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Residential Broadband Access for Students at Walters State Community College.

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ABSTRACT

Residential Broadband Access for Students at Walters State Community College

by

Mark A. Hurst

The purpose of this study was to determine the availability of internet access for students attending Walters State Community College during the spring semester 2010. In particular, it is unknown to what degree broadband internet access is available in the counties that Walters State considers the service area of the college.

The research was conducted during the spring semester 2010 including the months February, March, and April of 2010. Data were gathered by surveying currently enrolled students of the college. Twelve percent of the population responded to the study. The survey instrument covered the areas of demographics, Internet connection type from home, and usage of that Internet service for coursework.

The results of the data analysis gave insight into what degree students of WSCC had access to high-speed Internet from their homes. For example, over 20% of the respondents did not have an internet connection at all or only dial-up available at their home. Thirty percent were dissatisfied with their current high-speed Internet service. Approximately 64% thought high-speed Internet was very important in completing coursework. The study provided an increase in the body of knowledge on Internet access for Walters State students and increased the body of knowledge for Internet availability in the surrounding counties of Walters State.

DEDICATION

This study is dedicated to my wife Cindy and two children, Ian and Alyssa, who have been so supportive throughout the process.

ACKNOWLEDGMENTS

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CHAPTER 1

INTRODUCTION

A community college has to be at the forefront of technology in order to achieve its

mission of educating the people in the service area. In order for a college to function efficiently

this pioneering mentality must also apply in the classroom as well as to the various operating

systems used by the college. Those operating systems include web-based technology that allows

students to register, pay fees, review the college catalog, order books, and view grades. In the

classroom web-based systems allow students to submit assignments, chat with other students,

view grades for assignments, and discuss topics presented by the instructor. These technologies,

called D2L and Banner Self-Service, are readily available on the Walters State Community

College campus and are considered conveniences for our student population. These systems,

which are open nearly 24 hours a day, allow students to access important information without

having to waste time standing in long lines. The D2L and Banner Self-Service systems are

accessible from any campus location, from the convenience of a student's home, or any location

that provides an Internet connection. Some might contend that anyone who has a phone line has

access to the Internet and that assertion is true for dial-up connections. However, the

complexities of today's learning environment require a constant Internet connection with the

capacity to accommodate faster download speeds, and those two necessities are found only

through the technology of a broadband Internet connection.

Considering the creation of self-service applications for the Internet, programs are more

complex and require greater speed to download. At the time of the proposed study to assume

that a dial-up connection constitutes access to the Internet is as absurd as suggesting that one 12

volt circuit is enough to provide electricity for an entire household. For universities, which are

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generally located in relatively populous areas and offer on-campus housing, broadband or high-speed Internet is normally furnished. However, for a community college with a service area including several rural or remote counties access to broadband or high-speed Internet is of concern. Additionally, community colleges in the state of Tennessee that receive state appropriations are not permitted to offer on-campus housing for students; therefore, it is crucial for community college students to have access to broadband at home or they will be forced to rely heavily on computer labs on campus.

Background of the Problem

The Government Accountability Office stated, "There's not only a lack of broadband access in rural areas of the U.S., there's a lack of information about broadband access in rural areas" (as cited in Bosworth, 2006, para. 1). At the end of 2008 bills were introduced in both houses of Congress to address the problem of lack of broadband access. Each bill, including the U.S. House of Representatives (*H.R. 3919 The Broadband Census of America Act*) and the U.S. Senate (*S. 1492 The Broadband Data Improvement Act*), was intended to enable the Federal Communications Commission to provide better broadband service areas and to improve broadband access in rural areas. After President Barack Obama took office in January 2009, the American Recovery and Reinvestment Act, passed on February 13, 2009, allocated 7.4 billion dollars to expand broadband services (U.S. Congress, 2009). Before the money was allocated FCC acting- Chair Copps (2009) admitted in his report *Bringing Broadband to Rural America* that the federal government did not know how much of America was even hardwired for broadband. The report gave the current status of broadband in America and identified several critical areas of need. However, the FCC had no information concerning where broadband was

available, where there was a demand for broadband, what transfer speeds were available, or what monthly price was asked by providers (Copps, 2009).

At the time of the study the website www.connectedtn.org offered the most thorough information available related to broadband access availability; however, the information presented was by zip codes rather than specific addresses. Consequently, the entire zip code was reported as having broadband coverage, which could be misleading. By reporting zip codes only the website could refer to one customer or one thousand customers as having broadband coverage; therefore, an accurate count of people having broadband access could not be obtained.

The study is particular to Walters State Community College (WSCC). Walters State Community College is located in East Tennessee and serves approximately 6,200 students. WSCC serves 10 counties with a total approximate population of 433,000 (U.S. Census Bureau, 2008). Currently for the 10 counties it is not known whether Walters State students have complete access to broadband services and choose not to subscribe or whether there is a lack of availability for the service despite a demand. The adoption of broadband at one's home could be attributed to annual family income. "Overall, fewer than 35% of households earning a family income of less than $50,000 subscribe to broadband services, compared to 76% of households earning a family income of more than $50,000" (Copps, 2009, p. 13). In 2007 no county within the 10 county service area of Walters State had a median income at or above $50,000 according to a census table for Small Area Income and Poverty Estimates. The range for median incomes within the service area for Walters State was high at $40,312 in Sevier County with a low of $24,375 in Hancock County (U.S. Census Bureau, 2007). If specific data were available on the exact number of people in the WSCC service area who had broadband service in their homes, WSCC administrators could determine the need for expansion of online services.

This study was not designed in a way to educate respondents about the benefits of broadband Internet services prior to completion of the survey. However, armed with information from these specifics, Walters State administrators, for example, could provide their students with additional information about the benefits of broadband. The student satisfaction at Walters State from the expansion of online courses, library services, and other web-based student services may be dependent on the speed of the students' Internet connection from their homes, thus reinforcing the importance of widespread broadband availability.

Research Problem

The problem this study addressed was to determine the availability of broadband access for students attending during spring semester 2010 at Walters State Community College. The findings from this research determined the percentage of the student body with high-speed access that can take full advantage of the online services offered and determine what areas are lacking in broadband service.

Research Questions

The following questions related to residential broadband access for Walters State students for the spring semester 2010 controlled the direction of the study.

1) Are there relationships between the type of Internet service students have at home and (a) whether students use Walters State computer labs due to faster connection speeds; (b) whether they have taken a web-based course; (c) how often students use or plan to use Walters State's computer labs; and (d) how often students use the Internet for coursework at home.

Ho1_1: There is no relationship between the types of Internet access students have at home and whether they have used Walters State computer labs because Internet access is faster on campus.

Ho1_2: There is no relationship between the type of Internet access students have at home and whether they have taken a web-based course.

Ho1_3: There is no relationship between the type of Internet access students have at home and how often students use or plan to use Walters State computer labs for coursework.

Ho1_4: There is no relationship between the type of Internet access students have at home and how often students use the Internet at home for coursework.

2) Are there relationships between age and how students connect to the Internet from home; between age and the reasons students do not have Internet access at home; and between age and student perceptions of the importance of high-speed Internet access as it relates to their coursework?

Ho2_1: There is no relationship between age and how students connect to the Internet from home.

Ho2_2: There is no relationship between age and students not having a computer at home as a reason not to connect to the Internet from home.

Ho2_3: There is no relationship between age and students not needing Internet access at home as a reason not to connect to the Internet from home.

Ho2_4: There is no relationship between age and Internet service expense as a reason not to connect to the Internet from home.

Ho2$_5$: There is no relationship between age and Internet speed as a reason not to connect to the Internet from home.

Ho2$_6$: There is no relationship between age and poor Internet service as a reason not to connect to the Internet from home.

Ho2$_7$: There is no relationship between age and any other response as a reason not to connect to the Internet from home.

Ho2$_8$: There is no relationship between age and student perceptions of the importance of high-speed Internet access as it relates to their coursework.

3) Is there a relationship between student financial need (regarding Pell grant funding) and the type of Internet access at home?

Ho3$_1$: There is no relationship between financial need and how students connect to the Internet from home.

Significance of the Study

Those who work in public education can attest that budgets and resources are constantly strained. As a result administrators implement only changes that can be supported by data driven, evidence-based programs (McMillan & Schumacher, 2006). No studies exist particular to Walters State with quantitative research addressing broadband availability for currently enrolled students. Moreover, there are no completed studies on broadband access by address for the entire 10 county service area, and there are limited resources to identify access for the service area.

Connected Tennessee provides a broadband availability map; however, the map identifies access only by zip code, which is not detailed enough for administrators to make decisions

related to Internet access. The data that will be provided from the survey instrument administered to Walters State students attending spring semester 2010 will greatly enhance the detail available for broadband access.

The American Recovery and Reinvestment Act (ARRA) will offer grants to expand broadband accessibility in Walters State's 10 counties of responsibility. Taylor (2009) of Ed Market Lookout, asserts that "estimates put the number of Broadband Technologies Opportunity Program (BTOP) applications over 100,000 with an estimated 10,000 grants being awarded" (para. 2). Based on the data collected and analyzed through this research, Walters State leadership can work with local leaders to address shortages of broadband access in parts of the Walters State service area. Furthermore, Walters State can partner with local governments and submit grants to address the lack of broadband access where current students reside. Also, the findings of this study can greatly assist WSCC administrators in planning future expansion of classrooms in counties with current campuses or possibly looking at expansion into counties without a current physical presence.

Furthermore, data-driven research will offer Walters State leaders the opportunity to analyze on-campus computer lab usage by WSCC students. The study can alert administrators to areas where computer labs are most needed because of limited access to broadband. In those areas with limited broadband access, additional laptop computers could be made available for checkout depending on the number of participants in the survey that indicate they do not have a computer at home. It is often assumed that residential broadband access in the 10 counties is readily available to Walters State students. This research may prove this assumption to be true or show the Walters State campuses and the 10 county service areas are at opposite ends of the technology spectrum.

Finally, specific data on broadband availability can help the WSCC leaders determine what areas need alternative plans related to academic continuity emergency plans. Currently, these emergency plans rely heavily on the use of the Internet and D2L course offerings.

Definitions of Terms

The following terms are defined for the purposes of this study:

Academic Continuity Plan: Walters State Community College formed a committee to address the ways in which the college would respond to a crisis, such as an outbreak of flu, and to determine the continuation of operations (Walters State Community College, 2007).

Bandwidth: The capacity for data transfer of an electronic communication system (Bandwidth, n.d.). Download a file with dial-up in over 2 minutes or under 4 seconds with a cable connection. Use the analogy of filling up your car with gas where the hose is bandwidth. Dial-up would be like filling up your car using a straw and broadband would be like using a fire hose.

Bit: "the smallest part of a digital signal, typically called a data bit" (Louis, 2001, p. 267).

Blended Learning: "[A] pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment" (Dziuban, Hartman, & Moskal, 2004). Blended Learning uses instruction types including web-enhanced and hybrid instruction. Any instruction that includes web-based and classroom instruction includes a blended learning approach.

Broadband: Advanced communications systems capable of providing high-speed transmission of services such as data, voice, and video over the Internet and other networks (Federal Communications Commission, 2008b).

Desire2Learn (D2L): A web-based suite of easy-to-use teaching and learning tools for course development, delivery, and management used by all the Tennessee Board of Regents colleges and universities (Desire2Learn, 2009).

Digital Divide: The "perceived gap between those who have access to the latest information technologies and those who do not" (Compaine, 2001, p. ix). Generally, the digital divide exists between people living in cities and people living in rural areas and those whom are educated and those whom are uneducated.

Downstream: Data transfer from the Internet to the computer (FCC, 2008a).

Federal Communications Commission (FCC): The FCC is an independent United States government agency. The FCC was established by the Communications Act of 1934 and charged with regulating interstate and international communications by radio, television, wire, satellite and cable. The FCC's jurisdiction covers the 50 states, the District of Columbia, and United States possessions (Federal Communications Commission, 2009).

Internet: A computer network providing electronic information and communication transferred among users (Malhan & Rao, 2006).

Internet Service Provider (ISP): "An ISP is a vendor that provides access to the Internet and the World Wide Web" (Louis, 2001, p. 287).

Kbps: Refers to kilobits per second. A kilobit is 1,000 bits per second (Philip, 2010).

Mbps: Refers to megabits per second. A megabit is 1,000,000 bits per second (Philip, 2010).

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MB: Refers to megabytes per second. A megabyte is 8,000,000 bits per second (Philip, 2010)

Organization for Economic Cooperation and Development (OECD): OECD incorporates the governments of countries committed to democracy and the market economy from around the world (OECD, 2009).

Ten county service area: Walters State Community College serves a primary 10 county service area, consisting of Claiborne, Cocke, Grainger, Greene, Hamblen, Hancock, Hawkins, Jefferson, Sevier and Union, where the college can actively recruit students (Tennessee Board of Regents, 2009)

Upstream: Data transfer from the computer to the Internet (FCC, 2008a).

