A Comparison of Web-based and Paper-and-Pencil Library Satisfaction Survey Results

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Although authors have done validation or comparison studies of Web-based and paper-and-pencil surveys for different samples, few have published such studies for library patrons. After publishing its previous Web-based library satisfaction survey, Western Kentucky University Libraries developed a similar survey with identical content for library Web and exit patrons to compare these groups' responses. This article focuses on the collection of Web and exit survey responses in a two-week period, the transformation of response data for analysis, a comparison of the two samples, and discussion of the potential use of the results. Future research on the Web-based and paper-and-pencil methods themselves is indicated.

With the advent of the Internet and the World Wide Web, researchers have innovated the use of Internet surveys, including Web-based surveys, and have cited many considerations for their use. For example, authors such as Michael A. Smith and Brant Leigh as well as Robert N. Davis have suggested several advantages and cautions.[1,2] The advantages of such surveys included accessibility to either large sample sizes or specialized sample groups; the ability for subjects to interact with multimedia; the availability of looking at, or interacting with, passive data; convenient time and location for subjects; anonymity for researchers and subjects; minimization of researchers' time and resources; automatic transformation of subject responses for data analysis; and the opportunity to answer new research questions about a unique Web culture. However, Internet surveys, including Web-based surveys, also have brought responsibilities such as the need for informed consent, easy withdrawal from the study, data security; generalization of the samples to an entire popu-

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lation, and validation or other comparison studies that address the possibility of subjects being more heterogeneous than typical paper-and-pencil recruits. The loss of control over the testing environment and multiple data entries by frustrated or mischievous subjects also need to be addressed.

Several authors have compared the results of Web-based surveys with those of paper-and-pencil surveys for psychological research. In general, such studies compared the responses of somewhat similar samples of psychology students and self-selected respondents. Comparisons of the two methods have indicated similar responses and/or similar internal consistency. For example, in 1997, John H. Krantz, Jody Ballard, and Jody Scher compared laboratory responses of psychology students to an experiment on the determinants of female attractiveness with Web responses.[3] Web individuals responded to postings of the experiment on the Hanover College Psychology Department home page or to the American Psychological Society's online research Web site. Both correlational and regression analyses suggested validity of the Web-based studies. In a series of three studies in 1998, Karen A. Pasveer and John H. Ellard compared paper-and-pencil responses of two samples of university undergraduates with two samples of Web-based responses.[4] Web-based respondents were recruited via e-mail from a membership directory of the International Network of Personal Relationships, or the International Society for the Study of Personal Relationships, and from respondents to links with the American Psychological Society and various search engines. The questionnaire was a new self-trust instrument. Both descriptive and psychometric analyses suggested similar results for the two sources of samples; however, there was more variance in the Web-based scale scores. In 1999, Tom Buchanan and John L. Smith found similar psychometric characteristics for the Self-Monitoring Scale (revised) in a large-scale comparison between paper-and-pencil and Web-based responses.[5] In a second study later that year, they identified and compared the handles, or screen names, of two groups of high self-monitoring and low self-monitoring Usenet Newsgroups.[6] In a related study, newsgroup participants from the high self-monitoring group scored higher on a Web-based survey, the Self-Monitoring Scale (revised), suggesting construct validity on the Web test. Finally, also in 1999, Davis compared paper-and-pencil questionnaire responses from two groups of psychology students and one group of nonpsychology students with responses from a Web sample recruited from university flyers that listed a Web site address for filling out a questionnaire.[7] The survey was the Ruminative Response Scale. Scores of self-focused rumination were somewhat higher for the Web sample, but internal consistency of the instrument was similar across the two samples.

In 1998, Jeffrey M. Stanton compared the paper-and-pencil survey responses of professional employees at sixteen organizations with responses from Web surveys filled out by individuals from twenty organizations who were contacted by e-mail.[8] The survey concerned employee perception of supervisor fairness. There was a small, but significant, difference in missing values, and there were similar internal covariance patterns across the two samples.

