research procedure must be reported to the IRB Chair or representative immediately.
5. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity. If you use a signed consent form, provide a copy of the consent form to subjects at the time of consent.
6. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.

Please inform Office of Institutional Research (OIR) or myself when this project is terminated. As noted above, you must also provide OIR with an annual status report and receive approval for maintaining your status. If your project receives funding which requests an annual update approval, you must request this from the IRB one month prior to the annual update. Thanks for your cooperation. If you have any questions, please contact me.

Sincerely,

Thomas Peard
Chair, Baker University IRB

CC: Harold Frye