Wi-Fi: "[A] certification mark developed by the Wi-Fi Alliance to indicate that wireless local area network (WLAN) products are based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards" (WiFi Alliance, 2009).

Delimitations and Limitations

The following limitations and delimitations existed for this study:

1. Participants represented various levels of computer literacy.

2. Because the survey was administrated through D2L, students not enrolled in an online course or who were enrolled in an on-campus course for spring semester 2010 not using D2L were excluded.

3. Participants were at various levels of understanding about Internet connections.

4. Participants were at various levels of understanding about broadband Internet services providers.

Assumptions

1. Participants were knowledgeable about the Internet.

2. Participants were knowledgeable about the Pell grant award.

3. Participants were knowledgeable about various degrees of Internet speed.

4. Participants were aware of the Internet service provider for their residence.

Overview of the Study

This study is organized into five chapters. Chapter 1 includes a brief introduction, statement of the problem, research questions, definitions of terms, delimitations and limitations, and an overview. Chapter 2 presents a review of the literature from 1999 to 2009 related to residential broadband access and the challenges faced with expansion of high-speed Internet. Chapter 2 includes sections related to the speed of broadband, importance of broadband access, broadband technology for education, barriers to residential broadband access, demographics of broadband users, broadband monthly pricing, technology adoption model, and a summary. Chapter 3 clarifies the research methods of the study including the population, design, data collection, methodology, and data analysis. Chapter 4 presents the findings of the study, and Chapter 5 consists of the conclusions and recommendations for future research and practice.

CHAPTER 2

REVIEW OF THE LITERATURE

Advanced telecommunications systems capable of providing high-speed transmission of services such as data, voice, and video over the Internet and other networks are considered broadband (Federal Communications Commission, 2008b). Technologies used for such transmission include digital subscriber lines and fiber optic cables, coaxial cables, wireless technology, and satellite. Due to the speed of broadband, convergence of voice, video, and data services onto a single network becomes possible. The FCC (2008c) stated that 99% of the United States had at least one available service provider. However, a key criticism of the FCC's broadband reports was its reliance on zip codes to determine access and the prices related to broadband services provided (Bosworth, 2008). By 2009 the FCC noted the need for better data. The Future of Music Coalition Blog (2009) remarked that many public interest groups had offered that information to the FCC for years. The FCC presented a National Broadband Plan to Congress on February 17, 2010, (Wigfield, 2009) that addressed concerns such as speed, pricing, access, and an availability map based on data more specific than zip codes.

Broadband Speed Defined

Broadband refers to the amount of capacity or *bandwidth*, also called speed transfer or data transfer, provided on a telecommunications network (Xavier, 2003). Dial-up service provided by an Internet Service Provider (ISP) offers limited speed at which data could be transferred; therefore, it is referred to as *narrowband*. Broadband, on the other hand, offers

greater bandwidth and provides a continuous connection, allowing the user easier access to online information without having to redial for service.

Speed was used as a basis for defining broadband, yet there was no consensus on what should be the ideal speed for a connection to be considered broadband. The Organization for Economic Cooperation and Development (OECD) defines broadband as providing downstream access of 256kbps and upstream access of 126kbps because these were the most common speeds offered by the Digital Subscriber Line (DSL) in advanced countries. According to the International Telecommunications Union (ITU), services could be defined as broadband if they offered speeds of over 256Kbps in at least one direction (Biggs & Kelly, 2006). However, the International Telecommunication Union (2009) did not refer to a certain speed or service when defining broadband but did suggest the transmission capacity be 2.0 megabits per second. Simply put, broadband was a generic term for an Internet connection faster than 256Kbps. Kbps referred to kilobits per second and one kbps equaled 1,000 bits per second. Mbps referred to megabits per second, one mbps equaled 1,000,000 bits per second and a "gigabit is 1000 times faster than a megabit" (Kaplan, 2007, p. 82). Various other opinions and definitions of broadband have been suggested. For example AT&T opted for the definition given by the FCC: 768 kilobits per second or faster downstream and 200 kb/s or faster upstream (Gubbins, 2009). The FCC also used the term *advanced telecommunications capability* when referring to high-speed or switched broadband telecommunications capability. Advanced telecommunications capability enabled the user to originate and receive high quality voice, data, graphics and video telecommunications using this technology (Xavier, 2003). However, the Communication Workers of America, along with the California Public Utilities Commission, suggested a definition of broadband that would be even faster: three Mb/s (megabytes per second)

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downstream and one Mb/s upstream. They considered areas with fewer than three Mb/s downstream and 768 kb/s upstream as underserved areas, while the Rural Independent Competitive Alliance contended that broadband should mean Internet access at a consistent speed no less than that available through DSL technology. HierComm Wireless, an upstart fixed wireless Internet service provider in rural Wisconsin, suggested that the appropriate definition of broadband should be one with a minimum average speed increase every few years (though always symmetrically): from 3Mb/s symmetrical in 2009 to 15 Mb/s in 2010 and reaching 100 Mb/s by 2019 (Gubbins, 2009). The Office of Telecommunications for the United Kingdom defined broadband as higher speed access to the Internet that enabled advanced services, ranging from enhanced web browsing to true broadband services, such as the ability to watch and interact with video over the Internet (Xavier, 2003). The operators in the United States had differing opinions as well. For instance Verizon Communications proposed the following definition of broadband: a broadband service used packet-switched or successor technology and included the capability of transmitting information, generally not less than 384 kbps in at least one direction or 56 kbps in both directions (Glover, Evans, Shakin, & Leo, 2001). The U.S. Telecommunications Industry (TIA) asserted that providers without the minimum speed required to be deemed broadband should call their service high-speed Internet.

Obviously, the definition of broadband continued to evolve as speed increased. Broadband was frequently used as a marketing tool with various connotations such as *current generation broadband* or *next generation broadband*. In fact the modern version of broadband would most likely become narrowband because broadband capability could be provided by different electronic platforms and tailored to suit individual patterns and interests (Xavier, 2003).

Overall, broadband incorporated a wide set of technologies that generated some minimum level of high-speed Internet connection (Xavier, 2003).

Some were opposed to defining broadband in connection with speed alone because latency and other characteristics were considered to be of equal importance (Gubbins, 2009). Although speed might increase, the substantial expense of deployment could slow broadband expansion in the future. Many authorities suggested that because broadband was an evolving service standard, it should be defined at a reasonable and realistic level. According to Bråten, Tardy, Nordbotten, Zsombor, and Morozova (n.d.) broadband was more than just high-speed networking; it was a technology that provided growth opportunities for the economy, opened new avenues, and created productivity.

In general broadband referred to telecommunication in which a wide band of frequencies transmitted information (Broadband Technology, n.d.). Because of the availability of such a wide band of frequencies, the information could be multiplexed and sent on many different frequencies or channels simultaneously. This allowed more information to be transmitted in a given amount of time. In addition Biggs and Kelly (2006) described certain characteristics of broadband that differentiated the method from other technologies:

- Broadband connections suggested that an individual was always online; he or she did not have to dial-up to an Internet service provider;

- Costs were affordable to the consumers;

- Pricing was on a flat-rate basis;

- At times charges were based on the volume of data downloaded rather than time used but, by and large, broadband was free of restrictions on the number of downloads permissible within a month.

- Broadband usage was independent of distance pricing. Price was constant within the country irrespective of the locations or with whom the subscriber interacted, nationally or internationally.

The perception of broadband has changed as higher transfer rates have become feasible. Because broadband had a higher capacity for information transmission, it provides a possible substitute for a large number of existing services – messaging, file transfer, entertainment, and information retrieval. Nationally the growth of broadband market has been driven by growing consumer demand for multimedia services, competitive pricing strategies, and the higher speeds possible through the development of infrastructure. The growth of broadband worldwide was demonstrated in a survey completed by The Pew Internet & American Life Project in April 2009, which stated that "63% of adult Americans now have broadband Internet connections at home", which represents a "15% increase" (Horrigan, 2009, p. 9) from a year earlier. The report by the Pew Internet and American Life Project indicated the increase of broadband connections by adults was despite the fact that consumers were paying more for broadband connections than in the previous year (Horrigan, 2009).

Broadband speed depended on the area of service because there were many rural areas where terrestrial services were not an option and where satellite service might be the only feasible choice of service (Gubbins, 2009). Consumers familiar with Internet service were very aware of the speed at their address. Providers were also aware that increased speed could influence consumers selecting providers in areas where there were multiple options. Speed was an essential factor not merely in receiving data more quickly but in how the access was used. In fact the State Educational Technology Directors Association (SETDA) designed a two-stage growth goal for schools related to Internet speed. SETDA recommended "10 mbps per 1,000

students for an external Internet connection and 100 Mbps per 1,000 students for district WAN bandwidth" (Jones R., 2008, p. 4.). Speed could provide an opportunity to create new, strictly web-based applications. There was certainly a need for increased Internet speed throughout the United States but the questions remained of which areas and how much more speed. "At a time when our country is developing a National Broadband Plan, it absolutely makes sense to have a single definition of the term broadband for regulatory and policy purposes" (Rodriguez, 2009, para. 1).

<center>Importance of Broadband Technology for Education</center>

Despite the economic recession, the higher costs of healthcare and higher education, and the global climate change threatening the world, broadband continued to hold importance. Broadband was a means to spur economic growth, boost the competitiveness of the United States in the global economy, and enable the citizens to reach for the American Dream in the Digital Age (Benton, 2008). A report entitled *Using Technology and Innovation to Address our Nation's Critical Challenges* provided persuasive evidence suggesting that broadband was a catalyst for innovation, economic growth, job creation, educational opportunity, and global competitiveness (Benton). This report was done prior to the full extent of our current recession was known; however, it is evident that broadband is important to economic growth, but it, nor any technology, can prevent economic downturns. Broadband enhanced public safety, homeland security, health care, energy efficiency, environmental sustainability, and the worldwide distribution of millions of products, processes, and services. A report prepared for the U.S. Department of Commerce in 2006 indicated, "the positive direction of broadband's impact was found to be robust across the different models tested at the zip code level, including models of

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economically distressed areas such as the Appalachian region" (Gillett, Lehr, Osorio, & Sirbu, 2001, p. 3).

Internet access was more than downloading a movie for entertainment or connecting on a social website. It was a repository of information with a shared public space like a park to which everyone had access. In addition, broadband helped bridge the technical divide and improve digital literacy. High-speed access and, particularly wireless access, helped parents, teachers, students, and others who valued enhanced portability, flexibility, and speed that came without having to bother with a modem (Leibowitz, 2005).

Furthermore, broadband has become a vital tool for finding information (Whitney, 2009). Even when economic times are difficult, broadband has become a necessity for most users. In fact, results from a survey in the report *Home Broadband Adoption 2009* showed "a 15% increase in adult Americans having broadband Internet at home from April 2008 to April 2009" (Horrigan, 2009, p. 9). Before taking office then-President-elect Barack Obama announced his administration's commitment to making broadband a high priority in his impending economic stimulus package (Benton, 2008).

Broadband has changed the way in which people communicate with each other as well as how they work and exchange information (Federal Communication Commission, 2009). In addition it changed the means through which children were educated and ways in which people could be entertained. Broadband technology enabled users to originate and receive data, graphics, voice, video, and, in the future, integrated voice services. Without doubt, broadband has been particularly critical in rural areas where advanced communications could shrink their isolation from other communities. Because many cities and counties have realized the importance of broadband access in assisting education, broadband expansion, funded by

municipalities, was suggested to aid students in rural communities. Often, rural consumers could not afford the high cost of broadband usage, thus service providers did not see any economic reason to offer service is such areas (Leibowitz, 2005). Phone and cable companies normally stay away from rural communities in order to assure less resistance toward expansion from national broadband providers for cities and counties offering broadband services.

In Philadelphia citywide Wi-Fi Internet access was introduced in 2007 because city administrators realized the importance of providing broadband for education. City officials noted that while their schools had invested heavily in their computer systems only 58% of the students had Internet access at home (Leibowitz, 2005). Thus, an effort to provide computer systems in school was useless if students were not able to access the Internet and a similar computer system at home. Other school systems much smaller than Philadelphia discovered the benefits of introducing broadband to provide unique instructional opportunities. With the introduction of broadband in Scottsburg, Indiana, students gained the same educational opportunities as their peers in bigger cities (Leibowitz, 2005). Those educational opportunities included instructional audio clips and video clips to appeal to various types of learners in the classroom. Whether through a private company, a government initiative, or a public-private partnership, the importance of Internet access for students should not be ignored when educational opportunities depend on an available and affordable network.

"While the national statistics boast an average of 98% connectivity through broadband in schools, the connection is problematic and insufficient" (Wolf, 2008, para. 1). Additionally, "even in schools that are sufficiently connected with broadband, bandwidth demand is quickly exceeding capacity" (Jones R., 2008, p. 6). The federal government considered high-speed broadband access for all students a critical national issue based on the necessity of technology

for assessment, accountability, engagement, and preparing students for work and life in this century. Without question, technology significantly affected student achievement in all subject areas and grades. In addition, it provided teachers with the opportunity for sustainable professional development to improve their classroom performance.

