Electronic Survey Methodology:
A Case Study in Reaching Hard-to-Involve Internet Users

Dorine Andrews, D.C.D.
Research Professor,
Communication, Culture and Technology Program
Georgetown University
Washington, DC
dca4@georgetown.edu

Blair Nonnecke, Ph.D.
Assistant Professor
Computing & Information Science
University of Guelph
Guelph, Ontario
nonnecke@cis.uoguelph.ca

Jennifer Preece, Ph.D.
Professor and Chair,
Information Systems Management Dept.
University of Maryland Baltimore County
Baltimore, Maryland
preece@umbc.edu

Conducting Research on the Internet:
Electronic survey Design, Development and Implementation Guidelines

Abstract

Using the Internet to conduct quantitative research presents challenges not found in conventional research. Paper-based survey quality criteria cannot be completed adapted to electronic formats. Electronic surveys have distinctive technological, demographic and response characteristics that affect their design, use and implementation. Survey design, subject privacy and confidentiality, sampling and subject solicitation, distribution methods and response rates, and survey piloting are critical methodological components that must be addressed.

This paper presents quality criteria for electronic survey design and use based on an investigation of recent electronic survey literature. A case study demonstrates the application of these criteria to reach a hard-to-involve online population, non-public participants of online communities (a.k.a. 'lurkers') and survey them on their community participation, a topic not salient to the purpose of their online communities. The results show that a hard to reach audience can be reached using the quality criteria that are most important for reaching these types of audiences. The results suggest how the use of some criteria may conflict, and what researchers may experience when conducting electronic surveys in an online culture where people are not tolerant of intrusions into online lives.

Keywords: Electronic surveys, web-based surveys, email surveys, methodology, online community, research techniques, Internet research.

1.0 Introduction

Some knowledge concerning the design and use of paper-based surveys does translate into electronic formats. However, electronic surveys have distinctive technological, demographic and response rate characteristics that affect their design, distribution and response rates (Sohn, 2001). This paper presents the results of a comprehensive investigation into the nature of electronic surveys and current methodological approaches. Quality criteria across five important methodological components are explored. These include survey design, participant privacy and confidentiality, sampling and participant selection, distribution and response management, and survey piloting. This is followed with a case study of an online community participation survey that informs how these quality criteria can be applied to a survey designed to reach a population of hard-to-involve Internet users, non-public participants in online communities - people who do not interact with other members by posting messages and replies in the public spaces of their communities.

2.0 Electronic Survey Literature Review

Surveys are imperfect vehicles for collecting data. They require participants to recall past behavior, which can be more accurately captured through observation (Bernard, et al., 1981; Bernard, et al., 1983, Schwarz, 1999). For example, online consumers consistently overestimate the amount they purchase online by as much as 55% (Comscore, 2001). Additionally, survey questions bias subject judgments and answers (Schwarz, 1999). An alternative is to combine observations, focus groups, individual interviews, email, and Web-based, postal, or random digital dial telephone surveys can improve response quality (Rogers, 1987; Sudweeks & Simoff in Jones, 1999, Smith, 1997) and sample representativeness significantly (Swoboda, et al., 1997, Yun & Trumbo, 2000). This is costly. Electronic surveys provide a way to conduct studies when it is impractical or financially unfeasible to access certain populations (Couper, 2000; Sheehan & Hoy, 1999; Weible & Wallace, 1998) and they are very cost effective as the costs per response decrease as sample size increases (Watt, 1999).

2.1 The Nature of Electronic Surveys

Electronic surveys are increasingly common (Lazar & Preece, 1999) and results from electronic surveys can be the same as postal survey content results, with the advantages of speedy distribution and response cycles (Slaughter, et al., 1995; Swoboda, et al., 1997; Yun & Trumbo, 2000).

Text-based email electronic surveys have existed since 1986 and Web-based surveys since the early 1990s (Kiesler & Sproull, 1986, Kehoe & Pitkow, 1996). The differences between the two have been reduced now that email is multi-media capable. However, there are several important differences. Web-based surveys allow automatic verification and survey response capture in databases. Software applications such as Survey Wiz, Factor Wiz, QUIS The Dragon, Survey Pro, Survey Said, Zoomerang, Survey Monky, and WebSurveyor eliminate manual construction and administrative challenges (McCoy & Marks, 2001;Birnbaum, 2000;Shneiderman, 2001). However, web-based surveys do not provide email's "push" affordance and must be integrated with it to create the "pull" effect to bring people to the survey.

2.2 Survey Design

Table 1 summarizes criteria for quality electronic survey design gleaned from recent electronic survey studies. The different capabilities of email and Web-based software may inhibit implementing all of these design criteria.

Table 1 *Survey Design Quality Criteria*
Supports multiple platforms and browsers/email clients (Yun & Trumbo, 2000)
Controls for browser settings (Yun & Trumbo, 2000)
Detects multiple submissions automatically (Yun & Trumbo, 2000)
Presents questions in a logical or adaptive manner, e.g., provides control of when and how questions displayed (Kehoe & Pitkow, 1996),
Allows saving responses before completion (Smith, 1997)
Collects open-ended or quantified-option responses (Bachmann & Elfrink, 1996; Kielser & Sproull, 1986; Loke & Gilbert, 1995; Schaefer & Dillman, 1998; Yun & Trumbo, 2000)
Provides automatic feedback with completion (Smith, 1997)
Uses paper questionnaire design principles (Dillman, 2000; Oppenheim, 1992; Preece, Rogers & Sharp, 2002; Witmer et al, 1999)
Provides automatic transfer of responses to database (Kehoe & Pitkow, 1996; McCoy & Marks, 2001; Smith, 1997)
Prevents survey alteration (Witmer et al., 1999)
Provides response control and economical displays (Preece, Rogers & Sharp 2002; Stanton, 1998)
Provides for links to definitions, menus, button and heck box options, animation, sound, graphics options, etc. (Preece, Rogers & Sharp, 2002; Yun & Trumbo, 2000)
Does not require familiarity with survey presentation software (Sheehan & Hoy, 1999)
Displays appear quickly to participant (Couper et al., 2001)
Tracks response source of response failure (Paolo et al., 2000)

For example, participants can alter an email or word processed survey (Witmer et al., 1999) until very recently with new Acrobat PDF form software. Further, email surveys can be confusing to participants due to participants' own email or word processing software (Sheehan & Hoy, 1999).

Many paper-based survey design principles apply to electronic surveys (Dillman, 2000; Oppenheim, 1992; Preece, Rogers & Sharp, 2002; Witmer et al, 1999). Technology does not limit either the use of open-ended questions or all forms of structured questions(Andrews et al, 2001; Bachmann & Elfrink, 1996; Kielser & Sproull, 1986; Loke & Gilbert, 1995; Schaefer & Dillman, 1998). Textual options, format controls and graphics include links, radio buttons, check box selections, defaults and menus (Preece, Rogers & Sharp, 2002). Images, animation and color can enhance survey presentation (Yun & Trumbo, 2000), but may increase download time and affect answers (Couper et al., 2001). However, attrition (drop-out) rates may increase when there are too many open-ended questions, multiple answers in a single open-ended question (Crawford et al., 2001), questions arranged in tables or inconsistently formatted, or questions that are required rather than optional (Knapp & Heidingsfelder, 1999). Also, variations in email software, browser settings, survey software and participant skills can increase response error and lead to higher attrition rates (Dillman et al., 1998; Dillman, 2000).

2.3 Subject Privacy and Confidentiality

Table 2 summarizes electronic privacy and confidentiality quality criteria.

Table 2
Privacy & Confidentiality Quality Criteria (Cho and LaRose, 1999 except where noted)

Participants can designate conditions of release, use, retention and disposal of personal data
Sample only from public email lists, online communities and automated mailing lists
Send invitations and surveys separately
Collect data through web pages
Provide multiple response options
Use “re-mailers” to ensure anonymity
Do not troll through observation
Do not use “cookies”
Do not use links from personalized sites
Provide disclosures
Provide 3rd party privacy certification
Use credible domains
Use encryption for sensitive material
Use hypertext links for long disclosures
Disclose sampling procedures
Obtain community leader consent
Provide survey results to respondents
Use self-selected user ids, passwords (option)
Provide “rather not say” response option (Kehoe & Pitkow, 1996)
Allow people to "opt-in" (Yun & Trumbo, 2000)
Establish credibility quickly through subject lines and opening statements (Yun & Trumbo, 2000)
Guarantee that no one will see one's personal data, not anonymity as researchers will know who the participants are, and explain the method for maintaining confidentiality (Sheehan & Hoy, 1999).

