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Abstract

"Raising the level of digital inclusion by increasing the number of Americans using the technology tools of the digital age is a vitally important national goal" (U.S. Department of Commerce, 2000). The study reported here focused on Extension administrators throughout the United States to gauge their opinion concerning the role of Extension in bridging the digital divide. It was found that a perceived digital divide existed. Extension administrators expressed that Extension was an adequate mechanism to combat this societal dilemma. Recommendations included establishing strategic partnerships with local community groups to provide technology access and training for residents.

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Introduction

Access to the Internet and other digital technologies has rapidly become a necessary tool to function in today's highly information-rich society. The Internet is utilized by Americans for a variety of tasks such as business transactions, personal correspondence, research and information gathering, and shopping. In order for an individual to advance economically, educationally, and socially, being digitally connected is even more vital. "Now that a large number of Americans regularly use the Internet to conduct daily activities, people who lack access to these tools are at a growing disadvantage. Therefore, raising the level of *digital inclusion* by increasing the number of Americans using the technology tools of the digital age is a vitally important national goal" (U.S. Department of Commerce, 2000).

This phenomenon of individuals lacking digital access is popularly known as the "digital divide." The digital divide, as defined by Cyber Outreach (2002), is "the gap that separates those who have access to technology and the Internet and those who do not, a disparity which exists along the lines of education, income, and race." What role can the United States Cooperative Extension Service play in alleviating the digital divide?

Digital Divide Demographic Overview

Overall, the number of households with access to the Internet has increased; additionally, more households are increasingly acquiring computers. The gap between rural households and households nationwide narrowed in 2000; however, a great disparity still exists. Additionally, in relation to age, while younger Americans are most likely to utilize the Internet, an increasing number of Americans over the age of 50 are becoming connected to the Web for leisure and

occupational purposes.

The number of individuals using the Internet rose by a third from 32.7 in December 1998, to 44.4% in August of 2000 (U.S. Department of Commerce, 2000). However, disparities still exist economically, socially, ethnically, and racially. Individuals with the greatest access to digital technology are Whites and Asians/Pacific Islanders, who, on the average, have higher incomes, more education, and dual-parent households. Moreover, the information-poor are usually African-Americans or Hispanics, who, statistically, have lower incomes and education levels than the information rich and who also often reside in rural areas or central cities (Cyber Outreach, 2002).

According to Cyber Outreach (2002), households with incomes of \$75,000 and higher are more than 20 times more likely to have access to the Internet than those at the lowest income levels and more than nine times as likely to have a computer at home. African-American and Hispanic households are approximately one-third as likely to have home Internet access, as are households of Asian/Pacific Islander descent and approximately two-fifths as likely as are White households. The theoretical framework for this study was guided by Rogers's (1995) diffusion of innovations theory.

Purpose and Objectives

The purpose of this study was to determine the perceptions of Extension administrators throughout the United States toward bridging the digital divide. Three objectives were developed to guide the study:

1. To determine the demographic characteristics of Extension administrators throughout the United States;
2. To determine the perceptions of Extension administrators regarding socio-demographics in relation to the digital divide;
3. To determine the role of Extension in bridging the digital divide as perceived by Extension administrators throughout the United States.

Methodology

A census study of all 82 state Extension Service directors as listed in the 2002 Directory of State Extension Service Directors and Administrators was conducted. A mixed mode survey design was utilized, combining traditional mailings with email surveying (Dillman, 2002). Researchers designed a survey instrument based on the objectives of the study. The instrument consisted of three sections: Part I. Digital Divide Socio-Demographic Characteristics, Part II. Extension in the Digital Divide, and Part III. Demographics. Parts I and II consisted of Likert-type items; Part III consisted of a series of open-ended and multiple-choice items.

The validity of the instrument was verified by a panel of university professors at both institutions. A pilot test of the instrument to measure instrument reliability was conducted in February 2003 with 15 of the state Extension directors and administrators listed in the directory. The survey was sent by email to Extension directors, with instructions to return the survey within a week: 10 surveys were returned. No adjustments were made to the instrument as a result of the pilot study. The pilot study resulted in a Cronbach's alpha reliability coefficient of .88; thus, the instrument was deemed to be reliable.

