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Research Notes

Attitudes toward Technology as Predictors of Online Catalog Usage

Grant Noble and Steve O'Connor

While other studies have concentrated on evaluations of specific online public access catalog (OPAC) software, this study addresses the general acceptance of computer technology, as well as user attitudes toward OPACs. Questionnaire data was subjected to factor and discriminant analyses in order to seek out predictors of future OPAC use. These analyses defined two distinct groups of respondents: the "reluctant OPAC user" and the "naive OPAC enthusiast."

INTRODUCTION

The uncritical acceptance of the various forms of electronic media in the last ten years has been a feature of libraries as well as the wider society. Where we have concentrated on the specific application of technology, our enthusiasm for it may have blinded us to user reactions to the technology in general.

James Adams of Stanford University's School of Engineering highlighted the dilemma facing society today with respect to computers:

> We will no doubt be subjected to continued fear of technology because of the resulting uncertainty and danger. We will also probably become increasingly dependent upon technology. A Society split into practitioners of technology who are ignorant of human concerns and non-practitioners who are ignorant of technology can only result in a hazardous and unpleasant future.[1]

The paradox of fear or distrust coexisting with increasing dependence is a dimension of technological change that needs to be closely examined.

This view finds research support in seminal studies such as Lee's, which set out to examine popular beliefs and attitudes toward the "electronic computer." Lee found two independent belief-attitudes toward the computer through a series of Likert-scale questions. The first viewed the computer as an instrument of human purposes, while the second portrayed it as a relatively autonomous entity.[2]

Lee's study was replicated in Australia by Morrison in 1983 with a sample of students at the University of New England. Morrison indicated that his findings differed from Lee's and that "the largest amount of variance is explained not by the 'beneficial tool' factor as in Lee's study but by a factor representing negative attitudes toward the possible disemploying and dehumanising effects of computers and fears for their reliability and power over the lives of individuals."[3]

Zoltan and Chapanis undertook a study

Grant Noble is associate professor of psychology at the University of New England, Armidale, New South Wales, while Steve O'Connor is associate librarian at the University of Western Australia, Perth, Western Australia.

in 1982 to investigate the attitude of professional groups in Baltimore toward computers. A number of factors were represented in an analysis of the data from the sixty-four-item questionnaire distributed to these accountants, lawyers, pharmacists, and physicians. Factor one bore a close resemblance to Lee's "beneficial tool of man" perspective; factor two was seen as accounting for the dehumanizing, depersonalizing, impersonal, cold, and unforgiving effects of computers. The remaining factors displayed positive attitudes.[4]

The literature examining the introduction and acceptance of the Online Public Access Catalog (OPAC) in libraries has been wide and detailed. Many aspects of OPAC have been discussed, but no attention has been paid to an emerging literature assessing attitudes toward technology and its potential impact on OPAC.

The earlier (1981–2) exploratory studies of Carole Weiss Moore, Pritchard, Pawley, and Norden and Lawrence, all contributed to our understanding of OPAC acceptance.[5] But the studies sponsored by the Council on Library Resources, Inc., (CLR) provided the major research thrust in OPAC study.[6] The CLR research found that over 90 percent of users thought the OPAC systems to be acceptable and that nonusers liked it almost as much. One of the goals of the present study was to investigate those factors that affect user acceptance of OPAC systems. Previous studies have concentrated on evaluating attitudes toward specific computer systems rather than the computer technology. It has been previously assumed that acceptance of the specific technology implies acceptance of the technology in general.

BASIS OF THIS STUDY

With the introduction of OPAC (with VTLS software) to the Dixson Library, University of New England (New South Wales, Australia) in March 1984, a questionnaire was established to examine not only user reaction to the VTLS system but also attitudes toward computer technology. The survey questionnaire was administered online, on the same terminal as the catalog software. Each of the questions assessing attitudes toward technology was scored on a Likert scale. The survey data were collected over a period of three weeks in April and attracted 271 valid sets of responses. Each user of the online catalog was invited to respond to the questionnaire, which they were able to access upon entering an appropriate command. Approximately one-third of response sets were eliminated because they were incomplete or had fixed responses (e.g., A,A,A,A). Since reports on the usage of this OPAC installation have been published elsewhere[7,8,9] the aim of the present paper is to relate both positive and negative attitudes toward computer technology in general to acceptance and evaluation of the specific technology of the VTLS OPAC.