The State Educational Technology Directors Association (SETDA) served as the principal association for state directors of technology and their staff members. SETDA provided professional development and leadership in the use of technology in education to enhance competition in the global workforce (SETDA, 2008). SETDA (2008) strongly recommended that the United States education system increase high-speed broadband access to maximize the potential of technology for student achievement. Many rural schools were in danger of missing data and instructional opportunities due to lack of broadband access. Obviously, having high speed both in school and residences would help close the digital divide for rural and low socioeconomic areas.

The cost of broadband included the cost of the equipment, the cost of getting the technology to work properly, and the cost of access. Youtie, Shapira, and Laudeman (2001) found that students who did not have access to Internet claimed they did not need it, but those who did have access found it supported their academic work and improved their professional opportunities. Students with more financial resources had higher rates of technology adoption than did those with fewer resources. Technological resources for students improved at their respective institutions; however, there remained a need to provide technological learning tools in the home to increase the students' comfort level with using the computer and to aid in retention of information.

The technique of blended learning supported the traditional mode of imparting education by incorporating technology. E-learning, according to Sun Microsystems, typically involved the use of more than one learning medium – a combination of instructor-led learning combined with Internet components specific to each class, called blended learning (Bauer, Gai, Kim, Muth, & Wildman, 2002). Because printing costs were often a focus for institutions seeking to trim their budget during times of reduced appropriations, blended learning became a great solution as it allowed more class materials to be posted online instead of printing many paper copies for student access.

Potentially blended learning could improve the efficiency of teaching and learning. Blended learning helped educate students from a distance through email, learning management systems, and video. The students benefited from blended learning because it combined educational materials and innovative technologies to provide maximum support for their learning styles (Heilesen & Nielsen, n.d.). Teachers could combine technology, materials, and teaching methods to present to help students achieve a learning goal in a beneficial and effective way. Blended learning combined the mixed modes of web-based technology (like virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to accomplish an educational goal (Driscoll, n.d.). The techniques of blended learning mixed various event-based activities: self-paced learning, live e-learning, and face-to-face classrooms (Alonso, Lopez, Manrique, & Viñes, 2005). Self-paced learning provided the learners with the right skills at the most appropriate time; whereas, live e-learning took place at a scheduled time wherein the students had the opportunity to collaborate and exchange ideas.

According to Australian teachers interviewed for a study done in 2002, blended learning encouraged students to use the Internet for research, to retrieve resources from a CD, or to

reference online materials (Field, 2003). Unfortunately, most e-learning programs were ineffective due to low-bandwidth connections such as dial-ups. E-learning services could be delivered over a wide geographical area; however, all participants needed to be connected to network systems for synchronous services (Bauer et al., 2002). However, standard service or even simple Integrated Services Digital Network (ISDN) could not support multipoint connections.

The reported benefits of broadband in the classroom were limitless. With the help of broadband instructors could tap students' current context for exploring the world. The Web could provide flexible learning for students to explore at their convenience (Field, 2003). Web learning could lead to the development of skills like critical thinking, problem solving, writing, and working collaboratively.

Other benefits of having broadband access included reduced costs because time and distance barriers to learning were greatly diminished. Without broadband the sound and video quality of web-based communications might be below standard and not serve the intended purpose of providing clear and concise information. With broadband learning materials could be distributed to multiple locations easily and conveniently for students to access at their convenience. This self-paced, personalized learning resulted in improved collaboration, uniformity, and customizable content and was less intimidating than an instructor-led course (Bauer et al., 2002).

Distance learning has become essential for remote and rural areas like portions of Tennessee because it has provided the flexibility to meet specific needs, low-cost alternatives, new learning experiences, and equal learning opportunities for all students from different localities (Cavanaugh, 2001). "Rural regions are particularly affected by the scarcity of math

and science teachers" (Holt & Galligan, 2008). A shortage of teachers in rural areas put those students at a disadvantage when they continued their education in college or a technical school. Broadband would enable rural schools to deliver advanced math and science courses to students and instructional materials to teachers. It was one way of linking educational content to individuals who might not otherwise receive it (Holt & Galligan, 2008). Distance teaching supported student motivation and promoted learning pleasure and effectiveness (Holt & Galligan, 2008). However, interactive sessions were possible only through broadband and not through dial-up because these sessions required using the video-conferencing technology that demanded a higher bandwidth, thus, rural students were limited from using this distance teaching type of learning opportunity.

As part of a blended learning approach class lecture slides and lecture notes, which all required high bandwidth, are available to students for download via the Internet. Some lectures can be web cast *live*, which eliminates the use of paper-based learning materials and reduces the overall cost of distribution. Through the use of broadband satellite links two physical classrooms can be connected via audio and video and can share a common teacher. This, in turn, promotes and encourages interaction between the students and teachers as well as among the students. However, no matter how widely available these services and benefits are, broadband technology must be understood by the students, otherwise the intended purpose remains unfulfilled.

Moreover, broadband provided value-added functions such as distance learning, remote medical care, utility computing, and video streaming, which placed those without broadband access at a serious disadvantage. According to research by the Pew Internet and American Life project many teachers did not assign homework requiring the Internet simply because not all students had access to broadband at home. However, if the schools could provide their

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communities with low-cost universal broadband service, schools would be able to reduce this barrier and make the Internet a much more powerful resource for education. Educational institutions where blended learning took place and technology was applied reported greater teacher-student interaction, increased learner efficiency, improved instructional techniques, better student feedback, and higher grades (Snyder & Edwards, 2003).

In 2007 The University of Central Florida undertook an online learning initiatives survey to increase student engagement and learning outcomes. This was an institution-wide initiative that focused on technology-enhanced teaching and learning supported with faculty development and assessment (Hartman, Dziuban, & Moskal, 2007). These efforts were considered an efficient solution to the university's scarce classroom resources. Similar changes can be found in many educational institutions. By fall 2005 nearly 90% of all institutions in the United States offered courses online. Such changes in online course offerings created a shift from a teaching-centered to a learning-centered approach and a positive attitude towards technology adoption. Alongside this shift in approach was also a shift in place and time from synchronous classroom experiences to asynchronous online experiences; yet, efficient uses of technology could become a reality only if efforts were supported by high-speed bandwidth in rural areas. Therefore, colleges must consider technology and infrastructure issues in advance before implementing a blended learning approach.

Earlier educational technology was used more because of the fascination with technology rather than as a means for imparting knowledge to students. Some researchers were apprehensive about the outcome of online education or tutoring because online education could lead to unplanned or nonbeneficial consequences such as potential problems of judgment, psychological distance, and ethics or moral distance (Sharma & Maleyeff, 2003). However,

blended learning could reduce this shortcoming and effectively apply technology to the delivery of education.

Walters State Community College students would benefit in various ways if residential broadband access were provided for them. For example, broadband access would ensure timely and proper distribution of assignments in addition to allowing access to class lecture notes and presentations. Also, collaboration among students, between students and teachers, between two different physical classes, self-testing, access to administrative information relating to courses, and discussion in an interactive tutorial mode would be possible with broadband (Peacock & Middleton, 1999). Fletcher (2009), Editorial Director of Technology Horizons in Education, declared that "with the growth of technology use in education, and the increasing demand for digital content in general and bandwidth-eating applications like movie clips and other rich media, schools will need even more bandwidth and they need it now" (para. 5).

Barriers to Rural Broadband Access

"We have two fundamental problems in our broadband market – availability and competition" (Turner, 2007, p.1). Only a relatively small group of residential consumers had broadband access often because American consumers struggle to find broadband in their area at an affordable price. Moreover, many broadband customers are not aware of all the uses of broadband. In fact the Internet connectivity for most customers is used mainly for messaging, emailing, and keeping in touch with peers and friends. In previous studies non-Internet users gave various reasons not to connect to the Internet. Twenty-two percent were not interested in getting online; 16% said they could not get access where they lived; and 5% said they did not have a home computer (Horrigan, 2009).

Interestingly, broadband penetration in Tennessee homes is only 54% although 77% of the residents have a computer at home. Tennessee consumers tended to use the Internet to send emails, to search for information, and to buy products online. The Internet was hardly used for the purpose of education or schoolwork. Consumers claimed that they did not access the Internet because broadband was not available and that they did not want dial-up service. Some confessed that they did not know what they would use the broadband access for if it were available in their area. Basically, many Tennessee consumers did not use broadband because they were not aware of the potential and the opportunities it provided (*Tennessee Technology Trends 2009*, 2009).

Overall, in the United States broadband penetration was very poor because only 63% of American households had high-speed Internet connections (Horrigan, 2009). Additionally, the country ranked 15th in the world in broadband penetration as of December 2008. This ranking slipped from 4th place in 2001 and to 12th place in 2006 (Jones, K.C., 2008). Furthermore, consumers did not get faster broadband speeds, but paid a much higher fee than their counterparts in more than two-thirds of the countries studied by OECD. For example, "in Japan, 1000Mbps speeds are available, but in the US, the fastest download speed advertised is 50Mbps" (Jones, K.C., 2008, p.5a). This finding suggested a need for more competition, consumer choice, and a national broadband policy. According to K.C. Jones (2008), Derek Turner, Research Director of the Free Press, responded to the OECD report of broadband penetration by stating, "The fact is that the countries outperforming the United States have something we lack – a coherent national broadband policy" (para. 7). Because the country does not have a coherent broadband policy, policymakers need to focus on an increase in public funding and open access policies that would provide the benefits of broadband to all Americans.

Tennessee ranked 33rd in broadband penetration, but the importance of broadband to Tennessee in both national and global economies was immeasurable. In a 2006 study conducted by MIT researchers found that the potential benefits for advanced broadband in Tennessee might exceed $10 billion in additional state GDP and result in an additional 20,000 jobs (*Broadband in Tennessee,*" n.d.). Residents of Tennessee could benefit in ways other than just economic growth. Another study conducted by Jupiter research suggested that the average household would need 57–72 Mbps of bandwidth with the more technologically advanced homes requiring up to 100 Mbps to support high-definition television, video on demand, work-at-home situations, and in-home wireless networks.

While some residents found broadband beyond their means, others wanted the service but it was not available in their area. Even though the service demand increased and the supply appeared greater, the prices increased from 2008 to 2009 (Horrigan, 2009). "Some 17% said that service was not available in their area while about 19% found it too expensive" (Horrigan, p. 8). Nevertheless, if a choice had to be made between retaining television, mobile phones, or broadband, more people would opt for broadband (Horrigan, 2009). However, according to Youtie et al. (2001) even if the Internet were cheap and easy, many people would not use it because they did not perceive it as useful. Users' attitudes about the Internet and broadband were positively correlated in areas of use, productivity, and job satisfaction. If more nonbroadband users were aware of the productivity and job satisfaction correlation, perhaps the subjective significance would be made clear.

Several barriers to residential access to broadband existed in rural areas. One of the barriers to residential access was the rate at which broadband was purchased or adopted for home use. Although broadband might be available at a person's address, there was no guarantee it

would be purchased. Broadband adoption meant more than providing access or availability to drive demand. More specifically, broadband adoption implied the service was available; however, the rate of broadband availability and adoption differed. Broadband adoption was not increasing at the same rate as broadband accessibility due to a lack of affordable computer equipment, hardware and installation charges, and digital illiteracy among potential consumers many of whom are from rural and lower socioeconomic areas (Streeks, 2009). Reforms and changes in the tax structure have been considered vital to increase the adoption of broadband in such areas. These reforms include incentives for both the consumers and for the service providers. For instance, to enhance the adoption of broadband among low-income people, broadband installations should be included when renovations are made to public housing. If broadband were installed in affordable housing, the broadband affordability for low-income people could accelerate.

Second, some lower income people are not native speakers of English and may not find general information easily accessible, which indicates that information in English should be made available in multiple languages. One Economy Corporation has made this possible by creating a series of media projects that make the content interesting and fun, thereby attracting people from all races and classes. Free broadband is also provided by One Economy Corporation to those who cannot afford it, and broadband education is provided to promote wider usage. Efforts are also being made to provide culturally relevant content. Broadband can help tie people together with education, healthcare, and other areas that involve civic participation. Broadband has to be affordable, people must know how to use it, and the content must be relevant, attractive, and decipherable.

Third, merely having access to a broadband platform is not sufficient; students must be able to apply it for education and healthcare. What may be practical in one community may not be relevant in another, thus the local implementation, rather than the national implementation of networks, should be stressed. Again, merely investing in technology is insufficient unless people have been trained to deploy this technology. Even if people deploy technology, they must be able to adopt it, which requires digital literacy. Only then can such investment be financially sustainable. Providing broadband free also may not give people the urge, the interest, or the incentive to use it. Hence, people who are conversant with technology should be given incentives to provide free education and guidance to others in rural areas.

