Choosing to Use the Web: Comparing Early and Late Respondents to an Online Web-based Survey Designed to Assess IT Computer Skills Perceptions of County Extension Agents

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Abstract

Research was conducted to compare early versus late respondents to an online Web-based survey designed to assess perceived computer IT skills of a population of cooperative extension agents. Two-hundred ninety-nine respondents returned the survey, 21 returning by paper and 278 by electronic form. Response rate to the survey was 90.3%. Results showed that, overall, respondents self-rated their overall computer IT skills to be either "average" or "above average." In general, demographics for early and late online respondents tended to be comparable, although late online respondents tended to skew more female than early online respondents. In addition, more early online respondents rated their IT computer skills as average or above average than did late online respondents.

In addition to the finding that a large majority of respondents rated their IT computers skills as at least average or above, results of this study provided some support for the use of Web-based survey techniques in terms of achieving an effective response rate and, to a lesser extent, comparability of early and late respondents. Recommendations stemming from this research include supporting further refinement of Web based survey techniques, including developing a model for comparing relevant variables, such as prior experience with Web surveys, computer and Web competencies, level, type and speed of computer access and overall motivation to use computers, as a means to verify and insure validity of online survey results .

Introduction

The use of self-administered surveys has been viewed as a vital tool for social science researchers, including those in agricultural education (Fraze, Hardin, Brashears, Haygood & Smith, 2002). Traditionally, survey data has been collected in a variety of formats by a wide range of researchers attempting to describe and understand demographic, perceptual and performance factors related to psychological and psychosocial processes. In education research, surveys are considered to be the most commonly used method of data collection activity (Ary, Jacobs & Razavieh, 2002). But, although survey methods have the advantage of being efficient in terms of instrument development and testing and analysis, dissemination of survey instruments via telephone and mail can be expensive, time consuming and prone to non-response and coverage error (Dillman & Bowker, 2001).

In increasing numbers, researchers, including those in agricultural education, have begun to turn to Web-based surveys methods as a mechanism to reduce time and expense and potentially, for discrete populations of respondents for whom the variables of interest would theoretically hold salience, enhance response rate and time of return over traditional mailed methods. In an attempt to ascertain the utility and validity of Web-based surveys, as well as develop procedures for optimal utilization of these methods, recent studies in the discipline have been conducted to assess perceptions of respondents and potential differences between those who respond via the Web and those who respond on paper (Fraze, Hardin, Brashears, Haygood & Smith, 2002; Ladner, Wingenbach & Raven 2003). For example, in a computer technology assessment study of American Association of Agricultural Education (AAAE) members, Wingenbach, Lander and Newman (2002) found that Web surveys were perceived by AAAE member respondents as a valid and reliable method for data collection, although those respondents who returned their surveys via the Web were significantly more positive in terms of their perceptions than those who returned the survey via hard copy paper instrumentation. In a study of educational preferences of 323 Cooperative Communicators of America members, Brashears, Bullock and & Akers (2003) found Web survey methods 74% less expensive than other survey methods.

Theoretical/Conceptual Framework

Since the advent of the Web, researchers have sought to understand how individuals make the decision to utilize the online environment for information processing purposes as opposed to other more traditional methods. From a theoretical standpoint, adoption behavior, commonly thought of as how early or late in a diffusion cycle one adopts a new product, idea or innovation, is a construct developed from Rogers and Shoemaker's diffusion of innovations framework. In their original conceptualization, Rogers and Shoemaker defined adoption behavior as the relationship between the time at which an individual chooses to adopt a technological innovation and the time at which other members of his/her social system do so (Rogers & Shoemaker, 1971). Rogers (1995) described the usual process of implementing an innovation as being comprised of knowledge, persuasion, decision-making,

implementation, and confirmation. But he also argued that prior attitudes toward an innovation frequently intervened between knowledge and decision (attitude and behavior), and that there are instances where attitudes and actions are not consistent.

