

Perceived Barriers to the Adoption of a Web-Based Resource by County Extension Agents

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Abstract

Perceived barriers may negatively affect an individual's decision to adopt an innovation. This descriptive study determined the perceptions held by Texas Cooperative Extension county extension agents ($N = 533$) with regard to the potential barriers to the adoption of eXtension, a Web-based educational resource. A random sample of 237 agents was selected to complete an online survey instrument which measured their perceptions of five potential barriers: (a) concerns about time, (b) concerns about incentives, (c) financial concerns, (d) planning issues, and (e) technology concerns. Agents tended to somewhat agree that concerns about time ($M = 4.12$, $SD = .87$), concerns about incentives ($M = 3.90$, $SD = 1.00$), planning issues ($M = 3.84$, $SD = .93$), financial concerns ($M = 3.77$, $SD = 1.01$), and technology concerns ($M = 3.66$, $SD = .97$) were potential barriers to adoption of eXtension. Cooperative Extension should offer technical assistance, financial assistance, and training opportunities to lessen agents' concerns about eXtension, and positively influence its rate of adoption.

Key words: Adoption, Diffusion, Technology, Web-based, Extension

Introduction

In 2006, Cooperative Extension launched an early version of a Web resource known as eXtension (pronounced e-extension). eXtension is a repository of multimedia learning modules containing educational information based on research conducted by America's land-grant universities. It is available to both extension agents and the public. eXtension was developed to (a) increase the economic efficiency of the current Extension model by eliminating redundant educational efforts, (b) increase the profitability of Cooperative Extension, (c) raise consumers' awareness of Cooperative Extension, and (d) provide an instantly accessible information resource to increase customer satisfaction (Accenture, 2003). In short, eXtension could be the key to increasing the relevance of Cooperative Extension for future generations of Web-savvy clientele.

The emergence of the Internet as a tool for extension work is not limited to the United States. Dolly and Kisoosingh (2006) found extension agents in Trinidad and Tobago preferred to access Internet sources for information about current farm matters over television. In Ghana, Information Communication Technologies (ICTs) – which include e-mail and the Internet – are highly regarded by extension agents as tools for agricultural and rural development (Annor-Frempong, Kwarteng, Agunga, & Zinnah, 2006). Similarly, the importance of ICTs for agricultural extension is gaining recognition with extension specialists in Iran (Hedjazi, Rezaee, & Zamani, 2006). The failure or success of the eXtension model may provide useful information for the development, adoption, and diffusion of similar innovations in other countries.

The theoretical framework for this research was based upon Rogers' (2003) theory of the diffusion of innovations. Rogers' theory states innovations diffuse through a social system over time. The rate of diffusion for an innovation is related, in part, to how potential adopters perceive the innovation, and the characteristics of potential adopters. Certain factors, often called barriers, can negatively affect any of the perceived characteristics of an innovation and the speed with which it is diffused.

This study focused on eXtension, which is an emerging innovation. No published studies about eXtension were found during the review of the literature. Studies of the diffusion of web-based education in higher education and studies of the diffusion of technologies related to eXtension amongst extension agents were reviewed for germane findings.

A review of the literature found a substantial amount of research regarding barriers which may prevent faculty in higher education from adopting distance education (e.g., Curbelo-Ruiz, 2002; Kuck, 2006; Porter, 2004). Maguire's (2005) synthesis of the literature found a number of recurring barriers identified in multiple studies, such as faculty time and compensation, technical expertise, concerns about workload, and lack of funding. In order to derive clearer meaning from the many barriers found to be issues for faculty, Maguire proposed dividing barriers into three categories: intrinsic, extrinsic, and institutional. Extrinsic barriers were associated with the institution. Intrinsic inhibitors included resistance to change and intimidation of technology (Berge, 1998; Parisot, 1997, in Maguire, 2005). Institutional inhibitors were subdivided into factors concerning administrative and technical support, and factors addressing technology and teaching concerns. It is important to understand these differentiations because eXtension's diffusion rate may also be impeded by intrinsic, extrinsic, and institutional barriers. Participant adoption increases when barriers and inhibitors are eliminated (Schifter, 2000).

