Methodology Meets Technology: Survey Response Rates Using Mail, Email and Fax

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ABSTRACT

The use of email and fax communications has increased dramatically over the last decade. They are now commonplace methods of information exchange. Most research involving questionnaires has used postal mail to deliver and return the surveys from recipients who might not otherwise be reached through live administration. A frequent methodological issue with mail surveys is low levels of return rates. The present research compared the return rates of a survey that was sent by mail, email or fax. Participants could return the survey by any of the same three methods. The results showed that postal mail and email exhibited higher return rates than facsimiles and that the method of return tended to be the same method in which the questionnaire was originally sent. Implications of these results for survey research are discussed.

INTRODUCTION

Questionnaires (written surveys) are widely-used instruments that can potentially provide insight into the attitudes, perceptions, and memory of individuals or groups. Questionnaires are a tool that can assist Human Factors/Ergonomics (HF/E) professionals and researchers in identifying user opinions and preferences, to determine the safety awareness level of a population, or to evaluate product design. Some questionnaires are personally delivered by the administrator(s) to participants. Not infrequently, the live presentation format involves participants who as a group do not fit the desired target audience. Live administration to a more representative sample of individuals may involve costs that cannot be borne by HF/E professionals or researchers. For a representative sample, it might be necessary to travel to distant locations which may involve costs (time, money and effort) that are prohibitive. A more economical approach has been to use postal mail to deliver surveys to potential participants. A frequent issue in such research is the return rate. It is not unusual that a "good" return rate is less than half of the surveys that are sent out.

Recent advances in communications technology have provided new tools that could benefit questionnaire administration. In the last 10 years, we have seen dramatic growth and adoption of facsimile machines and email. Twenty years ago these tools did not exist and they are now commonplace and are used by large sectors of the population. It is possible that email and fax could potentially yield higher return rates than the traditional postal mail method. The present study addressed this issue. As a vehicle to examine this issue, a questionnaire was sent to a random sample of HFES Members/Fellows and Student Affiliates. They received the questionnaire by mail, email, or fax, and they could return the survey by any of the same three media.

METHOD

Participants

Three hundred potential recipients were randomly selected from the *1998-1999 Human Factors and Ergonomics Society Directory and Yearbook.* Half were Members or Fellows, while the others were Student Affiliates. Listings from the Associate or Affiliate categories were excluded. All had U.S. addresses.

Materials

A questionnaire was designed to gather basic demographics and asked recipients to describe how they were introduced to HF/E and to describe some examples of HF/E that they might use to interest students in the area. Some of the survey's content and results are described in Martin, Wogalter, and Yarbrough (2000). Three nearly identical forms of the survey were constructed; they differed only in the order of three questions. The order served to code for the method of delivery (sending mode). The three questions asked age, sex and how many years the recipients have had membership in HFES. A cover letter accompanying the survey explained the purpose of the questionnaire, how they were selected, and stated that they could return the completed survey by either mail, email, or fax. A full postal mail address, an email address and a fax phone number were provided. The postal mail recipients also received a pre-stamped and a pre-addressed envelope.

Two hundred paper cover letters and copies of the survey were produced. They were addressed to individuals receiving the survey by postal mail or fax. The cover letter was printed on official North Carolina State University (NCSU) stationary. Two hundred official NCSU business-sized envelopes were used. One-hundred were addressed to the individuals selected to receive the survey by postal mail. The other 100

were return envelopes already addressed to the researchers affixed with a 33-cent first-class U.S. postage stamp. These return envelopes were enclosed with the materials sent to the postal mail recipients.

The cover letter and survey in the email version mimicked as much as possible the same format as in the mail and fax copy. The email lacked the information that is present in all official NCSU stationary (e.g., including a statement in the margin describing NCSU as a land grant institution). The emailed version was sent as the message text (not as an attachment) and care was taken to ensure that the survey could be read on the screen without the interference from excessive line breaks that sometimes occurs when the line lengths are long. Consequently, the email lines were made relatively short, and the postal mail and fax versions were made with same short line lengths.

