People's Beliefs about the Internet: Surveying the Positive and Negative Aspects

Eric N. Wiebe Eric F. Shaver Michael S. Wogalter

North Carolina State University
Raleigh, NC, 27695-7801 USA

Abstract

The explosion of the Internet -- and the World Wide Web (WWW) in particular -- has led to the distribution of information to a much more diverse and unspecified audience. Human factors professionals have a stake in the design of these Internet-based tools and the delivery of information over them. An initial survey distributed to a large diverse population asked respondents to provide positive and negative aspects about the WWW and related Internet communication technologies. The responses (n = 380) were grouped according to general positive and negative categories. Most of the categories paralleled each other on the negative and positive side. Access to information and security dominated both the positive and negative. A second survey had respondents rate 26 positive and negative items based on aspects identified in the first survey. The responses (n = 219) supported the larger categories identified in the first survey and revealed differences in attitude towards the Internet based on age, gender, and student status. These issues, plus others mentioned in the responses, are ones that human factors professionals are in a position to address.

INTRODUCTION

Many of the design problems human factors professionals face concern well-defined problems with relatively well-defined populations. The explosion of the Internet -- and the World Wide Web (WWW) in particular -- has led to the distribution of information to a much more diverse and unspecified audience. In addition, how this material is used and how they respond to it is often equally undetermined. Given this environment, it is worthwhile to understand how larger, more general demographic groups approach the use of the Internet. To this end, the interest should be both in these groups' likes and dislikes. Moreb@obal information about different group's attitudes concerning the Internet can be useful early in the design stages in making larger, more strategic decisions concerning information to be distributed via the Internet. Clearly, human factors professionals have a stake in the design of these Internet-based tools and the delivery of information over them (cf., Forsythe, Grose & Ratner, 1997). Given that user attitudes, beliefs, and perceived benefits interact with interface design elements to influence usage patterns of information technologies (Davis, 1993), it becomes critical to be aware of these issues while developing interfaces.

A starting point for examining subjective beliefs about Internet based technologies is to capture the most salient aspects in the minds of the general population. An initial questionnaire distributed to a large diverse population asked the respondents to provide positive and negative aspects about the Internet and related Internet communication technologies. The responses given to this survey guided the development of 26 issue statements (13 positive and 13 negative) about the Internet. A second survey given to a second group of individuals solicited responses to these issues. This study examines some of concerns, issues, and attractions of the Internet. It also evaluates how well the identified items capture the most salient affective issues surrounding the use if the Internet.

METHOD

Participants. Of the 380 respondents to the first survey, 207 (60.5%) indicated they were male and 135 (39.5%) female. Most respondents were Caucasian, with only 14% choosing another ethnic category. Thirty-five percent of the respondents were between 18 and 21 years of age, 38% between 22 and 40 years, and the remainder over 40 years. These age ranges roughly paralleled the level of education of the respondents, with 26.3% not having completed at least one year of college and another 30.1% having completed at least an undergraduate degree. Of the 219 respondents to the second survey, 122 (55.7%) indicated they were male and 97 (44.3%) female. For this survey, only 7.3% chose an ethnic category other than Caucasian. The age distribution was again weighted towards college age with 55% between the ages of 18 and 21, 36% between 22 and 40 years, and the remainder over 40 years. Of those responding, 71.7% were full-time students while 28.3% were not.

Materials. Both the first and second survey included items on a range of ergonomics issues of interest to a larger study, as well as items about the WWW and related Internet technologies. As part of the first survey, respondents were asked to list five positive and five negative aspects of the Internet. In the second survey were a group of 13 items listing positive aspects of the Internet. Individuals were asked to respond to these items one at a time with a score on a 9-point Likert-type scale from 0 (not at all important) to 8 (extremely important). Individuals were then given a group of 13

negative items to score on a scale from 0 (not a problem at all) to 8 (extremely a problem).

Procedure. For both surveys, students in an undergraduate ergonomics course were asked to solicit 10 individuals to complete a survey. The data for the first survey was collected during the month of November 2000. The second survey was administered in April 2001.

RESULTS

Survey One

Of those returned, 342 (89%) listed one or more positive aspects while 336 (87%) listed one or more negative aspects of the Internet. Positive and negative free responses were interpreted and initially grouped in logical categories. A review of these initial categories led to a second round of groupings forming the subordinate categories, as seen in Table 1.