Time has been one of the most significant concerns for faculty since distance education began to gain momentum in the nineties. Murphy and Terry's study (1998) was one of the first to report time was perceived by faculty to be a barrier to the diffusion of distance education in

agricultural education. Similar research in the following years yielded more evidence of time as a barrier, both in agricultural education and other higher education fields (Berg, Muilenburg, & Van Haneghan, 2002; Haber, 2006; Li & Lindner, 2007; Roberts & Dyer, 2005). Nelson and Thompson (2005) reported faculty and program leaders of agricultural education programs perceived there was a lack of administratively provided time to develop distance education materials. The amount of time necessary to learn how to use the technology was also perceived to be a problem (Curbelo-Ruiz, 2002), as was the amount of time necessary to develop distance education materials (Daugherty & Funke, 1998). Spector (2005) found experienced online teachers spent substantially more time on their courses than colleagues teaching face to face classes.

The issue of time spent teaching online is better understood in the context of the research conducted by Bender, Wood, and Vredevoogd (2004). Nearly twice as much time was needed per distance versus face-to-face student. Researchers identified factors such as time spent on e-mail correspondence, high student anxiety for first time distance learners, and difficulties using the technologies as attributing the higher distance workload. A study by Cavanaugh (2005) supported the conclusions drawn by Bender, et al.. These results raise serious questions about how eXtension will retain the quality associated with traditional Extension programs without overloading agents with additional demands on their time. Many already struggle to manage the stress caused by demands on their time (Enslie, 2005; Harder & Wingenbach, 2006; Place, Jacob, Summerhill, & Arrington, 2000).

Murphrey and Dooley's (2000) study of the diffusion of distance education technologies in a college of agriculture and life sciences identified weaknesses and threats instead of barriers. Weaknesses included slow action on critical issues and loss of interaction, while career and job security, competition from public and private institutions, and misinformation on the Internet were all perceived threats (Murphrey & Dooley). All of these are serious concerns for Cooperative Extension to consider with eXtension. Agents are unlikely to support less interaction with clientele and are even less likely to endorse an innovation if they feel it will threaten their job security. Additionally, if distance education truly is slow to respond to critical issues, this does not bode well for eXtension, which is designed to correct the same criticism of the traditional Extension system. Most importantly, the threat of misinformation on the Internet represents a risk to Extension's reputation as a trustworthy purveyor of non-biased, research-based information and may damage both eXtension and the traditional service.

Purpose and Objectives

Agents must accept eXtension in order for it to be successful (Accenture, 2003). The findings presented in this article are part of a larger study undertaken to understand the influence of selected factors on the adoption of eXtension by Texas Cooperative Extension county extension agents (Harder, 2007). The objective was to determine agents' perceptions of potential barriers (concerns about time, concerns about incentives, financial concerns, planning issues, and technology concerns) to the adoption of eXtension.

Methods and Data Sources

The section of the study presented here was descriptive in nature. The target population was Texas Cooperative Extension county extension agents employed in 2007. According to the Texas Cooperative Extension office, there were 533 county agents (K. A. Bryan, personal communication, February 12, 2007). Cochran's (1977) formula was used to determine the

sample size ($N = 237$) for the study. County extension agents were randomly selected to participate (Gall, Gall, & Borg, 2007).

An online questionnaire was used to collect data. The original instrument was developed by Li (2004) to examine the diffusion of distance education at the China Agricultural University. Li's original instrument was modified by the researcher to fit the context of eXtension, based upon selected studies from the review of literature (Li, 2004; Maguire, 2005). It was then converted to an online format.

The instrument was reviewed for content validity by a panel of experts composed of faculty members in the Department of Agricultural Education, Leadership, and Communications at Texas A&M University and the national marketing director of eXtension. A pilot study was conducted to test face validity and establish reliability.