Some fifteen questions in the forty-eight-item questionnaire elicited attitudes toward technology:

1. Computers are so amazing that they stagger your imagination.
2. There's something exciting and fascinating about electronic brain machines.
3. These machines can make important decisions better than people.
4. Computers will free people to do more interesting and imaginative work.
5. They are very important to the "man-in-space" program.
6. Computers can make serious mistakes because they fail to take the human factor into account.
7. They can be used for evil purposes if they fall into the wrong hands.
8. There is no limit to what these computers can do.
9. They will help bring about a better way of life for the average person.
10. With these machines, the individual person will not count for very much anymore.
11. Books offer more opportunity than do computers for creative involvement.
12. In the library computer, records are more reliable than card/microfiche records.
13. Computer systems constantly refuse to trust their users.
14. Computer systems are programmed to act as if they always know what is best.
15. Computers have their own minds,

which the user is powerless to alter.

These questions had been drawn from the seminal study by Lee[10] and also from the research by Marvin and Winther.[11] The remainder of the questions assessed various aspects of the OPAC.

RESULTS AND DISCUSSION

Attitudes Toward Technology

The questions about attitude toward technology were submitted to factor analysis to assess the extent of positive and negative attitudes toward computer technology. Using the varimax rotation method, a factor analysis was performed with the specification of two output factors. Only those items having factor loadings with a value greater than .30 were treated as being significant.

The factor explaining the largest percentage of variance (17.9 percent—factor 1—showed characteristics of distrust of computer technology. As the factor loadings in table 1 show, elements of this distrust were that "computers refuse to trust their users; computers are programmed to always know what is best; computers have their own minds, which the user is powerless to alter; and computers make serious mistakes because they fail to take the human factor into account." Factor 2, explaining 13.9 percent of the variance, displayed characteristics of positive acceptance of the technology. This was expressed in attitudes such as: "computers will bring about a better life for the average person; computers will free people to do more interesting and imaginative work; there is something exciting about electronic brain machines; and computers are so amazing that they stagger your imagination."

It is important to note that respondents in this study display a wide range of attitudes toward technology, as measured by factor scores. Inspection of "distrust" factor scores, for example, revealed that 46 percent of respondents obtained negative

TABLE 1

FACTOR ANALYSIS OF ATTITUDES TOWARD TECHNOLOGY

Variables	Factor 1 Distrust Factor	Factor 2 Positive Acceptance Factor	Mean	s.d.
14. Computers constantly refuse to trust their users.	0.632	0.065	5.044	1.794
15. Computer systems are programmed to act as if they always know what is best.	0.632	−0.094	4.487	2.058
16. Computers have their own minds, which the user is powerless to alter.	0.614	0.055	5.730	1.867
11. With these machines, the individual will not count for much anymore.	0.607	−0.335	5.509	1.738
7. Computers can make serious mistakes because they fail to take the human factor into account.	0.555	−0.007	4.077	2.227
8. They can be used for evil purposes if they fall into the wrong hands.	0.407	0.051	3.099	1.940
12. Books offer more opportunity than do computers for creative involvement.	0.385	−0.298	3.734	1.886
4. These machines can make important decisions better than people.	0.325	0.318	5.811	1.524
13. In the library computer, records are more reliable than card/microfiche records.	0.168	0.161	2.970	1.798
10. They will bring about a better way of life for the average person.	−0.320	0.626	3.221	1.691
5. Computers will free people to do more interesting and imaginative work.	−0.199	0.615	2.664	1.695
3. There's something exciting and fascinating about electronic brain machines.	0.052	0.613	3.188	1.765
2. Computers are so amazing that they stagger your imagination.	0.277	0.567	4.011	2.057
9. There is no limit to what these computers can do.	0.320	0.484	5.416	1.899
6. They are very important to the "man-in-space" program.	−0.073	0.280	1.778	1.218
Eigenvalues	2.678	2.088		
Percent of variance	17.9	13.9		

factor scores. Moreover, 19 percent of respondents' distrust factor scores were greater than −1, and 18 percent were greater than +1. It is therefore clear that distrust attitudes were reasonably normally distributed in the present sample. It is particularly ironic that such widely varying attitudes toward technology were displayed by the same respondents who also recorded a high, 95.6 percent acceptance of the OPAC. This contrasting evidence is a matter of great concern for those involved in the introduction of new technologies such as the OPAC. Concentration in the literature has been exclusively on the acceptance of the software with little or no attention being paid to the technology; "the literature of library and information science is still concentrated on the technological ramification of various systems."[12] This survey clearly indicates that both positive and negative attitudes toward technology exist in this survey group.