Daft and Lengal (1986) extended the diffusion of innovations framework to focus on the decision to use a specific information channel. They argued that the information richness, defined as the ability of information to change understanding within a time interval (p. 560) of an informational channel influenced the decision making processes of managers. The researchers argued that individuals cognitively weigh a combination of evaluative factors when making the decision as to what channel would be most effective to utilize. When faced with a volitional choice, such as making use of a technological innovation to complete an information transmission activity like filling out a web survey, information richness theory posits that individuals evaluate the information richness of a channel, combined with attitudes and perceptions toward the channel's appropriateness for a given task. Within this framework, face to face and telephone are seen as the most information rich channels, followed by print and then electronic forms of communications such as web and email.

Although the first electronic surveys conducted via the Internet were in fact predominately done through e-mail (Solomon, 2001), the advent of the World Wide Web introduced electronic surveys created in hypertext markup language (HTML) – known as "Web-based surveys" (Solomon, 2001, p.2). Due to their low cost relative to conventional surveys (paper-based, face-to-face, computer-assisted telephone surveys, etc.), and their ability to quickly return copious amounts of data from the tremendous populations they reached, Web-based surveys experienced explosive growth (Dilman & Bowker, 2001; Yun & Trumbo, 2000; Solomon, 2001). But if individuals draw on different types of evaluative information in order to choose whether and how to respond to web based surveys, how comparable and representative are results from these types of surveys?

Research suggests that validity may be an issue with some forms of web based surveys, depending on the administration technique. Perhaps more so than conventional surveys, those conducted via the Web may be subject to various sources of potential survey error. Coverage error, or the error resulting from drawing a sample that does not adequately represent a population, is of particular concern in Web-based surveys – especially those of the general public (Coomber, 1997; Dilman & Bowker, 2001; Solomon, 2001). Though this situation is seen as mitigating in the future as more individuals use the Web (Coomber, 1997), currently not everyone has access, and/or is reluctant to use the web for certain activities, which can create sample bias issues. According to Dillman & Bowker (2001), however, "Some populations – employees of certain organizations, members of professional organizations, certain types of businesses, students at many universities and colleges, and groups with high levels of education – do not exhibit large coverage problems. When nearly

all members of a population have computers and Internet access, as is already the case for many such groups, coverage is less of a problem" (p. 5).

Non-response error, though, remains a concern for all surveys, both Web-based and conventional. As Bosnjak & Tuten (2001) put it: "Non-response is of particular importance to researchers because the unknown characteristics and attitudes of non-respondents may cause inaccuracies in the results of the study in question" (p. 2). Dillman & Bowker (2001) indicate that response to Web-based surveys is likely to be low, and can potentially cause non-response error. Addressing ways of reducing survey error as they pertain to Web-based surveys, Dillman & Bowker (2001) contended that proper use of the introductory page, choice of first question, visual appearance of questions, and use of graphical symbols or words to convey level of completion of the survey are all ways to reduce potential sources of error. Extending from Dillman's own work on the subject (2000), they contended that non-response error can be reduced by including an email invitation cover letter to ask for participation from respondents before sending out the actual survey, as well as a series of timed email reminders urging participation after the survey has been sent out. As a means to combat non-response due to reluctance to use the Web, they advised that a paper-based version for the instrument should be sent to those who do not respond to the initial waves of the electronic version of the survey.

Another potential issue for web based surveys is time of response. Studies suggest that respondents who choose to fill out a survey online are likely to return the survey more quickly, often within the first few days, although the overall rate of response may be lower than that of traditional paper-based methods. For example, in an experimental study of Web-based versus paper-based respondents, Ladner, Wingenbach, and Raven (2002) found that although paper based respondents had an overall higher rate of response, during the first week, Web based respondents returned their surveys at a significantly higher rate than did paper based respondents. Based on their findings, the researchers proposed a survey methodology for the Web they termed the Web/Paper Survey Data Collection Model, or W/PSDC, also referred to as the Bi-Modal Survey Model (Brashears, Bullock & Akers, 2003; Fraze, Hardin, Brashears, Haygood & Smith, 2002). This approach gives individuals a period of time to complete a Web-based survey instrument, but then sends a paper copy of the survey instrument to those individuals who have not completed the Web-based version.