Participants were asked to rate 31 statements based upon a six-point Likert-type scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Somewhat Disagree*, 4 = *Somewhat Agree*, 5 = *Agree*, 6 = *Strongly Agree*). The scale was interpreted as follows: *Strongly Disagree* = 1.00 – 1.50, *Disagree* = 1.51 – 2.50, *Somewhat Disagree* = 2.51 – 3.50, *Somewhat Agree* = 3.51 – 4.50, *Agree* = 4.51 – 5.50, *Strongly Agree* = 5.51 – 6.00. Categories suggested by Li (2004) and Maguire (2005) were used to cluster the statements into constructs. The constructs were (a) concerns about time, (b) concerns about incentives, (c) financial concerns, (d) planning issues, and (e) technology concerns. A sample of statements from the instrument is presented in Table 1.

Table 1

Sample Statements

| Statement | Barrier |
|---|---------------------------|
| Lack of time available to access eXtension materials. | Concerns about time |
| Lack of monetary compensation for developing eXtension resources. | Concerns about incentives |
| My state Extension program does not have enough money to support eXtension. | Financial concerns |
| Lack of identified need (perceived or real) for eXtension. | Planning issues |
| Lack of agent access to computers. | Technology concerns |

The reliability of the instrument was tested by calculating Cronbach's alpha coefficient for each internal scale (Cronbach, 1951). A reliability level of .80 or higher was considered acceptable (Gall, Gall, & Borg, 2007). Reliability levels for the internal scales are presented in Table 2.

Table 2

Reliability Levels of Internal Scales

| Internal Scale | α Levels |
|---------------------------|-----------------|
| Concerns about time | .890 |
| Concerns about incentives | .924 |
| Financial concerns | .909 |
| Planning issues | .921 |
| Technology concerns | .883 |

Note: Reliability levels $\geq .80$ were considered acceptable.

Participants were contacted via e-mail using Dillman's (2000) Tailored Design Method. Of the original 237 addresses, 236 were valid. A final response rate of 66.90% ($N = 158$) was obtained. Eight participants opted out. There were 25 responses removed due to missing or incomplete data, reducing the number of usable responses to 125. It was concluded the results could be generalized to the target population, based upon the lack of significant differences between early and late respondents for the primary variables of interest (Lindner, Murphy, & Briers, 2001).

The majority of respondents had primary responsibilities in the areas of agriculture ($n = 45$), family and consumer sciences ($n = 39$), and 4-H/youth development ($n = 26$). Fewer agents were employed in the areas of horticulture ($n = 8$) and natural resources ($n = 3$). No respondents reported community development as a primary agent role. The minimum educational level for all respondents was a bachelor's degree. Most (84.8%) of the agents were at least thirty years of age. Approximately 46% of respondents were female and 51% were male.

Results

The objective was to describe agents' perceptions of potential barriers (concerns about time, concerns about incentives, financial concerns, planning issues, and technology concerns) to the adoption of eXtension. On a six-point scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Somewhat Disagree*, 4 = *Somewhat Agree*, 5 = *Agree*, 6 = *Strongly Agree*), agents tended to somewhat agree concerns about time ($M = 4.12$, $SD = .87$), concerns about incentives ($M = 3.90$, $SD = 1.00$), planning issues ($M = 3.84$, $SD = .93$), financial concerns ($M = 3.77$, $SD = 1.01$), and technology concerns ($M = 3.66$, $SD = .97$) were potential barriers to adoption of eXtension. The means and standard deviations for each construct are presented in Table 3.

Table 3

Respondents' Perceptions of Potential Barriers to eXtension by Construct

| Construct | <i>N</i> | <i>M</i> | <i>SD</i> |
|---------------------------|----------|----------|-----------|
| Concerns about time | 125 | 4.12 | .87 |
| Concerns about incentives | 125 | 3.90 | 1.00 |
| Planning issues | 125 | 3.84 | .93 |
| Financial concerns | 125 | 3.77 | 1.01 |
| Technology concerns | 125 | 3.66 | .97 |

Note. Scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Somewhat Disagree*, 4 = *Somewhat Agree*, 5 = *Agree*, 6 = *Strongly Agree*.