Internet flexibility and the ease with which false identities can be created exacerbate trust and confidentiality issues and can render survey results unreliable (Cho and LaRose, 1999). There are four possible types of electronic survey privacy and confidentiality infringements: (1) physical (unsolicited requests), (2) informational (personal information control), (3) psychological (personal choice control), and (4) interactional (relationship control) privacy infringements (Cho and LaRose, 1999). For example, pre-notification email and follow-up notes can be considered to be rude, unsolicited “spam” (Schillewaert, et al., 1998; Swoboda et al., 1997). Informational privacy may be violated when participants are not allowed to control conditions of release, use, retention, and disposal of personal data; and privacy is breached when sampling lists are culled from non-public online communities and automated mailing lists (Cho & LaRose, 1999). Psychological and interactional privacy protection can be violated when individuals are not allowed to preview the survey (Burgoon, et al., 1989) or because communities are sources for emotional support and entering them is thus perceived as an invasion (Cho & LaRose, 1999). Additionally, the lack of anonymity may not affect response rates (Couper et al., 1999) or it may be important to response rates (Kiesler & Sproull, 1986). These conflicting findings may be the result of survey topic subject matter differences or the 13-years of Internet experience.

In summary, building sufficient trust for people to participate in surveys requires some level of survey transparency, recognized credibility of researchers, and distribution procedures that attempt not to offend or intrude inappropriately.

2.3 Sampling and Participant Selection

Many large-scale telephone and paper surveys establish representativeness and genralizability using random digit dialing (RDD) (J.B. Horrigan, personal communication, September,2002). Others use the General Social Survey or other national census data (Neustadl & Robinson, 2002; Robson, 1993). For electronic surveys the problem is that the nature of the Internet prevents random sampling (Kehoe & Pitkow, 1996) and non-response rate tracking (Kehoe & Pitkow, 1997). Table 3 summarized electronic survey quality criteria.

Table 3
Sample and Participant Selection Quality Criteria

Recognize that online population results are not generalizable to offline populations
Recognize that clear identification of complete online populations continues to be impractical
Make study one of a series of indicative studies which uses random sampling within artificially defined sampling frames

The lack of Internet central registries prevents researchers from identifying all the members of an online population along with multiple email addresses for the same person and invalid or inactive email addresses. Electronic survey selection is limited to non-random and probabilistic sampling (Couper, 2000; Dillman, 2000; Kehoe & Pitkow, 1997; Schaefer & Dillman, 1998; Swoboda, et al., 1997; Yun & Trumbo, 2000).

2.3.1 Sampling Options

The sampling frame and selection technique must be carefully defined and customized to suit the needs of the particular electronic survey. Table 4 shows several methods, but there is no "guaranteed" online sampling method (Couper, 2000).

Table 4
Sampling Options for Electronic Surveys (Couper, 2000)

Non-probabilistic methods: (1) Self-selection (2) Volunteer panels of Internet users
Probability-based methods (3) Intercept (4) List-based high-coverage (5) Mixed-mode design with choice of completion method (6) Pre-recruited panels of Internet users (7) Probability samples of full populations

With the self-selection sampling option, participation invitations are posted at multiple online locations or distributed through offline media. There is no random sample. With Internet user volunteer panels users participants self-select by submitting demographic information, then participate in various surveys by invitation-only based upon demographics. Researchers have more participant information, but not a random sample.

The sampling options using probability-based methods require knowledge of the sampling frame and recruitment process to permit non-response source measurements. The sample can be restricted to those with Web access or can be broader if a mixed mode (e.g., paper and electronic) is used. However, mixed mode surveys raise issues of measurement equivalence.

Intercept surveys target visitors at a particular Website, asking every n^{th} visitor to participate, similar to an election exit poll. Invitation presentation timing problems may increase non-response. With the sampling option, list-based sampling, everyone on a "list" is sent an invitation to increase coverage. However, this approach does not address non-responses. With pre-recruited Internet user panels, panel members are recruited using probability-sampling methods such as RDD (random digital dialing). Here, non-response can occur at any stage of the recruitment and survey process. The last sampling method, probability samples of full populations, requires that participants be provided with the PCs and Internet access necessary to participate. Couper (2000) suggests this approach does allow generalization and generates high participation response rates, but recruitment response rates are very low.

2.3.2 Online versus Offline Demographic Sampling Issues

Size and demographic estimates of the online population are not consistent and differences between online and offline populations affect the ability to generalize to the total population from an online population. Those who participate in electronic surveys may be more experienced, more intense Internet users, and have stronger Internet skill than those who do not participate (Kehoe & Pitkow, 1997). They may be predominately male, younger and from households with fairly high incomes (Sheehan & Hoy, 1999; Sohn, 2001); and be more Caucasian and less African American and Hispanic than the general population (Witte, et al., 2000). However, the Internet user male - female gap has disappeared (NUA, 2001) while economics, age and ethnicity continue to produce significant gaps between online and offline populations (NUA, 2000; Yun & Trumbo, 2000; Zhang, 2000).

2.3.3 Sampling Adjustments

Over sampling adjustments may reduce the chances of systematic population segment exclusion (Kehoe & Pitkow, 1996; Smith, 1997). However, probability estimates must be calculated by comparing the sample (post survey) to benchmarks, such as official government statistics with similar demographic data (Kehoe & Pitkow, 1996; Witte et al., 2000). Also, Internet Service Providers (ISP) access policies, email filtering, and increasing volumes of email is decreasing unsolicited email survey responses (Sheehan & Hoy, 1999). Others suggest sensitivity analysis to determine weighting adjustments across subgroups, however, differences in online and offline populations corrupt this analysis (Witte et al., 2000).

2.3.4 The Alternative

The alternative is to build knowledge through studies that provide results that may be indicative of similar populations. In this approach, random sampling to select participants is contained within an artificially bounded sampling frame that is not the complete population under study (Coomber, 1997; Yun & Trumbo, 2000).

2.4 Distribution Methods and Response Rate Management

Today's online populations are less cohesive and less interested in participating in surveys not salient to their interests (Cho & LaRose, 1999; Sheehan, 2001). This makes attaining response rates for some studies more challenging for many survey topics.

Although the definition of a valid response depends upon the survey topic and context, Bosnjak and Tuten (2001) suggest valid responses may include a: (1) complete response - all questions are answered and the survey is submitted, (2) unit response - all questions in some, but not all survey sections are answered and the survey is submitted, and/or (3) partial item response - only some questions are answered and the survey is submitted. When the survey is never submitted, non-responses (read the invitation) and attritions (drop outs during while taking the survey) are indistinguishable. Table 5 summarizes criteria to encourage quality (high response) rates.

Table 5

Response Rate Quality Criteria

The survey has been tested across many platforms to avoid technical breakdowns (Sheehan & McMillian, 1999; Watt, 1999).
The survey is salient to participants' interests (Sheehan & McMillian, 1999; Watt, 1999).
There is no systematic judgment by the survey population (Kehoe & Pitkow, 1996; Sheehan, 2001).
Privacy and confidentiality are assured (Couper, 2000)
Participants can inspect entire survey before taking the survey (Crawford et al., 2001)
Financial incentives are offered (e.g. lottery prizes, coupons or discounts) (Brick, et al., 1999; Couper, 2000; Cho & LaRose, 1999; Kehoe & Pitkow, 1997)
Personal (demographic) data is requested first, not last (Frick et al., 1999)
Automated (embedded) passwords that have no ambiguous characters in passwords are used (Crawford et al., 2001)
A multi-step invitation and survey presentation process is used (Cho & LaRose, 1999; Mehta & Sivadas, 1995; Sheehan, 2001; Witmer et al, 1999)
Estimated time to complete the survey and periodic reminders to complete the survey are provided (Crawford et al., 2001)
An appropriate subject line in the invitation, email address of sender and sender's name are used (Sheehan, 2001)
Multiple ways to contact and invite participation are part of the distribution strategy (Sheehan, 2001; Pereira et al., 2001)
The survey is customized to the target population – invitation language, type of notification media, and follow-up process (Sheehan, 2001)

With surveys where the sample frame is known, response rates can be calculated. Email response rates of 20% or lower are not uncommon (Witmer, et al., 1999) and, although rates exceeding 70% have been recorded, they are attributed to participant-work group cohesiveness (Walsh et al., 1992). web-based surveys using unsolicited email invitations outperform unsolicited email-based survey only participation significantly; however, non-response problems are continually encountered (Smith, 1997). Also, electronic surveys responses are faster than postal surveys without significant impacts on survey response rates (Sheehan & Hoy, 1999; Sheehan and McMillian, 1999;Yun & Trumbo, 2000). Therefore, the question becomes, what design and distribution techniques affect response rates most for electronic surveys?