Although promising new techniques have been developed, and surveying via the Web has been shown to be more cost efficient and preferred by some respondents over traditional methods, questions remain as to its effectiveness and representativeness. Can web methods generate effective response rates? And, if a significant portion of online respondents do return surveys earlier than other respondents, how comparable are early versus late online respondents in terms of their responses to variables under study?

Purpose and Objectives of the Study

This study was initially conducted to assess the use of information technology (IT) by a statewide population of county Extension agents. Ten years previously Ruppert (1992) had conducted a similar survey in the same state which indicated that although 92.7% of respondents had access to a computer, and used it on average, 28.64 hours week, 54.4% did not have a computer on their desk. Many agents shared a computer with a colleague or staff. Less than one third of the respondents reported they used a computer at home. Female agents had less access to a computer than males, and fewer females had a computer on their desk than did males. Ruppert also found that "age, program area, typing, computer training and computer resource contact were all significant demographic and situational independent variables that affected the overall computer use mean score of county agents" (Ruppert, 1992, p. 102).

Based on the above, the purposes of this study were two-fold: first, to follow up on the 1992 study with a view toward assessing county Extension agents' current use and perceptions of information technology, and second, to utilize survey results to assess the degree to which use of a web-based survey technique could be utilized to yield both an acceptable response rate and comparable online respondents with respect to time of response and variables of interest. As such, objectives for the study were to:

(1) Describe respondents to a bi-modally administered Web-based survey of a state's county extension agents in terms of their demographic characteristics and selected variables under study, in this case, gender and self rated computer IT skills.

(2) Compare early and late online respondents with respect to gender and self-rated computer IT skill.

Methods and Procedures

The population for this descriptive survey study was county Extension agents in the employ of a state Cooperative Extension Service. At the time the study was initiated, this population numbered 331. The descriptive survey instrument utilized in the study was adapted from an IT computer skill assessment instrument developed by Albright (2000) that had been used to assess county extension faculty IT use in Texas. The instrument contained 99 items that collected information on software skills, patterns of computer IT use, and future software training needs of county extension faculty.

In addition to specific demographic characteristics associated with the respondent, the instrument included items asking the respondent if they could perform specific computer technology skills associated with eight types of computer software (i.e., e-mail, word processing, etc.). Respondents were also asked to estimate the average number of hours they

"were on the computer" per week, and to respond to a series of five point Likert type items asking them to rate their overall IT skills. The instrument was reviewed by a panel of experts for face and content validity, and then pilot tested with a small group of agents.

After minor refinement of the survey, the full Web-based survey was subsequently introduced by a message e-mailed to all county agents from the Dean for Extension. The study commenced with a follow-up e-mail message from the researchers containing specific information on the survey's rationale, a hyperlink to the World Wide Web site hosting the survey instrument, and the agent's unique, individualized access code. Six reminder messages were subsequently sent to those who had not responded. After the sixth wave, agents who had not filled in the Web-based instrument were sent a survey packet via conventional mail. The information in this package contained language indicating that the survey could alternately be filled out online, and provided the URL to the site and the individual's unique access code. A single reminder message was sent by post two weeks thereafter to those agents who had not returned the paper survey, or who had not completed it online.

Two hundred ninety-nine agents, or 90.33% of the population, ultimately completed the survey. Of these, 278 filled out the survey online, while 21 completed the paper version of the survey. To assess reliability of the final instrument, Chronbach's alpha statistic was calculated, resulting in a standardized item alpha of .83 for the overall scale. Based on the fact that this was a census study, data analysis, conducted with SPSS 10.0, consisted of frequency distributions and descriptives which were calculated for all appropriate survey items.

Findings

Objective one. Describe county agents in terms of their demographic characteristics and self rated overall computer IT skills.

By gender the respondents were 57.86% female, and 42.14% male, a figure close to that of the general population of county Extension agents (58.01% female and 49.99% male) as verified by consulting the current personnel employee database. The majority of respondents (63.54%) indicated that their age fell between 41 and 50 years. Most respondents (69.90%) reported work experience, including both inside and outside of Extension, of 16 or more years. Table 1 presents this information.

