An Evaluative Study of the United States Cooperative Extension Service’s Role In Bridging The Digital Divide

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Abstract

Access to the Internet and other digital technologies has rapidly become a necessary tool to function in today’s highly information rich society. “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 coined as the “digital divide.” The purpose of this research study was to conduct an evaluative study of cooperative extension administrators throughout the United States in order to gauge their opinion as to the role of cooperative extension in bridging the digital divide. Overall, it was found that a perceived digital divide existed along ethnic, economic, and geographic lines. Cooperative extension administrators saw The United Cooperative Extension as 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. Additionally, more inservice technology training for cooperative extension agents was recommended.
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 coined 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.” How has this gap affected individuals? What role can the United State’s Cooperative Extension Service play in alleviating this gap in 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. The gap between genders in relation to internet usage has narrowed significantly, 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. Additionally, individuals with disabilities are only half as likely to have access to technology such as the Internet in comparison to those without a disability (U.S. Department of Commerce, 2000). Additionally, individuals with visual impairments or manual dexterity problems have even lower rates of Internet access and are less likely to use a computer regularly than people with hearing and mobility problems (U.S. Department of Commerce, 2000).

The number of individuals using the Internet rose by 35 percent; rose from 32% from December 1998 to 35% in August of 2000, up from 32.7% (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 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 twenty 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. The gap in the number of White and Asian/Pacific Islander households that have home Internet access in relation to the numbers of African-American and Hispanic households is also evidence of the persistence of the Digital Divide. 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 digital divide is becoming more pronounced as the information rich outpace the information poor in gaining access to electronic resources. Regarding education and income levels, the Digital Divide widened between 1997 and 1998. Between this one-year period, the divide between those at the highest and lowest education levels increased twenty-five percent and between those at the highest and lowest income levels grew twenty-nine percent. As a result of the Digital Divide the information poor are not only unable to use the Internet as a source of information, communication, and entertainment, but more importantly as a tool that can help them to help themselves. Specifically, 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 (Cyber Outreach, 2002). “It seems that 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” (Cyber Outreach, 2002).

Cooperative Extension and The Digital Divide

The national mission of the cooperative extension service is to enable people to improve their lives and communities through learning partnerships and that put knowledge to work (Extension Committee on Organization and Policy, 1995). Throughout the cooperative extension’s service’s history many issues have come about that have required the scholarly knowledge base of the land grant system, the current digital divide is no exception. In February of 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. According to this report “Twenty-first Century education will become most powerful as a mixture of “high tech” and “high touch.” In relation to information technology ECOP established as subgoals the implementation of an effective electronic system, learning information system to expand learning choices in support of just in time learning, develop alternative means of technology access for rural, disadvantaged and hard-to-reach communities, and lastly to implement partnerships to manage learning centers in locations such as malls, libraries, and schools. According to this report “Lifelong learning applications using digital technologies and distance education offer limitless possibilities to engage multiple audiences, expanding Extension’s educational role as a “brand name” quality source for unbiased, research-based information and education.” With this statement in mind the current digital divide gap will most assuredly become a major priority of the extension system nationwide over the next few years as agents continue to strive to serve various clientele with unbiased research based-information, while seeking new and innovative ways to accomplish this task.

Theoretical Framework

In order gauge the role of the United States Cooperative Extension Service in bridging the digital divide the theoretical framework for this study was guided by Rogers's (1995) diffusion of innovations theory. This theory was initially designed to describe patterns of adoption, explain the mechanism, and assist in predicting whether and how a new invention will be successful. According to the diffusion of innovation theory, technological innovation is communicated through particular channels, over time, among the members of a social system. The stages through which a technological innovation passes are knowledge, persuasion, decision,
implementation, and confirmation. Additionally innovations have certain characteristics: relative advantage, compatibility, complexity, trialability, and observability. The diffusion of innovation theory also classifies individuals into technology adopter categories, which directly relates to the considerations that extension personnel must perhaps be concerned with when developing strategies to aid in the closure of the digital divide. The adopter categories are innovators (venturesome), early adopters (respectable), early majority (deliberate), late majority (skeptical), and laggards (traditional).

