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An Analysis of the North Carolina Cooperative Extension Service's Role in Bridging the Digital Divide

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Abstract: The study reported here sought to determine the perception of North Carolina County Cooperative Extension directors in regard to the North Carolina Cooperative Extension Service's role in bridging the digital divide. It was perceived by respondents that variables such as income, education, gender, disability status, race/ethnicity, age, and geographic location (rural versus urban) are major factors in the digital divide. Recommendations are made regarding North Carolina Cooperative Extension forming partnerships in order to narrow the digital divide in its regions, in addition to developing educational programming efforts in this area for all clientele served.

Introduction

The economic recession of late 2008 has greatly affected all sectors of society, establishing the fact that people today live and work in a global economy in which factors in one section of the world can have major implications for other geographic areas. This concept of a global economy is greatly shaped by technology, particularly digital technology and information access in the form of the Internet.

The Internet today provides increased access to information in real time, which is then used by the individuals for personal decision making and by entrepreneurs to shape the future of their respective enterprises. In today's information technology-dependant global economy, power and money are more and more going to communities that have the ability to connect with the most bandwidth through broadband digital technology. According to estimates by the U.S. Bureau of Economic Analysis, every dollar invested in broadband digital technology returns another $3 to the economy (Crandall, Jackson, & Singer, 2003). In contrast, the failure to make this investment has been estimated to reduce productivity 1% per year or more (Ferguson, 2002). It is estimated that in some states a 1% increase in states' broadband penetration results in 0.2 - 0.3% increase in employment. For North Carolina, the presence of an increase broadband penetration could bring between 9,100 -12,700 new jobs (Crandall, Lehr, & Litan, 2007).

With a population of over nine million, North Carolina is a very diverse state that has experienced major shifts in its demographic and economic profile over the past decade (U.S. Census Bureau, 2009; e-NC Authority, 2007). The traditional jobs in textiles, tobacco, and manufacturing have given way to occupations closely associated with information technology and biotechnology. With this shift it is becoming more evident that communities that do not possess access to broadband technology are at a very profound economic and educational disadvantage.

The mission of the North Carolina Cooperative Extension Service in relation to community focus is to help build quality communities by training adult and youth volunteers to become community leaders, providing educational programs to stimulate economic development, working in partnership with other agencies to help citizens prepare for and recover from disasters, and more (North Carolina Cooperative Extension Service, 2009). According to the e-NC Authority (2009), all educational organizations including nonprofits should work to encourage digital literacy, which is defined as the use and adoption of information and communication technologies (ICT) within their organizations.

Theoretical Framework

In order gauge the role of the North Carolina Cooperative Extension Service in bridging the digital divide the theoretical framework for the study reported here was guided by E.M. Rogers's (2003) diffusion of innovations theory. This theory was initially designed to describe patterns of adoption and explain the mechanism of new inventions, as well as assist in predicting if 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 (exposure to its existence and understanding of its functions), persuasion (the forming of a favorable attitude to it), decision (commitment to its adoption), implementation (putting it to use), and confirmation (reinforcement based on positive outcomes from it). Additionally, innovations have certain characteristics: relative advantage (the degree to which it is perceived to be better than what it supersedes); compatibility (consistency with existing values, past experiences and needs); complexity (difficulty of understanding and use); trial-ability (the degree to which it can be experimented

with on a limited basis); and observability (the visibility of its results).

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). Innovators and earlier adopting individuals tend not to be different in age, but to have more years of education, have higher social status and upward social mobility, be in larger organizations, have greater empathy, have less dogmatism, have a greater ability to deal with abstractions, have greater rationality, have greater intelligence, have a greater ability to cope with uncertainty and risk, have higher aspirations, have more contact with other people, have greater exposure to both mass media and interpersonal communications channels, and engage in more active information seeking.

Purpose and Research Questions

The purpose of the study reported here was to determine the perception of North Carolina County Cooperative Extension Directors in relation to the North Carolina Cooperative Extension Service roles in bridging the digital divide. To accomplish the aforementioned purpose, the following research questions were developed:

1. What are the general perceptions of North Carolina county Extension directors in relation to the socio-demographics characteristics that impact the digital divide in North Carolina?