Predicting Future Usage: The Impact of the Distrust Factor

It was obviously desirable to test further and determine whether there was any relationship between attitudes of technology distrust and future use of the specific OPAC system. To do this the OPAC evaluation data was subjected to discriminant analysis to contrast those who distrusted

TABLE 2

RESULTS OF DISCRIMINANT ANALYSIS OF PAC ACCEPTANCE DIVIDED BY "DISTRUST" ATTITUDES TOWARD TECHNOLOGY

Variables	Group 1 Negative Mean	Group 1 Negative s.d.	Group 2 Positive Mean	Group 2 Positive s.d.	F df(1/32)	P	Standardized Canonical Discriminant Function Coefficient: Reluctant User
17. My first PAC search was looking for (a book, journal, etc.).	2.977	1.876	2.430	1.455	4.879	0.028	0.193
19. My overall attitude to PAC is . . .	1.516	0.708	1.247	0.544	1.560	0.213	0.286
20. How likely are you to use PAC in the future?	1.325	0.703	1.032	0.177	15.19	0.0001	0.441
23. Remembering the correct way to enter a subject search is difficult.	3.269	1.535	3.838	1.393	6.865	0.009	−0.165
24. Remembering search commands in the middle of a search is easy.	2.887	1.274	2.354	1.315	7.691	0.006	0.277
25. Finding the correct subject term is difficult.	2.943	1.456	3.365	1.231	4.463	0.036	−0.124
34. Access to a printer would be a useful feature of PAC.	2.067	1.670	1.580	1.024	5.667	0.018	0.298
39. Which catalog is superior to learn without assistance?	2.786	1.027	3.150	1.062	5.511	0.020	−0.304
41. I use the library (daily, weekly, etc.).	2.370	1.495	2.924	1.758	5.220	0.023	−0.077
42. I would use this PAC (daily, weekly, etc.).	2.044	0.796	1.612	0.692	15.30	0.0001	0.373
43. I use computer terminals other than library's (daily, weekly, etc.).	4.303	1.891	3.526	2.003	7.216	0.007	0.259
45. My age group is . . .	2.415	1.286	2.858	1.125	5.586	0.019	−0.335
46. My sex is . . .	1.393	0.491	1.258	0.439	3.832	0.051	0.168
18. My first search was satisfactory, etc.	1.887	1.081	1.688	1.073	1.560	0.213	−0.275
26. Understanding the HELP screen is difficult.	3.797	1.478	3.892	1.330	0.206	0.649	0.235
30. Limiting search by language.	3.662	1.864	3.666	1.952	0.0001	0.989	−0.278
38. Which catalog is superior for finding books on a topic?	3.561	0.582	3.645	0.775	0.477	0.490	0.218

Scoring Key:
17: Scores are not in a continuum.
23, 24, 25, 26, 30, 34: Low score = agree/helpful; High score = disagree/unhelpful.
38, 39: Low score = care/microfiche superior; High score = PAC superior.
18, 19, 20, 41, 42, 43: Low score = more use; High score = less use.
45: Low scores = younger; High score = older.
48: Low score = arts and humanities; High score = economics/accounting.

the computer technology (group 1—top one-third of factor 1 output scores) with those who positively accepted the computer technology (group 2—bottom one-third of factor 2 output scores), in order to determine whether these attitudes could predict future OPAC usage.

Table 2 summarizes the results of this discriminant functions analysis. Looking at those variables that are most important in discriminating between high- and low-distrust groups (variables with standardized canonical discriminant function coefficients greater than .25), the analysis indicates that those who distrust and are suspicious of the computer technology would have less use for the OPAC in the future (question 20); find difficulty in remembering search commands (question 24); not use the OPAC on every visit to the library (question 42); use other computer terminals quite infrequently (question 43); and are generally in the older group (question 45). Ironically, they see the OPAC as being easier to learn without assistance (question 39). This discriminant function has been characterized as being one of the "reluctant OPAC user."