2.4.1 Survey Design Features Affecting Response Rates

Shorter questionnaires do not necessarily produce higher response rates (Sheehan, 2001; Witmer, et al., in Jones, 1999). Cash incentives can increase the number of responses twice as much as altruistic motives (Tuten, Bosnjak & Bandilla, 2000), however, they may introduce a systematic bias (Kehoe & Pitkow, 1997). Perceptions of the effort required to complete a survey may affect response rates. Those who were told a survey would take less time, those receiving an automated (embedded) password, and those who received more frequent reminders were all more likely to accept an invitation to participate; but not more likely to complete the survey (Crawford et al., 2001). Also, ambiguous characters in passwords (e.g., 1 [the number one] or l [or the letter L]) lower response rates (Couper et al., 2001).

Placing demographics data requests at the end of a survey may (Frick et al., 1999) or may not (Dillman, 2000; Oppenheim, 1992) affect response rates. Difference may be due to the fact that paper surveys can be fully inspected before they are completed, thus eliminating surprise. Only single page Web-based surveys provide for such inspection.

2.4.2 Distribution Procedures Affecting Response Rates

Surveys presented in a single email containing both an invitation and the survey are likely to cause high non-response rates (Cho & LaRose, 1999; Mehta & Sivadas, 1995; Sheehan, 2001; Witmer et al, 1999). Response rates are higher when a short "pre-notification" invitation email introduces the coming email survey and provides "opt-in" or "opt-out" options to participate (Sheehan & Hoy, 1999; Sheehan, 2001; Witmer et al, 1999). Follow-up reminder emails appear to spike participation (Sheehan & Hoy, 1999; Smith, 1997). To increase response rates up to 70%, more sophisticated approaches integrate online and offline invitations and reminders beginning with an invitation postal letter, then a paper survey and an email survey with a Web-based version URL option, followed with reminder postcards (Yun & Trumbo, 2000). Notification placement and mix targeted to the specific audience such as advertisements in journals increase response rates also (Pereira et al., 2001). However, response rates are not affected by varying the interval time periods between reminders (Claycomb et al, 2000).

2.4.3 Other Affects on Response Rates

Lastly, response rates are affected by participants' ability to answer (e.g., perform complex mental tasks, make judgments), and their motivation (e.g., topic salience, belief in usefulness of questionnaire) (Krosnick, 1999).

2.5 Survey Piloting

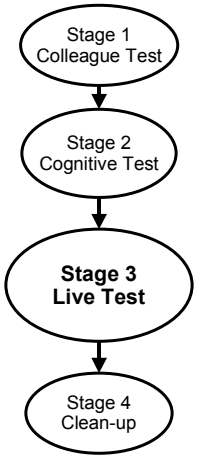
"Survey piloting is the process of conceptualizing and re-conceptualizing the key aims of the study and making preparations for the fieldwork and analysis so that not too much will go wrong and nothing will have been left out" (Oppenheim, 1992, p. 64). Inattention to detail in question development and distribution procedures defeats quality (Table 6). Question bias introduced through closed questions; skewed frequency scales, reference periods and rating scales; leading questions and question placement can be uncovered in piloting (Krosnick, 1999; Schwarz, 1999). Significant structural problems can be revealed as when Witte et al. (2000) found their very long survey needed to be modularlization and procedure restructure.

Table 6 *Frequent Survey Structure Detail Errors Discovered in Survey Pilot Testing (Crawford et al., 2001; Dillman, 2000; Krosnick, 1999; Preece, Rogers & Sharp, 2002; Schwarz, 1999)*
Demographic data requests that are inappropriate for the survey
Overlapping question scales (e.g., 1-3, 3-6) or selection options
Questions that few or no one answers
Too many questions that highly correlate
Too many open-ended questions
Open ended questions that do not provide useful information
Incorrect defaults (hidden or revealed)
Small text boxes that do not scroll
Ambiguous wording
Bias in question/answer wording
Inconsistent terminology
Non-orthogonal or overlapping categories
Specialist terms or technical vocabulary not familiar to the target population
Answers that cannot be undone
Insufficient space for open-ended question answers
Inconsistent wording and spelling errors
Inaccurate or missing instructions
Inaccurate time to complete estimates

2.5.1 The Survey Pilot Process

Using a multi-stage testing process that integrates an array of different testing techniques and a four-stage process is recommended (Figure 1) (Dillman, 2000; Oppenheim, 1992; Preece et al., 1994; Schwarz & Sudman, 1996).

Figure 1. Survey Pilot Process



In Stage 1 a review by knowledgeable analysts ensure question completeness, efficiency, relevancy, scale and format appropriateness. Heuristic review is a useful technique. In Stage 2, "typical" participants take the survey using a "think aloud" protocol while developers observe and follow-up with retrospective interviews. Survey language, question interpretation consistency, logical question sequencing and survey "look and feel" are evaluated. In Stage 3, a small study emulates all the procedures proposed by the main study. In the stage 4 one last check is done to catch typos and errors inadvertently introduced during the last revision process.

2.4.2 Predicting Response Rates

Piloting can reveal undeliverable email, declined, and

completed survey rates, which are all useful for estimating the amount of over sampling required (Sheehan & Hoy, 1999). Survey log files can measure response rates at the question level to identify question problems, if each question is on a separate web page (Bosnjak & Tuten, 2001; McCoy & Marks, 2001).

In summary, a conscientious and complete piloting of the survey instrument, distribution process, and response and attrition behavior creates a high quality electronic survey.

2.6 Overview Summary

It appears that Web-based surveys are the most appropriate format for surveys when research costs are a constraint, timeliness is important and the nature of the research requires it. However, this method presents both technical and administrative challenges that do not exist with traditional postal or text-based email surveys. Piloting is required to perfect the survey, sampling, survey distribution and estimate response rates.

3.0 Online Participation Case Study

The following case study applies the electronic survey criteria to reach a hard-to-involve population of Internet users, online community non-public participants (a.k.a. 'lurkers') and the issues encountered. The results show that the criteria, when properly applied, generate strong response rates.

3.1 Overview

A study into the nature of participation in online communities was undertaken to follow-up on previous studies, the first of which explored why people lurk using a small qualitative face-to face interview methodology. The results revealed 79 potential reasons for lurking, which were grouped into four categories: member characteristics, group characteristics, membership life cycle stage, and external constraints (Nonnecke & Preece, 2000). A preliminary "gratification" model was developed and researchers concluded that lurking is a strategic activity. The second study, a quantitative email-logging study, showed that lurking levels varied among different types of online communities and were not at the 90% levels often discussed (Nonnecke, 2000). The current study explores why some people post and others only read ('lurk') and the reasons for the behavior using a quantitative study that cuts across a diverse population of online communities.

3.2 Participants

The study was carefully designed to attract non-public (lurking) participants as well as public (posting) participants in a diverse set of online communities as lurkers are likely not to post to a survey. Privacy and anonymity were issues for the survey design as follow-up interviews with a subset of survey participants might be needed. Also, topic salience was an issue. Online community participation is of little interest to most people.

Using the sampling and participant selection quality criteria (Table 3), researchers knew generalizable results to all online community participation was not possible. Study results could only be considered indicative of what may be found in other online community populations.

Given this assumption, a diverse cross section of online communities was chosen using an artificially constructed sampling frame from which a stratified random sample was drawn. The non-probabilistic sampling option of self-selection was chosen (Table 4).

This study was limited to asynchronous online communities to match previous work. There were many different portal and non-portal resources (i.e., MSN, Yahoo!, Catalist, Talkcity, Google, Altavista, http://www.webcom.com/impulse/list.html, and http://www.tile.net/lists) from which to choose the sampling frame. Because previous research (Nonnecke, 2000) clearly demonstrated that different types of online communities have different lurker characteristics, a heterogeneous online community resource, MSN online communities service, was selected as it has 16 online community categories at the highest level of MSN's community hierarchy. Also, MSN online communities service lists community membership numbers and provides counts for the communities in each category and sub-categories.

