DOCUMENT RESUME

ED 446 512 HE 033 324

AUTHOR	Handwerk, Philip G.; Carson, Cristi; Blackwell, Karen M.
TITLE	On-Line vs. Paper-and-Pencil Surveying of Students: A Case Study. AIR 2000 Annual Forum Paper.
PUB DATE	2000-00-00
NOTE	19p.; Paper presented at the Annual Forum of the Association for Institutional Research (40th, Cincinnati, OH, May 21-24, 2000).
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Attitude Measures; *College Choice; Computer Uses in Education; Decision Making; Electronic Mail; *Evaluation Methods; Higher Education; *Internet; Student Attitudes; Student Evaluation; Undergraduate Students
IDENTIFIERS	*Paper and Pencil Tests

ABSTRACT

This study compared the benefits and costs associated with online versus paper-and-pencil surveys for a random sample of undergraduate students. Students completed the College Selection Survey, which had them evaluate the soundness of 10 reasons for choosing, or not choosing, to attend the university, if they could make their choice over again. Half of the sample was contacted by mail and asked to complete the paper-and-pencil survey. The other half was contacted by e-mail and asked to complete the same survey online. Willing students participated in focus groups to discuss how influential the survey reasons would be if they could select their college over again. The overall response rate was 33.3 percent for the paper-and-pencil sample and 26.2 percent for the online sample. A higher percentage of traditional age than nontraditional students responded online. Students in the two groups had similar feelings about whether they would choose the institution again, with 66.7 percent saying yes, 8.9 percent saying no, and 24.3 percent undecided. Students believed that the main advantage to online surveying was its convenience, though students without computers considered it difficult to find open computers in the campus laboratories. (Contains 15 references.) (SM)

On-Line Vs. Paper-And-Pencil Surveying of Students: A Case Study

Authors

Philip G. Handwerk
Research Associate
University of North Carolina at Greensboro
103 Forney Bldg.
Greensboro, NC 27402-6170
(336) 334-5930

Cristi Carson
Research Coordinator
University of North Carolina at Greensboro
149 Mossman Bldg.
Greensboro, NC 27402-6170
(336) 334-5582

Karen M. Blackwell
Planning and Institutional Research Analyst
University of North Carolina at Greensboro
103 Forney Bldg.
Greensboro, NC 27402-6170
(336) 334-5930

On-Line Vs. Paper-And-Pencil Surveying of Students: A Case Study

In the fall of 1999, a mid-size, Southeastern, public university administered the College Selection Survey to a random sample of students in either an on-line or paper-and-pencil format. Analysis was conducted viewing the differences in responses by method of administration.

By using both on-line and paper-and-pencil versions of the same survey the authors examine the benefits and costs associated with administering surveys on the World Wide Web. Findings from this study should provide a clearer picture of the factors involved in conducting on-line surveys and aid institutional researchers in deciding whether or not on-line surveys are appropriate for their institutions.

On-Line Vs. Paper-And-Pencil Surveying of Students: A Case Study

Two major developments in the world of institutional research have instigated significant changes in the way institutional research professionals work. One development is the enhanced accountability felt by institutions of higher education nationwide. As a result, outcomes assessment, surveying in particular, has become an increasingly major component of institutional researchers' activities.

The second development is the Internet and the World Wide Web. The wide access, ease of use, and ease of analysis provided by the World Wide Web has made surveying on-line a very attractive alternative to traditional, paper-and-pencil surveys. As a result, the office of Institutional Research staff at a mid-size, public university has begun to utilize the Web as a part of its surveying work. With this move in institutional research toward Web-based research, the need to analyze this method of survey administration versus more conventional methods is in order.

As stated, part of the reason for the increased focus on surveying via the Web is due to the many advantages this medium offers. A frequently cited advantage is the cost associated with on-line research. Schmidt (1997) finds surveying on-line has benefits including "savings in both time and money for survey researchers" (p. 274). Among the savings found are the reduction or elimination of paper resources and elimination of data entry expense and time (Schmidt, 1997, p. 275). Gjestland (1996) notes "because all interviews on the Internet are self-administered, there is a tremendous cost savings in not having interviewers" (p. 3). Gaddis reports (1998) that the "relatively low cost of designing and conducting an on-line survey" (p. 67) increases its appeal to researchers.