The postal mailing address given was the NCSU Psychology Department. The email address was to the NCSU.edu domain. The fax number was to a fax/answering machine in the Psychology Department's Ergonomics Laboratory.

Procedure

Random selection and assignment to conditions involved the use of a random number table and the *1998-1999 Human Factors and Ergonomics Society Directory and Yearbook.* The random number table was used to point numerically to a valid page number and a person on that page. Persons in the two membership categories were assigned to one of three sending modality conditions. Thus, there were six (modality x membership category) groups of 50 .

Because Student Affiliates were less likely to list a fax number in the directory, the 50 recipients in the Student Affiliate-Fax category were randomly selected first to avoid further limiting that pool by assigning those individuals to another category. In this case, whenever the random number table pointed to a nonstudent or to a student that did not have a fax number, the listing was disregarded. A similar procedure was followed in selecting the recipients for the Member/Fellow-Fax, Student Affiliate-Email, Member/Fellow Email, Student-Mail, and Member/Fellow-Mail categories in that order.

The cover letter explained the nature of the survey and stated that the survey could be returned by any of the three return methods. Nothing in the cover letter suggested anything about the manipulation of different sending or returning modalities. Because of the importance of determining the initial method of transmission in interpreting response rates, it was necessary to devise a coding scheme to identify the sending modality. Since any hidden markings on a particular form would be negated if the recipient chose to respond via email, we changed the order of three questions to distinguish the three sending forms. For example, the postal mail version first asked the recipient's age, their sex second and how many years the recipient had been a member of HFES third. The other two modalities had two other orders of these questions.

Surveys were then distributed to the 50 people in each of the six categories. All 300 were sent out the same day. The two days following dispersement were used to retry busy or disconnected fax phone numbers (fax), and/or to follow up on undeliverable emails. University and commercial internet search engines/directories were used in an extensive attempt to locate current email addresses. After the third day, follow-up fax and email attempts ceased.

Recipients were asked to return the completed survey and could choose whatever method they preferred up to a stated deadline date that was three weeks after the original dispersement. Surveys were accepted up to the specified return date with the exception that postal mail replies were accepted as long as they were postmarked by the date indicated on the cover letter to compensate for possible delays in mail transit times. Surveys returned after the specified date were used solely for informational purposes and were not included in the tally of response rates.

RESULTS

Demographic Data

Of the 109 questionnaires returned, 65 were men and 44 were women. We do not know how many of the original 300 were men and women because many of the names in the directory could not be decoded into a definitive sex classification. Age of the respondents ranged from 21 to 78 with a mean of 42.9 (SD = 13.6). The women (M = 38.8) were significantly younger than the men (M = 45.7), $t(106) = 2.68$, $p < .01$. The mean years since joining the society was 11.6 (SD=10.0). The women (M = 8.8) have held membership for significantly fewer years than the men (M = 13.5), $t(104) = 2.42$, $p < .05$. Most of the 29 respondents who had been in the Society three or fewer years were probably students.

Of the respondents returning questionnaires, 35 indicated that they were students. Because 150 surveys were sent to Student Affiliates, the apparent response rate was 23%. Seventy-two questionnaires listed an occupation (other than student) for an apparent response rate of Members/Fellows of 48%. However, because the questionnaires could not be coded to indicate whether they had been sent to a Member/Fellow or a Student Affiliate, we do not know how many of the questionnaires originally sent to Student Affiliates were returned listing an occupation other than student. Thus, the response rate of 23% for students probably underestimates the true percentage because some students were probably employed since completing their directory listing form.

Of the student respondents, 34 were graduate students; one was an undergraduate. The graduate students had been in their programs for a mean of 4.4 years (SD =2.1). Fifteen have been graduate students for five or more years.