Negative Aspects. The revised groupings shown in Table 1 reveal the common concerns that define the subordinate categories. Of most interest may be those items listed as negative aspects of the Internet. A total of 49% of the respondents reported Technology Performance/Cost as a negative aspect of the Internet. Within this category, the speed of moving information over the Internet was the dominant theme (32%). Cost of connecting to the Internet and the related issue of access to the Internet combine to form a substantive (14%) secondary issue in this category.

A larger number of respondents, 76%, indicated that a negative aspect of the Internet related to Information Performance. This category was dominated by a parallel theme of either too much or unreliable information (51%). In addition to these information issues was the negative aspect of advertising (7%). Combining for 10% of the respondents were items related directly to the other information overload issues — navigation confusion and the inability to find information.

A total of 62% of the respondents indicated Social/Safety issues were of a concern. These personal issues largely centered on a variety security issues relating to how secure personal information was and viruses. Also noted by 21% of the respondents was the issue of pornography. Also of a personal nature was the Mental/Physical Health category. Finally, 15% of the respondents indicated an item in this category, with a majority (11%) noting the addictive nature of the Internet.

Positive aspects. These aspects of the Internet were dominated by the ease and speed of communication along with the flexibility to communicate around the world at any time of the day or night. 62% of the respondents noted positive Technology performance/cost items while 42% noted positive Information performance items. These positive items almost directly mirrored their negative counterparts, though at different frequencies. A new positive category however, Commerce/Entertainment, was created. This category was dominated by shopping (14%) and online business possibilities (4%). Together, these items relate to the information and technology issues. Positive social/safety and health issues were also noted, though at a lower rate than their negative counterparts.

In the response categories seen in Table 1, analyses of variance failed to show any substantial differences in response patterns based on demographic categories of ethnicity, age, or gender. An analysis based on the educational level of the respondents, a significant difference in Negative Social Aspects responses was seen when those respondents who had not completed at least one year of college were separated from the remaining population.

Table 1. Groupings of the free response answers in frequency (f) and percentage of total responses (%).

Negative	f	%
Technology performance/cost	**164**	**49**
Too much traffic/slow	108	32
No computer, access, or phone line	23	7
Cost	23	7
Sites down; broken links	4	1
Computer locks up	3	1
Busy signals	3	1
Information performance	**255**	**76**
Unreliable information	87	26
Too much information	83	25
Advertisements; pop-up windows	22	7
Confusing to navigate	19	6
Can't find information	15	4
Junk e-mail	11	3
Bad search engines	11	3
Poorly designed web pages	5	1
Lack of customer service	2	1
Social/Safety	**208**	**62**
Security issues	106	32
Pornography	71	21
Cookies	12	4
Viruses	11	3
Information that is bad for children	4	1
People want to censor	4	1
Mental/Physical Health	**52**	**15**
Time spent online; addictive	36	11
Impersonal; No socialization with others	13	4
Strain on eyes	3	1
Other	**25**	**7**
Other	25	7

Table 1. (Continued)

Positive	f	%
Technology performance/cost	**211**	**62**
Easy to Use	142	42
Speed	55	16
Saves time	7	2
Free or cheap	7	2
Information performance	**144**	**42**
E-mail	71	21
Communicate with friends, family and people around the world	37	11
News	21	6
Research	8	2
Instant messaging	4	1
Up to date information	3	1
Commerce/Entertainment	**72**	**21**
Online business	15	4
Shopping	47	14
Music	4	1
Games	3	1
Sports	3	1
Social/Safety	**34**	**10**
Pornography	20	6
Privacy/Use at home	11	3
Free expression	3	1
Mental/Physical Health	**32**	**9**
Fun to Use	32	9
Other	**26**	**8**
Other	26	8

Survey Two

The subordinate groupings and the aspects that dominated each of these groupings formed the basis for the 13 positive and 13 negative items generated for use in the second survey. These items are listed in Table 2, ranked from high to low on the mean response score. There was no clear correspondence between the frequency that these items were mentioned in the first survey (see Table 1) and the strength of response elicited in the second survey, for either the positive or negative items. For example, the top three positive aspects from the first survey (Easy to use, E-mail, and Speed) ranked fourth, fifth, and sixth, respectively, in the second survey. Similarly, the aspect of Privacy was only mentioned by 3 % of the respondents on the first survey but was ranked two on the second survey. The negative aspects showed similar trends, with many of the top ranked items on the second survey lagging well behind in frequency of occurrence in the first survey. For example, the top ranked negative item in the second survey, Viruses, was only listed by 3% of the respondents in the first survey. The second ranked item in the second survey, Junk e-mail, also elicited only 3% on the first. Finally, the second ranked aspect on the first survey, Security, was ranked ninth on the second survey.