Other advantages of on-line surveying have been reported. One such benefit is that researchers, when using the Internet to conduct surveys, are not bound by geography (Gjestland, 1996; Smith & Leigh, 1997; Swoboda, Mühlberger, Weitkunat, Schneeweiss, 1997). Smith and Leigh (1997) praise the accessibility of the Internet as well as its potential to transmit a variety of communications including text, images, and sound (p. 496). Davis (1997) agrees with the conveniences or ease of access and adds the benefit of "confidentiality of responses" (p. 2).

Archiving of data resulting from on-line surveys is also a stated benefit (Smith & Leigh, 1997; Schmidt, 1997). Several studies applaud the rapid return of instruments when published on-line, which leads to more rapid analysis (Gaddis, 1998; Gjestland, 1996; Swoboda et al., 1997;). Gaddis indicates (1998) that when relying on the Web for surveying, one is also less likely to have "interference from people or institutions that may prevent a survey from being delivered to a respondent" (p.67).

Davis (1997) sums up these points by stating that "Internet surveys are fast, effective, and cost-efficient" (p. 1).

With savings on cost and the ease of survey processing, the remaining questions are: (1) is the profile of the Web respondent different, (2) do response rates differ, (3) are the results obtained from those responding via electronic formats different from those filling out a pencil-and-paper version.

Considering first the profile of Web respondents, apprehensions frequently are voiced that Internet surveying invites potentially biased results. The reason for this concern is the frequently reported, earlier, findings that the majority of Internet users are young, white, educated, males (Gjestland, 1996; Swoboda et al., 1997). However, recent studies report that

Internet users are becoming more representative of the population as a whole (Georgia Technical Institute's Graphics, Visualization & Usability Center (GVU), 1999; Kaye & Johnson, 1999). Although, the Graphics, Visualization and Usability Center's tenth World Wide Web User Survey (1999) reports most recently a decrease in the number of female respondents.

Several studies have looked at the differences between the response rates in traditional, paper-and-pencil surveys and electronic formats. Most of these studies, particularly the earlier studies, have focussed on the use of e-mail as a survey instrument (Heflich & Rice, 1999; Schuldt & Totten, 1994). Often, when examining the differences in response rates, the results have been mixed. Schuldt and Totten (1994) report their mail survey far out performing their e-mail survey, regarding response rates, 56.5% to 19.3% (p. 4). However, in 1997, Smith examines the findings of four previous studies and reports one instance in which the e-mail response rate exceeded the postal mail rate, one study where the e-mail response rate was much lower, and two studies where no significant differences in response rates were reported.

A second methodology frequently reported concerns on-line surveying where a sample is not drawn from a known population. Rather, participants are reached by posting notice of an on-line survey via listservs, news groups, and/or other Web pages (Kaye & Johnson, 1999; Smith, 1997; Smith & Leigh, 1997; Swoboda et al., 1997). These individuals are then given the URL of the actual survey instrument and invited to participate in the study. A particular challenge with this methodology is to estimate the total number of individuals in your sample. Without this knowledge, an exact response rate is difficult to calculate (Smith, 1997, p. 8).

Swoboda et al. (1997) conducted a hybrid of these two methodologies. They randomly selected 200 of 8,017 newsgroups focussing on issues relevant to their desired sample. Next, e-mail addresses were acquired from those newsgroups. The sample was then e-mailed the survey

and invited to participate. Overall, they achieved a 19.3% response rate from this e-mailed sample.

Concerns over how representative data from an e-mail survey may be have also been addressed. Smith and Leigh (1997) report that analysis of responses from male participants did not show any significant differences across the method of the survey taken. Similarly, female responses, whether from the e-mail group or the paper-and-pencil group did not differ. They conclude, "obtaining similar patterns of responses, despite these differences in sample population, subject selection, survey administration, and testing environments, strongly argues in favor of the generalizability and validity of data collected from Internet subjects and hence the utility of using the Internet as an alternative or supplemental source of subjects" (Smith & Leigh, 1997, p. 502). Heflich and Rice (1999) also found their e-mail survey to be "a viable method for obtaining reflective data from participants."