Concerns about Time

Responses for the five items addressing potential concerns about time ranged from "strongly disagree" to "strongly agree" on a six-point scale (1 = *Strongly Disagree*, 6 = *Strongly Agree*). Table 4 displays the means and standard deviations for each item. Respondents tended to somewhat agree with all five statements for this construct. The statement "Lack of time to learn how to incorporate eXtension into typical job responsibilities" ($M = 4.25$, $SD = 1.00$) had the highest mean. The statement "Lack of time available to access eXtension materials" ($M = 4.05$, $SD = 1.05$) had the lowest mean.

Table 4

Respondents' Perceptions of Concerns about Time as a Potential Barrier to eXtension by Individual Response Item

| Concerns about Time Items | <i>N</i> | <i>M</i> | <i>SD</i> |
|---|----------|----------|-----------|
| Lack of time to learn how to incorporate eXtension into typical job responsibilities. | 125 | 4.25 | 1.00 |
| Lack of time to meet the needs of traditional Extension clientele. | 125 | 4.14 | 1.04 |
| Lack of time available to respond to online requests for information. | 125 | 4.10 | 1.05 |
| Lack of time available to search for information on eXtension. | 124 | 4.05 | 1.09 |
| Lack of time available to access eXtension materials. | 125 | 4.05 | 1.05 |

Note. Overall $M = 4.12$, $SD = .87$. Scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Somewhat Disagree*, 4 = *Somewhat Agree*, 5 = *Agree*, 6 = *Strongly Agree*.

Concerns about Incentives

Responses for the seven items addressing potential concerns about incentives ranged from “strongly disagree” to “strongly agree” on a six-point scale (1 = *Strongly Disagree*, 6 = *Strongly Agree*). Table 5 displays the means and standard deviations for each item.

Table 5

Respondents' Perceptions of Concerns about Incentives as a Potential Barrier to eXtension by Individual Response Item

| Concerns about Incentives Items | <i>N</i> | <i>M</i> | <i>SD</i> |
|--|----------|----------|-----------|
| Lack of correlation between agent use of eXtension and performance evaluation. | 124 | 4.07 | 1.11 |
| Lack of county/parish recognition for using eXtension. | 124 | 4.04 | 1.20 |
| Lack of salary increase for using eXtension. | 125 | 4.00 | 1.25 |
| Lack of monetary compensation for developing eXtension resources. | 125 | 3.92 | 1.15 |
| Lack of awards for involvement with eXtension. | 124 | 3.75 | 1.21 |
| Lack of support from local administrators. | 125 | 3.75 | 1.28 |
| Lack of support from state administrators. | 125 | 3.74 | 1.21 |

Note. Overall $M = 3.90$, $SD = 1.00$. Scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Somewhat Disagree*, 4 = *Somewhat Agree*, 5 = *Agree*, 6 = *Strongly Agree*.

Respondents tended to somewhat agree with all seven statements. The statement “Lack of correlation between agent use of eXtension and performance evaluation” ($M = 4.07$, $SD = 1.11$) had the highest mean. The statement “Lack of support from state administrators” ($M = 3.74$, $SD = 1.21$) had the lowest mean.

Financial Concerns

Responses for the five items addressing potential financial concerns ranged from “strongly disagree” to “strongly agree” on a six-point scale (1 = *Strongly Disagree*, 6 = *Strongly Agree*). Table 6 displays the means and standard deviations for each item.