The final survey was conducted on the remaining 67 Extension administrators. An initial letter notifying the Extension administrators of the survey was sent by mail 1 week after the pilot study concluded. Respondents were asked to verify their correct email addresses if different from the ones stated in the letter by sending the correct ones electronically to the researchers. Those who preferred a traditional mail survey were allowed this option and were asked to notify the researchers accordingly.

One week after the initial mailing, the survey was sent to each administrator by email with instructions. After 1 week, a reminder email was sent, which resulted in 10 more surveys being received. After this had been accomplished, a full survey packet was mailed to all non-respondents through traditional mail, which resulted in five more surveys. Finally, follow-up phone calls were made to all nonrespondents in order to yield a maximum return rate; five more surveys were received from this round. The final response rate was 35% (N = 24).

Because the number of responses was small, because the pilot study participants were members of the target population, and because the pilot study did not result in any changes to the instrument, it was decided by the research team to pool the pilot study results with the final results, which yielded an overall all response rate of 43% (N = 36). In order to control for nonresponse error, Lindner, Murphy, and Briers (2001) recommended comparing early to late respondents. Research has shown that late respondents are often similar to nonrespondents; no differences were found.

Findings

Objective One

A substantial number of the respondents were male (86%). Nearly 80% were white, and 17% were black. The majority (86%) of Extension administrators possessed a doctorate and had been with Extension for an average of 11-15 years. Respondents had been administrators for an average of 11 years and had taken between three-five training programs in the area of technology since January 2000.

For the purpose of data analysis, readers should utilize the following specifications when interpreting Tables 1 and 2: 1-1.49 = Strongly Disagree; 1.50-2.49 = Disagree; 2.50-3.49 = Uncertain; 3.50-4.49 = Agree; and 4.5-5.0 = Strongly Agree.

Objective Two

The following results were found for objective two. In viewing Table 1, Extension administrators felt that 4-H could play an imperative role advancing in technology to improve their daily lives. While on the other hand, the mean scores indicated that the people who have most to gain are the least likely to have access to technology.

Table 1.

Means, Standard Deviations, and Ranking Results for Digital Divide, Socio-Demographic Statements

Statements	Mean	SD	Rank
The 4-H youth development component of the Extension Service can aid in educating youth about the advantages of technology access in order to improve their daily lives.	4.52	.63	1
Individuals of higher educational attainment levels are more likely to have access to the Internet than individuals of lower educational attainment levels.	4.42	.76	2
Extension can aid minority communities in gaining wider access to technology.	4.10	.79	3
Extension can aid lower income communities in gaining wider access to technology.	4.00	.77	4
Alternative means of technology access for rural areas can be developed by Extension.	3.97	.75	5
The information poor are left out of the opportunity to use the Internet to improve and advance their current status by using it to search for jobs, to take courses, or to do school research.	3.84	.78	6
Alternative means of technology access for urban areas can be developed by Extension.	3.68	.94	7
The digital divide is becoming more pronounced as the information rich outpace the information poor.	3.61	1.02	8
The technological gap between rural households and households nationwide has narrowed over the past two years.	3.52	.96	9
The people who have the most to gain from using the Internet are the same people who are the least likely to have access to it.	3.35	.98	10
Note. 1= Strongly Disagree, 2= Disagree, 3= Uncertain, 4= Agree, 5= Strongly Agree			

Objective Three

The following section presents the findings of this research study for objective three.

Table 2.