From the review of literature, several points became clear. First, very few of the studies on electronic surveying concerned higher education. The majority of the studies focussed either on applications for private business or use in marketing research. Second, no study was found where an examination was conducted between paper-and-pencil surveys and an on-line survey sent to a specific, targeted sample. Either the format was e-mail, not on-line, or the Web survey was open to members of a listserv, newsgroup, etc. where little was known about the potential participants and minimal screening was possible.

This study was developed to compare the benefits and costs associated with on-line and paper-and-pencil surveys for a sample that had been purposefully drawn from a known population of college undergraduates. The study incorporates elements of quantitative and qualitative methodologies that provide different perspectives for examining the critical questions

which still remain unanswered: (1) is the profile of Web respondents different, (2) do response rates differ, (3) are the results obtained from Web respondents different, and (4) is there less burden on respondents with a Web-based survey?

Methodology

A closed sample of college undergraduates was randomly selected from the authors' institution. The instrument issued was a locally designed College Selection Survey that asked students to evaluate the soundness of ten different reasons for choosing, or not choosing, to attend the university, if they had the opportunity to make their choice over again. Half of the sample was contacted by mail and asked to complete a paper-and-pencil version of survey. The other half of the sample was contacted by e-mail and asked to respond to the same set of questions on-line. Both sets of students were also asked whether they would be willing to participate in focus groups to discuss how influential the survey reasons would be if they could select their college over again. The willing students were contacted and two focus group discussions were conducted. The remainder of this section presents the details of the design and analysis of the surveys, the focus groups and the sample selection process.

The College Selection Survey

The College Selection Survey that was used as the basis for comparing the benefits and costs associated with on-line and paper-and-pencil surveys, was developed to illuminate students' reasoning for choosing to attend the college if they had the opportunity to make the decision over again. The thinking behind students' college selection decisions has become a critical recruitment and retention issue at the researchers' institution over the last several years

because the percentage of students who affirmed that "they would choose the institution again" on state-mandated surveys has been below the state average.

The College Selection Survey was based on students' responses to an open-ended prompt on a locally developed student satisfaction survey that was administered to a randomly selected sample of undergraduates in the spring of 1999. The open-ended prompt invited students to explain their reasons for choosing or not choosing the institution again. A content analysis of the students' written responses produced several distinct and valid sets of reasons that appeared to motivate students' college re-selection decisions. These included: (1) students' sense that they are connected to, valued, and treated with dignity and respect on campus; (2) the availability of students' chosen majors and courses; (3) the quality of the faculty and the academic climate; and, (4) the comparative cost, appearance, and location of the institution. Ten items were constructed based on these responses. In the final form of the survey, after indicating whether they would choose the university again, students evaluated the ten items on a five point Likert scale that weighed how relevant each reason was to their stated choice. Additionally, students indicated whether they would be willing to participate in focus groups; how long they were willing to spend on surveys; and whether they preferred to take surveys on paper or on-line. They were also invited to elaborate on their reactions to the survey. Students entered their social security numbers so that non-respondents and potential lottery winners could be identified, as well as to ensure that only those in the sample responded and to prevent multiple responses.

Sample Selection and Survey Administration

A random sample of 3,000 undergraduates was selected to receive the College Selection Survey. Each survey was accompanied by a brief letter that explained the purpose of the survey, insured the confidentiality of the student's responses, and alerted the students to a $100 cash

prize that they would be eligible for if they completed the survey and returned it. 1,500 of the students received the letter and the survey which, combined, fit on one side of an 8½" by 11" sheet of paper. In all, 280 students completed and returned their surveys after the first mailing. The non-respondents were mailed a second survey. The second mailing produced additional 207 surveys, yielding a final response rate of 33.3%. Thirty-six of the 1,500 paper-and pencil surveys were returned undeliverable.