Comparison of Web-based and Paper-and-Pencil Satisfaction Surveys at Western Kentucky University Libraries

Participating in the proliferation of Web-based satisfaction surveys in academic libraries, Western Kentucky University (WKU) Libraries developed and published a Web-based library instrument in 2000 to study patron satisfaction with the libraries' resources and services.[9] The advantages of Web-based surveys already have been cited, not the least of which is ease of administration, data collection, and data analysis.[10] However,

generalization to an entire population was a concern, and there was no validation or other comparison of Web-based and paper-and-pencil surveys in the library literature. Thus, the WKU Libraries' Satisfaction Survey Committee developed a single instrument to compare Web-based and paper-and-pencil library satisfaction survey results, approved by the Western Kentucky University Human Subjects Review Board, Office of Sponsored Programs. The purposes of this satisfaction survey were as follows:

- to compare descriptions of samples of patrons who access WKU Libraries' home page and patrons who exit the Main Library;
- to compare how satisfied these two groups are with WKU Libraries' electronic and printed resources as well as the services of library faculty and staff ;
- to compare these two groups' general comments about WKU Libraries;
- to possibly use the survey data to promote use of Web-based surveys in libraries;
- to possibly use the survey data to effect improvement.

Administration of WKU Libraries' Satisfaction Survey

Two groups of individuals were sampled in this study: WKU Libraries' Web respondents and its Main Library exit respondents. Both groups took the survey and were sampled during the last two weeks of February 2000. The Web respondents accessed the survey from WKU Libraries' home page, which used JavaScript to pop up a window before the page was launched asking users to choose to either take the survey or bypass it. A total of 458 survey responses were registered out of 4,554 counts of accessing WKU Libraries' home page, a 10.06 percent response rate. The survey is included here as figure 1.

Like the first WKU Libraries' Web-based satisfaction survey, the inexpensive and user-friendly client PC software, Message Parse, was used to abstract the needed data from a designated e-mail account that had received all the survey responses sent from a Web form filled out by respondents. Quantitative and qualitative data were collected separately in prescribed tabulated ASCII text files. The files then were filtered through MS Excel to become spreadsheets exportable to package analysis programs such as SPSS or SAS.[11]

Needless to say, gathering data from paper-and-pencil questionnaires was a nightmare.

The paper-and-pencil survey was administered during the open hours of the Main Library on Monday, February 14; Thursday, February 17; Sunday, February 20; and Friday, February 25. The four sampling days included a holiday (Valentine's Day), two weekdays, and a weekend day, a combination that would yield a sampling size close to those that could have been obtained through a random sampling. Unlike the Web-based survey, the paper-and-pencil survey required tremendous library resources. Apart from the cost of printing five hundred copies of professional questionnaires, fifty-six hours were needed just to get the questionnaires filled out at the gate of the Main Library during the four days of the exit survey. With the support of the library administration, faculty, and staff, teams were formed consisting of one WKU Libraries' Satisfaction Survey Committee member paired with a library faculty or staff member or a student assistant. The team offered a survey to every tenth individual exiting the Main Library. During the four days of the survey, 366 survey responses were collected out of a gate count of 4,831, registering a response rate of 7.58 percent. This percentage was lower than 10 percent because library faculty and staff, library student assistants on duty, repeat patrons, and patrons who did not want to participate were excluded.

After data collection, data analyses were initiated, with the following as their goals:

FIGURE 1
WKU Libraries' Satisfaction Survey

Please complete this satisfaction survey if you have used WKU Libraries electronically or in person. WKU Libraries value your input!

1. Please select one:

WKU Faculty
WKU Staff
Undergraduate Student
Graduate Student
Other

2. Location: Where are you now?

WKU Bowling Green, KY Campus, South Campus, and Residence Halls
WKU Extended Campus (Glasgow, Owensboro, Elizabethtown, and Others)
Non-Campus, Bowling Green, Kentucky
Non-Campus Locations other than Bowling Green, Kentucky

3. I have attended a library orientation session such as a class or workshop:

○ Yes ○ No

4. How often do you use WKU Libraries' ELECTRONIC resources?

○ Once a Year or Less ○ A Few Times a Year ○ Monthly ○ Weekly ○ Daily

5. How often do you use WKU Libraries' PRINTED resources (books, journals, etc.)?

○ Once a Year or Less ○ A Few Times a Year ○ Monthly ○ Weekly ○ Daily

6. How would you rate TOPCAT 2000's ease of use?

○ Very Hard ○ Hard ○ Neutral ○ Easy ○ Very Easy ○ Not Applicable

7. Do you think the WKU Library personnel are helpful?

○ Never ○ Occasionally ○ Neutral ○ Moderately ○ Very ○ Not Applicable

8. How adequate are WKU Libraries' collections in meeting your information needs?

○ Not Adequate ○ Occasionally Adequate ○ Neutral ○ Moderately Adequate ○ Very Adequate