Other barriers to free broadband arose from competitors such as telephone and cable companies that made serious attempts to prohibit municipalities from providing free or discounted broadband to their residents (Leibowitz, 2005). A new generation of broadband could bring significant benefits to Tennessee and the United States, but private operators have not been upgrading their facilities to provide these capacities (*Broadband in Tennessee*, n.d.). The private sector recently made an investment to upgrade their copper-based plants to hybrid-fiber coaxial (HFC) plants. These units could deliver entertainment services such as digital cable television and residential Internet and telephone services. The HFC design provided a new short-term solution; however, the design was unable to meet the current or future bandwidth needs for advanced applications important to education and industry. Fiber-To-The-Home (FTTH) could transmit multiple data streams and make such applications as work-at-home, telemedicine, and distance learning affordable for the average citizen. Unfortunately, private operators were not in a position to make additional investment in FTTH technology to upgrade their system to serve these important sectors. Insufficient upgrading was the primary reason that

broadband in Tennessee was not used for improved education, business opportunity, healthcare, or economic growth. Moreover, in Tennessee several areas lacked the demographic density to justify the large capital investment in technology.

The demographics of the student population have changed. Students of all age groups with diverse needs, more working adults, more women, and more part-timers are enrolled in college studies in all parts of North America (Yi, 2005). Nontraditional students have multiple life roles and need flexibility to achieve their educational goals in order to maintain a balance in their lives. Online learning would be especially beneficial for nontraditional students because it eliminates the barriers of time and space. Broadband alone can pave the way for successful online learning as it delivers digitized content at a high speed. Removing the barriers to broadband access has never been more important for education.

Digital Divide

In developed countries the digital divide has increased because people residing in rural and remote areas do not have access to high-speed broadband networks (Xavier, 2003). This isolation leaves people unable to access the benefits expected of broadband such as online education, health information, and government services. The digital divide described the perceived gap between the haves, or the information rich, and the have-nots, or the information poor (Huang & Russell, 2006). The first group, the haves, owned the most sophisticated computers and had access to the latest technology; whereas, the second group did not, thereby placing them at a disadvantage in a knowledge-driven economy. Groups associated with the digital divide, the have-nots, needed to abandon their computer anxiety and apathy and adopt a

willingness to learn to use computers and broadband in order to stay in touch with the world around them.

Educational institutions could provide the solution to narrow the digital divide. Moreover, a study conducted by Russell and Huang (2008) revealed that students with the highest access to technology both at home and at school ranked higher in academic achievement tests than did students with lower access to technology. Access to technology-enhanced information greatly increases communication and learning; however, the level of integration and purpose for which the technology is used affects how relevant it becomes in the daily life of the user. Families who could not afford a computer and Internet technology in their home could benefit by their children's school and their communities' availability of technology.

Many areas seeking to reduce the digital divide rely on their local libraries for broadband access and updated computers. Libraries in rural areas play a critical role in bridging the gap by offering a much broader section of information more quickly to their communities through the use of broadband and online database search engines. Libraries could benefit from broadband stimulus funds or the Broadband Technology Opportunities Program through "inventory connectivity in your community, identify needs for future telecommunications services, and working with other libraries to aggregate demand" (Oder, 2009a, para.3). Rural areas, including tribal areas of North America, consider their local libraries as principal information centers because public access to computers and Internet is provided. The Bill and Melinda Gates Foundation have invested $350 million in library support since 2007 through a program entitled Turning the Page: Building Your Community Library (Oder, 2009b).

At the beginning of the 21st century high-speed Internet access was limited to users with local area network (LAN) connections at their place of work or study (Biggs & Kelly, 2006).

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Residential users primarily used dial-up connections, but by 2006 there were more than 200 million households around the world that enjoyed Internet access at speeds higher than 256/kbit/s. Satellites have not proved as important to high-speed communications as have telephone and cable lines, but satellites have played an important role in closing the digital divide (Holstein, 2007). No new network or services have grown at such a speed as has fixed-line broadband, which is partially due to the higher cost for satellite service.

The U.S. National Telecommunications and Information Administration found four distinct indications of the digital divide between urban and rural, rich and poor, Caucasian and minority, male and female, and high and low education (Youtie et al., 2001). Internet users in urban areas were also affected by the digital divide that excluded so many rural households. Rural communities in America were at a disadvantage in areas such as E-commerce merchants attracted fewer customers, online universities attracted fewer students, and businesses could not communicate as well with other locations (Peha, 2008). Other disadvantages exist for residents of rural areas whether they subscribed to the Internet or not. Bringing broadband to an area made homes throughout the area more desirable, which could increase property values (Peha, 2008).

The digital divide existed by location and also by socioeconomic status. According to a study conducted by Orszag, Dutz, and Willig (2009), "there is still significant evidence of a digital divide" (para.3). The evidence from this study did not include addresses or even zip codes, but presented discrepancies by nationality, educational level, and age.

For instance, while 82% of Asian households in 2008 were connected to home broadband, only 57% of African-American households were

connected. While 83% of college graduate households were connected at

home, only 38% of households with less than high school diplomas had

adopted home broadband. And while 84% of GenY households between

ages 18 and 24 were connected, only 43% of senior households aged 65

and over had adopted it. (Orszag, 2008, para. 3)

A national broadband policy would address the multi-faceted digital divide that exists in the

United States. In general the policy should create incentives for broadband providers to offer

affordable options in all areas and provide avenues for educational institutions to reach out to

their communities and demonstrate the benefits of broadband access.

Technology Adoption Model

"Although there is inadequate information on broadband availability to rural consumers,

there is data on adoption and use" (Dabson & Keller, 2008). Certain characteristics were

common among individuals who used technology and individuals who chose not to use

technology. People adopted technology at different rates and in different ways. The Technology

Adoption Model (TAM) offered a theoretical model that helped predict whether users would

adopt new information technology (Saljoughi, 2002). TAM noted that acceptance and use of

information depended on an individual's belief in the usefulness of technology. Considered

valid by Saljoughi, TAM was developed to explain computer usage behavior; therefore, for the

purpose of this research this model is ideal because the literature review suggested that people

expressed reluctance and resistance in accepting broadband usage. Under the model attitudes

predicted intentions and intentions predicted behavior. The model focuses on Perceived

Usefulness (PU) and Perceived Ease of Use (PEOU). In the United States the age group that most frequently adopted new technology was those aged 15-17 years, followed by the 26-35 age groups(Dwivedi & Lal, 2007). There were almost equal numbers of men and women using the Internet and the adoption of technology were not associated with gender. For this reason gender would not likely explain the differences between the adopters and nonadopters of broadband. In addition, individuals with high educational qualifications were more likely to adopt innovation. Furthermore, there was a positive correlation between computer ownership and income.

The digital divide between the rich and the poor is evident in the use of and access to broadband. Age, income, education, and occupation are important variables that explain the difference between early adopters and nonadopters. However, Dabson and Keller (2008) suggested that when broadband technologies had become familiar to rural consumers through access at school, home, and work, they had benefited equally from participation in online services. In other words the benefit was equal whether broadband technology was adopted early or by those who had become aware of the benefit at later stages. Early adopters of technology had certain unique characteristics; thus, characteristics identifying individuals who did not adopt technology at an accelerated pace could provide insight into lack of broadband adoption in areas where the technology was available but not in widespread use. Huang and Russell (2006) contended that technological adoption had occurred among most groups of Americans irrespective of income, education, race, ethnicity, location, or gender despite the claims of an increasing digital divide. Snyder and Edwards (2003), on the other hand, posited that broadband was prohibitively expensive for millions of consumers. One third of households, especially in rural areas or low-income urban households, did not subscribe to broadband.

Broadband has been beneficial to many Tennesseans. In 2005 one of the largest FTTH (Fiber To The Home) projects in the United States was located in Jackson, Tennessee, created by the Jackson Energy Authority. This broadband initiative improved the quality of life in that community. "The school system operates more efficiently with 100mbps connectivity provided to all 28 schools in the Jackson Area" (*Broadband in Tennessee*, n.d., p. 4). Several other private initiatives existed in the state, such as Morristown Utilities with Internet penetration of 67% of the households. Bristol Tennessee Essential Services built a fiber-to-the-user system where a majority of the customers were residential, and the Pulaski Electric Systems built a FTTH (Fiber To The Home) network covering more than 4,750 homes in the area. A partnership between communities and their schools could lead to an increased technology adoption model with increased awareness and benefits specifically for municipalities.

Because most studies have showed many people have not expressed eagerness to use broadband, it is evident that a positive attitude towards technology is lacking. This hesitant attitude could be attributed to lack of awareness or a lack of information or understanding about the benefits that broadband can provide. Ironically, some of those most resistant to technology use have been teachers. "With many teachers, the way the technology is introduced into the academic environment can mean the difference between adoption and abandonment" (O'Hanlon, 2009). Anyone could resist technology adoption, but according to Barbara Dunn of the Remediation and Training Institute technological improvement "starts with how you communicate with teachers" (O'Hanlon, 2009, para. 6). Is communication the key to how individuals adopt technology? "Predominantly, even in context with reliable supply of broadband, it is consumer demand for broadband that is the tallest barrier to adoption and

represents America's competitive vulnerability" (Consumer Insights to American's Broadband Challenge, 2008, p.3).

Broadband Pricing

The price of broadband rose by about 13% between 2008 and 2009 (Horrigan, 2009), and, because of competition among service providers the price fluctuated. In areas where there was only one provider, the average household monthly bill was $44.70, while in areas with multiple providers the average charges were $38.30. Premium subscription charges could add another $7.50 per month. Competition should be the most efficient way for resource allocation and price reduction. However, perfect competition was not observable for telecommunications market because existing levels of infrastructure were significantly lower in some areas (Teppayayon & Bohlin, 2009). For example, AT&T and Verizon offered fiber-optic high-speed home Internet and a wireless product for Internet service for a mobile device or a laptop. Perfect competition could not exist in an environment where wireless broadband was offered in ways that do not harm the wireline services or create competition between wireline and wireless services (Frieden, 2008).

Several Tennessee communities were building fiber networks that included expansion to all homes in their area irrespective of income and density. Communities such as Jackson, Morristown, Bristol, Chattanooga, Clarksville, Pulaski, and Tullahoma are engaged in providing advanced broadband to their citizens or building their networks. These communities alone would number over 250,000 homes with municipal broadband, giving Tennessee a distinct advantage in competing nationally or globally for industry to locate in their respective communities. Nationally municipal broadband efforts met mixed results (Gubbins, 2008). In the state of Tennessee, "AT&T and Charter know no service-area boundaries" (Moore, 2009).

However, "Morristown Utility Systems' Fibernet and other municipally owned telecommunications system have a state-drawn line in the sand" (Moore, 2009). Competition with Fibernet could lower broadband prices for customers in areas where AT&T, Charter, and Fibernet provided service. However, AT&T and Charter noted that competition from a city government that controlled Fibernet was unfair competition. Atkinson and Bennett (2009) from the Information Technology and Innovation Foundation in commenting to the FCC about A National Broadband Plan for Our Future said, "There is perhaps no issue more central to the debate about broadband policy than the state of and role of competition" (p. 8).

A number of factors affected broadband pricing strategies depending on the needs of each market. Varying pricing strategies were based on the competitive structure of the market, regulatory restrictions, competitive technologies, and competition from neighboring countries (Biggs & Kelly, 2006). Because of liberalization of government restrictions, innovation, and convergence, broadband service providers responded with differentiated pricing strategies based on speed of connection and technology. With the liberalization of government restrictions expanding capacity of broadband was possible. When expanding capacity is impossible, network owners face three options, refusing new customers, raising prices, or allowing service to degrade (Spulber & Yoo, 2008). A national broadband initiative that could have a positive effect on pricing should include cooperation among carriers to share networks much like wireless phone service and redirecting a seven billion dollar federal phone subsidy away from home phone service and towards home broadband service (Kang, 2009).

The price of broadband has played a critical role in determining access. More federal policies or oversight might be the solution to contain pricing structures and expand service areas. Possible changes in pricing structures could also be the answer to the need for greater broadband

speed and access. Verizon Chief Technology Officer Dick Lynch stated, "In the coming years wired broadband will likely be sold in packages based on the amount of data a person wants to consume much like wireless broadband is sold today" (as cited in Higginbotham, 2009, para. 1). A pricing structure should more closely resemble an electric bill than a cable television bill. A final pricing structure option would more closely resemble a home telephone bill. "The 1996 Telecommunications Act was very specific in mandating that new telecommunication services that reached low income rural, insular, and high-cost areas must be served at rates (prices) comparable to high density, low cost areas" (Compaine, 2003). The act was passed through the use of the Universal Service Fund, which could be used to subsidize broadband pricing and expansion much as it did touch tone phone service and cable television service. A paradigm shift is needed to show broadband as a necessity instead of entertainment before a subsidy could be approved for broadband.

Demographics of Broadband Users

A 2007 study by the Pew Internet and American Life Project indicated that steady growth occurred in the use of broadband among Americans; at that time nearly half of all Americans had broadband connections, largely due to increasing use among minorities and the poor (Horrigan & Smith, 2007). According to a later study conducted by the Pew Research Center's Internet & American Life Project the increase in growth occurred after a period of stagnation. The report showed an increase of 12% from March 2006 to March 2007, an increase of 17% from March 2007 to March 2008, and a 15% increase during the most recent reporting period ending March 2009 (Horrigan, 2009). As of 2009, 63% of consumers had broadband access at home, which increased by about 8% from 2008 (Horrigan, 2009).