An imperative component of the diffusion of innovation theory concerns the roles that individuals play in the process. Important roles in the innovation process include: opinion leaders, change agents, change aides. The change agent functions are: to develop a need for change on the part of the client; to establish an information-exchange relationship; to diagnose the client problems; to create intent to change in the client; to translate this intent into action; to stabilize adoption and prevent discontinuance; and to shift the client from reliance on the change agent to self-reliance.

This theory provides the structure for this study in several ways. To enable the digital divide gap to be narrowed and eventually eliminated individuals must be exposed to the technology and shown the relative advantage of adoption. Secondly, the individual must be allowed to practice with the innovation while at the same time infusing the technology into their existing value structure. Lastly, the individual must be allowed constant access to the technology to allow for trialability. How will the United States Cooperative Extension System aid in the diffusion of innovation process in relation to digital technology?

**Purpose and Objectives**

The purpose of this study was to determine the perceptions of cooperative 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 cooperative extension in bridging the digital divide as perceived by extension administrators throughout the United States.

**Methodology**

In order to gauge the perceived role of the United States Cooperative Extension Service in bridging the digital, 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. To maximize the response rate of the survey a mixed mode survey design was utilized, combining traditional mailings with email surveying (Dillman, 2002). Researchers in the Department of Agribusiness, Applied Economics and Agriscience Education at North Carolina A&T State
University and the Department of Agricultural Education at Texas A&M University 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 Part III. Demographics. Parts one and two consisted of Likert-type items part three 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 was conducted in February, 2003 with fifteen of the state extension directors and administrators listed in the directory, to measure instrument reliability. The survey was sent by email to extension directors, with instructions to return the survey within a week, ten 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 conducted on the remaining 67 extension administrators. An initial letter notifying the extension administrators of the survey was sent by mail one week after the pilot study concluded. The letter contained instructions on how to answer the upcoming survey, which was also conducted by email. Respondents were asked to verify their correct email address if different from the one stated in the letter by sending the correct one electronically to the researchers. For those who preferred a traditional mail survey they 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 one week, a reminder email was sent which resulted in ten 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, and 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%) of respondents were males. Nearly 80% were white, 17% were black. The majority (86%) of cooperative extension administrators possessed a doctorate and had been with cooperative extension for an average of 11-15 years. Respondents had been administrators for an average of eleven years, and had taken between 3-5 training programs in the area of technology since January 2000.

For purpose of data analysis, readers should utilize the following specifications when interpreting tables one and two: 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:

*Table 1*

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>SD</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 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.</td>
<td>4.52</td>
<td>.63</td>
<td>1</td>
</tr>
<tr>
<td>2. Individuals of higher educational attainment levels are more likely to have access to the Internet than individuals of lower educational attainment levels.</td>
<td>4.42</td>
<td>.76</td>
<td>2</td>
</tr>
<tr>
<td>3. Cooperative Extension can aid minority communities in gaining wider access to technology.</td>
<td>4.10</td>
<td>.79</td>
<td>3</td>
</tr>
<tr>
<td>4. Cooperative Extension can aid lower income communities in gaining wider access to technology.</td>
<td>4.00</td>
<td>.77</td>
<td>4</td>
</tr>
<tr>
<td>5. Alternative means of technology access for rural areas can be developed by Cooperative Extension.</td>
<td>3.97</td>
<td>.75</td>
<td>5</td>
</tr>
<tr>
<td>6. 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.</td>
<td>3.84</td>
<td>.78</td>
<td>6</td>
</tr>
<tr>
<td>7. Alternative means of technology access for urban areas can be developed by Cooperative Extension.</td>
<td>3.68</td>
<td>.94</td>
<td>7</td>
</tr>
<tr>
<td>8. The digital divide is becoming more pronounced as the information rich outpace the information poor.</td>
<td>3.61</td>
<td>1.02</td>
<td>8</td>
</tr>
<tr>
<td>9. The technological gap between rural households and households nationwide has narrowed over the past two years.</td>
<td>3.52</td>
<td>.96</td>
<td>9</td>
</tr>
<tr>
<td>10. 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.</td>
<td>3.35</td>
<td>.98</td>
<td>10</td>
</tr>
</tbody>
</table>