9. What is the single most important thing WKU Libraries could do to help you as a patron?

10. What do you like most about the WKU Libraries?

11. I would rate the WKU Libraries overall as:

○ Poor ○ Fair ○ Average ○ Good ○ Excellent

12. Please make any other comments regarding Western Kentucky University Libraries:

Submit Cancel

Last updated November 18, 1999
Send comments to library.web@wku.edu

TABLE 1
Academic Status of Paper-and-Pencil and Web-based Survey Respondents

	Paper-and-Pencil Survey		Web-based Survey	
Academic Status	**Frequency**	**%**	**Frequency**	**%**
WKU faculty	8	2.20	34	7.42
WKU staff	6	1.65	23	5.02
Undergraduate students	294	80.77	309	67.47
Graduate students	34	9.34	63	13.76
Other	22	6.04	29	6.33
Total	364	100.00	458	100.00

- to describe the responses of the Web-based library satisfaction surveys;
- to describe the responses of the paper-and-pencil exit library satisfaction surveys;
- to compare the responses of the Web-based and paper-and-pencil exit library satisfaction surveys.

Needless to say, gathering data from paper-and-pencil questionnaires was a nightmare. Although quantitative data can be machine-scanned at the WKU Office of the Institutional Research, recording data from the three open-ended questions—needed to access users' responses and suggestions for implementing improvement of WKU Libraries' resources and services—required a good deal of labor and time. It took a full-time summer student assistant twenty days to key in the data character by character onto a similar spreadsheet format to be comparable with the Web-based survey. Nonetheless, all the time and labor would be worthwhile to compare Web-based and library exit survey results.

Survey Results

Results indicated that both the Web-based and paper-and-pencil survey respondents comprised somewhat similar groups (table 1). Sixty-seven percent (n = 309) of the Web-based survey respondents and 81 percent (n = 294) of the paper-and-pencil survey respondents were undergraduate students; 14 percent (n = 63) of the Web-based survey respondents and 9 percent (n = 34) of the paper-and-pencil survey respondents were graduate students; 6 percent (n = 29) of the Web-based survey respondents and 6 percent (n = 22) of the paper-and-pencil survey respondents were in the "Other" classification; 7 percent (n = 34) of the Web-based survey respondents and 2 percent (n = 8) of the paper-and-pencil survey respondents were WKU faculty members; and 5 percent (n = 23) of the Web-based survey respondents and 2 percent (n = 6) of the paper-and-pencil survey respondents were WKU staff.

At the time of taking the survey, 59 percent (n = 270) of the Web-based survey respondents and, of course, 100 percent (n = 364) of the paper-and-pencil survey respondents were located at the WKU Bowling Green, Kentucky Campus, South Campus, or Residence Halls.

TABLE 2
Comparison of Paper-and-Pencil and Web-based Survey Mean Responses to Item 4, Frequency of Use of WKU Libraries' Electronic Resources

Survey Method	X	S .	X_1-X_2	N	dF	t
Paper-and-pencil	3.42	1.15	.34	365	813	4.41**
Web-based	3.08	1.10		450		

Note: The rating scale for this item was: 1 = Once a year or less, 2 = A few times a year, 3 = Monthly, 4 = Weekly, 5 = Daily.
**p < .001

TABLE 3
Comparison of Paper-and-Pencil and Web-based Survey Mean Responses to Item 5, Frequency of Use of WKU Libraries' Printed Resources

Survey Method	X	S .	X_1-X_2	N	dF	t
Paper-and-pencil	2.97	.94	.26	365	808	3.68**
Web-based	2.71	1.08		449		

Note: The rating scale for this item was: 1 = Once a year or less, 2 = A few times a year, 3 = Monthly, 4 = Weekly, 5 = Daily.
**p < .001

were classified based on the following criteria: item means in the range 3.5–5.0 were considered positive, item means in the range 2.5–3.5 were considered neutral, and item means in the range 1.0–2.5 were considered negative.