Table 6

Respondents' Perceptions of Financial Concerns as a Potential Barrier to eXtension by Individual Response Item

| Financial Concerns Items | <i>N</i> | <i>M</i> | <i>SD</i> |
|--|----------|----------|-----------|
| Cost of purchasing the necessary computer technologies. | 125 | 4.09 | 1.24 |
| Lack of financial resources to promote eXtension locally. | 125 | 3.96 | 1.20 |
| Concerns about sharing revenue from eXtension with multiple partnering institutions. | 125 | 3.69 | 1.16 |
| Lack of financial resources to support the necessary computer technologies. | 125 | 3.66 | 1.24 |
| My state Extension program does not have enough money to support eXtension. | 123 | 3.46 | 1.07 |

Note. Overall $M = 3.77$, $SD = 1.01$. Scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Somewhat Disagree*, 4 = *Somewhat Agree*, 5 = *Agree*, 6 = *Strongly Agree*.

Respondents tended to somewhat agree with the statement “Cost of purchasing the necessary computer technologies” ($M = 4.09$, $SD = 1.24$). They tended to somewhat disagree with the statement “My state Extension program does not have enough money to support eXtension” ($M = 3.46$, $SD = 1.07$).

Planning Issues

Responses for the five items addressing potential planning issues ranged from “strongly disagree” to “strongly agree” on a six-point scale (1 = *Strongly Disagree*, 6 = *Strongly Agree*). Table 7 displays the means and standard deviations for each item.

Table 7

Respondents' Perceptions of Planning Issues as a Potential Barrier to eXtension by Individual Response Item

| Planning Issues Items | <i>N</i> | <i>M</i> | <i>SD</i> |
|---|----------|----------|-----------|
| Lack of planned opportunities for agents to learn about eXtension. | 124 | 4.10 | 1.08 |
| Lack of shared vision for the role of eXtension with traditional Extension structure. | 125 | 3.88 | 1.09 |
| Lack of identified need (perceived or real) for eXtension. | 125 | 3.76 | 1.03 |
| Lack of coordination between participating eXtension partners. | 125 | 3.73 | 1.07 |
| Lack of strategic planning for eXtension. | 125 | 3.70 | 1.05 |

Note. Overall $M = 3.84$, $SD = .93$. Scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Somewhat Disagree*, 4 = *Somewhat Agree*, 5 = *Agree*, 6 = *Strongly Agree*.

Respondents tended to agree somewhat with all five statements. The statement “Lack of planned opportunities for agents to learn about eXtension” ($M = 4.10$, $SD = 1.08$) had the highest mean. The statement “Lack of strategic planning for eXtension” ($M = 3.70$, $SD = 1.05$) had the lowest mean.

Technology Concerns

Responses for the nine items addressing potential technology concerns ranged from “strongly disagree” to “strongly agree” on a six-point scale (1 = *Strongly Disagree*, 6 = *Strongly Agree*). Table 8 displays the means and standard deviations for each item.

Table 8

Respondents' Perceptions of Technology Concerns as a Potential Barrier to eXtension by Individual Response Item

| Technology Concerns Items | <i>N</i> | <i>M</i> | <i>SD</i> |
|---|----------|----------|-----------|
| Concern about loss of face-to-face contact with clientele. | 124 | 4.31 | 1.41 |
| Lack of technical support. | 125 | 4.06 | 1.38 |
| Lack of training programs to learn how to use eXtension. | 124 | 4.06 | 1.25 |
| Concern about loss of control of Extension information at the local level. | 125 | 3.57 | 1.38 |
| Concern for legal issues (e.g., computer crime, hackers, software piracy, copyright). | 125 | 3.53 | 1.30 |
| Lack of agent access to adequate Internet connection speeds. | 123 | 3.46 | 1.42 |
| Concern about intellectual property rights. | 125 | 3.44 | 1.10 |
| Concern that eXtension will be used to replace local agent positions. | 125 | 3.40 | 1.48 |
| Lack of agent access to computers. | 125 | 3.07 | 1.36 |

Note. Overall $M = 3.66$, $SD = .97$. Scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Somewhat Disagree*, 4 = *Somewhat Agree*, 5 = *Agree*, 6 = *Strongly Agree*.

Respondents tended to somewhat agree “Concern about loss of face-to-face contact with clientele” ($M = 4.31$, $SD = 1.41$) was a potential barrier to the diffusion of eXtension. They tended to somewhat disagree “Lack of agent access to computers” ($M = 3.07$, $SD = 1.36$) was a potential barrier.

