



December 2012
Volume 50 Number
6
Article Number:
6RIB2

Will eXtension Survive? Oklahoma Cooperative Extension Service Employees' Perceptions of Adopter Attributes of eXtension

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Abstract: *eXtension was introduced in 2008 as an innovation to rekindle public interest in Extension. The founders forecasted a 75% adoption rate within 1 year. However, adoptions rates have been much lower than expected. The study reported here investigated eight perceived adopter attributes (relative advantage, compatibility, trialability, visibility, ease of use, result demonstrability, image, and voluntariness) of eXtension among Oklahoma Extension employees to identify threats to adoption. Findings indicated that Extension employees generally held negative views of all eight attributes of the innovation. Without profound changes to the innovation and process of adoption, eXtension risks failure in this state.*

Introduction

In 1914 the Cooperative Extension System (Extension) was founded with the mission to diffuse research-based information and technology from the land-grant university to farm-based communities and to deliver educational programs to the public

(McDowell, 2001). Extension has made continuous efforts to utilize new technology to reach broader audiences with enhanced programs (Hightower, Murphrey, & Dooley, 2010). With the advancement of the Internet and communication technologies throughout the 1990s, online learning and collaboration permeated educational settings (Johnson et al., 2002). At the same time, Extension struggled to maintain its traditional support base and include non-traditional audiences with diminishing support from federal, state, and county governments (McDowell, 2001). Extension was in transition and looked to the Internet revolution for answers. eXtension was offered as an alternative innovation to information dissemination in 2008 (Grace & Lambur, 2009).

The innovation development process often "begins with recognition of a problem or need, which stimulates research and development activities designed to create an innovation to solve the problem or need" (Rogers, 2003, p. 137). In terms of Extension education programs, the Internet is an efficient channel to reach clients and diffuse research-based knowledge (Harder & Lindner, 2008). To improve efficiency and retain trust and support from the public, Extension began using e-learning tools in the 1990s (Hightower, Murphrey, & Dooley, 2010). While online learning was adopted by Extension over two decades ago, eXtension was officially launched in 2008 (Kelsey, Stafne, & Greer, 2012) as "a national, collaborative effort to provide research-based knowledge and information to larger, broader audiences through the use of online learning" (Hightower, Murphrey, & Dooley, 2010, p. 484).

In 2006, eXtension pioneers expected that 75% of Extension employees would adopt eXtension within 1 year (Harder & Linder, 2008). However, the adoption rate has been much slower. In 2008, 69% of Extension educators in Texas knew about eXtension, yet only 10.4% of the respondents were using it at the time of Harder and Lindner's 2008 study. Kelsey, Stafne, and Greer (2012) found similar results in Oklahoma in 2009. While 80% of OCES employees had heard of eXtension, only 49% had used the resource in their work.

Researchers have found several perceived benefits and barriers to adopting eXtension among Extension employees including the following:

- It was a good method for saving money and expanding programs to larger audiences (Dromgoole, 2006).
- It increased employees' professional knowledge in specific areas (Sellers, Crocker, Nichols, Kirby, & Brintnall-Peterson, 2009).

- It improved employees' ability to network with colleagues who had the same interest in a specific topic or issue (Seller et al., 2009).
- It gave employees opportunities to be involved in progressive and advanced technologies (Sellers et al., 2009).
- It lacked interaction between clients and educators (Dromgoole, 2006).
- It was an additional burden to employees' work load (Kelsey, Stafne, & Greer, 2012).
- It was perceived as a substitute for employee positions and a threat to employment (Dromgoole, 2006).

The attributes of an innovation play an important role in affecting its rate of adoption (Rogers, 2003). Rogers identified five perceived characteristics of an innovation: 1) relative advantage, 2) compatibility, 3) complexity, 4) trialability, and 5) observability.

Purpose and Objective

The research reported here sought to understand why the adoption rate of eXtension has not met expectations using Rogers' (2003) theory of diffusion of innovations as the theoretical framework. The authors measured Oklahoma Cooperative Extension Service (OCES) employees' perceptions of the innovation using Rogers' five adopter attributes.