Twenty-five percent (25%) of the MSN group categories were selected using a random number generator to narrow the sampling frame. The categories selected were (1) health and wellness, (2) government, (3) sports and recreation, and (4) organizations. This population was further defined with the criteria that a selected community must have a critical mass of at least 50 members, be open to public participation, and have an active online community having 4 to 5 people posting within the past 90 days. A total of 1304 online communities were identified. The frame was then stratified so that each category could be proportionally sampled (Table 7).

Table 7
Stratified Sampling Frame

Category	Groups Meeting Criteria	Frame Proportion	Sample
Health & Wellness	435	33%	122
Government	139	11%	41
Sports/Recreation	531	41%	152
Organizations	199	15%	56
Total	1304	100%	371

The qualifying communities within each category were numbered sequentially (1-n). To attain a 95% confidence level that the sample results were generalizable to the sampling frame, 371 online communities were surveyed to attain a confidence level just over 4% (4.31%) (Creative Research Systems, 2001). In the actuality, 375 communities accepted the original invitation, providing a confidence interval of 4.27%.

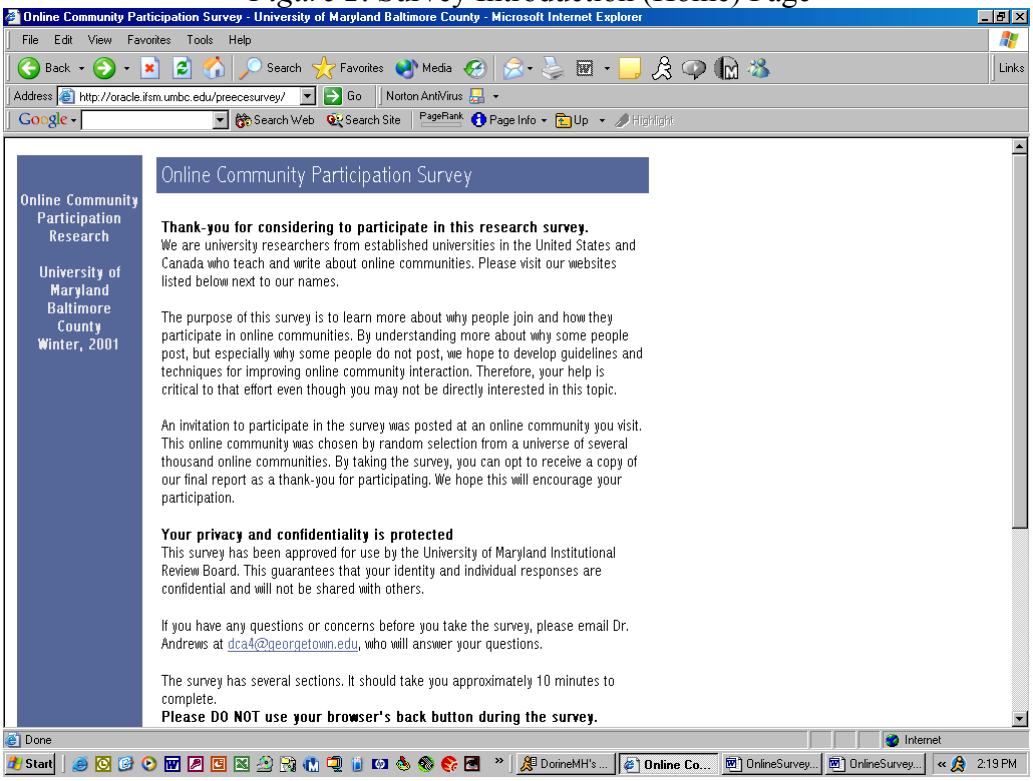
3.3 Apparatus- Survey Instrument

The survey was designed to implement as many of the quality criteria (Tables 1-5) as possible. It had a professional, simple layout using a straightforward navigation strategy, kept graphics and color to a minimum to keep downloading time as short as possible (http://oracle.ifsm.umbc.edu/preecesurvey/). Cold Fusion, Microsoft Access and HTML were used to develop the survey as other software mentioned in the literature review was not accessible as yet. The software supported multiple platforms and browsers, multiple opportunities for saving respondent answers, coded and open-ended responses, an immediate

"thank-you" feedback upon survey completion and detected multiple submissions. If a multiple submission was detected a gently worded error message "It appears you have already completed a survey for this online community. Please contact the survey administrator at the link below to investigate the problem" was sent to the participant.

The survey contained 12 demographic items, 28 primary coded questions integrated with 20 secondary coded and open-ended questions. An introduction page and an informed consent page preceded these questions.

Figure 2. Survey Introduction (Home) Page



The purpose of the survey introduction page (Figure 2) was to create a trusting relationship with survey participants by establishing researcher authority and credibility, repeating the survey purpose first explained in the invitation posting, offering a non-financial incentive – a report of the results, guaranteeing confidentiality and privacy, providing access to researchers via email, and explaining the sampling methodology. It also provided a third party guarantee of the survey's authenticity and credibility by stating the University's Institutional Review Board (IRB) approval and providing a link to the IRB website. If an IRB had not been available, they could have referred to their professional association memberships (i.e., Association of Computing Machinery, Association of Internet Researchers, etc.) and links to these association ethics to provide credibility via this reputable third party.

The informed consent page (Figure 3) asked participants to give their permission for the survey (see 3.4 Tasks – Completing the Survey). Also on this page and throughout the survey, terms used throughout the survey are linked to "pop-up" definitions (Figure 4).