The other half of the sample received notification of the on-line survey via e-mail and a post card. Both notifications explained the purpose of the survey, insured confidentiality, offered the cash incentive and provided students with the Web address for the survey. When students went to the Web-address, they encountered an initial screen that asked for their social security numbers. Self-identification was necessary to insure that only the sampled students had access to the survey, and to prohibit students from completing the survey more than once. The initial contact yielded 256 responses. Non-respondents were sent a second e-mail, which produced another 56 responses. A third, and final, e-mailing produced 80 additional surveys, for an overall response rate of 26.2%. Three of the 1,500 students had both undeliverable e-mail and mail addresses.

Focus Groups

A total of 184 students from the paper-and-pencil and on-line groups volunteered to participate in follow-up focus groups. 135 of these students had responded that they would choose the institution again, 16 had responded that they would not, and 33 were unsure. All of the students were contacted by phone and invited to participate in a late afternoon discussion (pizza and sodas were provided). The fourteen students who consented met in two groups. The first group (8 students) was comprised of students who had said they would choose the university

again, and the second group (6 students) was comprised of students who had said they either would not or were unsure. The interviews lasted an hour and a half. The bulk of the time was allotted to gaining deeper insight into the students' reasons for their choices, thus providing further validation for the survey items. The final fifteen minutes were devoted to questions concerning students' reactions to both versions of the survey, the $100 incentive, and their preferences for future surveys.

Results

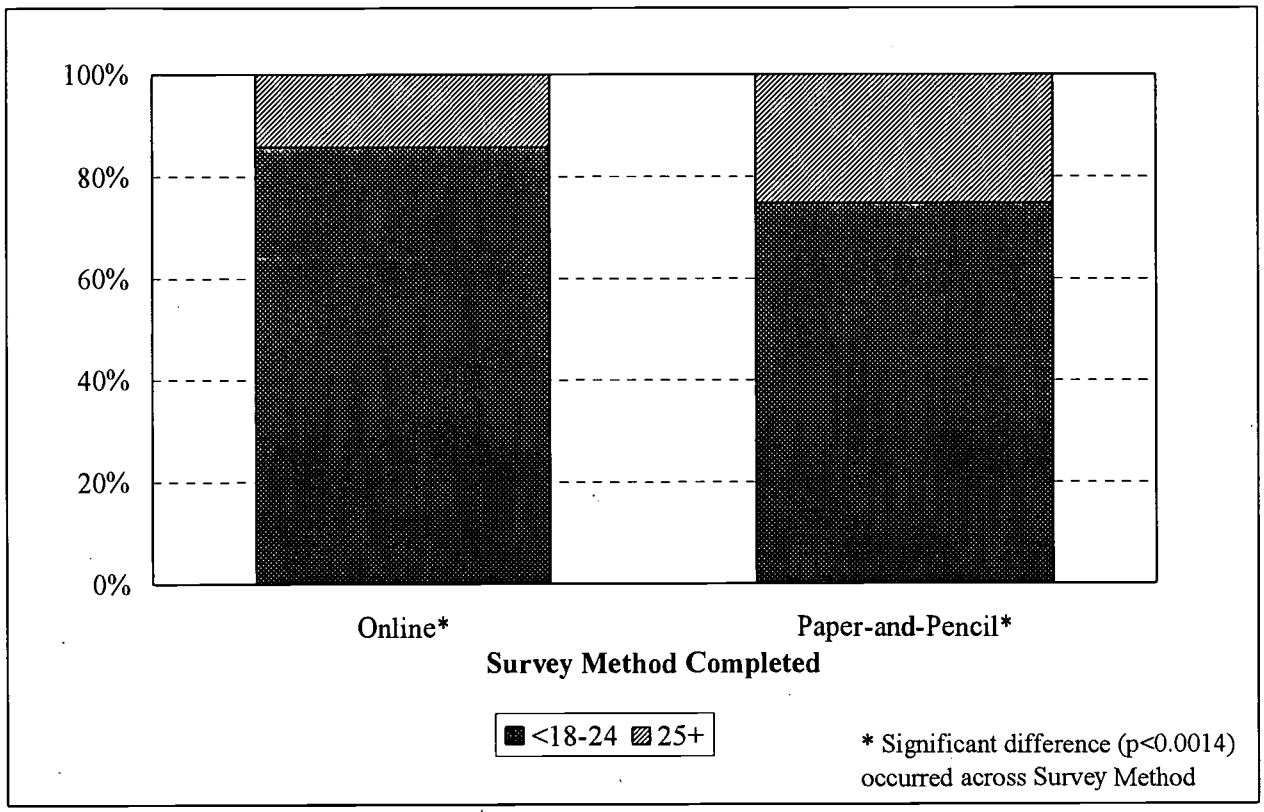
The demographic characteristics of the students who responded to the survey on-line and those who responded via the Web were obtained from institutional databases. The composition of the two groups, based on class level, major, race, and gender were representative of the undergraduate population.

