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Residential Broadband Access for Students at a Tennessee Community College

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ABSTRACT

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

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-seeking students of the college 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 have 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 students and increased the body of knowledge for internet availability in the surrounding counties of the institution.

INTRODUCTION & STATEMENT OF RESEARCH PROBLEM

A community college must 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, Desire2Learn (D2L, 2009) and Banner Self-Service, are readily available on the community college campus of this study and are considered conveniences for that 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 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. This may be impractical for many students because of the distance those students commute to attend class.

The problem this study addressed was to determine the availability of broadband access for students attending during spring semester 2010 at a community college in east Tennessee during the spring semester of 2010. 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.

RELATED LITERATURE

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 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.

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, 2008a). Technologies used for such transmission include digital subscriber lines and fiber optic cables, coaxial cables, wireless technology, and satellite. Because of the speed of broadband, convergence of voice, video, and data services onto a single network becomes possible. The FCC (2008b) stated that 99% of the United States had at least one available service provider. However, a key criticism of the FCC's broadband report 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.

METHODOLOGY

Research Questions

The following questions related to residential broadband access for the targeted community college 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 college 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 college computer labs; and (d) how often students use the internet for coursework at home.
- 2) Are there relationships between age and how students connect to the internet from home and 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?

Population

The survey was administered to a sample of students enrolled in classes for the spring semester 2010 at all campus locations, including four off-campus sites, 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 access to D2L; however, not all courses require students to use the Desire2Learn system.

Instrumentation, Data Collection, and Analysis

A survey, collecting minimal demographic information and using primarily Likert-type items, was developed and used for data collection. The instrument was administered electronically during the Spring 2010 semester through the Desire2Learn system, which is used by the majority of courses offered at the college. A series of chi square tests were used to analyze the data and address the research questions

FINDINGS

Research Question 1

Are there relationships between the type of internet service students have at home and (a) whether students use college 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 the college's computer labs; and (d) how often students use the internet for coursework at home.

A chi-square for independent samples was used to determine if there were significant differences among the types of internet access students have at home and whether or not they have used college computer labs because the internet access is faster on campus. The chi-square test was significant, $\chi^2(3, N=679) = 106.887, p < .001$. The strength of the relationship between the type of internet access students had at home and their use of college computer labs as measured by Cramer's V was moderate (.40). 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.

A chi-square for independent samples was used to determine whether or not there were significant differences among the types of internet access students have at home and whether students have taken a web-based course at the college. The chi-square test was significant, $\chi^2(4, N=740) = 17.335, p = .002$. 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 the college. Thus, students with faster internet connections at home were significantly more likely to have taken a web-based course. Slightly over 36% 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.

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 college computer labs for coursework. The chi-square test was significant, $\chi^2(12, N=740) = 60.105, p < .001$. 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 college

computer labs. 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 college 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 computer lab more than once a week, while 23% of students with cable access at home (fastest access) used a college computer lab more than once a week.

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. 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, $\chi^2(6, N=679) = 11.099, p = .085$. 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. 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.

Research Question 2

Are there relationships between age and how students connect to the internet from home and between age and student perceptions of the importance of high-speed internet access as it relates to their coursework?

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, $\chi^2 (12, N=740) = 14.138, p = .292$. 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. In other words, for each type of internet service at home, the percentages of students across the four age categories were very similar. 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%).

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. The difference between the age of a student and the importance of high-speed internet for coursework was significant, $\chi^2 (6, N=61) = 26.075, p < .001$. 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 students was an indicator of students' perceptions of the importance of internet service to their coursework. 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.

Research Question 3

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

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, $\chi^2 (4, N=740) = 3.684$, $p = .451$. Thus, whether or not a 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). 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.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations were developed from the data analysis and the review of related literature:

1. Over 20% of survey respondents indicated that they did not have internet service at home or had only dial-up service at home. The specific community college should continue to follow the Federal broadband initiative included in the American Recovery and Reinvestment Act of 2009 (ARRA) to try to and identify opportunities for broadband expansion for their 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. Two particular counties in the service area were selected most by survey respondents indicating no internet connection or a dial-up connection from home. The college should continue to work with www.connectedtn.org (Ramage, 2007, 2009; Tennessee Technology Trends, 2009) 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. According to the survey respondents, high-speed internet is primarily provided by two companies. Additionally, over 30% of respondents were dissatisfied with their high-speed internet service. The Tennessee Board of Regents (TBR) should work with additional 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.
5. Nearly 65% of survey respondents indicated access to high-speed internet was very important to coursework completion. An on-line suggestion box should be setup for students to submit suggestions, questions, and recommendations concerning 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 service area.

7. Over 33% of respondents said the internet costs too much as a reason for not having access at home. Students are currently allowed to check-out laptops from the library. The college 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 college's service area do not have a campus site in their county. Over 67% of respondents without an internet connection from home use college computer labs multiple times each week. Therefore, the college should explore partnerships with local libraries or governments to provide computer lab space to make access easier to those labs for students.
9. Computer lab availability should continue to be monitored and reassessed on a semester basis for operating hours and locations to ensure students receive maximum benefit from labs.
10. The college 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.

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