

Theory-to-Practice

Rural Internet Use Via Broadband Connections: Real Challenges for Lifelong Learning

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Abstract

Internet use is increasing each year. Unfortunately, such usage in rural areas is lagging behind urban and suburban areas primarily because of few broadband connection opportunities. The American Distance Education Consortium is directing a multimillion dollar National Science Foundation grant to bring broadband Internet to various rural communities in the United States via satellite transmissions. The research project reported in this paper, one of several coordinated efforts by the authors, involved obtaining interview data from 51 people in three rural communities. Rural users were found to quickly become avid and fairly sophisticated Internet users, with such connections becoming essential means for enhancing their lives. Numerous implications for e-learning were determined.

Introduction

The United States is approaching 1.5 billion Internet addresses, used by more than 200 million people; the European Union has more than 215 million users; and China is emerging rapidly with more than 87 million users (Miniwatts International, 2005). Thomas Friedman's (2005) run-away best seller declares that the world is now flat and the

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power of Internet connecting is unstoppable. However, as the well educated, wealthy, and urban population increasingly can't work, play, or live without constant access to the World Wide Web, those in rural and remote areas have little or no choice of provider. Typically, they only have access to the Internet via a phone modem connection and also pay more from their lower incomes for such access than do their urban or suburban counterparts.

Limited and expensive access to telecommunications infrastructure, therefore, becomes a problem for many rural people as they pursue lifelong learning, information acquisition, and the many other uses of the Internet that their urban and suburban counterparts take for granted. Unless addressed, this situation will continue to divide many of these people, who most need educational opportunities, from the so called "haves" in society. The longer this situation continues, the more will be the potential havoc that will be raised locally, nationally, and, even, internationally.

Unfortunately, creating true educational access and subsequent networking choices for people regardless of location or financial capability is confusing to adult education leaders, community developers, and policymakers. Even when choices are few, political considerations may cloud the options, raise the price, and limit learning opportunities available to those who need them most.

Furthermore, the rapid development of Internet-based content is changing fundamentally the way people access, think about, and use information for education and learning. Leadership decisions, both current and subsequent, will determine long into the future a number of things: (a) what enterprises develop and where, (b) who learns what and how they learn it, and (c) who is isolated versus who has the opportunity to become a fully engaged citizen of local and worldwide communities. In essence, without strategies for full participation, certain populations will remain marginalized and cannot share fully in the rewards of our expanding information society.

The research reported in this article will be of particular importance to those continuing educators who attempt to reach out to rural Internet users through various e-learning efforts. It stems from an American Distance Education Consortium's (ADEC) National Science Foundation (NSF) sponsored Internet Project that provides a broadband connection to hard-to-reach people through satellite transmissions (ADEC, 2005). The purpose of the research, therefore, was to determine how rural people

think about, use, and embrace the Internet when they have broadband access. Based on this desire for an enhanced understanding, three broad objectives guided this study:

1. To better understand how rural adults and youth use the Internet when it is available via broadband connectivity.
2. To better understand what types of resources, databases, and collaborative opportunities such adults and youth access over the Internet when it is available this way.
3. To examine the impact on learning for rural adults and youth who access the Internet over a broadband connection.

In essence, people living in rural, remote areas who do not have broadband access to the Internet cannot participate well in the expanding information age. Many will have fewer opportunities to enhance their learning efforts. This research is aimed at discovering new ways to increase such opportunities and understand the impact of a broadband connection.

Background on Internet Usage

In recent years studies about how people use the Internet have increased. For example, the Pew Research Center (2005) is one of two national organizations studying Internet usage. They report that online activity has grown consistently over the past several years: "Internet users discover more things to do online as they gain experience and as new applications become available" (Madden & Rainie, 2003, p. 2). They also note that "[t]his momentum often fuels increasing reliance on the Internet in everyday life and higher expectations about the way the Internet can be used in matters both mundane and mighty" (p. i).