A factor analysis was performed on the response patterns to the positive and negative items to see whether there was correspondence with the subordinate groups defined in the first survey. For the positive items, three factors were identified. Using a varimax rotation, five items loaded in the first factor with a coefficient of 0.46 or better (E-mail, Instant messaging, E-business, News, Communications). Four items loaded on the second factor with a coefficient of 0.43 or better (Speed, Searching, Information, Communications). Finally, one item loaded on the third factor at 0.58, No censorship. For negative items, two factors were identified. Using a varimax rotation, eight items loaded in the first factor with a coefficient of 0.47 or better (Slowness, Information, Advertising, Searching, E-mail, Security, Censorship, Design). Four items loaded on the second factor with a coefficient of 0.43 or better (Pornography, Privacy, Security, Children). Finally, Viruses loaded on the first factor at 0.42 and at 0.38 on the second factor.

Looking at the variability of response to the positive and negative items, some differences were seen based on age (see Table 3). There was a significant difference both in the response to the positive items about Speed ($F(2, 206) = 5.25$, $p < .006$) and Instant Messaging ($F(2, 206) = 6.26$, $p < .002$). In both cases, paired comparisons indicated the primary break was for the ages on either side of 30 years (younger respondents considering these items more important). For negative items, Pornography solicited significantly different responses based on age ($F(2, 206) = 3.35$, $p < .04$) with the difference primarily seen between those under 21 (less important) and those over 30 (more important). Paralleling this, the item concerning Information Harmful to Children was significantly different ($F(2, 206) = 3.96$, $p < .02$) for those on either side of 30 years.

Pornography, both as a positive and negative item elicited significantly different responses from men and women. As a positive item, men rated pornography more important ($M = 2.28$) than women did ($M = 0.13$) ($F(1, 206) = 8.91$, $p < .003$) while for the negative item, the reverse was true (men, $M = 3.81$; women, $M = 5.87$) ($F(1, 206) = 7.36$, $p < .007$).

Individuals who were full-time students had a significantly different response to the negative items concerning Information Reliability ($F(1, 206) = 4.54$, $p < .03$) and Advertising ($F(1, 206) = 6.76$, $p < .01$) than those who were not. In both cases, full-time students had stronger concerns (Reliability, $M = 4.61$; Advertising, $M = 6.00$) about these items than those who were not full-time students (Reliability, $M = 3.85$; Advertising, $M = 4.71$).

Table 2. Items used in Survey 2 with mean importance rating (M) and standard deviation (SD).

Positive Items	M	SD
Search engines that allow you to find what you are looking for	6.72	1.55
Privacy	6.63	1.63
Up to date and accurate information	6.61	1.56
Ease of use	6.60	1.63
E-mail	6.54	1.64
Websites that load quickly	6.51	1.62
Ability to communicate with friends and family around the world	6.32	1.72
News	4.57	2.00
Instant messaging	4.41	2.56
Lack of Censorship	4.27	2.40
On-line shopping	3.99	2.13
E-business	3.64	2.22
Pornography	1.33	2.36

Negative Items	M	SD
Viruses	5.94	2.04
Junk e-mail; 'spamming'	5.82	2.05
Slow connections	5.78	1.79
Advertisements; pop-up windows	5.64	2.23
Information that is bad for children	5.16	2.40
Lack of privacy; 'cookies'	5.04	2.17
Pornography	4.72	2.70
Search engines unable to find what you are looking for	4.67	2.12
Security	4.57	2.31
Information reliability	4.40	1.95
Censorship	3.56	2.27
Amount of time spend on-line	3.26	2.36
Poorly designed web pages	3.09	2.24

DISCUSSION

The free response format, used in the first survey for identifying negative and positive aspects of the Internet, provided an opportunity to capture what was 'on the mind' of those who responded to the survey. This format provided a number of interesting findings. On the negative side, factors that kept people from finding the information they wanted — either because of speed or quality/quantity of information — dominated the list. Close behind, however, on the negative side were issues of security and pornography. While some individuals mentioned the addictive nature of the Internet, this was not a dominant negative theme.

Table 3. Mean score (M) of selected items, by age group.