2. What are the general perceptions of the North Carolina county Extension directors in relation to extension roles in bridging the digital gap?

3. What are the demographics of the North Carolina Cooperative Extension county directors?

Methodology

The population for the census study consisted of all North Carolina county-level Extension directors (N = 101). The survey method used for this descriptive study was adapted from a previous study conducted by Elbert & Alston (2005). For the aforementioned study, content validity was established by a panel of university professors at two different land grant institutions with experience in this focus area. The Cronbach's alpha reliability of the study was .88. For the study reported here, a post hoc reliability was taken resulting in a .91 reliability level. The survey instrument for the study consisted of three sections: Part I. Digital Divide Socio-Demographic Characteristics; Part II. Extension in the Digital Divide; and Part III. Demographics. A three round-1 week interval data collection format was used for the study. The survey was conducted by email according to conventions established by Dillman (2009). The final response rate was 46% (N = 46). In order to control for non-response error, Miller and Smith (1983) recommended comparing early to late respondents. Upon completion of the study, an evaluation of the data showed that there were no significant differences found among the early respondents (respondents during the first round) and the late respondents (respondents after the first round). Data analysis was conducted using SPSS version 18.0 for personal computers.

Findings

Research Question One

Respondents were asked their general perceptions in relation to the socio-demographic characteristics that affect the digital divide in North Carolina (Table 1). In relation to the interpretation of results for tables 1 and 2 in the study, the following scale was used: 1=Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Strongly Agree. It was perceived that younger Americans were more likely to use the Internet than older Americans. Respondents on the average indicated no knowledge of a gap in genders in relation to usage of the Internet. North Carolina Cooperative Extension county directors were unaware of the individuals with disabilities and their usage of technology. Respondents agreed that households with higher incomes were more likely to have access to technology than those with lower incomes.

In general it was agreed upon that the digital divide is not becoming less significant but rather more pronounced as the information rich outpace the information poor in gaining access to electronic resources. Respondents indicated that 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 enroll in courses, or perform school research. It appears that county directors are knowledgeable about the need to inform low-income populations about the advantages of using the Internet, especially when seeking employment, conducting school research, or enrolling in courses. Respondents agreed that individuals of higher educational attainment levels are more likely to have Internet than those with lower education levels. Respondents agreed that the digital divide has narrowed between rural and urban communities. With regard to race, respondents were undecided if minorities had less access to technology than the majority population.

Table 1.
Socio-Demographics Factors as Related to the Digital Divide

Socio-Demographic Characteristics	**Mean**	**SD**	**Rank**
Younger Americans are more likely to use the Internet than older Americans overall.	4.65	.60	1
Individuals of higher educational attainment levels are more likely to have access to the Internet than individuals of lower educational attainment levels.	4.04	.78	2
Households with incomes of $75,000 and higher are more than 20 times as likely to have access to technologies such as the Internet than those at the lowest income levels.	3.82	.71	3
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.	3.61	.88	4
The gap between rural households and households nationwide has narrowed over the past two year.	3.59	.88	5
The digital divide is not becoming less significant but rather more pronounced as the information rich outpace the information poor in gaining access to electronic resources.	3.50	.83	6

Minorities have less access to technology than the majority population.	3.48	.88	7
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.	3.37	.82	8
There is a significant gap between genders in relation to Internet usage.	2.54	.91	9
Individuals with disabilities are less likely to have access to technology than those without a disability.	2.83	.85	10

Research Question Two

Respondents were asked their general perceptions in relation to Extension's role in bridging the digital gap (Table 2). In relation to The North Carolina Cooperative Extension Service's role in bridging the digital divide, the following statements were agreed upon by respondents: digital technology should be an integral part of Extension's educational programming efforts; Extension community resource development programs have a strong technology focus; Extension programming aids minorities in obtaining digital access; 4-H should be utilized as a mechanism of technology dispersion; local partnerships should be established by Extension for digital technology promotion, and digital technology access for rural areas should be promoted by Extension. In contrast to the aforementioned findings, respondents were undecided if the North Carolina Cooperative Extension Service was prepared to assist the public in bridging the digital divide.