The University of Southern California's (USC) Center for the Digital Future is the other organization studying Internet usage (Lebo, 2004). The Center established a four-year baseline for categorizing behavior and attitudes about the amount of Internet use, who is using it, and types of uses. Their year-four report on national trends revealed that the Internet has become the number one source of information for users. Their findings parallel in many ways the Pew results. The number of hours that the national population that they studied spent online increased

to an average of 12.5 hours weekly in 2004, up from 6.1 hours in 2000. Favored uses were e-mail and general browsing/surfing.

Unfortunately, rural areas lag behind urban areas:

When the Pew Internet & American Life Project first began surveying the Internet landscape in early 2000, 41% of rural residents were online, while 51% of urban residents and 55% of suburban residents were online. Rural Internet penetration . . . has remained roughly 10 percentage points behind the national average in each of the last four years. (Bell, Reddy, & Rainie, 2004, p. 2)

Bell, Reddy, and Rainie (2004) note, too, that rural residents may also have “less choice than others about the way they access the Internet” (p. 3), with fewer opportunities for broadband connections than their urban or suburban counterparts.

Broadband access to the Internet is growing steadily in the United States, although it may be slowing. Horrigan (2005) says that, by May, 2005, “approximately 66 million Americans had high-speed connections at home” (p. 6). Mason and Rennie (2004) like the potential of broadband: “Broadband technologies offer the potential to overcome many unique challenges and traditional limitations that characterize the rural economy” (¶ 1). Unfortunately, because of costs and other limitations only about 10% of rural users in the U.S. have broadband service compared to “28% of those living in urban or suburban locations” (Horrigan, 2004, p. 7) who have home access.

In terms of specific information related to learning, the Pew Center has documented how youth use the Internet in and out of school, how it enriches their lives and/or success in school, what it means to them, and how it improves their abilities to communicate with other young people and even teachers. Levin and Arefeh (2002), for example, looked at what they called the widening gap between youth who readily use the Internet and the general educational approaches of schools. They found that three in five youth under 18 and 78% of those 12-17 go online. In essence, “Internet-savvy students rely on the Internet to help them do their schoolwork” (p. 3), as it helps them do their work more quickly and it provides access to more resources than are available at school.

The Pew Center also has compiled considerable data on parents and other adults in terms of their Internet usage and attitudes about the

Internet. Parents with children under 18 also are more likely to use the Internet than non-parents. Allen and Rainie (2002) found that

70% of the U.S. parents with a child under age 18 use the Internet, compared to 53% of non-parents. That means there are almost 45 million online parents in the United States today, and they make up 43% of the U.S. Internet users. (p. 2)

In essence, the Internet is rapidly becoming a mainstream source for information. Horrigan and Rainie (2002a, 2002b) note that increasing numbers of adults expect to find what they want to learn about such topics as health care, governmental services, news, and commerce on the Web.

What does all of this mean for educators and others interested in the learning process? The power of the Internet for learning is just beginning to be understood (Web-Based Education Commission, 2000). Certainly it is providing a multitude of choices for people of all ages. For learners these choices mean that the Internet has the potential of providing resource access anytime, any pace, any path, any place. For teachers, administrators, and resource developers these choices means new opportunities. The current and other related research efforts are providing new knowledge for the learning process, accessing learning resources, and those facilitating such learning.

The Research Project

ADEC's multi-million dollar NSF-funded Advanced Internet Satellite Extension Project (AISEP) is designed to overcome some of the broadband limitations noted earlier that exist in rural areas. This project focuses on hybrid networks combining Internet2, VSAT technology, and new applications. In conjunction with Tachyon Networks Incorporated (2005) as an Internet provider via satellite transmissions and several cooperating higher education institutions, the project seeks to understand the impact of a broadband connection in rural areas by determining activities in which rural people typically engage via the Internet.