The objectives were to 1) determine OCES educators' perceptions of eXtension in regard to adopter attributes; 2) compare the differences between perceptions of different age, gender, and educational groups; and 3) compare the differences between perceptions of adopters and non-adopters of eXtension.

Methodology

The research used a cross-sectional survey design to collect data (Dillman, 2000). The population was all Extension educators employed by Oklahoma State University in 2010. The list of employees was obtained from the official website for the college. From this list, there were 203 Extension educators in 77 counties, and 200 people had valid e-mail addresses. A census was used.

The survey instrument was developed by Moore and Benbasat (1991) based on

Rogers' five perceived characteristics of an innovation. During the instrument development process, Moore and Benbasat (1991) added two more constructs beyond Rogers's theory, and they reworded Rogers' complexity as ease of use. Moreover, they interpreted observability as two constructs: result demonstrability and visibility. The definitions of the eight constructs follows:

- Relative Advantage: the degree to which an innovation is perceived as being better than the idea it supersedes.
- Compatibility: the degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters.
- Trialability: the degree to which an innovation may be experimented with on a limited basis.
- Visibility: the degree to which an individual can see others using an innovation.
- Ease of Use: the degree to which an individual believes that using an innovation is free of physical and mental effort.
- Result Demonstrability: the degree to which the results of using an innovation can be demonstrated to potential adopters.
- Image: the degree to which the use of an innovation is perceived to enhance one's image or status.
- Voluntariness: the degree to which use of the innovation is perceived as being of free will.

The survey was minimally reworded to suit the local context of the study and sent to a panel of Oklahoma Extension experts to check for face and content validity. To test reliability of the instrument, Cronbach's alpha reliability coefficient scores were calculated. Nunnally (1967) argued that reliability scores of 0.50 to 0.60 were sufficient. For this instrument, the overall Cronbach's alpha was 0.93, indicating excellent reliability.

The survey was converted to an electronic format and administered to the population using an e-mail solicitation January 2011. Data collection was concluded February

2011. To reduce non-response error the researchers used multiple contacts, personalized invitations, appropriate timing, and offered special access ID (Dillman, 2000).

Findings

The survey was sent to 200 OCES educators, and 80 people responded, for a 40% response rate. Lindner, Murphy, and Briers (2001) suggested comparison of early to late respondents is a widely used and effective method to address non-response error. They defined late respondents as the "later 50% of the respondents" (p. 52). A *t-test* was conducted to compare the responses of early to late respondents. There was no statistically significant difference between the two groups; therefore, the results can be generalized to the population.

Among the 80 respondents, 42 (52%) reported having more than one role within Extension; Community Economic Development, 4-H, Agriculture, Family and Consumer Science, Rural & Community Development, and Horticulture. Thirty-three percent (33.8%) of the respondents worked from 0 to 5 years, 57.5% were female, 63.7% held a master's degree, and 20% were regular users of eXtension (Table 1).

Table 1.
Respondent Demographics

Characteristics	%	n
Education		
B.S.	35.0	28
Masters	63.7	51
Ph.D.	1.3	1
Gender		
Female	57.5	46
Male	42.5	34
Years of Service with OCES		
0 to 5	33.8	27
5 to 10	21.3	17
10 to 20	15.0	12

More than 20	30.0	24
Adoption stage of eXtension		
No Knowledge	2.5	2
Knowledge	15.0	12
Non-Regular Users	62.5	50
Regular Users	18.7	15
Contributor	1.3	1

Perceptions of eXtension

The survey consisted of eight variables to describe respondents' perceptions of eXtension: (a) voluntariness; (b) relative advantage; (c) compatibility; (d) image; (e) ease of use; (f) result demonstration; (g) visibility; (h) trialability. The seven-point Likert-type scale ranged from strongly disagree to strongly agree and was scored 1 = strongly disagree, 4 = neutral, and 7 = strongly agree. The mean value and standard deviation of each variable are presented in Table 2. Most of the mean values were below neutral. Compatibility was slightly above neutral (Table 2).

Table 2.