Figure 3. Survey Informed consent Page

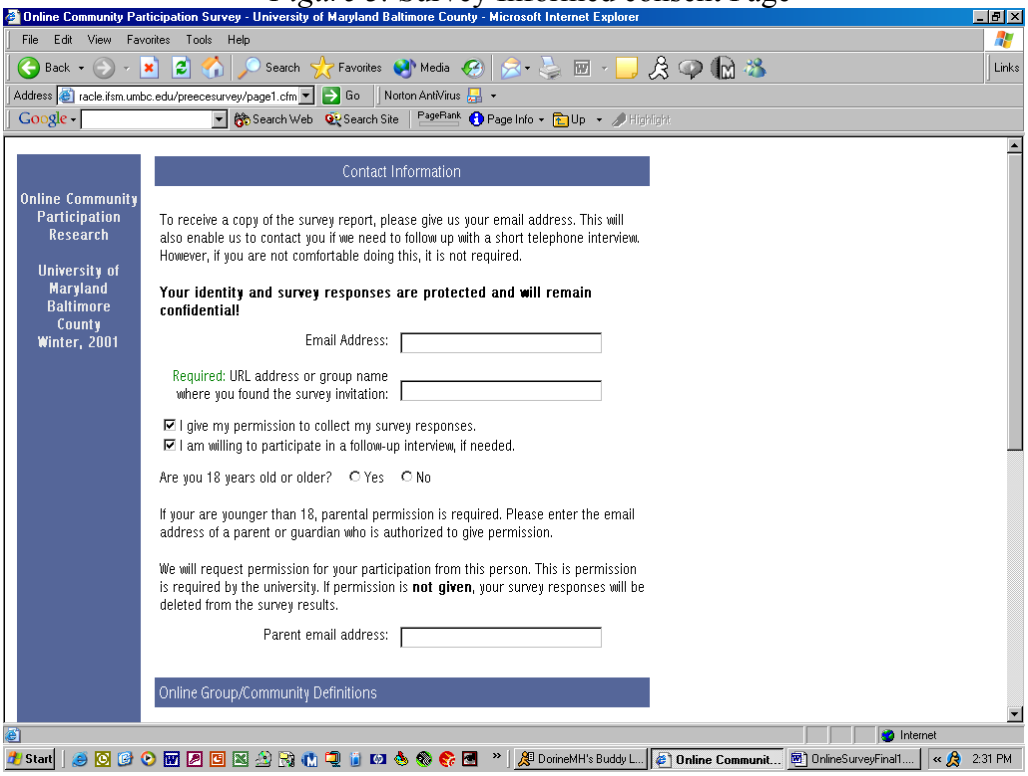
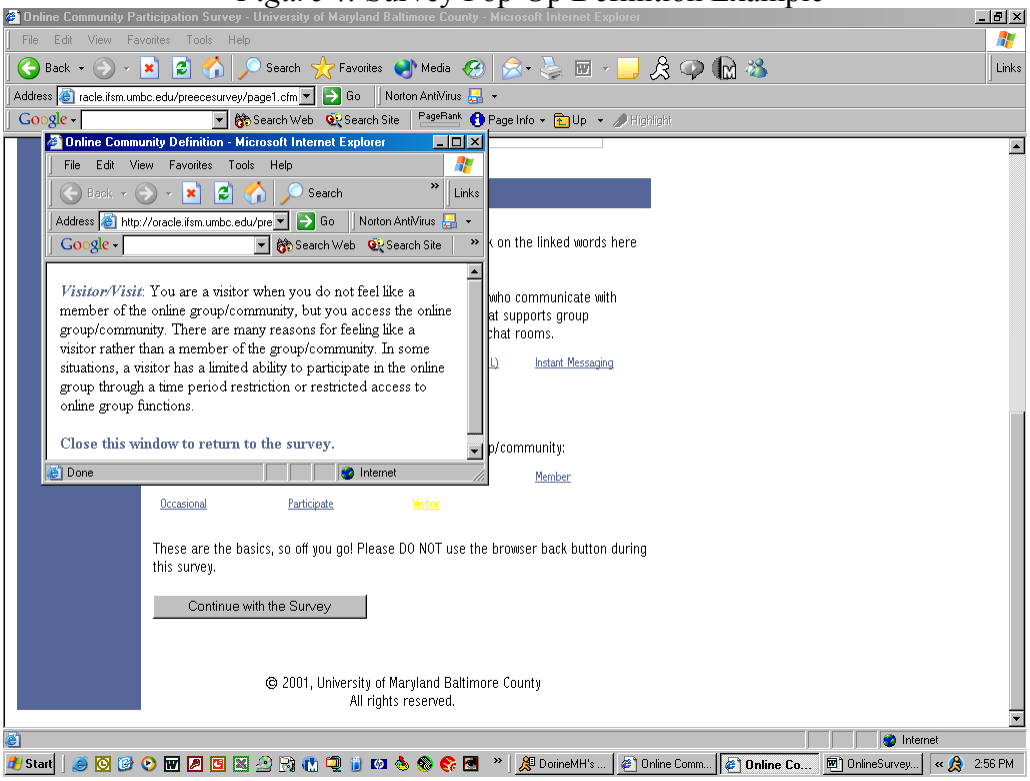
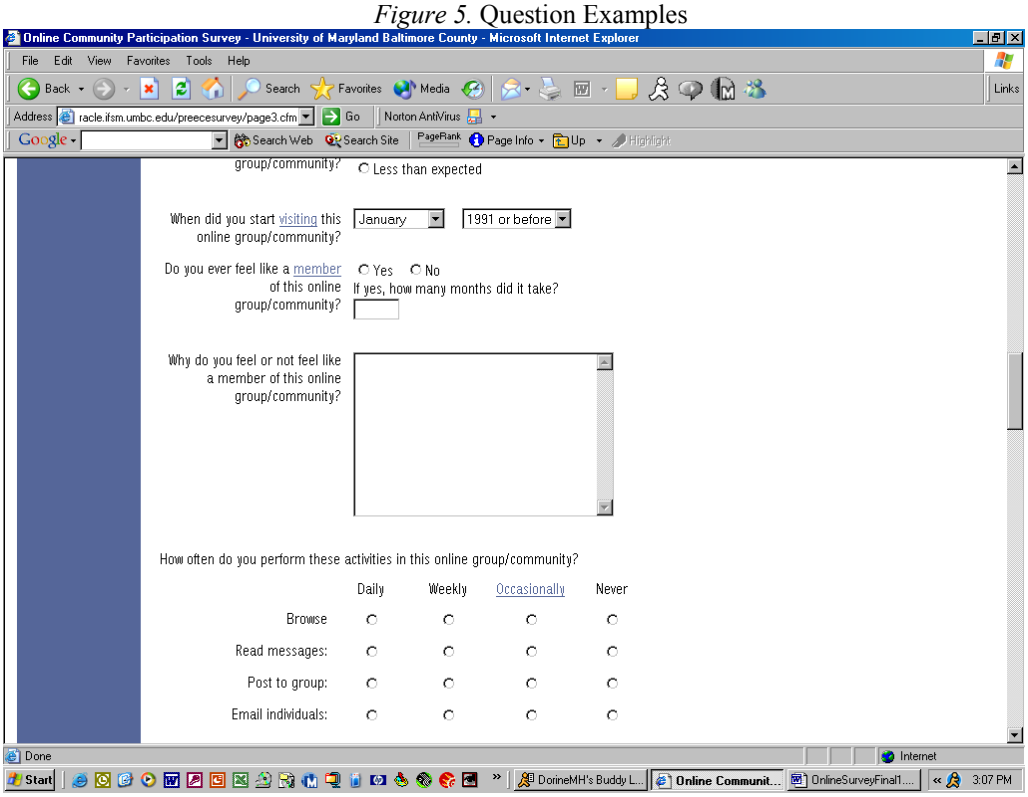


Figure 4. Survey Pop-Up Definition Example



Following the introduction and informed consent pages, the survey questions were divided into three sections, each having a "submit" (save) button. Questions were not numbered. The first section contained demographic questions, the second section, questions about the online community where the invitation was posted, and, the last section contained questions about a online community that the participant had permanently left. This last section was optional. Coded questions used drop down menus, radio buttons and check boxes with nominal scales, Likert Scales, semantic differential scales, single and multiple choice selection options (Figure 5). Open-ended questions were limited to optional opportunities at the end of a coded question set and presented via text-input boxes with wrapping and scrolling, not single line entry.

Figure 5. Question Examples



3.4 Tasks – Completing the Survey

Survey participants were asked to complete tasks in the survey upon entering the informed consent page after reading the introduction page. They included optionally providing an email address; entering the URL address or online community name where they learned of the survey; opting out of permission to collect data and/or permission for a follow-up interview; stating their age qualifications, and pressing the submit button to continue with the survey.

On the demographic page of the survey using coded questions, participants were asked to specify age within a range and select gender, Internet experience, work/career situation, work environment and education level from lists of options; describe their online community

experience and activity; enter their activity volume in text-boxes; and press the "submit" button and continue with the survey.

The survey second section presented survey questions to participants. They were asked to "focus on the online group/community where you found the survey invitation" to answer questions about their participation in that particular online community and press the submit button and continue with the survey.

The third section of the survey asked to "focus on an online group/community that you have permanently left." If they had never permanently left an online groups/community, they linked to the end of the survey. If they had left a community, they were asked to enter the URL or name of the community they permanently left; answer questions about their participation in the online community they have left; and press the submit button.

Lastly, participants were presented with a thank you screen verifying response recording.

3.5 Procedures – Conducting the Survey

The survey invitation was posted as a message on public online communities. Multiple contact and invitation methods, as recommended in the quality criteria in Table 5, were not used as researchers hoped to calculate some type of response rate at the community category and community level. Direct email to each member would have allowed non-response tracking, but was considered overly intrusive (Table2). Also, the invitation was posted without community owner/moderator permission, unless online community policies directly required owner/moderator permission to post a message that was not directly "on topic." This procedure was adopted as a result of pilot testing (see 3.6 Experimental Design – Conducting the Pilot Test). The invitation posting was a shortened version of the survey introduction page. It was introduced with a short note from the research fellow (figure 6). After reading the invitation, online community members ignored the post or self-selected to take the survey by clicking on the survey URL.

Two follow-up "reminder" invitations were posted one week apart to each online community. All inquiry email, whether sent as a reply to the posting or sent to the survey "webmaster" was responded to within 24 hours. Even those emails, which were statements rather than questions, received recognition from one of the researchers.

An unexpected procedural posting problem arose during the survey. To post to MSN communities, an individual must have a hotmail account. Each account is limited to 50 online communities. Therefore, multiple email accounts were required to post to all online communities. Other online community populations may not have this limitation, however it should be addressed in the survey procedure design.

One small technical problem occurred when the first invitation was posted. The survey had been moved to a new server and researchers were not notified until an email was received asking why the link was not working. This was repaired within an hour before other invitations were posted.

3.6 Experimental Design – Conducting the Pilot Test

The four stage pilot process as defined in the literature overview was followed to refine and finalize the survey and its distribution method, and to estimate response levels.