The Research Sites

The first site visited during the data collection process was the Kettunen Center in Michigan. It is located in a rural area in the lower

peninsula about 15 miles south of Cadillac. The Center, a complete conference facility, provides a variety of training opportunities to adults and youth throughout Michigan. The satellite dish is installed as a roof mount and feeds to a 12-station computer lab located in the basement. Center personnel and Michigan Cooperative Extension agents provided access to the facilities and program participants.

The second site visited was a computer lab housed in the Kinross, Michigan, Recreation Center. It is in a rural area of the Upper Peninsula 20 miles south southwest of Sault Ste. Marie. The computer lab houses 15 computers and peripheral equipment. The satellite dish is located on a raised platform adjacent to the Center. Center personnel and a Michigan Cooperative Extension specialist assisted with providing access to the Center and computer lab users.

The final site visited was the Resource Center in Marsing, Idaho, about 30 miles southwest of Boise. Marsing is an economically depressed, rural community of around 900 people, with a large percentage (23%) of Hispanic ethnicity. Although the building is quite small, it houses 15 computers and supporting peripheral equipment. The satellite is located on the building's roof. Center personnel and Idaho Cooperative Extension agents assisted with providing rooms for interviewing purposes and access to computer users.

The Research Subjects

Because of the travel required to reach the sites and limitations in the opportunities for site visits (each site was visited only twice for arrangement and data collection purposes), it was determined to seek volunteers willing to be interviewed. Letters and phone calls to known computer users, requests from personnel at the sites, and face-to-face solicitation during site visits resulted in 51 usable interviews (five from the Kettunen Center, 13 from Kinross, and 33 from Marsing), including 15 female and 15 male youth (8-18) and 14 female and 7 male adults (19 or older). Information pertaining to race and experience level also was obtained.

Data Gathering Process

The research effort utilized primarily qualitative data-collection techniques in meeting project objectives. A semi-structured interview schedule was designed as an aid to gathering needed information. It consisted of several fairly open-ended items that permitted asking similar

questions about Internet usage of each participant and subsequent probing as needed to help extract clarifying information during face-to-face interviews. In addition, by observation, perception, or initial questions information pertaining to gender, race, age, and experience with the Internet were obtained for comparison purposes.

Participant observations of people using the computers, interactions among people in each setting, and visual assessments of the computer labs and community setting at each site also added useful information. In addition, memos and field notes were written throughout the data collection and analysis process to capture ideas, insights, and speculations about the study.

Data Analysis Procedures

Qualitative data analysis allows a researcher to uncover the meaning of why people do what they do, how they think about what they are doing, and what resulting impacts exist on their lives through respondents' own words. Merriam and Simpson (1995) note that qualitative research is appropriate for naturalistic inquiry, interpretative research, field study, and participant observations. Such research strategies fit well with efforts to understand and interpret the impact of the Internet on people living in rural and remote areas of society.

QSR International's (2002) NVivo software supports qualitative research processes in various ways. It utilizes various means for handling, reducing, rearranging, linking, and displaying data so new understanding of situations, experiences, and observations can be gained. It facilitates the constant comparative method of data analysis involving a cyclical process of data collection, coding, and assessment that helps the researcher obtain a framework for understanding and describing the data (Glaser & Strauss, 1967). In essence, the ultimate goal of qualitative research is to extract significant themes, insights, and threads of meaning in complex data sets. The retrieval power, storage capacity, and speed possible through computer software made the NVivo software an important aid in the data analysis process for this study.

The initial coding process involved reading the transcribed interviews two or three times depending on the complexity or length of various passages in an interview. During this process notes were made, additional analysis memos written, and codes and descriptors for specific meanings created. Initial coding categories (referred to as "nodes" in NVivo) centered on several categories:

- Impact on community
- Experience level with the Internet
- Barriers/hurdles/problems
- Type of Internet usage or activity
- Success promoters
- Education or learning activities
- Enjoyment level
- Online uses in terms of learning
- Skill transference to life
- Self-directed learning preferences

Quantitative analyses were helpful minimally in this research effort because of the small numbers. In some cases simple tallies of various categories or components within a category aided in describing the findings. It was intended originally that various statistical comparisons would be made. However, dividing the sample into groups based on the various demographic descriptors resulted in such small cells that only a few comparisons (a testing of null hypotheses) were deemed useful as a means for explaining or showing differences. Version 6.1 of SPSS, a computer software package designed to assist in various quantitative analyses, was used in the current research project.