Comparison of the two groups' mean responses indicated small, but significant, differences for five of the six items; given the large sample sizes, significance was not surprising. For each of these items, the Web-based survey group had a somewhat lower mean than that of the paper-and-pencil survey group. On average, Web-based survey respondents felt that they used WKU Libraries' electronic resources "monthly" (X = 3.08, S.D. = 1.10) and paper-and-pencil survey respondents felt that they used WKU Libraries' electronic resources "monthly" (X =3.42, S.D.=1.15) (table 2). The mean scores of these respondents differed by .34, a small, but significant, difference. Web-based survey respondents felt that they used WKU Libraries' printed resources "monthly" (X =2.71, S.D.=1.08) and paper-and-pencil survey respondents felt that they used WKU Libraries' printed resources "monthly" (X =2.97, S.D.=.94) (table 3). The mean scores of these respondents differed by .26, a small, but significant, difference. Web-based survey respon-

Nineteen percent (n = 88) of the Web-based survey respondents were located at noncampus locations other than Bowling Green, Kentucky; 16 percent (n = 72) at noncampus locations in Bowling Green, Kentucky; and 6 percent (n = 28) at WKU Extended Campus (Glasgow, Owensboro, Elizabethtown, and others).

A review of this study's results suggested very minor, but significant, differences in the item means for the Web-based and paper-and-pencil methods.

Finally, 67 percent (n = 305) of the Web-based survey respondents and 69 percent of the paper-and-pencil survey respondents had attended a library orientation session such as a class or workshop. Thirty-three percent (n = 153) of the Web-based survey respondents and 31 percent of the paper-and-pencil survey respondents had not attended such a class.

Tables 2 through 7 summarize the comparison of the Web-based and paper-and-pencil survey respondents to the six Likert-scaled items. Because the choice of response alternatives for each of six items was distinct, each item was interpreted on an individual basis and with an individual table. Responses

TABLE 4
Comparison of Paper-and-Pencil and Web-based Survey Mean Responses to Item 7, Helpfulness of WKU Library Personnel

Survey Method	X	S .	X_1-X_2	N	dF	t
Paper-and-pencil	4.28	1.01	.35	366	805	4.61**
Web-based	3.93	1.14		446		

Note: The rating scale for this item was: 1 = Never, 2 = Occasionally, 3 = Neutral, 4 = Moderately, 5 = Very, 6 = Not applicable.
**p < .001

dents thought that WKU Libraries personnel were "moderately" helpful (X =3.93, S.D.=1.14) and paper-and-pencil survey respondents thought that the WKU Libraries personnel were "moderately" helpful (X =4.28, S.D.=.1.01) (table 4). The mean scores of these respondents differed by .35, a small, but significant, difference. Web-based survey respondents felt that the WKU Libraries' collections were "neutral" (X =3.49, S.D.=1.09) in meeting their information needs and paper-and-pencil survey respondents felt that WKU Libraries' collections were "moderately adequate" (X =3.94, S.D.=0.87) in meeting their information needs (table 5). The mean scores of these respondents differed by .45, a small, but significant, difference. Web-based survey respondents felt that they would rate the WKU Libraries overall as "good" (X =3.61, S.D.=0.89) and paper-and-pencil survey respondents felt that they would rate the WKU Libraries overall as "good" (X =4.09, S.D.=.69) (table 6). The mean scores of the respondents differed by .48, a small, but significant, difference.

TABLE 5
Comparison of Paper-and-Pencil and Web-based Survey Mean Responses to Item 8, Adequacy of WKU Libraries' Collections in Meeting Information Needs

Survey Method	X	S.D.	X_1-X_2	N	dF	t
Paper-and-pencil	3.94	.87	.45	355	797	6.44**
Web-based	3.49	1.09		444		

Note: The rating scale for this item was: 1 = Not adequate, 2 = Occasionally adequate, 3 = Neutral, 4 = Moderately adequate, 5 = Very adequate.
**p < .001

Comparison of the two groups' mean responses indicated no significant difference for one item that concerned TOPCAT 2000, the WKU Libraries' online catalog. Web-based survey respondents rated TOPCAT 2000's ease of use as "easy" (X =3.76, S.D.=.1.09); and paper-and-pencil survey respondents rated TOPCAT 2000's ease of use as "easy" (X =3.87, S.D.=.1.06) (table 7). The mean scores of these respondents differed by .11, a difference that was not significant.