The overall response rate for the paper-and-pencil sample of 33.3% was significantly greater than the 26.2% response rate for the on-line sample (based on a t-test, $p < 0.0014$[1]). The two samples were similar to each other with respect to sex, race, class, and housing status, but they differed with respect to age. The on-line sample had a significantly higher proportion of "traditional" students, age 18 to 24 (Figure 1).

The students in the two groups were similar with regards to whether they would choose the institution again. Two-thirds (66.7%) answered "yes," 8.9% answered "no" and 24.3% said they were "not sure." These results are consistent with findings from previous surveys that asked the same question.

[1] The α-level for our 7 comparison tests was adjusted downwards to insure that the overall risk of incorrectly identifying a difference between the on-line and paper-and-pencil groups remained at 0.01.

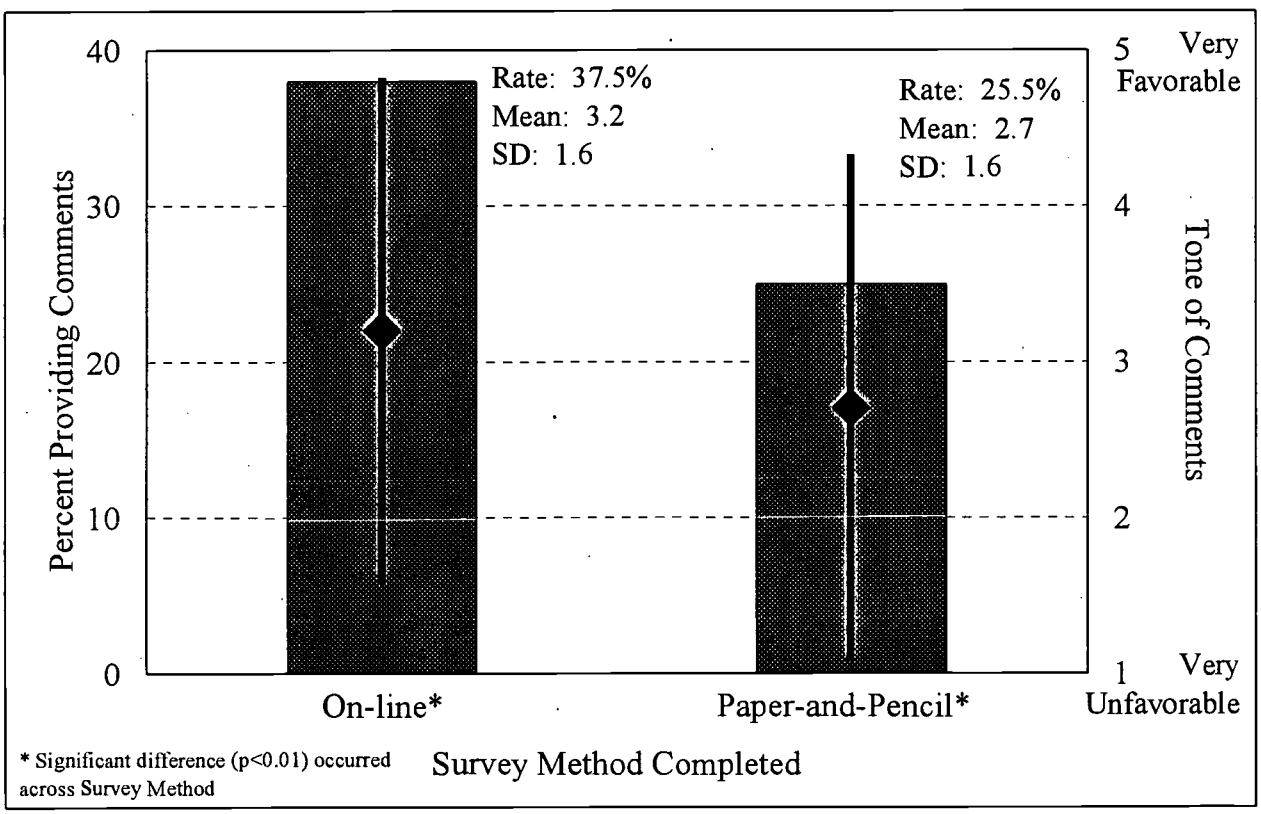
Figure 1. Age of respondents by survey method completed.