As noted above, only a few statistical comparisons were made in this research effort to examine differences among various groupings of the respondents. A correlation coefficient can be used to represent the linear relationship between two sets of data or categories. For example, are individuals with some demographic characteristic responding to interview questions the same or differently than those with a different characteristic, such as experienced versus inexperienced respondents? The Spearman rank order coefficient depends on the ranking of responses rather than the actual values and is useful when small numbers of subjects are utilized. Consequently, Spearman was used as another means for understanding better similarities and differences in respondents via four null hypotheses that are described in the next major section.

Internet Uses

Qualitative Results

During the interviews one of the areas respondents were asked to describe was the type of activities for which they use the Internet. Most

people talked quite freely and enthusiastically during their responses. Surprisingly, almost all respondents appeared to have quickly adopted Internet-use patterns, techniques, and approaches that one might have expected to find among sophisticated urban and suburban Internet users. They make wide, varied, and frequent use of the Internet when there is a broadband connection, complain whenever access speeds are slow, use fairly complex “Internet” terminology, and appear to have become quite proficient with search techniques. For example, interviewees checked to see what was playing at the cinema in the next town, learned what they could about topics of interest, made reservations for an upcoming vacation, and looked up words in various languages. They also searched for information about health topics, found recipes, listened to music, pursued hobbies, took online courses, and talked with friends or relatives about what they were doing. Following is a sampling of such uses in the participants’ own words.

A 19-year-old experienced male user from Idaho also had taught classes at the center and displayed some sophisticated insight on how to increase personal knowledge:

I use it to find information on things that I’m interested in, . . . and I help the kids on the Internet, help them build their Web sites. . . . Like if I see something on the news and it interests me and I want to find out more about the subject, I’ll go . . . to Mamma.com, my search engine, because it’s the best one.

A 13-year-old Hispanic female and experienced user living in Idaho made several uses of the Internet:

I type in my e-mail and I play NeoPet and I do research. I do the WebQuest things they do here. . . . It helps with my typing. I look up things. . . . I go to MSN and then I enter search and, say, I go, if I want to look up pets and it gives you a lot of details about pets and all these references that have pets.

A 29-year-old American Indian male and experienced user from Michigan made some eclectic uses of the Internet, even drawing on an interest related to his childhood:

I collect toys and a lot of Japanese cartoons. I use it for a lot for the animation and surfing the web. My Dad and most of my family served [in the Air Force], so I am an Air Force brat. So I use it to look up a lot of stuff on military equipment and everything in general and just to surf.

A 14-year-old female and experienced Internet user from Michigan put it this way:

E-mailing, searching, and I use it to take an Internet class. I chat with people from different countries, and I, oh well, I do some stuff for school.

A 47-year-old female and experienced user from Idaho commented:

Well, I do more searching things out like, I don't know, health issues, vitamins, and then . . . e-mail. We're in a home school group that you go to a Web site to read an article or something, you know, there's quite a bit of that.

A 47-year-old male and beginning user from Michigan was enthusiastic:

I've used it for references on different things, for medical problems, and I listen to a lot of country music there . . . and talk with other people from around the country on there, too. . . . I have used it for to look up, with my diabetes, and since my Dad got cancer they have a, I think it's called cancer.com, where you can speak with other people with cancer.

A 50-year-old experienced Idaho female took two courses on Microsoft software related to her teaching expertise:

The Word course I did take online. It was free and that's how I learned a lot before I started teaching it because I really didn't use Word. . . . I took another Excel course so that maybe I could teach at another level.