Means, Standard Deviations, and Ranking Results Cooperative Extension In Bridging the Digital Divide

Statements	Mean	SD	Rank
Extension agents can be an effective means of encouraging farmers or other audiences to adopt digital technology.	4.35	.61	1
Extension agents should identify and utilize innovators and early adopters of technology as change agents to encourage other citizens in their perspective local communities to make use of technology.	4.35	.55	1
Extension agents should have constant in-service training in the			

latest advancements in digital technology.	4.26	.82	2
Lifelong learning applications using digital technologies and distance education offer limitless possibilities.	4.23	.92	3
Community resource development programs in Extension Programs should have a strong technology focus.	4.13	.85	4
Local Extension offices should be equipped and staffed to become local centers of learning with technology.	4.06	.85	5
Partnerships can be established by Extension to manage technological learning centers in malls, libraries and schools.	3.87	.76	6
The United States Cooperative Extension Service is adequately prepared to assist the public in bridging the current digital divide.	2.68	1.01	7
Scale: 1= Strongly Disagree, 2= Disagree, 3= Uncertain, 4= Agree, 5= Strongly Agree			

Conclusions

Based on the findings of this study, the following conclusions were reached.

1. Extension administrators perceived that the gap between rural and urban residents in relation to technology had narrowed, but still existed. In order for rural residents to take advantage of the benefits of technology, they must first be given exposure to its existence, shown the relative advantage of the technology, and allowed the opportunity to explore the innovation for their own personal use all major components of Roger's diffusion theory (1995). Extension could serve as a channel of communication to give exposure to digital technology, while simultaneously acting as a change agent encouraging more technology adoption.
2. 4-H was perceived to be a mechanism to infuse knowledge of technological innovation into youth. This directly corresponds to Roger's diffusion theory (1995), which emphasized that individuals or organizations can serve as change agents to bring about new innovations in a society. This idea was supported in a study conducted by Kolodinsky, Cranwell, and Rowe (2002) who reported that 4-H teens training senior citizens on the Internet resulted in a positive learning experience that was expressed by both groups.
3. Extension administrators perceived that minority and low-income communities could gain wider access to technology with the aid of Extension. Extension could serve as the change agent for innovation as outlined by Roger (1995). Kolodinsky et al. suggested that programs could be developed with teens/or senior citizens to reach diverse audiences such as economically disadvantaged youth and adults, special needs groups, and geographically dislocated.
4. Education was perceived as a contributing factor in whether an individual adopts a technology. This directly corresponds to Roger's diffusion theory (1995), which emphasized that innovators and early adopting individuals tend to be of higher educational levels. In contrast, a study conducted by Hall, Dunkelberger, Ferreira, Prevatt, and Martin (2003) found that education played only a supporting role in determining PC and internet adoption; however, when the researchers controlled for age, education was less significant. In this regard, it was found that adoption related to having young people in the household was positive in providing exposure to the use of technology.
5. Extension administrators were uncertain if the United States Cooperative Extension Service as a whole was adequately prepared to address the current digital divide. Additionally, they stated that county Extension offices should be equipped and staffed to serve as centers of learning for technology. Moreover, they indicated a need for Extension personnel to receive more training in the area of information technology. In relation to Roger's diffusion theory (1995), Extension personnel must be highly equipped and trained if they are to act as change agents in society, serving as models of innovations and practice.

Recommendations

Based on the conclusions of this study, the following recommendations are given.

1. Strategic partnerships should be formed between Extension and local community organizations to infuse technology through training programs and the establishment of community technology centers, particularly in rural, minority, and low-income communities.
2. Continuous in-service training programs in relation to digital technology should be provided to Extension personnel in order for them to serve as change agents in their respective localities.
3. Special funding should be provided to Extension organizations from state legislatures to help

address the digital divide impacting society as a whole, in order to establish special technology initiatives.

4. States should assess how well their counties are actively addressing the needs in which administrators perceive to be important.

Implications

The "Digital Divide" has become more pronounced across racial, ethnic, economic, and geographic lines over the past decade as technology continues to advance. What role can the United States Cooperative Extension Service play in alleviating this growing national concern? In February 2002, The National Association of State Universities and Land-Grant Colleges (NASULGC) Extension Committee on Organization and Policy (ECOP) in the report "The Extension System--A Vision for the 21st Century" established Information Technology as an initiative. If Cooperative Extension is to expand its role as a "brand name" quality source for unbiased, research-based information and education, it must be cognizant of the growing Digital Divide throughout the United States and be a proactive source of change.

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