Mean Scores and Standard Deviation of Perception Scales

Variable	Overall Mean	SD
Voluntariness	2.5	1.4
Relative Advantage	3.9	1.5
Compatibility	4.3	1.4
Image	2.4	1.4
Ease of Use	3.9	1.2
Result Demonstration	3.9	1.0
Visibility	3.4	0.9
Trialability	3.9	1.5
Scale: 1 = strongly disagree, 4 = neutral and 7 = strongly agree		

Perceptions of eXtension by Educational Levels

Voluntariness, Relative Advantage, Compatibility, Image, and Trialability mean scores for bachelor degree holders were slightly higher than for master's degree holders. For Ease of Use, Result Demonstration, and Visibility, master's degree holders had slightly higher mean scores than bachelor degree holders; however, there were no significant differences between the two groups in seven of the eight scales. Image was significantly different (Table 3).

Table 3.

Mean Perceptions of eXtension by Educational Levels

Variable	Mean Score of Bachelor's Degree Holders	Mean Score of Master's Degree Holders	P Value
Voluntariness	2.7	2.4	0.21
Relative Advantage	4.3	3.9	0.20
Compatibility	4.5	4.3	0.78
Image	3.0	2.1	0.01*
Ease of Use	3.8	4.1	0.52
Result Demonstration	3.8	4.0	0.56
Visibility	3.5	3.6	0.29
Trialability	4.0	3.8	0.50
Sample Size	28	51	-
Scale: 1 = strongly disagree, 4 = neutral and 7 = strongly agree. *p = < .05			

Perceptions of eXtension by Seniority

Respondents who had worked more than 20 years had significantly lower mean scores than the other age groups for each scale. For Voluntariness, respondents who worked under 5 years had higher mean score than people who worked for more than 20 years (Table 4).

Table 4.

Mean Perceptions of eXtension by Seniority

Variable	0 to 5 Years	5 to 10 Years	10 to 20 Years	More than 20 Years
Voluntariness	3.0	2.3	2.7	1.4
Relative Advantage	4.2	3.6	4.1	3.0
Compatibility	4.6	4.1	4.4	3.3
Image	2.5	2.2	3.2	1.5
Ease of Use	3.8	4.0	4.5	3.0
Result Demonstration	3.9	3.7	3.9	3.3
Visibility	3.5	3.2	3.5	2.9
Trialability	4.2	3.5	3.6	3.2
Sample Size	27	17	12	24
Scale: 1 = strongly disagree, 4 = neutral and 7 = strongly agree				

Perceptions of eXtension by Gender

While males had slightly lower means scores on each scale than females, there were no statistically significant differences between the groups (Table 5).

Table 5.

Mean Perceptions of eXtension by Gender

Variable	Mean Score of Males	Mean Score of Females	P Value
Voluntariness	2.4	2.5	0.71
Relative Advantage	3.7	4.2	0.53

Compatibility	4.2	4.6	0.61
Image	2.2	2.6	0.35
Ease of Use	3.9	4.0	0.53
Result Demonstration	3.8	4.1	0.92
Visibility	3.5	3.6	0.53
Trialability	3.8	4.0	0.99
Sample Size	34	46	
Scale: 1 = strongly disagree, 4 = neutral and 7 = strongly agree			

Mean Perceptions of Respondents at Different Adoption Stage

Respondents at different adoption stages from *no knowledge* to *regular users* of eXtension had different perceptions of eXtension. Contributors and regular users had higher mean scores than respondents who had been on the eXtension website but were not regular users and respondents who had never been on the site (Table 6).

Table 6.

Mean Perceptions of Respondents at Different Adoption Stage

Variables	No Knowledge	Knowledge	Non-regular Users	Regular Users	Contributor
Voluntariness	2.0	1.6	2.4	3.2	4.0
Relative Advantage	4.0	2.3	3.9	5.6	6.0
Compatibility	4.0	3.1	4.4	5.5	6.3
Image	4.0	2.4	2.3	2.9	1.0
Ease of Use	4.0	3.4	4.1	4.5	5.3
Result Demonstration	4.0	2.7	4.1	4.8	6.5
Visibility	4.0	3.2	3.6	3.8	4.0

Trialability	4.0	2.9	4.1	4.1	7.0
Sample Size	2	12	50	15	1
Scale: 1 = strongly disagree, 4 = neutral and 7 = strongly agree					

Adopters had higher mean scores than non-adopters for all eight variables; however, only Voluntariness, Relative Advantage, Compatibility, and Result Demonstration scales were significant different (Table 7).