The study reported that usage of broadband increased among a wide spectrum of people from different age and income groups. The usage among the 65+ age group was only 19% in May 2008, and grew to 30% by April 2009 and for people between 50 and 64 years old usage grew by 11% within the same period (Horrigan, 2009). Nationally, broadband usage has also grown among those with an income of $20,000 or less regardless of age. Specifically for rural areas, including all income levels and age groups, high-speed access climbed to 46% in 2009 compared to 38% with high-speed access in 2008 (Horrigan, 2009). However, the broadband adoption rates among low-income, rural, and African-Americans people were below the national average, but, according to Horrigan and Smith (2007) 4 of 10 African Americans adults had broadband access at home compared to 15% in 2005. While in urban areas and the suburbs almost 50% of the people had broadband access at home, in the rural areas only about onethird of Americans had the connection. Horrigan and Smith (2007) confirmed that income and race were less important differentiators in broadband adoption than in years past.

While the adoption of broadband Internet use has risen continuously, there has remained a gap in the adoption curve. In the United States residential consumers who have not been subscribing to broadband access reported they did not see the need to subscribe at least at the prices being charged by providers. According to Pew Internet and Life Project report in 2009 "non-broadband users tend to be older, have lower incomes, have lower levels of educational attainment, and more likely to be African-American and more likely to live in rural areas" as cited in Horrigan, 2009). In the United States about 300,000 homes had FTTH connections, but these were typically affluent families with median household incomes greater than $85,000 per year located in densely populated urban and suburban areas (*Broadband in Tennessee*, n.d.).

Research completed by the Phoenix Center for Advanced Legal and Public Policy suggested, "Policies that focus on these demand-side factors perhaps offer more bang for the buck in terms of increasing broadband penetration than supply-side policies including subsidies for networks or regulation of providers" (Ford, Koutsky, & Spiwak, 2007). Demand-side factors include using educational institutions to demonstrate the uses of broadband for school age children. Demand-side factors were influenced by several demographics. For instance, the likelihood of adopting home broadband increased with income, decreased with age, increased with education, and varied by ethnicity (Orszag et al., 2009). Demand for broadband received a great deal of attention concerning the location of the service. However, less attention was paid to the characteristics of broadband adopters where the research should be focused.

Summary

Despite differences of opinions on the definition of broadband, it is generally defined as a means to transfer data at a very high speed not possible through dial-up services. Broadband allows a user to be perpetually online and to download videos at a fast speed. Even though broadband has been available for years, it has not gained popularity perhaps because prices have been prohibitive. People prefer the less expensive dial-up; consequently, they are unable to benefit from the advantages of broadband. Moreover, broadband access is available primarily in urban areas and affluent neighborhoods, thereby excluding rural areas and low-income communities from broadband benefits. Even though broadband is available, many do not find benefit from its use. The benefit of broadband access in the field of education is unquestioned. There are claims of a digital divide not due to limited access or availability but due to lack of awareness and proper understanding of the concept and technology. Students who did not have

access to broadband found little use for it, but the universities that enabled broadband access for their students both at home and on the campus had a lower digital divide than universities where broadband was not available to students in their homes. Broadband access at home allows flexibility for different types of college students, promotes interaction between and among students and teachers, and enhances collaboration. Blended learning is the most advantageous method for educating students but to achieve the best educational outcomes students and teachers need to be trained in deploying technology. The challenge exists to identify consumers who want access to broadband and, secondly, to educate potential consumers about the benefits of broadband. There are very few transformational innovations that economists describe as general purpose technologies. Scholars generally agree that in modern history electricity, the steam engine, and the semiconductor are considered transformational innovations (Wallsten, 2009). Scholars soon may agree that broadband is the next transformational innovation.

Broadband has had and will continue to have an effect on the economy. The effect broadband will have on educational goals, economic goals, and quality of healthcare depends on the speed with which the Federal Communications Commission can identify detailed data about the supply and demand for broadband in the nation.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

The purpose of this study was to examine the availability of residential broadband access for students enrolled in the spring semester 2010 at Walters State Community College. A web-based survey available through the D2L system was offered to all students enrolled in the spring semester 2010 in a course that used the D2L system as part of the course. This chapter details the research methodology that was incorporated in the study. The chapter is organized into the following sections: population, research design, data collection, and research questions and related hypotheses.

Population

Walters State Community College administered the survey to a sample of students enrolled in classes for the spring semester 2010 at all campus locations, including Greeneville, Morristown, Sevierville, and Tazewell, and to all students in other locations who enrolled in a web-based course. The target group consists of all students enrolled in a course that uses the Desire2Learn web-based system as part of the course requirements. All 6,165 students enrolled for spring semester 2010 were requested to participate in the study, but only those students who chose to log on to the Desire2Learn system had the opportunity to complete the survey. All students have a valid username and password for D2L; however, not all courses require use of the Desire2Learn system.

Research Design

The survey *Walters State Community College Residential Broadband Access Student Survey* (Appendix A) was used for data collection. The survey instrument was reviewed by seven full-time staff members at Walters State Community College as well as 21 students enrolled for spring semester 2010. Walters State staff and students were asked to volunteer to participate in a review of the survey and provide feedback. Based upon the feedback provided in the review, I modified the instrument. Data were analyzed from surveys completed by students enrolled at Walters State Community College spring semester 2010. The survey was offered through the Desire2Learn system used by the majority of courses offered at Walters State.

Data Collection

Prior to data collection permission was requested from the Institutional Review Board of East Tennessee State University to conduct the research, and written permission to collect survey data was obtained from the Vice-President of Planning, Research, and Assessment at Walters State Community College (Appendix B). Additionally, before this researcher administered the survey on D2L, the Vice-President of Academic Affairs at Walters State Community College reviewed the survey questions to ensure that student identifiable information was not collected. After permission was received, a meeting was arranged with the WSCC Manager of Faculty/Instructional Services and Interim Executive Director for Information and Educational Technologies who are responsible for overseeing the Desire 2 Learn (D2L) system. Following those meetings with the Manager of Faculty/Instructional Services and the Interim Executive Director for Information and Educational Technologies, the survey instrument was designed and made available on the D2L system. The data analyzed in this research were collected from

Walters State Community College. The college uses the Tennessee Board of Regents' software

program called Desire2Learn (D2L) to maintain class information and increase engagement

among students and instructors. When data were obtained, the information was stored on a

password protected personal computer and further evaluation was done using SPSS software

program by IBM.

Records were collected from a sample of all students enrolled at Walters State

Community College in the spring of 2010. The Walters State Academic Affairs Office sent an

email to all Walters State Faculty to make each member aware of the survey and encouraged

them to remind students of the survey to try and improve participation in the survey. When a

student completed the survey, the link to the survey was removed from that particular student

login to prevent multiple surveys completed by the same student. Information was collected

only on those students who were enrolled in a course that uses the D2L system as part of the

course requirements. Although minimal demographic information was collected and reported

through the web-based D2L system, student confidentiality was maintained because information

was classified by a system-assigned student identification number and access was available only

to the D2L system administrator. When the information was extracted into a Microsoft Excel

file, the student identification number was not included.

The following information was collected from Walters State students: age, whether the

student is receiving a Pell grant , county of current residence, city or town of current residence,

zip code of current residence, type of Internet connection at home, reason for no Internet

connection at home, how many providers of high-speed Internet in the home region, what

company provides high-speed Internet at home, approximate monthly cost of high-speed

Internet at student's home, satisfaction with speed/quality of high-speed Internet connection at

home, usage of Walters State computer lab for faster Internet speed, the importance of high-speed Internet in relation to coursework, frequency in using the Internet for coursework, and how often Walters State students plan to use a Walters State computer lab for coursework.

Descriptive Statistics

A portion of the survey given to students included questions that provided background information to better understand critical information related to broadband adoption. Descriptive statistics were used to provide an overview of students attending Walters State for spring semester 2010. Those questions included on the survey were:

1) To what extent is Internet access available to Walters State students at home?

      (a) How students connect to the Internet at home?

      (b) How many high-speed Internet providers offer service for their home?

      (c) What companies provide high speed Internet service in their area?

      (d) What is the level of satisfaction with the service?

      (e) What reasons are offered for not having Internet access at home?

2) How important is high speed Internet as it relates to coursework?

Research Questions and Hypotheses

The following research questions related to residential broadband access for Walters State students for the 2010 spring semester controlled the direction of the study:

1. Are there relationships between the type of Internet service students have at home (question 6) and (a) whether students use Walters State's computer labs due to faster connection speeds (question 11); (b) whether they have taken a web-based course

(question 12); (c) how often students use or plan to use Walters State's computer labs (question 15); and (d) how often students use the Internet for coursework at home (question 14).

To analyze the hypotheses, SPSS by IBM, version 14 was used. Cross-tabulated tables and a chi-square tests were used to evaluate the following hypotheses:

$Ho1_1$: There is no relationship between the types of Internet access students have at home and whether they use Walters State computer labs because Internet access is faster on campus. (Accuracy of internet faster on campus will not be tested.)

$Ho1_2$: There is no relationship between the type of Internet access students have at home and whether they have taken a web-based course.

$Ho1_3$: There is no relationship between the type of Internet access students have at home and how often students use or plan to use Walters State computer labs.

$Ho1_4$: There is no relationship between the type of Internet access students have at home and how often students use the Internet at home for coursework.

2. Are there relationships between age and how students connect to the Internet from home (question 6); between age and the reasons students do not have Internet access at home (question 6b); and between age and student perceptions of the importance of high-speed Internet access as it relates to their coursework (question 13).

To analyze the hypotheses, SPSS by IBM, version 14 was used. Cross-tabulated tables and a chi-square test was used to evaluate the following null hypotheses:

Ho2$_1$: There is no relationship between age and how students connect to the

Internet from home.

Ho2$_2$: There is no relationship between age and students not having a computer

at home as a reason not to connect to the Internet from home.

Ho2$_3$: There is no relationship between age and students not needing Internet

access at home as a reason not to connect to the Internet from home.

Ho2$_4$: There is no relationship between age and Internet service expense as a

reason not to connect to the Internet from home.

Ho2$_5$: There is no relationship between age and Internet speed as a reason not to

connect to the Internet from home.

Ho2$_6$: There is no relationship between age and poor Internet service as a reason

not to connect to the Internet from home.

Ho2$_7$: There is no relationship between age and any other response as a reason

not to connect to the Internet from home.

Ho2$_8$: There is no relationship between age and student perceptions of the

importance of high-speed Internet access as it relates to their coursework.

3. Is there a relationship between student financial need (as measured by question 2

regarding Pell Grant funding) and the type of Internet access at home (question 6)?

To answer this research question, SPSS by IBM, version 14 was used. Cross-tabulated

table and a chi-square test was used to evaluate the following null hypothesis:

Ho3$_1$: There is no relationship between financial need and how students connect

to the Internet from home.

CHAPTER 4

PRESENTATION AND ANALYSIS OF DATA

State funded colleges and universities in Tennessee have been forced to operate more

efficiently because of the recent cuts in state appropriations. One way institutions are cutting

expenses is to provide courses and student services online and thus reduce the number of

personnel needed to provide those services. The transition to more online services by institutions

has placed a greater need for students to have access to a high-speed Internet connection thereby

allowing more efficient use of the services offered by institutions, including Walters State. The

present study investigated the access and usage of high-speed Internet of students enrolled at

Walters State Community College in Morristown, Tennessee. For the present study students'

access and usage of high-speed Internet was measured by the type of home Internet access and

by their usage of high-speed Internet for coursework. Furthermore, descriptive statistics were

used to determine the access, usage of high-speed Internet, and demographics such as age,

county of residence, and household income. Additionally, the study investigated how age of the

student, frequency of computer lab use by students, and their perception of the importance of

high-speed Internet for coursework compared to their type of Internet access at home.

The nonrandom sample for the present study consisted of 740 Walters State students who

enrolled in the spring of 2010. The study focused specifically on those students who had

enrolled at Walters State for the spring semester 2010 and chose to complete the survey in the

D2L eLearn system.

Descriptive statistics and three research questions were selected to guide the investigation, and the data gathered were used to test 13 null hypotheses. A computer program, SPSS, was used to analyze the data.

To what extent is Internet access available to Walters State students at home? To answer this background descriptive question percentages were used to determine: (a) how students connect to the Internet at home; (b) how many high-speed Internet providers offer service for their home location; (c) what companies provide high-speed Internet service in their area; (d) what the level of satisfaction with the service is; or (e) what reasons are offered for not having Internet access at home.

As shown in Table 1, the county of residence for the respondents shows that all 10 counties of responsibility for Walters State are represented and several counties adjacent to the 10 county service area are also represented. The county of residence by the respondents may provide a better idea of the Internet service for other Walters State students living in each county identified in the survey.