A factor analysis was used to confirm whether the 10 reasoning items could be regrouped into the three conceptual scales that were identified during the analysis of the earlier survey results. The procedure reproduced the three factors. The first of these, Academics, had high factor loadings (>.50) for the availability of the students' major, course convenience, quality of the faculty and academic reputation. The second factor, Feeling Valued, had high loadings (> .76) for feeling connected, feeling valued and treated with dignity and respect. The final factor, Campus Attributes had high loadings (> .78) for campus appearance and location. Scores for all three factors were obtained by averaging the relevant items and a manova was used to determine if there were any differences in the factor scores between the two groups. The results indicated that there were no differences.

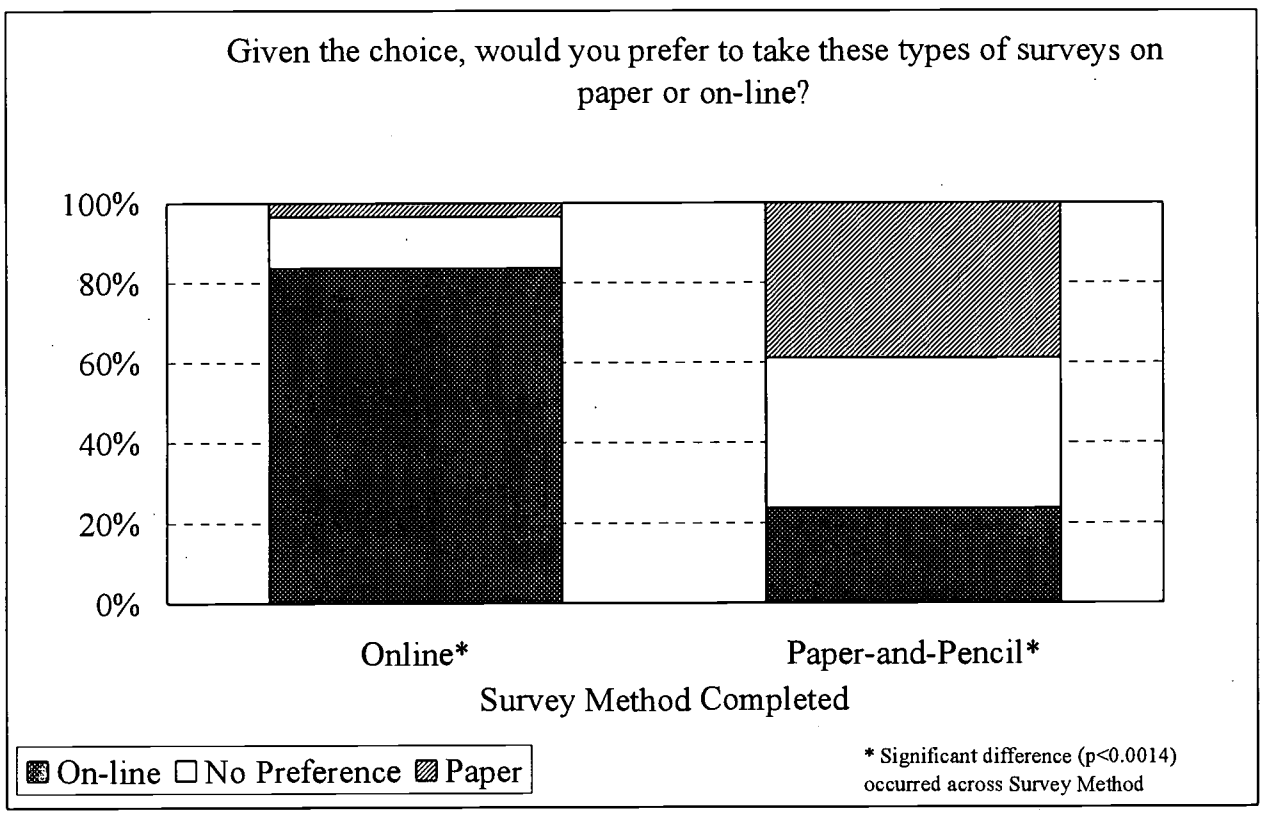
A significant difference was found in the percentages of students who volunteered written comments (χ_1^2= 14.8 p=0.0001). Over one-third of the Web respondents (37.5%) wrote comments compared to 25.5% of the paper-and-pencil respondents. The content of the students' comments was evaluated on a 5-point rating scale. "Very Favorable" comments received a score of 5 and "Very Unfavorable" comments received a score of 1. A t-test was used to determine if there were differences in the favorability of the comments between groups. The test showed that students in the on-line group were significantly more favorable (mean=3.2, sd=1.6) than students in the paper-and-pencil group (mean=1.6, sd=1.6). These results are presented in Figure 2.