3.6.1 Stage 1 – Colleague Test

In stage 1 four rounds of question drafting and sequencing were required and a prototype was developed. Question language proved more challenging than first anticipated. Shorter

sentences are better for reading on the screen as people do not read web pages, they scan them, looking for key words and phrases (Nielsen, 2000). Therefore, survey questions and instructions became briefer as the prototype was reviewed. For example, the original statement *"This second set of questions is similar to the first set, but focus on an online group which you have permanently left and no longer consider yourself to be a member of.*" became "*The questions below pertain to an online group you have permanently left."* There was a constant struggle to maintain the balance between brevity, friendly tone, and accurate description.

The research regarding question length is somewhat contradictory; however researchers assumed that the less salient the topic, the less tolerance participants would have for completing the survey. Therefore, researchers eliminated all redundant questions. The first draft of the survey had over 50 primary questions, at the end of this first stage it had been reduced by about 25%. By the end of the entire piloting process there were only 28 primary questions across sections 2 and 3.

3.6.2 Stage 2 – Cognitive Test

Stage 2 differed from the pilot testing quality criteria in that it consisted of two parts, not just one. First, several participants not involved in the research completed a usability test. Each read the invitation as if it were posted to their online community and completed the survey using "think out loud" protocols with retrospective interviews. This resulted in further language simplification on both the invitation and survey questions, changes in sequencing, and feedback on the look and feel of the survey. For example, following human computer interaction (HCI) principle to provide a Gestalt-like framework (Shneiderman, 1998), the 79 items of the preliminary model were structured into four groups using the category names as headings. However, from this first Stage 2 test, it was clear that constant scrolling up and down the screen was required to view all items. The list was too long. As a result, items considered duplicative were removed, similar items were placed together in groups of 3 and 4, and all category headings were removed, leaving a grouped list of 15-20 items depending upon the question. An open-ended question, "Please report any other reasons you might have" was added at the end of the listing, which now fit a small screen display.

After the prototype was updated once again, an invitation to review the survey was placed on an Internet researchers automated mailing list. Over 50 Internet researchers completed the survey and 15 people provided email feedback to varying degrees of detail. This expert testing revealed privacy and confidentiality concerns, numerous recommendations for question wording, inconsistencies among questions and a need to eliminate several questions. For example, the confidentiality guarantee language was clarified and reiterated several times on the introduction and permission pages. In addition, the invitation was shortened, the subject line refined, and the privacy and confidentiality statement was moved forward and set off with white space. Headings were added so that those who scanned the invitation instead of reading it would "get the same message" as reading the complete introduction. The researcher email address was also changed from a short abbreviated name to a full name.

3.6.3 Stage 3 – Live Test

In Stage 3 the sampling procedure, the survey and the invitation procedure were fully tested. Twenty online communities were selected from MSN online communities outside the

four sampling frame categories. Attention was paid to select a diverse range of communities, which met all the sample selection criteria (size range, activity and public access). Membership size ranged from 59 to 7859 for a total potential participant response volume of 17, 221 people. The original invitation posting procedure of requesting permission to post was abandoned after 10 requests to post went unanswered. The piloting continued by directly posting to the online communities after joining the community as required. No group "kicked-out" the post. A second invitation was posted one week later.

84 survey responses were gathered from the 20 boards. Of those responses, 14 (14.3%) were considered invalid because the participants did not provide any information on whether they posted or did not post to the online community. However, for the valid responses 6.9% said they never posted (also known as 'super lurkers'), 34.7% infrequently posted ('lurkers'), 20.8% posted weekly ('posters'), and 37.5% said they were daily posters ('super posters'). These results encouraged researchers to believe that online community non-public participants can be enticed to participate in a survey.

This piloting also provided other important feedback. First, the date the survey was submitted was added and captured automatically to provide a way to analyze response volume to invitations and follow-ups. Second, in an attempt to measure non-response rates, the survey captured the name of the online community automatically using the 'URLfrom' HTML capability as well as having the participant enter it. However, the URL placed in the 'URLfrom' field was related to the post, not just the online community so researchers knew for the results that each community had to be identified and clarified manually. In many cases, there was no reference as participants copied the survey URL into a browser address field or had left the source field blank.

Figure 6. Survey Invitation Posting

Subject: University Researchers Need Your Opinions about Online Communities

Hello everyone. I am a research fellow at the University of Maryland, Baltimore County. I would like to ask you to take the time and read the following invitation. Your participation will be most appreciated:

We are university researchers from Maryland, Washington, D.C., and Ontario, Canada. We invite you to participate in our online community survey at http://oracle.ifsm.umbc.edu/preecesurvey. We are looking for ways to expand and encourage online community participation.

Therefore, we need to know why some people post and why some people do not post. We especially need to hear from those of you who only read and do not post in this community. Your help in completing the survey is critical, even though you may not be directly interested in this topic.

Some facts:
- This online community was chosen by random selection from a universe of several thousand online communities.
- By taking this survey, you can opt to receive a copy of our final report as a thank-you for participating.

We hope this will encourage your participation.
- If you have any questions or concerns before you take the survey, please email Dr. Andrews, *researcher email address* who will answer your questions.
- The University of Maryland, Baltimore County Institutional Review Board (IRB) has approved our research. This guarantees that your identity and individual responses are confidential and will not be shared with others.

3.6.4 Stage 4 – Clean up

With final grammar and format checks completed, the first invitations were posted March 19, 2002 and the last post was completed May 14, 2002. The reason for staggered postings is described below.

3.7 Experimental Design – Administering the Full Study

The process of posting invitations to online communities began by generating a set of random numbers equal to the number of samples to

be drawn from a category (e.g, 122 numbers were generated for the Health & Wellness category). The initial invitation (Figure 6) was posted, then one week later a reminder was posted and then one week after that a third and last reminder was posted following the quality criteria in Table 5. When a discussion board rejected an invitation posting (the posting was 'kicked-off'), then another random number was generated and the process of posting was initiated with the newly selected community. Question results were analyzed using Kruskal-Wallis non-parametric tests because the data were categorical, not from a normalized distribution across the sample frame.

3.8 Results – Full Study

The survey invitation was successfully posted to 375 randomly selected MSN online communities with membership totaling 77,582 (Table 8). 18 (4.5%) of the online communities rejected the invitation outright (1st posting) requiring additional sample to be drawn to replace these rejections. Three additional groups rejected a follow-up invitation. These were included in the 375, as online community members had an opportunity to read and respond to the initial invitation.

Table 8
Survey Results Summary

Category	Groups Selected	Kicked-off*	Groups Surveyed	Members	Replies+
Health & Wellness	123	0	123	36,024	26
Government	41	0	41	15,176	20
Sports/Recreation	170	16	154	9,323	59
Organizations	59	2	57	17,059	2
Total	393	18	375	77,582	107

3 additional removals on 2nd or 3rd invitation posting after first week.
+ Replies to invitation posts (not emails from members)

3.8.1 Community Intolerance

In this study, 16 of the 18 1st rejections (89%) came from the sports and recreation category. This category also had the highest number of replies to the invitations (55%), but represented only 41% of the surveyed online communities and 12% of the potential survey participants. In addition, about half of the 41 survey email inquiries and most of the 107 invitation posting replies from this group were neutral or negative comments, and several events reinforced the impression of this category of communities' lack of tolerance. The survey server was “hacked” twice, presumably in response to the survey invitation and from time to time, researchers received unsolicited email offers, some of which were pornographic in content or aggressive tone.

3.8.2 Response Rates

1743 responses were submitted, equaling 2.3% of the sample frame member population (77,582), an average of 4.6 responses/online community, or a response rate of 21% from the 375

online communities. 555 (31.8%) responses proved to be invalid leaving 1188 (68%) valid surveys for item analysis (Table 9).

Table 9
Survey Record Validation Summary (N=1743)

	No permission	No Posting behavior*	Empty	Not 18+	Total
Records removed	81	254	166	54	555
Removed %	14.6	45.7	29.9	9.7	100
Total %	4.6	14.5	9.5	3.1	31.8
				Valid Records	1188

* Must have posting behavior for current online community where invitation was found

To be valid, a participant must have given permission, been at least 18 years of age, and answered the question on posting behavior for the online community where the invitation was posted. 70% of the responses were eliminated because one or more of these criteria were not met. Another 29.9% were completely empty records, meaning that almost 30% of the participants read, but did not participate in the survey. These records were removed.

3.8.3 People who participated are interested in the results

Despite the fact that the survey was not salient to the sampled online communities, 96% of those who did complete the survey requested a copy of the survey and supplied their email address for this reason.

3.8.4 Shared Characteristics

Participants completing this survey had characteristics similar to, but not exactly like those reported in other Internet surveys (Table 10).