The sample quotes above reveal how many people intuitively understand that their user-derived needs often can be met through the Internet. They are asking interesting questions about life, personal interests, and essential needs. Having a means for meeting such needs fairly quickly and efficiently becomes an important tool in developing learning skills.

Quantitative Results

This research effort also extracted specific information on how the Internet is being used by interviewees. As noted earlier, the Spearman correlation coefficient provides an indication whether or not statistical differences exist between groups. For example, differences can be seen between the 21 adults and 30 youth. Figure 1 shows that youth play games more and, as might be expected, use the Internet for homework. Adults do more browsing, look more for news, and pursue hobbies. The Spearman coefficient suggested that the null hypothesis of no relationship between the ways they use the Internet cannot be rejected. Care must be taken in interpreting the information because of sample size. Although a test of the alternative hypothesis was not attempted, the implication of group dissimilarities is implied. Future research to clarify and confirm these results will be useful in delineating different programs aimed at helping the two groups.

Three other comparisons were made. First, 37 experienced Internet users (one or more years of use) were compared with 14 inexperienced users (less than one year of use). The null hypothesis of no relationship between the two groups was rejected at the .01 level using the Spearman correlation coefficient. There also were no significant differences between the 29 females and 22 males and between the 13 minority subjects and 38 white subjects. Again, the small sample size characteristic of a qualitative approach and combining youth and adults on the last three comparisons provide unknown limitations. Obviously, future research is needed to obtain more clarifying information.

The broader picture does suggest, however, that these rural users were involved in a multitude of activities and they showed considerable sophistication as they used the Internet to meet personal needs. Their patterns are similar in some ways to those found in previous studies, but they differ in other ways. Further studies with hard-to-reach people who can access broadband Internet will shed additional light.

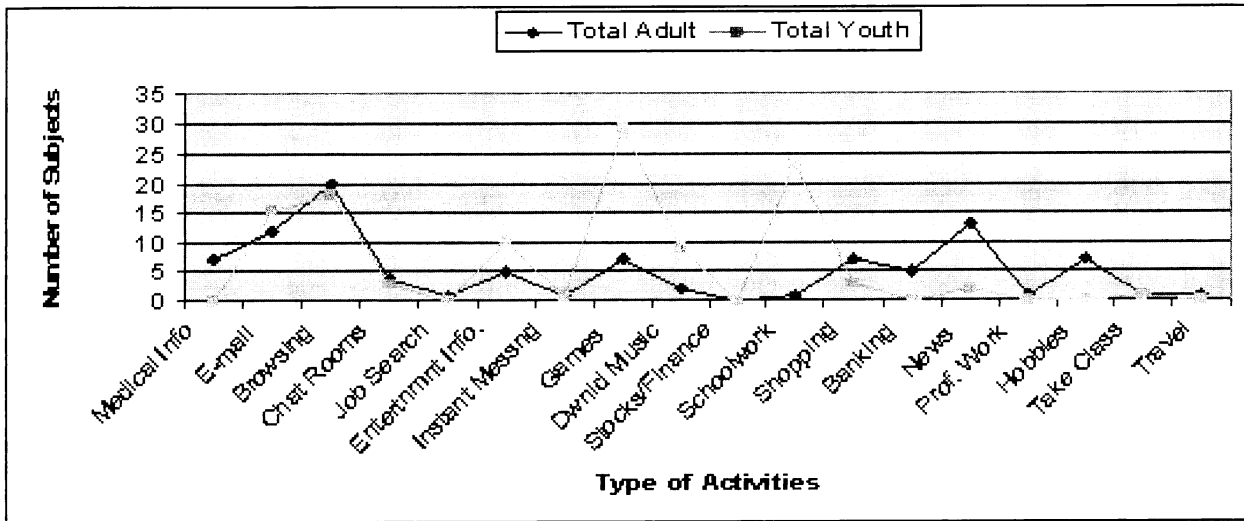


Figure 1. Use of the Internet by Rural Subjects: Adult and Youth Comparisons. Spearman rank correlation coefficient is .408; significance is greater than .05.