Table 2.
Extension's Role in Bridging the Digital Divide

Extension Variables	**Mean**	**SD**	**Rank**
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.	3.93	.65	1
Cooperative Extension agents can be an effective means of encouraging farmers to adopt digital technology.	3.91	.66	2
Cooperative Extension agents should have constant in service training in the latest advancements in digital technology.	3.89	.74	3
The 4-H youth development component of the Extension service can aid in technology access in order to improve people's daily lives.	3.75	.68	4
The Extension service should expand its learning information system to support just-in-time learning.	3.72	.86	5
Community resource development programs in Cooperative Extension should have a strong technology focus.	3.64	.67	6

Cooperative Extension can aid lower income communities in gaining wider access to technology.	3.53	.99	7
Cooperative Extension can aid minority communities in gaining wider access to technology.	3.51	.94	8
Partnerships can be established by Cooperative Extension to manage learning centers in malls, libraries, and schools.	3.45	.90	9
Local Extension offices should be equipped and staffed to become local centers of learning with technology.	3.44	.99	10
Alternative means of technology access for rural areas can be developed by Cooperative Extension.	3.36	.91	11
The North Carolina Cooperative Extension Service is adequately prepared to assist the public in bridging the current digital divide.	2.61	.82	12

Research Question Three

Respondents were asked to provide their personal and professional demographic characteristics (Table 3). The mean age of respondents in the study was 49, with the majority being white males who possessed a graduate credential. Additionally, it was found that the average years of Extension experience and Extension administrative experience were 22 years and 9 years, respectively. Last, Extension administrators indicated that they had received on average 25 hours of technology training within the past 5 years.

Table 3.
Demographic Characteristics of North Cooperative Extension Directors

Respondents Demographics	**N**	**Mean/Percentage**	**SD**
Age	46	49.54	
Gender:			
Male	28	60.9%	
Female	18	39.1%	
Race/Ethnicity:			
Black	5	10.9%	
White	40	87.0%	
Hispanic	0	0%	
Native American	1	2.2%	
Asian	0	0%	
Highest Degree Earned			
Bachelor's	1	2.2%	
Master's	40	87.0%	
Specialist	0	0%	
Doctorate	5	10.9%	

Years of Extension Service		22.00	7.80
Year as an Extension Administrator		9.41	7.11
Hours of Technology in past 5 years		24.98	33.46

Conclusions

Shade (2002) indicated that income, education, age, gender, race/ethnicity, and geographic location will continue to be the factors that have an impact on the digital divide. These factors greatly affect the diffusion of digital technology and the innovation that it brings to communities. First, in order for the digital divide gap to be narrowed and eventually eliminated, individuals must be exposed to the technology and shown the relative advantage of adoption. Second, the individual must be allowed to practice with the innovation while at the same time infusing the technology into his or her existing value structure. Moreover, and most important, the individual must be allowed constant access to the technology in order to allow for trialability and to see the relative advantage of the innovation. The diffusion of innovation in relation to digital technology will greatly affect the lives of Extension clientele. Guenthner and Swan (2011) indicated that Extension clientele use digital technology for business, communication, and entertainment.

Recommendations

Based upon the findings of this study the following recommendations are made.

- Extension county directors should establish partnerships with the local community college(s), churches, libraries, high schools, and telecommunication providers to assist lower income youth, disabled populations, and adults in gaining better access to technology in order to increase their employment status in both rural and urban areas. To narrow the digital divide occurring between younger and older Americans, services that can be facilitated through Extension should be developed and geared to teach older Americans about digital technology.

- Extension directors could establish partnerships with telecommunications providers to encourage that digital access be made available to underserved communities and populations.

Implications

According to Whitacre (2008), factors such as race, income status, educational level, and geographic location continue to show major gaps with regard to digital access and use. It was further suggested that Extension educators should play a major role in encouraging broadband access and usage among all stakeholders across the aforementioned demographic (Whitacre, 2008). Findings from the study reported here can serve as a basis for Extension educators throughout North Carolina to actively pursue initiatives that would encourage the facilitation of digital access and usage within the communities they serve to all citizens.

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