Table 10
Participant Characteristics (N=1188)

Characteristic	%
Education	
High School	21
Some College	42
College Grad	37
Gender	
Female	56
Male	44
Age	
<20	4.8
20-29	18.6
30-39	24.7
40-49	25.8
50-59	19.3
60+	6.6
Work type	
Retired	12
Full Time	43.1
Self-employed	12.3

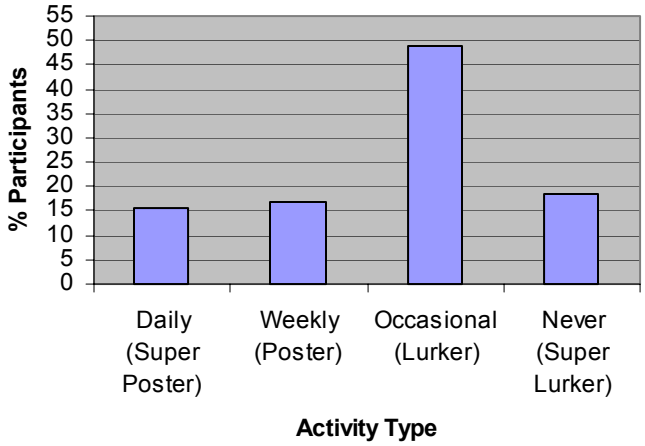
Part-time	11.1
Not Working	21.4
Work style	
At Home	16.2
Employer Office	39.3
Non-Office	44.5
Student Status	
Non-student	81.7
Student	18.3
Use Online groups	
No	6.9
Yes	93.1
Use email	
No	1.8
Yes	98.2
Online experience	
Less than 1 year	11.6
1-2 years	17.9
3 + years	70.5

They were educated like other survey participants, but 12% more women than men completed the survey. The majority of survey participants were between the ages of 30-49, with neither young nor old participants dominating the participation. 81.7% of the participants were non-students. Two-thirds of the survey participants were employed full time or self employed or worked part time (66.6%). 55.5% worked out of their home or a traditional office. Like other survey participants, in terms of their Internet experience, this survey's participants overwhelmingly were experienced people who had been online three or more years using email and joining online communities.

3.8.5 Non-Public Participants

From the beginning there was concern as to whether or not people who do not post in an online community would be willing to participate in a survey study. It appears that contrary to this concern, 18.6% of participants reported that they "never post to the online community" and another 48.9% reported only "occasional posting." Only 32.5% actively participated on a weekly or daily basis. Over two-thirds of this sampling frame is publicly inactive or rarely active in their online communities.

Figure 7. Posting Activity



4.0 Discussion and Conclusion

4.1 Hard-To-Involve Online Users Can Be Reached

Although the results of this study cannot be generalized to the total online community population, it appears that it is possible to coax non-public participants into publicly participating in an online survey. The quality criteria for survey design and use, when customized to the requirements of the particular research situation, were found to be effective. Some people will be interested and then back out as occurred in this study (e.g., 30% submitted the survey but did not answer any questions), but it appears a sizable number are reachable.

If this case study is indicative of what researchers will encounter when conducting research across a diverse online population, it appears that they can expect low response rates and a certain level of intolerance to the intrusion of the study on the part of some types of communities. In this community participation study, the low response rates of 2.5% of the sampling frame individuals or 21% of the communities may be due to the fact that the topic was not salient or the posted membership figures may not be representative of the actual number of members. However, for those online active or non-public participants who do choose to participate in research, they will most likely be interested in seeing the survey results no matter what the topic of study.

4.2 Protect Researchers without Damaging Survey Credibility

After the two-month survey period, researchers concluded that they had been somewhat naïve. The kind of intolerance and resulting attacks on the research server provide a cautionary warning to researchers. They raise the question whether researchers should identify themselves and welcome inquiries as the quality criteria in Table 2 suggest. Perhaps, creating a central email address, separate from all individual researcher emails is a more effective way of providing access to researchers. This may affect researcher credibility, but would provide some level of protection from abusive comments. Additionally, because the survey server what infected with a virus and was also hacked, it is important to provide strong firewall security.

4.2 The Quality Criteria for Electronic Surveys Provide Choices

Researchers did not implement all the recommended criteria for quality electronic surveys, but did implement those that made sense for the research objectives, context and content of this study. As discussed above, the survey succeeded in reaching a significant portion of a hard-to-involve population, non-public online community participants. From the case study experience, the most important criteria contributing to survey success appeared to be:

- For design, all the criteria in Table 1 except adaptive question presentation, which was not used
- For privacy and confidentiality, in Table 2, the criteria of full disclosure of study purpose and sampling procedures, those items which help to establish researcher credibility, and the promise of confidentiality and not requiring identification. Though as mentioned earlier, compromises may be needed to protect researchers from unpleasant, unsolicited email.
- For encouraging high response rates, in Table 5 the multi-step invitation and survey presentation process. Most importantly, researchers responded to all inquiries rapidly and in detail. This lead to moderators allowing the invitation to remain posted at the online community.
-

Could response rates have been higher? These researchers are not sure. The topic of online community participation is, in itself, not salient to most people and therefore will remain a stumbling block to higher participation. Perhaps a shorter survey may have increased participation. Additionally, the bad link discovery after the first invitation posting may have thwarted a few participants. This was repaired before the other 374 communities were contacted so its impact was minor.

4.4 Piloting is Essential

It was quite enlightening to see the evolution of the survey instrument and distribution procedure through the piloting process. The testing was invaluable. The quality of the survey improved dramatically at each stage of the process. The stage 2 “think aloud protocol” testing while researchers watched people read the invitation and complete the survey was most informative. That combined with the second stage 2 expert testing resulted in the most significant and beneficial changes and helped researchers let go of what they initially considered "good" language, question formatting, and overall structure for the survey.

We can expect that studies across diverse populations of online communities will continue to become more difficult as communities become more protective of their spaces. This study was neither a commercial study nor a marketing ploy, yet it was rejected by almost 5% of the communities. It is doubtful whether response rates above 20% can be reached as this study has demonstrated. However, this case study demonstrates that even studies designed to reach hard-to-involve participants can be successful.

5.0 References

Andrews, D., Preece, J., & Turoff, M. (2001, January). *A conceptual framework for demographic groups resistant to online community interaction.* Paper presented at the HICSS 2001 Conference, Honolulu, HI.

Andrews, D., Preece, J., & Nonnecke, B. (2002, January). *Online community participation survey*. Retrieved September 17, 2002 from http://oracle.ifsm.umbc.edu/preecesurvey/.

Bachmann, D., & Elfrink, J. (1996). Tracking the progress of email versus snail-mail. *Marketing Research 8*(2), 31-35.

Birnbaum, M.H. (2000). Surveywiz and factorwiz: Javascript web pages that make html forms for research on the internet. *Behavior research methods, instruments and computers, 32*(2), 339-346.

Burgoon, J.K., Parrott, R., LePoire, B.A., Kelly, D.L., Walther, J.B., & Perry, D. (1989). Maintaining and restoring privacy through communication in different types of relationships. *Journal of Social and Personal Relationships, 6*, 131-158.

Cho, H. & LaRose, R. (1999). Privacy issues in internet surveys. *Social Science Computer Review, 17*(4), 421-434.

ComScore (2001, January 16). *ComScore networks study reveals inaccuracies in consumers' ability to accurately recall their on-line buying behavior and offers new solution.* Retrieved September 17, 2002 from http://www.comscore.com/news/pr_comscore_study.htm.

Coomber, R. (1997). Using the internet for survey research. *Sociological Research Online, 2*(2), 14-23.

Couper, M.P. (2000). Web-based surveys: A review of issues and approaches. *Public Opinion Quarterly 64*, 464-494.

Couper, M.P., Blair, J. & Triplett, T. (1998). A comparison of mail and e-mail for a survey of employees in federal statistical agencies. *Journal of Official Statistics 15*(1), 39-56.

Couper, M.P., Traugott, M. W., & Lamias, M.J. (2001). Web survey design and administration. *Public Opinion Quarterly 65*, 230-253.

Creative Research Systems (2001). *Sample size calculator*. Retrieved September 17, 2002 from http://www.surveysystem.com/sscalc.htm.

Dillman, D.A. (2000.) *Mail and web-based survey: The tailored design method.* New York: John Wiley & Sons.