Educational Importance/Implications/Application

Web-based resources such as eXtension offer extension workers the opportunity to instantly access research-based information. In countries with the appropriate infrastructure, the spread of such technologies has the potential to improve the dissemination of information for extension clientele with a speed unmatched by earlier delivery strategies. The lessons learned from the launch of eXtension may be used by other Extension systems to proactively address potential barriers in the development of similar innovations. Too, the global nature of the Internet offers the possibility for expanding eXtension to include the international extension community.

This study provided information that may be used to address concerns which inhibit the rate of adoption for eXtension. The identified barriers to eXtension were similar to those found in the literature (Berg, Muilenberg, & Van Haneghan, 2002; Curbelo-Ruiz, 2002; Haber, 2006; Li & Lindner, 2007; Maguire, 2005; Murphrey & Dooley, 2002; Nelson & Thompson, 2005; Roberts & Dyer, 2005). Respondents somewhat agreed that each potential barrier was, in fact, a barrier. They had the most concerns about time. Technology concerns were least perceived as a barrier. Eliminating or decreasing the perceived barriers should increase agents' adoption of eXtension (Schifter, 2000).

The results of this study imply administrative planning is a critical component affecting the adoption of an innovation. An appropriately designed training program for agents could be

effectively utilized to (a) alleviate concerns about time, (b) provide important “how to” information related to the use of eXtension, and (c) offer access to technical support. The development of a communication strategy to demonstrate how eXtension fits with the vision and mission of Cooperative Extension would be especially helpful for addressing concerns about incentives. It is worth noting that the even best training programs and communication strategies will be rendered ineffective without the appropriate infrastructure available to support the innovation. Financial resources must be given particular consideration during the planning process.

The possibilities for future eXtension research are broad, given the “newness” of the innovation. Researchers working outside of the United States are encouraged to determine the appropriateness of assessing similar barriers to their countries’ Information Communication Technologies. The results of this and similar studies will aid in the development of a global understanding of the adoption and diffusion of information technologies as a delivery strategy for extension.

References

- Accenture. (2003, November). *e-Extension pre-select business case*. Washington, DC: U.S. Department of Agriculture.
- Annor-Frempong, F., Kwarteng, J., Agunga, R., & Zinnah, M. M. (2006). Challenges and prospects of infusing information communication technologies (ICTS) in extension for agricultural and rural development in Ghana. *Proceedings of the Annual Conference of the International Association of Agricultural and Extension Education*, 22, 36-46.
- Bender, D. M., Wood, B. J., & Vredevoogd, J. D. (2004). Teaching time: Distance education versus classroom instruction. *American Journal of Distance Education*, 18(2), 103-114.
- Berge, Z. L. (1998). Barriers to online teaching in post-secondary institutions. *Online Journal of Distance Learning Administration*, 1(2). Retrieved April 10, 2007, from <http://www.westga.edu/~distance/Berge12.html>
- Berge, Z. L., Muilenburg, L. Y., & Van Haneghan, J. (2002). Barriers to distance education and training. *The Quarterly Review of Distance Education*, 3(4), 409-418.
- Cavanaugh, J. (2005). Teaching online – A time comparison. *Online Journal of Distance Learning Administration*, 8(1). Retrieved June 27, 2006, from <http://www.westga.edu/%7Edistance/ojdl/spring81/cavanaugh81.htm>
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334.
- Curbelo-Ruiz, A. M. (2002). Factors influencing faculty participation in web-based distance education technologies. *Dissertation Abstracts International*, 63(4), 1227A. (UMI No. 3049007)
- Daugherty, M., & Funke, B. L. (1998). University faculty and student perceptions of web-based instruction. *Journal of Distance Education*, 13(1). Retrieved June 2, 2006, from <http://cade.athabascau.ca/vol13.1/daugherty.html>
- Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method* (2nd ed.). New York: John Wiley & Sons.
- Dolly, D., & Kisoosingh (2006). Prospects for distance education training among vegetable producers in Trinidad and Tobago. *Proceedings of the Annual Conference of the International Association of Agricultural and Extension Education*, 22, 194-203.