Figure 2. Open-ended comments by survey method completed.



Significant differences were also found between the groups regarding whether students preferred taking surveys on paper or on-line. An overwhelmingly greater proportion of students (χ_2^2 = 321.3 p=0.001) from the on-line group stated a preference for on-line surveys (83.7% compared to 23.6%, as depicted in Figure 3).

Figure 3. Preference for format a future surveys by survey method completed.



The advantages and disadvantages of on-line surveying were further explored in the focus group discussions. From the perspective of those students who are comfortable with and have access to the technology, the biggest advantage of on-line surveying is its convenience. Students can sit down and complete the survey, without having to handle paper, place it in an envelope, find a stamp and transport it to a mailbox. On the other hand, students who do not have direct

access to a computer complained about the difficulty of finding open computers in the campus laboratories. Computers are often unavailable when students go to the labs, and once they gain access, they are worried about task deadlines and do not take time to respond to e-mail or surveys. Students also complained about the awkwardness of their on-campus e-mail accounts and told us that they preferred to use their own Web-based accounts (i.e., Hotmail.com). There were also students who described themselves as "technologically illiterate" and talked about their fear and intentional avoidance of computers.

Finally, we explored ways that on-line surveys could be improved. In response to the survey question that asked how long students were willing to spend on a survey the mean reported response time was 13 minutes (sd = 13.4 minutes). There were no significant differences in the reported times across survey method or students' expressed preference for future survey formats.

In the focus groups, we asked students if they had been motivated to complete the survey by the $100 lottery prize. Some students had not been particularly enticed by the chance for the monetary reward and sincerely responded out of a sense of duty to the university. Others had overlooked the incentive entirely. When asked about the types of incentives that would be more enticing, students suggested movie tickets and gift certificates that could be redeemed at local shopping malls and restaurants.

Discussion

Taken as a whole, it appears that the demographic and attitudinal profiles of the on-line respondents were not significantly different from the paper-and-pencil respondents. Both methodologies were representative of the undergraduate population, while no significant differences appeared across methodologies with respect to sex, race, class, housing or evaluations of the university. The only difference occurred when examining the methodologies by age group.

Perhaps the higher percentage of traditional age students responding on-line is a sign of growing enthusiasm and comfort with on-line surveys. The GVU's tenth World Wide Web User Survey reports an interesting profile for the number of years respondents have been on the Web, with the largest category having been on 4-6 years (37.1%). Previously, the largest category had been on-line for 1-3 years. This indicates a shift toward more experienced users (on average) and may explain the higher response rate among students in the 18 to 24 age group (GVU's tenth WWW user survey, 1999). As familiarity with technology continues to expand, perhaps an increased comfort and willingness to take on-line surveys will arise.