Note. 1= Strongly Disagree, 2= Disagree, 3= Uncertain, 4= Agree, 5= Strongly Agree

Objective Three

The following section will present the findings of this research study for objective three.
**Table 2**  
*Means, Standard Deviations and Ranking Results Cooperative Extension In Bridging the Digital Divide*

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>SD</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cooperative Extension agents can be an effective means of encouraging</td>
<td>4.35</td>
<td>.61</td>
<td>1</td>
</tr>
<tr>
<td>farmers or other audiences to adopt digital technology.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Cooperative Extension agents should identify and utilize innovators</td>
<td>4.35</td>
<td>.55</td>
<td>1</td>
</tr>
<tr>
<td>and early adopters of technology as change agents to encourage other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>citizens in their perspective local communities to make use of technology.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Cooperative Extension agents should have constant in-service training</td>
<td>4.26</td>
<td>.82</td>
<td>2</td>
</tr>
<tr>
<td>in the latest advancements in digital technology.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Lifelong learning applications using digital technologies and distance</td>
<td>4.23</td>
<td>.92</td>
<td>3</td>
</tr>
<tr>
<td>education offer limitless possibilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Community resource development programs in Cooperative Extension</td>
<td>4.13</td>
<td>.85</td>
<td>4</td>
</tr>
<tr>
<td>Programs should have a strong technology focus.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Local extension offices should be equipped and staffed to become local</td>
<td>4.06</td>
<td>.85</td>
<td>5</td>
</tr>
<tr>
<td>centers of learning with technology.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Partnerships can be established by Cooperative Extension to manage</td>
<td>3.87</td>
<td>.76</td>
<td>6</td>
</tr>
<tr>
<td>technological learning centers in malls, libraries and schools.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. The United States Cooperative Extension Service is adequately prepared</td>
<td>2.68</td>
<td>1.01</td>
<td>7</td>
</tr>
<tr>
<td>to assist the public in bridging the current digital divide.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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. Cooperative extension administrators indicated in this study 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 additionally allowed the opportunity to explore the innovation for their own personal use, all major components of Roger’s diffusion theory (1995). Cooperative extension could perhaps 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.
3. Cooperative extension administrators perceived that minority and low-income communities could gain wider access to technology with the aid of cooperative extension. Perhaps cooperative extension could serve as the change agent for innovation as outlined by Roger (1995).

4. The information poor lack, were perceived to lack the resources to take advantage of technology in order to improve their quality of life. This directly relates to Roger’s diffusion theory (1995), which emphasized that individuals must be first exposed to an innovation in order to take advantage of it. If a person lacks resources it would be very difficult for them to take advantage of the benefits of the technology.

5. Education was found to be 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.

6. Cooperative 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 cooperative extension personnel to receive more training in the area of information technology. In relation to Roger’s diffusion theory (1995), cooperative 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.

7. It was also perceived that cooperative extension form strategic partnerships with local agencies and individuals regarding information technology training. Additionally, it was thought that farmers could be more adequately exposed to technology through the cooperative extension service. In relation to Roger’s diffusion theory (1995), cooperative extension could serve as a mechanism to bring about technological adoption in rural and urban settings, particularly if innovators within these localities are identified, and partnerships are formed with these entities.

**Recommendations**

Based on the conclusions of this study the following recommendations are given:

1. Strategic partnerships could perhaps be formed between cooperative extension and local community organizations to infuse technology through training programs and the establishment of community technology centers particular in rural, minority, and low income communities.

2. Continuous inservice 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 could perhaps be provided to extension organizations from state legislatures to help address the digital divide impacting society as whole, in order to establish special technology initiatives.

**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 of 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.

**References**


U.S. Department of Commerce - Economic and Statistics Administration National Telecommunications and Information Administration (October, 2000). *Falling Through the Net: Toward Digital Inclusion: A Report On America’s Access To Technology Tools*