Table 7.

Differences between Means of Adopters vs. Non-Adopters

Variables	Non-adopters	Adopters	P Value
Voluntariness	2.3	3.3	0.01*
Relative Advantage	3.7	5.6	2.9E-06*
Compatibility	4.2	5.6	0.0004*
Image	2.4	2.9	0.29
Ease of Use	4.0	4.5	0.12
Result Demonstration	3.9	4.8	0.002*
Visibility	3.5	3.8	0.36
Trialability	4.0	4.3	0.52
Sample Size	64	16	-
*p = < .05			

Conclusions

OCES employees did not perceive eXtension as an innovation that enhanced their work lives, as most mean scores were below neutral for all eight scales. Employees did not perceive the relative advantages of using eXtension. They did not consider that eXtension was user-friendly, nor did they perceive using it would improve their image or social status. Furthermore, they did not agree that the advantage of using eXtension could be easily demonstrated to the public. Related to these negative perceptions, only 20% of the OCES employees had adopted eXtension as their regular practice in 2010.

Consistent with Rogers' theory, OCES adopters had more positive perceptions of eXtension than non-adopters. However, even adopters were not satisfied with some attributes of the innovation, such as visibility and trialability. Also, adopters did not perceive eXtension as improving their image within the organization.

OCES educators of different educational groups were not significantly different in their perceptions of using eXtension. Females were more satisfied with eXtension than males, although not significantly. Respondents who had worked more than 20 years for OCES were less satisfied with eXtension than other years of service groups. This finding fits Rogers' (2003) theory that younger people are generally more innovative. Also, longer serving employees perceived less organizational pressure to use eXtension than younger respondents. On the other hand, adopters perceived higher organizational pressure than non-adopters.

Recommendations

Based on the findings reported here, the following recommendations are offered to speed the adoption rate of eXtension among OCES employees.

- Rogers (2003) found that group pressure could improve the adoption rate of an innovation. To enhance organizational pressure, supervisors, including Extension Directors, may consider relating employee performance evaluation with using and contributing to eXtension.
- In order to enhance Ease of Use, designers of eXtension website should strive make the interface more user-friendly. Good Web design principles have been outlined by Garrett (2011) and include attributes such as the surface plane, the skeleton plane, the structure plane, the scope plane, and the strategy plane. Carefully designed websites guide the user through an experience effortlessly that results in completing the desired tasks and motivating the user to return to the site for further experience. The findings of the study reported here suggest that eXtension is lacking design elements necessary for a satisfying user experience.
- In order to improve Visibility and Demonstrability, OCES leaders could select regular users as role models and ask them to help diffuse eXtension among the population. Along these lines, an award could be established within each state Extension to celebrate exemplary users of eXtension, increasing Visibility.

Implications

Extension leaders set high expectations regarding the adoption of eXtension among Extension employees. However, the study reported here and others (Harder & Lindner, 2008; Kelsey, Stafne, & Greer, 2012) found that Texas and Oklahoma Extension employees had overall low adoption rates and perceptions of eight innovation adoption variables (Relative Advantage, Compatibility, Trialability, Visibility, Ease of Use, Result Demonstrability, Image, and Voluntariness), indicating low adoption rates in the future. In addition, 62.5% of respondents who had visited the eXtension website were generally negative or neutral toward the innovation.

Rogers (2003) stated that the majority of potential adopters like to watch others and are influenced by peers' perceptions when making adoption decisions. OCES educators held negative perceptions about eXtension, which will prolong the adoption of eXtension in this state. Overall, as an innovation, eXtension has not attracted or retained users in Oklahoma.

Extension educators are responsible for bringing knowledge and innovations to the American public. They are the primary potential adopters of electronic technologies in Extension (Dromgoole & Boleman, 2006). If they don't perceive eXtension as a worthwhile innovation, they will be less likely to promote this innovation to their clients or contribute to its continued success. Consequently, the eXtension innovation is at risk of failure, and it will take more time and resources than expected for the eXtension pioneers to achieve their goals.

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