Web respondents appeared more comfortable with supplying comments than did the other participants. Additionally, the on-line comments on average were more favorable. The greater percentage of on-line respondents supplying comments appears to support Davis' (1997) finding that this method may add an additional sense of confidentiality over conventional paper-and-pencil methods. However, it is unclear as to why the on-line format elicited generally more positive comments.

Surveys, regardless of format, need to be brief. On average, students who completed the survey from our sample stated they were willing to spend 10-15 minutes on a survey of this type.

Most students prefer on-line surveys for several reasons or don't have a preference on format. It is encouraging to see that most feel comfortable with the Web format.

Response rates could be increased with incentives that are immediately tangible to students, such as movie tickets or gift certificates. According to those in the focus groups, monetary incentive was not necessarily a motivating factor to reply.

There is a need to search for alternative ways of contacting students to complete on-line surveys other than university e-mail accounts since many students have separate e-mail through their Internet service providers and do not forward their university accounts. When contacting students via mail, it is often difficult to determine which address to use. Most students have a campus mailbox, but not all check it if they live locally.

Some of the limitations of this study include the make up of the student body, type of institution, and focus of the survey instrument. More research is needed before these findings can be generalizable to other populations. The higher response rate for the paper-and-pencil method may be due to greater comfort with this format, or possibly a lack of convenient access to technology. Further studies are needed to examine what factors enter into the preference of one format over another and how that impacts survey response rates. Additional studies could continue to examine whether or not future freshmen classes will show a greater comfort with technology. Also, what impact taking a survey on-line has on the frequency and tone of comments would provide additional insight for surveying professionals.

Despite these limitations, it may be concluded that surveying on-line has the potential to be, in fact, both an efficient and reliable means by which to poll students.

References

Davis, G. (1997). Are Internet surveys ready for prime time? Marketing News, Vol. 31, 31-32.

Gaddis, S. E. (1998). How to design on-line surveys. Training & Development, Vol. 52, 67-71.

Georgia Technical Institute's Graphics, Visualization & Usability Center. (1999) GVU's tenth WWW user survey. Available URL: http://www.cc.gatech.edu/gvu/user_surveys/survey-1998-10/tenthreport.html

Gjestland, L. (1996). Net? Not yet. Marketing Research, Vol. 8, 26-30.

Heflich, D. A., & Rice, M. L. (1999). On-line survey research: A venue for reflective conversation and professional development. Proceedings of Society for Information Technology & Teacher Education.

Hewson, C. M., & Laurent, D., Vogel, C. (1996). Proper methodologies for psychological and sociological studies conducted via the Internet. Behavior Research Methods, Instruments & Computers 28, no. 2, 186-191.

Kaye, B. K., & Johnson, T.J. (1999). Research methodology: Taming the cyber frontier - Techniques for improving on-line surveys. Social Science Computer Review (Need article) 17, no. 3, 323-337.

Kiernan, V. (1998, September 25). Researcher believes Web surveys could benefit by offering freebies. The Chronicle of Higher Education, Vol. 45, A32.

Maddox, K. (1999). ARF Forum Examines Internet Research Effectiveness. Advertising Age, 28.

Schiano, D. J. (1997). Convergent methodologies in cyber-psychology: A case study. Behavior Research Methods, Instruments & Computers 29, no. 2, 270-273.

Schmidt, W. C. (1997). World Wide Web survey research: Benefits, potential problems, and solutions. Behavior Research Methods, Instruments & Computers 29, no. 2, 274-279.

Schuldt, B. A., & Totten, J. W. (1994) Electronic mail vs. mail survey response rates. Marketing Research, Vol. 6., 36-43.

Smith, C. B. (1997). Casting the Net: Surveying an Internet population. Journal of Computer-Mediated Communication, Vol. 3.

Smith, M. A., & Leigh, B. (1997). Virtual subjects: Using the Internet as an alternative source of subjects and research environment. Behavior Research Methods, Instruments, & Computers 29, no. 4, 496-505.

Swoboda, W. J., Mühlberger, N., Weitkunat, R., & Schneeweiss, S. (1997). Internet surveys by direct mailing - An innovative way of collecting data. Social Science Computer Review 15, no. 3, 242-255.

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

Reproduction Basis

☑ This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

☐ This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").