- Ensle, K. M. (2005). Burnout: How does extension balance job and family? *Journal of Extension*, 43(3). Retrieved March 27, 2007, from <http://www.joe.org/joe/2005june/a5.shtml>
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Education research: An introduction* (8th ed.). Boston: Pearson Education.
- Haber, J. R. (2006). Perceptions of barriers concerning effective on-line teaching and policies: Florida community college full-time faculty members. *Dissertation Abstracts International*, 66(7), 2508A. (UMI No. 3183605)
- Harder, A. (2007). *Characteristics and barriers impacting the diffusion of eXtension among Texas Cooperative Extension county extension agents*. Unpublished doctoral dissertation, Texas A&M University, College Station, TX.
- Harder, A., & Wingenbach, G. (2007). Texas 4-H agents' perceptions of selected competencies in the 4-H Professional Research, Knowledge, and Competency model. *Proceedings of the Annual Conference of the American Association for Agricultural Education*, 34, 445-455.
- Hedjazi, Y., Rezaee, R., & Zamani, N. (2006). Factors affecting the use of ICTs by Iranian agriculture extension specialists. *Journal of Extension Systems*, 22(1), 1-15.
- Kuck, G. R. (2006). Barriers to implementing distance education: A case study in the community colleges. *Dissertation Abstracts International*, 66(11). (UMI No. 3196833)
- Li, Y. (2004). Faculty perceptions about attributes and barriers impacting diffusion of web-based distance education (WBDE) at the China Agricultural University. *Dissertation Abstracts International*, 65(7), 2460A. (UMI No. 3141422).
- Li, Y., & Lindner, J. R. (2007). Barriers to diffusion of Web-based distance education at China Agricultural University. *Journal of International Agricultural and Extension Education*, 14(1), 45-57.
- Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education*, 42(4), 43-53.
- Maguire, L. (2005). Literature review – faculty participation in online distance education: Barriers and motivators. *Online Journal of Distance Learning Administration*, 8(1). Retrieved June 27, 2006 from <http://www.westga.edu/%7Edistance/ojdl/spring81/maguire81.htm>
- Murphrey, T. P., & Dooley, K. E. (2000). Perceived strengths, weaknesses, opportunities, and threats impacting the diffusion of distance education technologies in a college of agriculture and life sciences. *Journal of Agricultural Education*, 41(4), 39-50.
- Murphy, T. H., & Terry, H. R. (1998). Faculty needs associated with agricultural distance education. *Journal of Agricultural Education*, 39(1), 17-27.
- Nelson, S. J., & Thompson, G. W. (2005). Barriers perceived by administrators and faculty regarding the use of distance education technologies in preservice programs for secondary agricultural education teachers. *Journal of Agricultural Education*, 46(4), 36-48.
- Place, N. T., Jacob, S. G., Summerhill, W. R., & Arrington, L. R. (2000). Balancing work and family: Professional development needs of extension faculty. *Proceedings of the 27th Annual National Agricultural Education Research Conference*, 180-192. San Diego, CA.
- Porter, R. D. (2004). Internet-based distance educators address major education barriers in large postsecondary institutions. *Dissertation Abstracts International*, 65(4), 1278A. (UMI No. 3130048)

- Roberts, T. G., & Dyer, J. E. (2005). A summary of distance education in university agricultural education departments. *Journal of Agricultural Education*, 46(2), 70-82.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.
- Schifter, C. C. (2000). Factors influencing faculty participation in distance education: A factor analysis. *Education at a Distance*, 13(1). Retrieved December 8, 2006, from http://www.usdla.org/html/journal/JAN00_Issue/Factors.htm
- Spector, M. J. (2005). Time demands in online instruction. *Distance Education*, 26(1), 5-27.