Table 1.

Number of Respondents by Gender, Age and Years of Work Experience (N = 299*)*

Characteristic	***N***	***%N***
Gender		
Male	126	42.14
Female	173	57.86
Age Group		
20-30	35	11.71
31-40	51	17.06
41-50	97	32.44
51-60	93	31.10
61-70	19	6.35
No response	4	1.34
Years Work Experience		
Less than 5 years	22	7.36
5-10 years	31	10.37
11-15 years	34	11.37
16+ years	209	69.90
No response	3	1.00

Agents were asked to self-rate their overall computer IT skills on a scale from "poor" to "excellent." As shown in Table 2, 84.95% of the respondents reported their skills to be either "average" or "above average." By gender, 85.37% of the males, and 84.97% of the females rated their skills as being either "average" or "above average."

Table 2.

Self-rated Overall IT Skills for All Respondents (N=299)

Overall IT Skills Rating	*N*	*%N*
Very Poor	3	1.00
Poor	18	6.02
Average	129	43.14
Above Average	125	41.81
Excellent	22	7.36
No Response	2	0.67

When asked about average computer use per week, one hundred-thirteen agents (37.79%) responded that they use their computers, both at home and at work, over 20 hours a week. Another 78 agents (26.09%) reported computer use at between 16-20 hours per week.

Table 3.

Hours of Computer Use per Week for All Respondents (N=299)

Level of Use	*N*	*%N*
1-5 Hours/week	18	6.02
6-10 Hours/week	44	14.72
11-15 Hours/week	46	15.38
16-20 Hours/week	78	26.09
20+ Hours/week	113	37.79

Objective two. Describe early and late online respondents with respect to self-rated computer IT skill and hours of computer usage per week.

To assess the early and late online groups, the online respondents (n=278), were divided into percentage quartiles (Glenn D. Israel – Personal communication, October 2002). The first (n=65) and last (n=65) quarters of these respondents were chosen to form the early and late groups, respectively. Demographics for the early online respondents and late online respondents were then assessed. Results indicated that both early and late online groups were essentially comparable. The average age range for both early and late online respondents was 41-50; average years of work experience 11-15 years; and hours of computer usage per week 16-20 hours. With respect to gender, however, as is shown in Table 4, based on visual inspection, the percentages of male (44.62%) and female (55.38%) early online respondents are essentially equal to the percentages of gender for all respondents. This changes for the late online respondents, with females (64.62%) constituting a greater percentage of this category.

Table 4.

Frequency and Percent by Gender for the Early and Late Online Response Groups

Response Group	Male		Female	
	N	*%N*	*N*	*%N*
Early Online Respondents	29	44.62	36	55.38
Late Online Respondents	23	35.38	42	64.62

The analysis then examined the Early Online Respondents and Late Online Respondents in terms of self-rated computer skills. Results indicated that, for early online

respondents, 89.23% of the respondents reported their skills to be "average" or "above average." For late online respondents, 83.08% rated their skills as being "average" or "above average", indicating, upon visual inspection, slightly more early respondents rating their skills as average or above average (n=58) than late respondents (n=54).

Table 5.

Self-rated Overall IT Skills for Early and Late Online Respondents

	Early Online Respondents		*Late Online Respondents*		*Diff.*
Overall IT Skills Rating	*N*	*%N*	*N*	*%N*	
Very Poor	1	1.54	2	3.08	-1
Poor	2	3.08	5	7.69	-3
Average	31	47.69	28	43.08	+3
Above Average	27	41.54	26	40.00	+1
Excellent	4	6.15	4	6.15	0

Finally, respondents were asked to evaluate the convenience of, and their intent to respond in future to an online Web based survey. Over two-thirds (68.56%) of the respondents rated Web-based surveys to be of average, above average, or high convenience. Over three-quarters (76.55%) said they would be likely, more than likely, or highly likely to respond to a Web-based survey. Agents' response when asked to estimate how many Web-based surveys they had participated in ranged from a high of 45 to a low of 0 (mean = 5.60).