Table 1

County of Residence for Population

Tennessee County of Residence	N	%
Claiborne	39	5.3
Cocke	58	7.8
Grainger	133	40.7
Greene	91	27.8
Hamblen	37	11.3
Hancock	16	2.2
Hawkins	44	5.9
Jefferson	89	12.0
Sevier	139	18.8
Union	18	2.4
Outside WSCC Service Area		
Blount	3	.4
Carter	4	.5
Knox	22	3.0
McMinn	1	.1
Sullivan	1	.1
Washington	8	1.1
Total	740	100.0

Table 2 below provides information to better understand how prepared students are to use new web-based technologies Walters State may offer in the future.

Table 2

Type of Internet Connection from Home for Population

How Students Connect to Internet at Home	N	%
No Internet service	61	8.2
Dial-up	88	11.9
Cable Modem	296	40.0
DSL Modem	217	29.3
Satellite Modem	78	10.5
Total	740	100.0

Currently it is also very difficult to identify how many vendors offer high-speed Internet service to a person's home without asking each person. This makes it very time consuming to gather information on a large number of households. Additionally, many individuals, including the respondents for this survey, do not know how many high-speed Internet providers are available or the different companies who are offering the high-speed Internet at their residence. Table 3 shows the responses to the survey question of number of high-speed Internet providers available. As shown, 66 respondents do not know how many providers are available at their residence. One hundred sixty-six respondents said no high-speed Internet service providers were available at their current residence.

Table 3

Number of High-Speed Internet Providers Available to Population

Number of High-Speed Internet Providers in Student's Area	*N*	*%*
Don't Know	66	8.9
None	166	22.4
One Provider	191	25.8
Two Providers	197	26.6
More than Two Providers	120	16.2
Total	740	100.0

As shown in Table 4, AT&T provides the largest number of high-speed Internet connections to the respondents of the survey followed by Charter Communications, Inc. Table 4 includes the vendors that provide each of the delivery types of high-speed Internet including Wild Blue as a satellite high-speed Internet provider, AT&T as a DSL Internet delivery, and Charter Communications as a cable Internet provider.

Table 4

Providers of High-Speed Internet to Population

What Company Provides your High-Speed Internet Service at Home	*N*	*%*
AT&T	156	29.9
Charter	154	29.6
Comcast	23	4.4
Embarq	35	6.7
Frontier	115	22.1
MUS Fibernet	14	2.7
Wild Blue	24	4.6
Total	521	100.0

The survey asks WSCC students enrolled for spring semester 2010 how satisfied they were with their current high-speed Internet service provider. Listed in Table 5 below, the responses to their level of satisfaction with their current provider unfortunately show that 6.1% are very satisfied with their current high-speed Internet provider.

Table 5

Satisfaction with High-Speed Internet Service from Home

Level of Satisfaction	N	%
Very Dissatisfied	123	23.6
Dissatisfied	41	7.9
Neutral	87	16.3
Satisfied	238	45.7
Very Satisfied	32	6.1
Total	521	100.0

Those students who responded that they did not have high-speed Internet at home were asked to identify the reason or reasons for not having high-speed Internet service at their residence. Table 6 provides the responses students gave as reasons they did not have high-speed Internet at home.

Table 6

Reasons for No Internet Service at Home

Reasons	N	%
No Computer	14	8.3
Not Needed	2	1.2
Costs Too Much	56	33.1
Speed Too Slow	49	29.0
Service is Poor	40	23.7
Any Other Reason	8	4.7
Total	169	100.0

How important is high-speed Internet as it relates to coursework? Descriptive statistics were used for the responses to question 13 on the survey to provide background information for the study and to answer this question.

In higher education there is the assumption that there is a current need for high-speed Internet and that need will increase with the current trend of web-based services and courses. The respondents to this survey confirmed that assumption with 64.7% indicating high-speed Internet very important to coursework completion at Walters State as shown in Table 7.

Table 7

Importance of High-Speed Internet to Coursework Completion

Importance to Coursework	*N*	*%*
Not at all Important	64	8.6
Only Somewhat Important	3	.4
Moderately Important	36	4.9
Important	158	21.4
Very Important	479	64.7
Total	740	100.0

Research Question 1

Are there relationships between the type of Internet service students have at home and (a) whether students use WSCC computer labs due to faster connection speeds; (b) whether they have taken a web-based course; (c) how often students use or plan to use Walters State's computer labs; and (d) how often students use the Internet for coursework at home.

To answer this research question, cross tabulated tables and chi-square tests were used to evaluate the hypotheses.

$Ho1_1$: There is no relationship between the types of Internet access students have at home and whether they have used WSCC computer labs because Internet access is faster on campus.

For this null hypothesis, the researcher evaluated the Internet access of 679 students who were enrolled in the spring semester 2010 and who had some type of Internet access from home. The responses of 61 students who were enrolled in the spring semester 2010 and did not have Internet access from home were excluded.

A chi-square for independent samples was used to determine if there were differences among the types of Internet access students have at home and whether or not they have used Walters State computer labs because Internet access is faster on campus. The chi-square test was significant, χ^2 (3, N=679) = 106.887, $p < .001$. Therefore, the null hypothesis was rejected. The strength of the relationship between the type of Internet access students had at home and their use of Walters State computer labs as measured by Cramer's V was moderate (.40). As shown in Table 8, the percentages of students using a campus computer lab because Internet access was faster increased as the speed of their Internet access at home decreased. Over 77% of students with dial-up access (the slowest type of Internet access) at home used a campus computer lab because Internet access was faster; while 55.1% of students with satellite access (second slowest type of access) used a campus lab. Twenty-nine percent of students with DSL access (second fastest type) and 22.3% of students with cable Internet access (the fastest Internet access) used a campus computer lab because access was faster.

Table 8

Crosstabulated Table for Use of Computer Labs Due to Faster Internet Connection

WSCC Computer Labs Faster	Dial-up		Cable Modem		DSL Modem		Satellite Modem		Total	
	N	%	N	%	N	%	N	%	N	%
Yes	68	77.3	66	22.3	63	29.0	43	55.1	240	35.3
No	20	22.7	230	77.7	154	71.0	35	44.9	439	64.7
Total	88	100.0	296	100.0	217	100.0	78	100.0	679	100.0

Ho1$_2$: There is no relationship between the type of Internet access students have at home and whether they have taken a web-based course.

For this null hypothesis the researcher evaluated the Internet access of 740 students who were enrolled in the spring semester 2010 and had completed the survey. A chi-square for independent samples was used to determine whether or not there were differences among the types of Internet access students have at home and whether students have taken a web-based course at WSCC. The chi-square test was significant, $\chi2$ (4, N=740) = 17.335, *p* = .002. Therefore, the null hypothesis was rejected. The strength of the relationship as measured by Cramer's *V* (.15) showed a weak relationship between the type of Internet service students have at home and whether or not they have taken a web-based course at Walters State. Thus, students with faster Internet connections at home were more likely to have taken a web-based course. As shown in Table 9, 36.1% of students with no Internet access at home had taken a web-based course at the time each student completed the survey. Among students who had Internet access at home, the percentages of those who had taken a web-based course were 56.8% of those with dial-up access, 62.2% of those with cable access, 57.6% of those with DSL and 67.9% of those with satellite access.

Table 9

Crosstabulated Table for Type of Internet Access at Home and Taken a Web-based Course

Taken a web-based course	No Internet service at home		Dial-up		Cable Modem		DSL Modem		Satellite Modem		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Yes	22	36.1	50	56.8	184	62.2	125	57.6	53	67.9	434	58.6
No	39	63.9	38	43.2	112	37.8	92	42.4	25	32.1	306	41.4
Total	61	100.0	88	100.0	296	100.0	217	100.0	78	100.0	740	100.0

Ho1$_3$: There is no relationship between the type of Internet access students have at home and how often students use or plan to use Walters State computer labs for coursework.

For this null hypothesis the researcher evaluated the Internet access of 740 students who were enrolled in the spring semester 2010 who had completed the survey. A chi-square for independent samples was used to determine if the type of Internet access students have at home affected the frequency with which students used or planned to use WSCC computer labs for coursework. The chi-square test was significant, $\chi2 (12) = 60.105$, $p < .001$. Therefore, the null hypothesis was rejected. The strength of the relationship as measured by Cramer's *V* (.29) showed a definite relationship between the type of Internet service students have at home and how often they use the computer labs for coursework. Thus, students with no Internet access from home or with slower Internet access from home were significantly more likely to use or plan to use the WSCC computer labs. As shown in Table 10, the slower students' Internet access at home, the higher the percentage of students who used or planned to use a computer lab more than once a week. Sixty-seven percent of students with no Internet access at home and 45.5% of

those with dial-up access at home used WSCC computer labs for coursework more than once a week. Almost 40% of students with satellite access (the slowest of the high-speed Internet types) and 32.3% of students with DSL (the second slowest high-speed type) used a WSCC computer lab more than once a week, while 23% of students with cable access at home (fastest access) used a WSCC computer lab more than once a week.

Table 10

Crosstabulated Table for Type of Internet Access at Home and Usage of Computer Lab

Use of Computer Labs	No Internet service at home		Dial-up		Cable Modem		DSL Modem		Satellite Modem		Total	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Twice a semester or less	9	14.8	12	13.6	86	29.1	61	28.1	18	23.1	186	25.1
A few to several times a semester	7	11.5	30	34.1	107	36.1	68	31.3	19	24.4	231	31.2
Once a week	4	6.6	6	6.8	35	11.8	18	8.3	10	12.8	73	9.9
More than Once a week to daily	41	67.2	40	45.5	68	23.0	70	32.3	31	39.7	250	33.8
Total	61	100.0	88	100.0	296	100.0	217	100.0	78	100.0	740	100.0

Ho1$_4$: There is no relationship between the type of Internet access students have at home and how often students use the Internet at home for coursework.

For this null hypothesis the researcher evaluated the Internet access of 679 students who were enrolled in the spring semester 2010 and who had completed the survey. The responses of

61 students who were enrolled in the spring semester 2010 and did not have Internet access from home were not used as part of this analysis.

A chi-square for independent samples was used to evaluate the type of Internet access students have at home and how often they use the Internet at home for coursework. Originally there were eight response categories for the question related to how often students used the Internet for coursework at home: (1) never; (2) once or twice a semester; (3) a few times per semester; (4) several times a semester; (5) once a week; (6) more than once a week; (7) a few times a week; and (8) daily. The 4 by 8 crosstabulated table showed violations of chi-square test: 50% of the cells had an expected frequency of less than five and the minimum expected frequency was less than one. Therefore, the response categories for the frequency with which students used WSCC computer labs for coursework was collapsed into three categories: (1) several times a semester or less; (2) once to a few times a week; and (3) daily.

Using the collapsed variable the difference between the type of Internet access students have at home and how often students used the Internet for coursework at home was not significant, χ^2 (6) = 11.099, p = .085. Therefore, the null hypothesis was retained. The strength of the relationship as measured by Cramer's V was weak (.09). Thus, there was no difference in the frequency of Internet use for coursework at home based on the type of Internet connection from their home.

As shown in Table 11, regardless of the type of Internet access students have at home, the majority used the Internet for coursework at home at least once a week. Also noteworthy is that 55.7% of cable modem connections, 52.5% DSL connections, and 52.6% of satellite connections use the Internet daily for coursework compared to 37.5% of students with a dial-up connection, which is the slowest Internet connection from home.

Table 11

Crosstabulated Table for Type of Home Internet Access and Frequency of Use for Coursework

Frequency of Internet Use	Dial-up		Cable Modem		DSL Modem		Satellite Modem		Total	
	N	%	N	%	N	%	N	%	N	%
Several times a semester or less	12	13.6	24	8.1	19	8.8	4	5.1	59	8.7
Once to a few times per week	43	48.9	107	36.1	84	38.7	33	42.3	267	39.3
Daily	33	37.5	165	55.7	114	52.5	41	52.6	353	52.0
Total	88	100.0	296	99.9	217	100.0	78	100.0	679	100.0

Research Question 2

Are there relationships between age and how students connect to the Internet from home; between age and the reasons students do not have Internet access at home; and between age and student perceptions of the importance of high-speed Internet access as it relates to their coursework?

To answer this research question, cross-tabulated tables and a chi-square test were used to evaluate the following hypotheses:

Ho2$_1$: There is no relationship between age and how students connect to the Internet from home.

For this null hypothesis the researcher evaluated the Internet access of 740 students who were enrolled in the spring semester 2010 and who had completed the survey. The responses of

61 students who were enrolled in the spring semester 2010 and did not have Internet access from home were included as part of this analysis.

A chi-square for independent samples was used to determine if there was a relationship between the age of students and the way they connect to the Internet from home. The chi-square was not significant, χ^2 (12) = 14.138, p = .292. Therefore, the null hypothesis was retained. The strength of the relationship as measured by Cramer's V (.08) was weak. Thus, there was no relationship between age and the type of Internet connection students had at home. As shown in Table 12, for each type of Internet service at home, the percentages of students across the four age categories were very similar.