In addition, analysis of variance statistics compared Web-based and paper-and-pencil survey variances for each of the six Likert-scaled items. These statistics were computed on each of four samples: only undergraduates, only WKU Bowling Green respondents, only respondents who had attended library orientation sessions, and only respondents who met all three requirements. In general, there were small, but significant, statistical differences for 22/24 of the comparisons between the two survey methods, even when type of respondent was controlled. Further information is beyond the scope of this article but is available on request.

TABLE 6
Comparison of Paper-and-Pencil and Web-based Survey Mean Responses to Item 11, Rating of the WKU Libraries Overall

Survey Method	X	S.D.	X_1-X_2	N	dF	t
Paper-and-pencil	4.09	.69	.48	358	791	8.51**
Web-based	3.61	.89		437		

Note: The rating scale for this item was: 1 = Poor, 2 = Fair, 3 = Average, 4 = Good, 5 = Excellent.
**p < .001

Web-based survey responses and paper-and-pencil survey responses to each of the three open-ended items also were compared. Each open-ended re-

TABLE 7
Comparison of Paper-and-Pencil and Web-based Survey Mean Responses to Item 6, TOPCAT 2000's Ease of Use

Survey Method	X	S.D.	X_1-X_2	N	dF	t
Paper-and-pencil	3.87	1.06	.11	365	814	1.39
Web-based	3.76	1.09		451		

Note: The rating scale for this item was: 1 = Very Hard, 2 = Hard, 3 = Neutral, 4 = Easy, 5 = Very Easy, 6 = Not applicable.

sponse was assigned a category, and frequencies of category by method and item number also were reviewed. A few numbers of categories differed sizably between the Web-based and the paper-and-pencil survey responses. Differences seemed to relate to the physical premises of the Main Library: 2.84 percent (n = 13) of the Web-based survey responses and 15.03 percent (n = 55) of the paper-and-pencil survey responses to item ten commented on "computers/computer labs"; and 2.18 percent (n = 10) of the Web-based survey responses and 14.75 percent (n = 54) of the paper-and-pencil survey responses for this item commented on "study area/quiet/meeting area/seating."

The most interesting difference in Web-based and paper-and-pencil survey open-ended responses concerned the "None/Blank/Don't Know/Undecided/Unclear" response. For each of the three open-ended questions, there was a greater percentage of these responses for the Web-based survey respondents. In other words, a higher percentage of Web-based survey respondents made "no" or related responses than did the paper-and-pencil survey respondents for each of the three open-ended items. This may be attributed to the fact that respondents who used the Web might feel more independent in front of their computers than those who had to face the researchers at the library exit door.

Administrative Use of Results

A review of this study's results suggested very minor, but significant, differences in the item means for the Web-based and paper-and-pencil methods. Somewhat similar differences also were there, even when type of respondent was controlled. Thus, both groups of respondents comprised somewhat similar patrons who were viewing the library in like fashion. These results suggest that it is the method, and not the instrument or demographics, that may be related to the small differences.

Given the above results, as well as the previously mentioned ease in administration, data collection, and data analysis, the Web-based library satisfaction survey may be used to evaluate attitudes of remote patrons in an existing or virtual library.[12] The data require only inexpensive software and minor labor for analysis. Future research needs to focus on the Web-based versus paper-and-pencil method and possibly additional types of demographics as the cause of minor differences in responses.

Summary

This study provided a comparison of the survey responses of library Web patrons and library exit patrons. In a two-week period, 458 Web-based survey respondents and 366 paper-and-pencil survey respondents took WKU Libraries' satisfaction survey. The response data were transformed and analyzed. Results suggested small, but significant, differences in item means, as well as similar demographics for the two groups of library patrons. Because the differences may be attributable to the large samples of respondents, they still warrant Web-based surveys as an alternative to the paper-and-pencil surveys in the library environment. Future research could focus on the Web-based and paper-and-pencil survey methods themselves to further evaluate these minor differences.

Notes

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