Respondents giving an occupation, identified the following employment sectors: 20 were from private industry, 14 were university faculty, 8 had affiliations with government, 5 were from nonprofit or non faculty university positions, 5 were retired, and one was a homemaker.

Of respondents indicating a degree held or sought, 65% indicated a doctoral degree, 28% indicated a masters, and 7% indicated a baccalaureate. Fifty-nine percent were in psychology, 28% were in engineering, and 13% listed other fields (e.g., computer science, design, business). For those indicating an occupation, the mean years since their last degree was 18.1 (SD = 12.8).

Response Rates

Of the 300 surveys distributed, 109 were returned by the deadline for an overall response rate of 36.3%. The marginal totals displayed in the right column of Table 1 shows 43 of the successfully returned surveys were originally sent by mail, 33 by email, and 33 by fax. The marginal totals displayed in the last row of Table 1 shows that 48 surveys were returned by mail, 43 by email, and 18 by fax.

Questionnaires dispatched via email were most likely to be returned as not deliverable; 20% of the emails were returned as not deliverable, as opposed to 3% for postal mail and 10% for invalid fax numbers.

Of the surveys actually returned with recipient responses, those sent through postal mail had the highest return rate.

Table 1 shows the frequencies of the returned surveys as a function of the sending and receiving method. A chi square contingency analysis of the data in the internal cells of this table indicated non-independence of sent and received modalities, χ^2 (4, N = 109) = 126.2, $p < .0001$. As can be seen in the table, a survey tended to be returned using the same method that it was sent. Almost all of the recipients of the mail or email surveys tended to reply in the same modality. Fax recipients, on the other hand, opted to reply by one of the alternative methods 48.4% of the time.

Table 1. ***Frequencies for the Returned Surveys as a Function of Mode Sent and Received.***

	Mode Returned			
	Mail	*Email*	*Fax*	*Totals*
Mode Sent				
Mail	42	1	0	43
Email	0	32	1	33
Fax	6	10	17	33
Totals	48	43	18	109

DISCUSSION

The results showed that postal mail produced higher return rates than fax. However, the fax rate was not significantly higher than email. Respondents were more likely to use the same method in returning the questionnaire as it was delivered to them.

Accompanying the mailed survey was a return envelope addressed and with a stamp. This might have provided some advantage to the postal mail returns by enhancing the likelihood that it would be returned by this same method. It is interesting that none of the people who received the survey by mail returned it by fax and only one person used email. If the survey was sent by email, all but one was returned by email mode. Fax returns were highest for fax recipients, but the returns of fax recipients also involved greater use of the other two methods. Ten (30%) persons emailed the answers back and six (19%) sent it back by mail.

An important issue is this study's generalizability. The study was limited to membership in one organization. The results might be specific to the people working in HF/E. It is therefore possible that people outside of HFES would not, in general, behave in the same ways (or show the same trends) as was found in this study. To be more definitive, additional research would have to be conducted with other target audiences.

While postal mail exhibited the highest return rate, email and faxing also had a reasonable return rate. Implementation of postal mail and facsimile is generally more expensive than email. Large scale surveys using postal mail or facsimiles may have costs such as stamps, envelopes and long distance phone calls. If a researcher did not mind email's lower return rate, the cost to implement an email survey is relatively low. Also, email can have a potential sampling bias when individuals who do not use email regularly are excluded.

The potential advantage of email and fax is that if the correct address is known, the survey can potentially be delivered faster (shorter times) than the fastest non-express mail. The problem is that email addresses and fax numbers are apparently less stable than mail. We found numerous nondeliverable email and nonworking fax numbers.

The increasingly greater use of the World Wide Web (Internet) will probably enable better email sampling. Email systems that automatically copy the original message (e.g., a survey) into a reply window could facilitate the process of answering and returning the survey. The internet can also provide another method of administering surveys—via interactive form fill web pages. Online surveys can make use of extra computing capabilities providing the potential of dynamic tailored testing.

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