Table 12

Crosstabulated Table for Type of Internet Service at Home by Age of WSCC Student

Type of Home Internet Connection	19 or younger		20 – 29		30 – 39		40 or older		Total	
	N	%	N	%	N	%	N	%	N	%
No Internet service	19	8.7	28	12.1	7	4.5	7	5.2	61	8.2
Dial-up	30	13.7	27	11.7	15	9.6	16	11.9	88	11.9
Cable Modem	79	36.1	92	39.8	72	46.2	53	39.6	296	40.0
DSL Modem	70	32.0	61	26.4	44	28.2	42	31.3	217	29.3
Satellite Modem	21	9.6	23	10.0	18	11.5	16	11.9	78	10.5
Total	219	100.0	231	100.0	156	100.0	134	100.0	740	100.0

Ho2₂: There is no relationship between age and students not having a computer at home as a reason not to connect to the Internet from home.

Ho2$_3$: There is no relationship between age and students not needing Internet access at home as a reason not to connect to the Internet from home.

Ho2$_4$: There is no relationship between age and Internet service expense as a reason not to connect to the Internet from home.

Ho2$_5$: There is no relationship between age and Internet speed as a reason not to connect to the Internet from home.

Ho2$_6$: There is no relationship between age and poor Internet service as a reason not to connect to the Internet from home.

Ho2$_7$: There is no relationship between age and any other response as a reason not to connect to the Internet from home.

The analyses for Ho2$_2$ to Ho2$_7$ included 61 students who indicated they did not have Internet service at home. Each of the 4 x 2 crosstabulated tables for Ho2$_2$ to Ho2$_7$ showed violations of the assumptions of the chi-square test. Therefore, these hypotheses were not tested. Table 13 shows the reasons students gave for not having Internet service at home by age. As shown in the table, the three most frequently given reasons for not having high-speed Internet at home regardless of their age are that the service is poor (23.7%), the speed is too slow (29.0%), and high-speed Internet costs too much (33.1%).

Table 13

Crosstabulated Table for Students Who Do Not Have Internet at Home

| | 19 or younger | | 20 – 29 | | 30 – 39 | | 40 and older | | Total | |
Reasons	N	$\%$	N	$\%$	N	$\%$	N	$\%$	N	$\%$
No Computer	6	10.3	5	7.9	0	0.0	3	14.3	14	8.3
Not Needed	1	1.7	0	0.0	0	0.0	1	4.8	2	1.2
Costs too much	18	31.0	22	34.9	11	40.7	5	23.8	56	33.1
Speed too slow	19	32.8	19	30.2	7	25.9	4	19.0	49	29.0
Service is poor	11	19.0	15	23.8	7	25.9	7	33.3	40	23.7
Any other reason	3	5.2	2	3.2	2	7.4	1	4.8	8	4.7
Total	58	100.0	63	100.0	27	100.0	21	100.0	169	100.0

Ho2_8: There is no relationship between age and student perceptions of the

importance of high-speed Internet access as it relates to their coursework.

For this null hypothesis the researcher evaluated the Internet access of 740 students who were enrolled in the spring semester 2010 and who had completed the survey. The responses of 61 students who were enrolled in the spring semester 2010 and did not have Internet access from home were included as part of this analysis.

A chi-square for independent samples was used to evaluate the relationship between the age of the survey respondents and the importance of high-speed Internet for completing coursework. Originally there were five response categories for the question related to how important high-speed Internet is to completing coursework: (1) not at all important; (2) only somewhat important; (3) moderately important; (4) important; and (5) very important. The 4 by

5 crosstabulated table showed violations of chi-square test: Therefore, the response categories for the importance of high-speed Internet for coursework were collapsed into three categories: (1) not at all to moderately important; (2) important; and (3) very important.

Using the collapsed variable, the difference between the age of a student and the importance of high-speed Internet for coursework was significant, χ^2 (6) = 26.075, p < .001. Therefore, the null hypothesis was rejected. The strength of the relationship as measured by Cramer's V (.19) showed a somewhat weak but definite relationship between the age of a student and the importance of high-speed Internet as it relates to coursework. Thus, the age of WSCC students was an indicator of students' perceptions of the importance of Internet service to their coursework. As shown in Table 14, each age group had the highest percentage of students respond that high-speed Internet was very important for coursework. Also noteworthy was that as age increases the percentages of students who indicated high-speed Internet was not at all important to only moderately important increased. Less than 8.2% of students aged 19 or younger and 10.4% of those aged 20 to 29 indicated high-speed Internet was not at all important to only moderately important, while 18.6% of students aged 30 to 39 and 23.9% of students aged 40 or older thought the importance of high-speed Internet service for the completion of coursework was not at all or only moderately important.

Table 14

Crosstabulated Table for Importance of High-Speed Internet for Coursework by Age

Importance of Internet to coursework	19 or younger		20 – 29		30 – 39		40 and older		Total	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Not at all to Moderately Important	18	8.2	24	10.4	29	18.6	32	23.9	103	13.9
Important	58	26.5	43	18.6	31	19.9	26	19.4	158	21.4
Very Important	143	65.3	164	71.0	96	61.5	76	56.7	479	64.7
Total	219	100.0	231	100.0	156	100.0	134	100.0	740	100.0

Research Question 3

Is there a relationship between student financial need (regarding Pell Grant funding) and the type of Internet access at home?

To answer this research question cross-tabulated table and a chi-square test were used to evaluate the following hypothesis:

Ho3_1: There is no relationship between financial need and how students connect to the Internet from home.

For this null hypothesis the researcher evaluated the Internet access of 740 students who were enrolled in the spring semester 2010 and who had completed the survey. The responses

were grouped based on whether or not the respondents indicated they were receiving Pell Grant for spring semester 2010.

A chi-square test for independent samples was used to evaluate the relationship between student financial need and the type of Internet connection a student has at home. The relationship between a student's financial need, measured as whether or not students received a Pell Grant and the type of Internet access students have at home was not significant, $\chi^2 (4) =$ 3.684, $p = .451$. Therefore, the null hypothesis was retained. Thus, whether or not a WSCC student received a Pell Grant as a measure of financial need was not an indicator of the type of Internet service a student had at home. The strength of the relationship, as measured by Cramer's V, was weak (.07). As shown in Table 15, for each type of Internet access there was very little difference between the percentages of students who did not receive a Pell Grant and those who did.

Table 15

Crosstabulated Table for Financial Need of Students and Internet Connection from Home

	Pell Grant No		Pell Grant Yes		Total	
Internet Access at home	*N*	*%*	*N*	*%*	*N*	*%*
No Internet at home	22	6.7	39	9.4	61	8.2
Dial-up access	44	13.5	44	10.7	88	11.9
Cable modem	133	40.7	163	39.5	296	40.0
DSL modem	91	27.8	126	30.5	217	29.3
Satellite modem	37	11.3	41	9.9	78	10.5
Total	327	100.0	413	100.0	740	100.0

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to examine the availability of residential broadband access for students enrolled in the spring semester 2010 at Walters State Community College (WSCC). In particular, it was unknown to what extent students use high-speed Internet for coursework and the service and reliability of their broadband service. This chapter includes the findings, conclusions, and recommendations from the research study. Recommendations for further practice and for further research are also presented.

Summary of Study

High-speed Internet service from wired telecommunications such as cable and DSL can be thought of as readily available to the homes or businesses in the United States. Many college campuses highlight their Internet access on campus and the benefits of accessing information via the Internet. The benefits available to students on a college campus are generally extensive and provide instant information without the students having to printing college catalogs or time tables of classes. However, once removed from a college campus Internet speed and quality of service can be much slower and limited in many areas where the population becomes less dense. This is especially true in East Tennessee where WSCC has a service area of 10 counties.

The review of the literature documented the various information accumulated on the types of Internet access and the Internet speed associated with each type of access. The literature was divided into broadband speed defined, importance of broadband technology for education, barriers to rural broadband access, digital divide, technology adoption model, broadband pricing,

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and demographics of broadband users. In addition to the literature review, a survey on

broadband access was made available to students enrolled at Walters State for spring semester

2010.

<div align="center">Findings</div>

The study was able to determine the reported reasons for students not having broadband

Internet access in their home other than lack of availability. A potential reason for rural students

not having broadband Internet in their homes was not realizing the benefits a broadband Internet

connection can provide. Findings regarding the extent of Walters State students' Internet access

at home are as follows: It was not a significant finding that students tend to have a cable modem

or DSL modem as a way of connecting to the Internet at home. Within the Walters State service

area, there are many densely populated areas where faster Internet connections tend to be

located. Densely populated areas are favored by high-speed Internet vendors due to the potential

for a large number of customers within a smaller area that would require less installation costs.

The literature review in Chapter 2 indicated that that there are two fundamental problems

in the high-speed Internet market, availability and competition (Turner, 2007). Based on the

survey responses, many of the WSCC student population may have access to a high-speed

Internet provider, but due to limited competition the price per month for that high-speed access

may be greater than in other areas with more than one provider of high-speed Internet access to a

particular address.

The data did not make a distinction between the price per month for high-speed Internet

connection by the area or county that a student lives. In areas where there was only one

provider, the average household monthly bill averaged $44.70, while in areas with multiple

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providers, the average charges were $38.30 monthly (Teppayayon & Bohlin, 2009). The data

did show that almost 60% of Walters State students had access to a maximum of one high-speed

Internet provider at their home. Therefore, the cost for Walters State students to have high-speed

Internet service at their home has the potential to be greater than the average household in

America.

Moreover, nearly one half of respondents who have high-speed Internet at home were not

satisfied with the service of their high-speed Internet. It was unclear if a single vendor was the

source of the dissatisfaction with their high-speed Internet service or if the dissatisfaction was

consistent for all high-speed Internet service providers in the area. AT&T and Frontier

Communications were two of the top three high-speed Internet vendors identified by Walters

State students. Both AT&T and Frontier provide high-speed Internet by a DSL connection.

Potentially, the level of dissatisfaction was greater for DSL subscribers compared to cable

modem subscribers. Therefore, it was difficult to draw any conclusion on providers of high-

speed Internet and students' satisfaction with their Internet service.

The data indicated that students listed several important reasons for not having high-

speed Internet service at their home identified in the data in the findings of Walters State

students' Internet access at home survey question. Overwhelmingly, the three major factors for

not having high-speed Internet access at home was that high-speed Internet service cost too much

at their address, the speed of the high-speed Internet service offered was too slow, and the

service of high-speed Internet was poor at their home. Once again a review of the literature

suggested that competition is the key to increased broadband adoption by consumers. Having

more competition in the service area could reduce the reasons students identified for not having

high-speed Internet in the home. More high-speed Internet service providers can increase the chance of greater customer satisfaction and lead to more broadband adoption by the consumer.

The importance of high-speed Internet to coursework completion was significant based on the data collected. Over 86% of students selected important to very important on the survey question related to the importance of high-speed Internet for coursework for spring semester 2010. Therefore, there was a clear indication that high-speed Internet is being used by students to complete coursework and make progress towards graduation. The news media often advertises high-speed Internet for its entertainment value; however, this study suggests that students value high-speed Internet for continuing their education.

Research Question 1

Research question 1 asked if WSCC students used computer labs on campus because the Internet was faster than at their home. There was a significant relationship between type of Internet connection at home and using the computer labs on campus for coursework. Overall, students who use computer labs on campus generally did not use them because of a faster Internet connection. However, when specifically looking at those students who did not have a cable or DSL connection from home, the usage of computer labs because a faster Internet connection was significant. Over three fourths of dial-up users and a little more than half of satellite users specifically stated they used the WSCC computer labs mainly because of a faster Internet connection. As noted in the literature review, the areas relying on a dial-up or satellite connection are generally located in rural areas and therefore are further from any of the WSCC campus labs than those students with cable or DSL connections at home.

The extent to which WSCC students had taken a web-based course based on the type of Internet connection at home was part 2 of research question 1. It was significant to find that students with a faster Internet connection at home were more likely to have taken a web-based course. The majority of students included in the survey have taken a web-based course regardless of the type of Internet connection at home including those without any Internet connection at home. Over 58% of respondents had taken a web-based course; however, those students relying on a dial-up connection or without an Internet connection at all were less likely to have taken a web-based course. The data did not provide any additional insight as to a possible reason for a smaller percentage of students with a dial-up or no Internet connection indicating they have taken a web-based course.

The type of Internet access at home compared to the frequency of use of the WSCC computer labs was significant. Similar results were found with the frequency of use for coursework as was found with use due to faster Internet connection. Those students without an Internet connection at home in addition to those with a dial-up connection at home used the computer labs for coursework more often than those students with a cable, DSL, or satellite connection at home.

The type of Internet connection at home compared to the frequency of use of the Internet for coursework completion was not significant as was the use of computer labs. Internet use at home for coursework was consistent within each group category of usage no matter the type of connection at home. However, the data did show that the highest percentage of daily use was associated with the fastest type of Internet connection at home, a cable modem connection.