Item	Age Group	M
Positive - Websites that load quickly (Speed)	18-19	6.80
	20-21	6.59
	22-30	6.57
	31-40	5.18
	Over 40	6.10
Positive - Instant Messaging	18-19	5.80
	20-21	4.77
	22-30	4.13
	31-40	1.63
	Over 40	2.89
Negative - Pornography	18-19	4.41
	20-21	4.58
	22-30	4.14
	31-40	6.54
	Over 40	6.63
Negative - Information that is bad for children	18-19	5.27
	20-21	5.18
	22-30	4.54
	31-40	7.09
	Over 40	6.00

Interestingly, many of the same categories that appeared on the negative side also appeared on the positive side. While many persons noted negative technology performance aspects, quite a few individuals also listed ease of use and speed as positive aspects. Clearly, perceptions of these aspects of the Internet are variable and highly dependent on past experience. These experiences, in turn, have influence on affective responses (Hiltz & Johnson, 1989). Negative aspects concerning the quality/quantity of information are also balanced by the flexibility of how one communicates and gathers information on a global scale. Here, information is the clear theme, but the medium used for transport and how it is organized can elicit both positive and negative responses. Also of note is how most of these dominant issues touch on areas of interest to the human factors/ergonomics (HFE) community. Psychological/cognitive performance issues were central, mainly with respect to issues concerning the structuring of information and how it was delivered. These are areas where HFE professionals have considerable expertise.

When looking at the relationship of demographics to responses, the dominant finding of the first survey was the lack of significant differences based on age, gender, or ethnicity. However, a number of 'hot-button' issues were significantly different in the second survey. Here the items were presented to individuals to respond to. In the second survey, social issues such as pornography and information harmful to children showed differences based on age and gender, paralleling other studies on differential responses to

such issues based on gender (e.g., Lo & Paddon, 2000). The positive items that showed differences based on age seem to point to a younger generation having positive experiences with speed and instant communication. While this trend shows as a function of age, there was no significant difference based on student/non-student status.

These two surveys demonstrate how results of a free response survey and a more traditional scaled response survey on a similar topic can gather different types of information. Most directly, the results indicate that the frequency of occurrence of an aspect of the Internet in free response does not necessarily correspond directly with the strength of scaled response when presented with this aspect as part of a list of items about the Internet.

The first survey was used to generate a list of topical aspects of the Internet and helped guide the development of the list of positive and negative items used in the second survey. The use of the first survey to generate items for the ratings improved the second survey's content validity.

The subordinate categories developed from the results of the first survey (and used to help structure the positive and negative items) were supported in part by the results of the factor analysis. The analysis of the positive items showed three factors, all of who showed support for the subordinate categories. The first factor was closely aligned with Information Performance, with four of the five loading aspects being part of that group. Similarly, for the second factor seemed to be a combination of Information and Technology Performance, combining speed and searching efficiency with communicating with others. Finally, the third factor captured one of the Social/Safety aspects concerning free expression.

An analysis of the negative items showed two factors, both of which supported the subordinate grouping scheme. The first factor clearly was tied to Information and Technology Performance, with six of the eight items part of these two subordinate areas. The second factor aligned itself quite strongly with the Social/Safety area, with all four items coming from this area.

The results of the survey clearly indicate that there continues to be a love-hate relationship with the Internet. Many of these feelings seem to surround both the universality of communication and the breadth of information, tempered by the perceived difficulty of accessing the information one

While a specific negative item concerning poorly designed web pages were given relatively low ratings of importance, it must be kept in mind that these judgments were conducted wants and securing personal information one does not want released. Clearly human factors professionals have an opportunity to play a key role in addressing these issues.using individuals relatively inexperienced in web page design issues. HFE professionals understand that there is a connection between page and site design and the clear desire for high "information performance." While some HFE professionals do not see themselves directly involved in some of the softer social issues identified in these surveys, clearly those involved in WWW site design play an important role in communicating on issues such as: the security of information given to a site, how that information is being shared, and that bad information (i.e., viruses) will not be transmitted back to the user. Often times these issues are addressed as part of larger site design strategies rather than individual page designs, but most certainly it involves understanding one's customer and their hopes and fears about the Internet.

REFERENCES

Davis, F. D. (1993). User Acceptance of information technology - System characteristics, user perceptions and behavioral impacts. *International Journal of Man-Machine Studies, 38*(3), 475-487.

Forsythe, C., Grose, E., & Ratner, J. (Eds.). (1997). *Human factors and web development*. Mahwah, NJ: Erlbaum.

Hiltz, S. R., & Johnson, K. (1989). Measuring acceptance of computer-mediated communi-cations systems. *Journal of the American Society for Information Science, 40*, 386-397.

Lo, V.-h., & Paddon, A. R. (2000). Third-person perception and support for pornography restrictions: Some methodological problems. *International Journal of Public Opinion Research, 12*(1), 80-89.