Discussion, Conclusions, and Recommendations

This study sought to explore the comparability of early and late respondents to a web based survey. Findings of the study showed that respondents were 57.86% female, and 42.14% male, a figure close to that of the general population of county Extension agents (58.01% female and 49.99% male) in Florida. The majority of respondents (63.54%) indicated that their age fell between 41 and 50 years. Most respondents (69.90%) reported work experience, including both inside and outside of Extension, of 16 or more years. With respect to overall computer IT skills, 84.95% of the respondents self-reported their skills to be either "average" or "above average." By gender, 85.37% of the males, and 84.97% of the females rated their skills as being either "average" or "above average." When asked about average computer use per week, one hundred-thirteen agents (37.79%) responded that they use their computers, both at home and at work, over 20 hours a week. Another 78 agents (26.09%) reported computer use at between 16-20 hours per week.

Results describing early and late online survey respondent groups showed that they were essentially comparable in terms of age, (41-50); average years of work experience (11-15 years); and hours of computer usage per week (16-20 hours). With respect to gender, based on visual inspection, the percentages of male (44.62%) and female (55.38%) early

online respondents were essentially equal to the percentages of gender for all respondents. This changes for the late online respondents, with females (64.62%) constituting a greater percentage of this category for this group. In terms of self-rated computer skills, results indicated that, for early online respondents, 89.23% of the respondents reported their skills to be "average" or "above average." For late online respondents, 83.08% rated their skills as being "average" or "above average", indicating, upon visual inspection, slightly more early respondents rating their skills as average or above average (n=58) than late respondents (n=54). Finally, respondents were asked to evaluate the convenience of, and their intent to respond in future to an online Web based survey. Over two-thirds (68.56%) of the respondents rated Web-based surveys to be of average, above average, or high convenience. Over three-quarters (76.55%) said they would be likely, more than likely, or highly likely to respond to a Web-based survey.

Results of this study suggest that the Web-based bi-modal methodology used to administer the survey was, in general, effective, in terms of generating both a high response rate and comparability on selected variables under study. The overall response rate was extremely high, indicating that Web based methods can generate high levels of response when multiple waves in both electronic and print form are utilized.

Overall, these findings provide some support for the effectiveness of Web based surveys, although a key implication of these findings is the need to carefully consider the influence of the variables of interest before undertaking this approach. In this study, although statistical comparisons cannot be made, the pattern of response between early and late online respondents with respect to gender and self rated overall computer IT skills did appear to vary somewhat.

Limitations of this study include that it was conducted with respondents from one state's Cooperative Extension Service, thus limiting its generalizability, and that variables under study that could be relevant were limited in number. Due to the growing popularity of online survey methods, a need exits to continue and expand on this research, perhaps utilizing large sampling frames and multivariate techniques in order to develop a better understanding of individual decision making processes with respect to choosing and manner of responding to a web based survey.

Specific recommendations stemming from this research include the following:

- When conducting any web-based study, take care to carefully consider the relevance of the study and topic to the sample or population being targeted. In the case of the present study, the topic was highly relevant to the population, and may have had a bearing on final response rate as a result.

- Carefully consider potential sources of bias and non-comparability beforehand, as well as utilize other sources of data to provide verification, where possible, of population and sample distributions.
- When collecting data via a web based instrument and Bi-Modal survey technique, develop a data collection plan that includes multiple waves in a variety of sources, such as email and web.
- Conduct studies to further refine bimodal Web-based survey techniques, including developing a theoretical model to compare relevant variables, such as prior experience with Web surveys, computer and Web competencies, level, type and speed of computer access and overall motivation to use computers, as a means to verify and insure validity of online survey results.

In conclusion, these results suggest the profession has much to gain from further exploration of the possibilities presented by Internet based research in terms of cost efficiencies and implied productivity increases. In times where faculty resources are stretched thin, there is a critical need to maximize research productivity in terms of efficiency and effectiveness. Efforts to develop rigorous and reliable methods and procedures to utilize the Internet to expand research capabilities, therefore, have the potential to make a lasting and needed contribution to the discipline.

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