Conversely, those who had a positive acceptance of computer technology could be expected to display a different attitude toward the OPAC. Again, the OPAC evaluation data were subjected to discriminant analysis in order to contrast those who *did* have a positive acceptance of the technology (group 1—top one-third of factor 2 output scores) with those who *did not* (group 2—bottom one-third of factor 2 output scores). Table 3 reveals that those with a positive acceptance of the technology find the use of Boolean search logic to be helpful (question 33); are more frequent

TABLE 3

RESULTS OF DISCRIMINANT ANALYSIS OF PAC ACCEPTANCE DIVIDED BY "POSITIVE ACCEPTANCE" ATTITUDES

Variables	Group 1 Negative Mean	Group 1 Negative s.d.	Group 2 Positive Mean	Group 2 Positive s.d.	F df(1/26)	P	Standardized Canonical Discriminant Function Coefficient: Naive PAC Enthusiast
27. Searching by words in a title useful	2.122	1.520	2.849	1.933	7.967	0.005	0.083
28. Searching by words in a subject heading is useful.	1.933	1.330	2.720	1.843	10.90	0.001	−0.235
26. Understanding HELP screen is difficult.	3.755	1.424	3.655	0.773	1.091	0.297	0.218
29. Limiting search results by publication date.	2.822	1.686	3.505	1.827	6.894	0.009	−0.158
30. Limiting search results by language.	3.266	1.871	3.903	1.900	5.211	0.023	−0.108
32. Ability to search a book's table of contents would be a useful feature.	1.533	1.182	1.946	1.513	4.211	0.041	0.175
33. Ability to use Boolean search logic would be a useful feature.	3.088	1.981	3.903	2.048	7.465	0.006	−0.284
35. Which catalog is superior in terms of speed?	3.766	0.654	3.655	0.773	1.091	0.297	0.218
39. Which catalog is superior for learning without assistance?	2.933	1.014	3.053	1.035	0.630	0.428	0.290
40. Which catalog is superior for preparing a comprehensive bibliography?	3.655	0.721	3.408	0.837	4.557	0.034	0.224
41. I use the library. . .	3.022	1.767	2.344	1.463	8.016	0.005	0.327
42. I would use this PAC. . .	1.688	0.713	1.924	0.769	4.616	0.033	−0.145
45. My age group is. . .	2.844	1.226	2.473	1.079	4.736	0.030	0.323
46. My subject area of study is. . .	3.044	1.871	2.096	1.429	14.87	0.0002	0.647

Scoring Key:
26, 27, 28, 29, 30, 32, 33: Low scores = agree/helpful; High score-disagree/unhelpful.
35, 39, 40: Low score-card/microfiche superior; High score = PAC superior.
41, 42: Low score = more use; High score = less use.
45: Low score = younger; High score = older.
46: Low score = arts; High score = economics.

users of the library (question 41); are in the younger age group (question 45); and are students of arts and humanities (question 46), yet they find the card or microfiche catalogs easier to learn without assistance (question 39). This classification can be characterised as the "naive" OPAC enthusiast."

CONCLUSION

It is clear from the study that although library users, at one level, can give a specific technology a very high acceptance, the same users can, at another level, exhibit contrasting attitudes toward computer technology in general. This view of new computer technology has not been subject to intense investigation and yet may have far-reaching implications for library managers and practitioners.

These attitudes of distrust and positive acceptance can be predictors of acceptance and future usage of OPACs. The "reluctant OPAC user" needs to be more closely understood. Computer literacy programs need to be closely examined if OPAC success is to be assured in the long term.

For different reasons, a similar solution or approach may be applied to the "naive OPAC enthusiast" who is keen on the medium but has yet to realize the actual capabilities of the OPAC.

Adams[13] clearly sees that unless we are careful, users could become increasingly suspicious of the technology while becoming more dependent on it. These dimensions are evident in the present research and demand close attention in order to consolidate OPAC's place in the modern academic library.

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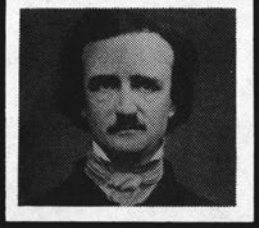

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