What Does This All Mean For Continuing Educators?

What are the real challenges for lifelong learning? In our knowledge-based world investing in human capital becomes increasingly more important: "Lifelong learning, both formal and informal, is the key to developing appropriate skills and maintaining employability. Increasingly the skills of knowledge workers lie in the domain of 'learning how to e-learn,' and clearly this requires good connectivity" (Mason & Rennie, 2004, ¶ 9).

Many educators already are making increasingly more use of e-learning to reach learners. Allen and Seaman (2004) note that online enrollments continue to grow at fast rates and such rates will only increase—"The expected average growth rate for online students for 2004 is 24.8%, up from 19.8% in 2003" (p. 1)—with such growth far exceeding "the overall rate of growth for the entire higher education student population" (p. 5). In terms of numbers, these researchers predicted nearly two million online enrollees in 2004. Reaching more rural learners who have broadband connections via e-learning is a likely outcome.

Isoph (2004) found that e-learning was used for such purposes as staff training, workshops, and volunteer training. In terms of a learning approach, "on-demand, self-paced e-learning is the most common e-learning format" (p. 2). Continuing educators seeking to serve a broader base, especially those in rural areas who often are underserved, can continue to utilize e-learning for such purposes. ADEC has experimented successfully with various online activities, real-time webcasting to multiple rural locations, and the utilization of numerous multimedia. Further experimentation will only add to our understanding of how best to serve rural learners.

Based on the study's results, we know, too, that people living in rural and remote areas will become avid users of broadband Internet if opportunities to do so exist. With experience such use often becomes more sophisticated, essential, and conducive to making a real difference in the lives of people and, subsequently, in their communities. National efforts by the Pew Research Center and USC's Center for the Digital Future, cited earlier, also confirm this trend. Having access to broadband Internet, such as the satellite transmissions that are foundational to the rural users studied in this project, facilitates use in rural areas. Continuing educators can work with those organizations in rural settings,

such as libraries, community centers, and Tribal colleges, that have access to broadband Internet to encourage participation in corresponding programs.

Essentiality becomes a probable outcome from understanding and embracing the power of the Internet. After interviewing 51 people, observing what was going on in parts of Idaho and Michigan, reading and rereading those interview transcripts, and finding ways to make a whole from the various parts, a conclusion can be reached. At least in those rural sites visited the Internet has become an essential means for enhancing the lives of many of these people.

In many respects the power of broadband Internet helps rural people think of it as their encyclopedia, *World Book*, and “go to” source of information needed for life. Yes, that capability includes playing games, e-mailing friends, listening to a song, and booking an airplane ticket for that get-away vacation. However, who can say that such snatches at joyful living aren’t just as essential as finding help for a college course, chatting with someone about your Dad’s cancer, or locating the information necessary for submitting a funding proposal? As a 14-year-old female in Michigan said, “Anything that you want is there. The whole world in a computer!”

This embracing of the whole world in a computer through Internet access even seems to be extended as these rural users gain experience and discover new applications. The interviewees seemed to become knowledgeable quite quickly about the Internet, computers, and various associated applications. As noted earlier, even a fairly new user often was employing the language, concepts, and approaches associated with Internet familiarity that one might expect with a very sophisticated and experienced user. Website names and URLs, common Internet jargon, complaints about slow computers, discerning comments about which search engines did what, and even Webpage-design talk emanated from Internet users of all ages.

Development of the AISEP came about because ADEC leaders believed that there were better ways to serve those living in rural and remote areas through the use of technology. The NSF and several cooperating institutions provided important financial support so that new models and approaches to providing access to broadband Internet could be determined. Developing a more inclusive future for learning that serves all people is crucial for the United States (Hiemstra & Poley, in press). As a female in Michigan said, “In my sleep I dream about

computers.” Can continuing educators turn the promise of that e-dream into reality for more people?

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