Dillman, D., Totora, R.D., Conradt, J. & Bowker, D. (1998). *Influence of plain versus fancy design on response rates for web-based surveys.* Paper presented at the annual meeting of the American Statistical Association, Dallas, TX.

Frick, A., Bachtinger, M.T. & Reips, U-D. (1999). Financial incentives, personal information and drop-out rates in online studies. *Current Internet Science.* Retrieved from http://www.dgof.de/tband99/pdfs/i_p/knapdf.

GVU (2001, June 29). *GVU's www user surveys*. Retrieved September 17, 2002 from http://www.cc.gatech.edu/gvu/user_surveys/.

Jupiter Media Metrix (2000, June 15). *Income and age, not ethnicity, to remain largest gap for us digital divide*. Retrieved September 17, 2002 from http://www.jup.com/company/pressrelease.jsp?doc=pr000615.

Kehoe, C. M. & Pitkow J. E. (1996). Surveying the territory: GVU's five www user surveys. *The World Wide Web Journal, 1*(3), 77-84.

Kehoe, C.M., Pitkow, J.E. & Morton, K. (1997). *Eighth www user survey.* Retrieved September 17, 2002, from http://www.gvu.gatech.edu/user_surveys/survey-1997-10.

Kiesler, S. & Sproull, L.S. (1986). Response effects in the electronic survey. *Public Opinion Quarterly, 50*, 402-413.

Knapp, F., & Heidingsfelder, M. (1999). Drop out analysis: The effect of research design. *Current Internet Science*. Retrieved from http://www.dgof.de/tband99/pdfs/i_p/knapdf.

Krosnick, J. A. (1999). Survey research. *Annual Reviews: Psychology 50*(1), 537-567.

Lazar, J. & Preece, J. (1999). Designing and implementing web-based surveys. *Journal of Computer Information Systems xxxix*(4), 63-67.

Loke, S.D., & Gilbert, B.O. (1995) Method of psychological assessment, self disclosure, and experiential differences: A study of computer, questionnaire and interview assessment formats. *Journal of Social Behavior and Personality 10*, 255-263.

McCoy, S., & Marks, P.V., Jr. (2001, August). *Using electronic surveys to collect data: experiences from the field.* Paper presented at the AMCIS conference, Boston, MA.

Mehta, R. & Sivada, E. (1995). Comparing response rates and response content in mail vs. electronic mail surveys. *Journal of the Market Research Society, 17*(4), 429-440.

Neustadl, A. & Robinson, J. (2002, September) Social contact differences among internet users and nonusers in the general social survey. *IT & Society, 1*(1). Retrieved September 17, 2002 from: http://www.stanford.edu/group/siqss/itandsociety/Vol01-1-A06-Neustadtl-Robinson.pdf.

Nielsen, J. (2000). *Designing web usability.* Indianapolis: New Riders.

Nonnecke, B. (2000). *Lurkers in email-based discussion lists.* South Bank University, London.

Nonnecke, B. & Preece, J. (2000). *Lurker demographics: counting the silent.* Paper presented at the CHI 2000 Conference on Human Factors in Computing Systems, The Hague, Holland.

Nonnecke, B. & Preece, J. (2001, August). *Why lurkers lurk*. Paper presented at the Americas Conference on Information Systems conference, Boston, MA.

Norman, K., Friedman, Z., Norman, K. & Stevenson, R. (2001). Navigational issues in the design of online self-administered questionnaires. *Behaviour & Information Technology, 20* (1), 37-45.

NUA. (2001). *Women now outnumber men on the Internet.* Retrieved September 17, 2002 from http://www.nua.ie/surveys/index.cgi?f=VS&art_id=905356873&rel=true.

Oppenheim, A.N. (1992). *Questionnaire design, interviewing and attitude measurement*. New York: Pinter Publishers.

Paolo, A.M., Bonamino, G.A., Gibson, D., Patridge, T. & Kallail, K. (2000). Response rate comparisons of email and mail distributed student evaluations. *Teaching and Learning in Medicine, 12*(2), 81-84.

Pereira, J., Bruera, E., & Quan, H. (2001). Palliative care on the net: An electronic survey of health care professionals. *Journal of Palliative Care 17*(1), 41-45.

Preece, J. (1994). *Human Computer Interaction.* Reading, MA: Addison-Wesley.

Preece, J., Rogers, Y. & Sharp, S. (2002). *Interaction design: Beyond human-computer interaction*. New York: John Wiley & Sons.

QUIS: The questionnaire for user interaction satisfaction. (n.d.). Retrieved September 17, 2002 from http://www.cs.umd.edu/hcil/quis/.

Robson, C. (1993). *Real world research*. Oxford, UK: Blackwell.

Rogers, E. (1987). *Progress, problems and prospects for network research: Investigating relationships in the age of electronic communication technologies*. Paper presented at the Sunbelt Social Networks Conference, Clearwater Beach, FL.

Schaefer , D.R. & Dillman, D.A. (1998). Development of standard email methodology: Results of an experiment. *Public Opinion Quarterly 62*(3), 378-397.

Schillewaert, N., Langerak, F. & Duhamel, T. (1998). Non-probability sampling for www surveys: A comparison of methods. *Journal of the market Research Society 4*(40), 307-313.

Schwarz, N. (1999). Self-reports: How the questions shape the answers. *American Psychologist 54*(2), 93-105.

Schwarz, N. & Sudman, S. (1996). *Answering questions: Methodology for determining cognitive and communicative processes in survey research*. San Francisco: Jossey-Bass.

Sheehan, K B. (2001) E-mail survey response rates: a review. *Journal of Computer Mediated Communication, 6*(2).

Sheehan, K. B. & Hoy, M. B. (1999). Using e-mail to survey internet users in the united states: Methodology and assessment. *Journal of Computer Mediated Communication, 4* (3).

Sheehan, K. B. & McMillan, S.J. (1999). Response variation in email surveys: An exploration. *Journal of Advertising Research. 39*(4), 45-54.

Slaughter, L., Norman, K.L., Shneiderman, B. (1995, March 26-28). *Assessing users' subjective satisfaction with the information system for youth services (isys).* Paper presented at the VA Tech Proc. of Third Annual Mid-Atlantic Human Factors Conference, Blacksburg, VA.

Smith, C. B. (1997). Casting the net: Surveying an internet population. *Journal of Computer Mediated Communication, 2* (4).

Shniederman, B. (1998). *Designing the user interface: Strategies for effective human-computer interaction.* Reading, MA: Addision-Wesley.

Stanton, J.M. (1998). An empirical assessment of data collection using the internet. *Personnel Psychology 51*(3), 709-726.

Swoboda, S. J., Muehlberger, N., Weitkunat, R. & Schneeweiss, S. (1997). Web-based surveys by direct mailing: An innovative way of collecting data. *Social Science Computer Review 15*(3).

Taylor, H. (2000). Does internet research work? Comparing electronic survey results with telephone survey. *International Journal of Market Research 42*(1), 51-63.

Tuten, T.L., Bosnnjak, M., & Brandilla, W. (2000). Banner–advertised web-based surveys. *Marketing Research*, *11*(4), 17-21.

Walsh, J.P., Kiesler, S., Sproull, L.S., & Hess, B.W. (1992) Self-selected and randomly selected respondents in a computer network survey. *Public Opinion Quarterly,* 546, 241-244.

Watt, J.H. (1999). Internet systems for evaluation research. In G. Gay & Bennington (Eds.), *Information Technologies in Evaluation: Social, moral epistemological and practical implications*, (pp. 23-44). San Francisco: Josey-Bass.

Weible, R. & Wallace, J. (1998). The impact of the internet on data collection. *Marketing Research, 10*(3), 19-23.

Witmer, D.F., Colman, R.W. & Katzman, S.L. (1999). From paper-and-pencil to screen-and-keyboard. In S. Jones (Ed.), *Doing Internet Research: Critical Issues and Methods for Examining the Net*. (pp. 145-162). Thousand Oaks, CA: Sage.

Witte, J.C., Amoroso, L.M., Howard, P.E.N. (2000). Research methodology -- Method and representation in internet-based survey tools -- Mobility, community, and cultural identity in survey 2000. *Social Science Computer Review, 18*(2), 179-195.

Yun, G. W. & Trumbo, C. W. (2000). Comparative response to a survey executed by post, e-mail, & web form. *Journal of Computer Mediated Communication 6*(1).

Zhang, Y. (2000). Using the internet for survey research: A case study. *Journal of the American Society for Information Science 51*(1), 57-68.