Research Question 2

The age of WSCC students was not a determining factor of the type of Internet connection the student has from home. The literature review as well as previous research would expect the younger the student the more likely that student would have a faster Internet connection at home. The data do not suggest that a digital divide exists and therefore is a reason for a lack of Internet service or a slower speed of Internet service at home.

Students who specifically indicated on the survey that they did not have Internet service at home were asked to identify reasons for not having Internet access at home. The ranking in order of greatest number of responses to fewest number responses are as follows:

1. Costs too much

2. Speed too slow

3. Service is poor

4. No computer at home

5. Reason other than listed on survey

6. Not needed

The above rankings show that a barrier to broadband adoption is the financial burden placed on students combined with other student-related costs such as tuition and books make broadband service at home too expensive. A financial burden was also identified in the literature review as a barrier for broadband adoption.

The importance of high-speed Internet service related to coursework completion was examined to determine the use of the Internet to complete coursework. The data showed that almost 65% indicated that high-speed was very important for coursework completion. When the age of the student separated the responses of how important high-speed Internet service was to

the completion of coursework, then a relationship was identified between the age of the student and the importance of Internet service to coursework completion. The data showed that older students did not feel high-speed Internet was as important to coursework completion as younger students. The percentage decrease was not a large margin, but the relationship between age and importance of high-speed Internet was significant.

Research Question 3

Research question 3 was intended to find what extent financial need as determined by Pell Grant awarded to each student determined the type of Internet connection the student had at home. The data did not show that students receiving Pell Grant for spring semester 2010 were less likely to have high-speed Internet at home. There was a slight percentage increase in the number of students with no Internet connection at home who were receiving Pell Grant compared to not receiving pell grant but that relationship was not significant for any type of Internet connection at home. Overall, 40% of students responding in the survey indicated that they had a cable modem Internet connection at home. Just over 40% of those students did not receive Pell Grant for spring semester 2010, and just fewer than 40% of those students did receive pell grant for the same semester.

Conclusions

The following conclusions and recommendations for practice were developed from the data analysis and the literature review:

1. Over 20% of survey respondents indicated that they did not have Internet service at home or only dial-up service at home. WSCC should continue to follow the Federal

broadband initiative included in the American Recovery and Reinvestment Act of 2009 (ARRA) to try and identify opportunities for broadband expansion for the Walters State service area such as grants or vendors planning broadband expansion projects in the area.

2. The federal government's ARRA program has funding available that encourages investment and innovation in broadband technologies.

3. Sevier and Cocke counties were the two counties selected most by survey respondents indicating no Internet connection or a dial-up connection from home. WSCC should continue to work with www.connectedtn.org and their Tennessee's Technology Trends assessment and the development of BroadbandStat which is a broadband inventory map that provides a visual aide for broadband coverage in Tennessee.

4. AT&T and Charter Communications are the two most frequently used high-speed Internet providers according to the survey respondents. Additionally, over 30% of respondents were dissatisfied with their high-speed Internet service. The Tennessee Board of Regents (TBR) should work with vendors providing broadband Internet service in Tennessee on ways to reduce the cost of high-speed Internet service for students enrolled in community colleges in Tennessee. The purchasing power of the Tennessee Board of Regents is used every day to negotiate reduced prices for items needed to operate the colleges and universities that are part of the TBR system. The same purchasing power could be used to negotiate lower monthly charges for Internet service for students enrolled in the TBR system.

5. Nearly 65% of survey respondents indicated access to high-speed Internet was very important to coursework completion. A suggestion box on-line should be setup for

students with suggestions, questions, and recommendations concerning Walters State computer labs.

6. The data showed that 52% of survey respondents used their Internet connection from home on a daily basis. Students from all campuses should be involved to ensure technology made available to the entire student population is beneficial for students in most of the Walters State service area.

7. Over 33% of respondents said the Internet costs too much as a reason for not having access at home. Walters State students are currently allowed to check-out laptops from the Walters State library. Walters State could develop a plan to include a wireless card on some of the laptops available for checkout. This would allow some Internet access at home for those students currently without Internet service at home.

8. Currently 6 of the 10 counties in the Walters State service area do not have a campus site in their county. Over 67% of respondents without an Internet connection from home use WSCC computer labs multiple times each week. Therefore, Walters State should explore partnerships with local libraries or governments to provide computer lab space to make access easier to those labs for Walters State students.

Recommendations for Practice

The study provided ongoing recommendations for practice as follows:

1. WSCC computer lab availability should continue to be monitored on a semester basis for operating hours and locations to ensure students receive maximum benefit from labs.

2. WSCC should continue to monitor type of Internet access for currently enrolled students from their home to determine if broadband growth is benefiting the service area.

Recommendations for Further Study

The study provided a broad overview of the broadband access and usage of high-speed Internet for coursework for Walters State students; however, the following represent recommendations for further study:

1. A similar study should be conducted to compare other community colleges in Tennessee, especially those community colleges with rural service areas, in order to establish a baseline for broadband coverage and Internet usage for students attending community colleges in Tennessee.

2. This study could not identify cost students were paying for high-speed Internet service. It was difficult to determine the monthly cost for high-speed Internet because many students have a package plan for Internet that includes television and phone service. Also, some students who completed the survey were not responsible for paying for Internet service; therefore, they were unaware of the cost of high-speed Internet. Therefore, a study should be conducted exclusively focused on price per month a student is paying for Internet service because price was the number one reason for not having high-speed Internet service at home.

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APPENDICES

APPENDIX A

**Walters State Community College Residential Broadband Access
Online Student Survey**

This brief survey is designed to gather information regarding Walters State student access to high-speed Internet. Your responses to this questionnaire are strictly confidential. Information regarding the location of your residence is for the purpose of identifying areas where high speed Internet service is unavailable or where the service is poor. Your participation in this survey is greatly appreciated.

1. What is your age? _____

2. Are you receiving a Pell Grant award this semester?
    ___1. No
    ___2. Yes

3. What is your county of residence?

    ___1. Cocke   ___ 7. Hawkins

    ___2. Claiborne   ___ 8. Jefferson

    ___3. Grainger   ___ 9. Sevier

    ___4. Greene   ___10. Union

    ___5. Hamblen   ___11. Other (Please specify) _____

    ___6. Hancock

4. What town/city is your mailing address? _____

5. What is your home zip code? _____

6. How do you connect to the Internet at home? (check one)

    ___1. I do not have Internet service at home
    ___2. Dial-up access
    ___3. Cable modem
    ___4. DSL modem
    ___5. Satellite modem

6b. If you do not have Internet access at home, please indicate the reason(s). (Check all that apply.)

     ___1. I don't have a computer at home
     ___2. I don't need Internet access at home
     ___3. Internet service costs too much
     ___4. Internet speed is too slow
     ___5. Internet service is poor
     ___6. Other (please specify) _____

7. Regardless of whether you have high-speed Internet at home, how many <u>high-speed</u> Internet service providers are in your area? Your best guess is fine. (Check one.)

     ___1. none
     ___2. one provider
     ___3. two providers
     ___4. more than two providers
     ___5. don't know

8. What company provides your <u>high-speed</u> Internet service at home? (check one)

     ___1. I do not have Internet access at home (Go to Question 12)
     ___2. I have dial-up Internet service (Go to Question 11)
     ___3. AT&T
     ___4. Charter
     ___5. Comcast
     ___6. Embarq
     ___7. Wild Blue
     ___8. Frontier
     ___9. MUS Fibernet
     ___10. Other (Please specify) _____

9. Approximately how much do you pay for <u>high-speed</u> Internet service per month?
     $_____ per month

10. How satisfied are you with the speed/quality of your <u>high-speed</u> Internet service at home?

     ___1. Very dissatisfied
     ___2. Dissatisfied
     ___3. Neutral
     ___4. Satisfied
     ___5. Very satisfied

11. Do you ever use a Walters State computer lab specifically because Internet access on campus is faster than your Internet service at home?

    ___1. No
    ___2. Yes

12. Have you ever taken (or are you currently taking) an online course at Walters State?

    ___1. No
    ___2. Yes

13. How important is <u>high-speed</u> Internet as it relates to your coursework?

    ___1. Not at all important
    ___2. Only somewhat important
    ___3. Moderately important
    ___4. Important
    ___5. Very Important

14. How often do you use the Internet for your coursework at home?

    ___1. Never
    ___2. Once or twice a semester
    ___3. A few times per semester
    ___4. Several times a semester
    ___5. Once a week
    ___6. More than once a week
    ___7. A few times a week
    ___8. Daily

15. How often do you use or plan to use a Walters State computer lab for coursework?

    ___1. Never
    ___2. Once or twice a semester
    ___3. A few times per semester
    ___4. Several times a semester
    ___5. Once a week
    ___6. More than once a week
    ___7. A few times a week
    ___8. Daily

Thank you for your participation!

Permission to Conduct Research

MEMORANDUM
PLANNING, RESEARCH AND ASSESSMENT

TO:　　　Lori Campbell

　　　　　　Wade B. McCamey

FROM:　　Debbie McCarter, Vice President for Planning, Research and Assessment

DATE:　　January 26, 2010

SUBJECT:　Dissertation Request

RECEIVED
FEB 1 2010
OPRA

Attached is a dissertation request from Mr. Mark Hurst, a doctoral candidate at East Tennessee State University. This research study will examine the availability and usage of residential broadband access at Walters State through an enrolled student survey that will be posted on the main page of D2L, the college's web-based instructional system. I have discussed this proposal with Dean Linda Roberts who is supportive of the project. Dean Roberts and I believe that findings from the study may inform Walters State decision making regarding Distance Education.

Please note that Mr. Hurst is requesting minimal demographic material and is not seeking information that will easily identify students. The researcher will not be able to view individual survey results; data will be extracted by authorized WSCC staff and summarized in an Excel spreadsheet. Student participation in the survey is voluntary and no one will be penalized for refusing to complete the survey. I recommend approval of this study as detailed in the accompanying application from Mr. Hurst. If you concur with the recommendation, please sign as indicated on the attached materials. Please call if you have questions or need additional information. Thank you.

vm

Attachment

WALTERSSTATE
THE GREAT SMOKY MOUNTAINS COMMUNITY COLLEGE
A Tennessee Board of Regents College

Request ID: N/A   Approval #:N/A

Human Research Project Information Form
Walters State Community College
Institutional Review Board

Application Date: 1/26/2010

Project Title: Residential broadband access for Walters State students

Study Director

Name:	Mark A. Hurst
Division:	College Advancement
Program:	ETSU ELPA program
Office Location:	CCEN 107B
Phone Number:	(423) 585-2619
Email Address:	Mark.hurst@ws.edu

Funding Source

☐ Grant: ☐ Corporate:

☐ Federal   Company: NA

☐ State   Contact Name: Title:

☐ Intramural Address: Email:

☐ Non-Profit City: Phone:

☒ None   State ZIP:

Project Period

From: *(02/15/10)*

To: *(03/31/10)*

Other Participating Institutions/Organizations

Institution	NA	Institution	
Contact Name		Contact Name	
Role on Project		Role on Project	
Email		Email	
Phone		Phone	

Institution	
Contact Name	
Role on Project	
Email	
Phone	

Request ID: N/A   Approval #:N/A

Institution	
Contact Name	
Role on Project	
Email	
Phone	

Signatures:

Study Director:

Signature: _Mark A Hunt_   Date: _1/26/2010_

Vice President for Planning, Research and Assessment: Dr. Debra L. Scott

Signature: _Debra Scott McCarter_   Date: _1/26/10_

Vice President for Academic Affairs: Dr. Lori Campbell

Signature: _Lori Campbell_   Date: _1/28/10_

President: Dr. Wade B. McCamey

Signature: _Wade B. McCamey_   Date: _1-29-10_

APPENDIX C

Number of No Internet and Dial-up Responses by County

Tennessee County of Residence	No Internet Connection	Dial-up Connection	Total
Claiborne	1	5	6
Cocke	6	18	24
Grainger	5	1	6
Greene	7	11	18
Hamblen	10	6	16
Hancock	1	6	7
Hawkins	7	8	15
Jefferson	9	14	23
Sevier	11	16	27
Union	2	1	3
Outside WSCC Service Area			
Carter	1	0	1
Knox	0	2	2
Washington	1	0	1
Total	61	88	149

APPENDIX D

Counties of Responsibility for Walters State Community College (Tennessee)

(Walters State Community College, 2010)

VITA

MARK A. HURST

Personal Data: Date of Birth: February 2, 1971
Place of Birth: Morristown, Tennessee
Marital Status: Married

Education: B. S. Human Ecology, University of Tennessee, Knoxville,
Tennessee 1995

M.B.A. Business Administration, East Tennessee State University,
Johnson City, Tennessee 2000

Ed. D. Educational Leadership, East Tennessee State University,
Johnson City, Tennessee 2010

Professional
Experience: Financial Analyst for Business Affairs, Walters State Community College,
Morristown, Tennessee, 1995 - 2006

Director of Accounting for College Advancement, Walters State
Community College, Morristown, Tennessee, 2006 – 2009

Director of Advancement Services, Walters State Community College;
Morristown, Tennessee, 2009- current