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Emerging factors in user evaluation of the World Wide Web

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Abstract

This study develops an integrative model and conceptually-based scales for evaluating the extent to which Web services satisfy information needs that arise outside the traditional organizational/work domain. Three streams of literature are considered: usage of the Web, user satisfaction with the Web, and individual performance and the impact of information technology. Based on this literature, as well as focus groups and pilot surveys, questionnaire items were developed and analyzed across three surveys. Predictors of performance included greater weekly usage, finding information on hobbies and interests, ability to find information on the Web that is current, reduced shopping cost and travel, finding otherwise difficult-to-locate information, and fun/entertainment.

Keywords: User evaluation; World Wide Web; Task–technology fit; Scale development

1. Introduction

World Wide Web (Web) services for satisfying personal day-to-day needs are growing at a rate that will have substantial influence in the larger information infrastructure. Yet it is unclear how the Web will realize that influence. In parallel with the unprecedented rate of growth in the Web presence by businesses, institutions and information providers is the rapid growth of access and usage of the Internet at home, in school, and while traveling [4]. The Web is now competing with traditional business and information services by providing an alternative way for individuals to satisfy their needs, whether work- or business-related or not. The Web is a computer-mediated environment that allows consumers to overcome some of the problems/barriers of traditional media: accessibility, bottlenecks, interaction and identification [24]. It is not clear what level of success is being experienced by users in utilizing the Web for information-based activities and how user behavior has changed and what benefits, if any, have been derived from the change [14].

Web-based consumer services are generally perceived as being successful, but there has been little evaluation of how well the Web meets its users' primary information requirements. There has been much research performed on the level of usage, satisfaction and effectiveness of IS within organizations (see [16]). The Web, however, is an IS that has a vast number of users who are not confined by an organizational context and for whom use of the Web is optional [27].

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This vast and rapidly growing number of new users has lead to the provision of a multitude of new possibilities in providing IS and services, implying a number of new aspects to consider when designing, and designing with, those systems and services. User profiles may be less homogenous than earlier and therefore their needs are harder to define. Providers aiming to build successful Web systems must attract voluntary users to visit and revisit the site. These requirements make the users' perception of the quality of the Web system critical for the success of the system [19].

2. Review of relevant literature

2.1. Web usage

Several important issues emerge from the literature on the Web from a user perspective. It may be goal-directed or experiential, the concept of flow may influence usage and evaluation of the Web, and the Web is used primarily as a communication medium.

Much of the study investigating user perceptions and experience of the Web has been undertaken from a user perspective. Hoffman and Novak [15], in addressing the role of marketing in a hypermedia computer-mediated environment, propose a broad structural model of consumer navigation of the Web, including: the nature of the task (Web usage is both experiential, e.g. net-surfing and goal-directed, on-line shopping), the concept of flow, and Web usage. In an investigation of the effect of the individual characteristics of playfulness on Web usage, Atkinson and Kydd [3] also distinguished between intrinsic and extrinsic factors affecting Web use with differential usage for entertainment or research purposes. In explaining the experiential nature of Web usage, Hoffman and Novak replace the notion of play with the theory of 'flow'. Flow experiences are those optimal and enjoyable experiences in which we feel "in control of our actions, masters of our own fate…we feel a sense of exhilaration, a deep sense of enjoyment" [5] (p. 4). The concept of flow has been adapted to the human–computer interaction experience [22]. In that context, flow incorporates the extent to which: (1) the user perceives a sense of control over the computer interaction; (2) the user perceives that his or her attention is focused on the interaction; (3) the user's curiosity is aroused during the interaction and (4) the user finds the interaction intrinsically interesting.

Eighmey [10] considered two questions about the benefits delivered by commercial Web sites, as well as the approach that delivers the greatest benefit. As part of that study, a scale of 44 items among six thematic areas (marketing perceptions, entertainment value, informational value, ease of use, credibility, and interactivity) was used to measure perceived benefits from visiting 28 commercial Web sites. Three factors emerged: (1) playfulness; (2) clarity of purpose and (3) timeliness and the approach to presenting information. Overall, Eighmey found that Web users are assisted by information placed in an enjoyable context. Liu and Arnett [20] concluded that four factors are critical to Web site success: (1) information and service quality; (2) system use; (3) playfulness and (4) system design quality.

The 'Homenet' study [17] found that electronic mail (e-mail) use was more popular and more stable than use of the Web. Thus e-mail drove continued use of the Internet overall. In the study participants used e-mail in at least 49% of their Internet sessions, but Web used only 38% of them. An investigation of usage patterns of the Internet in Singapore [26] found that messaging and browsing are performed more frequently than downloading or purchasing activities.

2.2. Influence on usage, task–technology fit and the nature of usage

Two traditional models help to provide the basis for identifying possible influences on Web usage. The theory of planned behavior and a synthesis of usage and *task–technology fit* (TTF) models.

Klobas [18] tested the effectiveness of three models of information resource use in explaining the use of the Internet: information use [1], the technology assessment model [6] and the theory of planned behavior [2]. Klobas found that the theory of planned behavior best explained the use of the Internet, indicating that information resource use is motivated by similar factors as those influencing other human behaviors. This is an interesting finding, as, unlike IS used at work, the use of the Internet at non-work locations is not mandatory and therefore may be influenced by a

wider range of social and motivational factors than are typically studied in organizational settings.

The theory of planned behavior is a model designed to explain specific human behavior. It has been used to explain why people participate in different recreational activities and health related behaviors. The most direct influence on behavior is intention to perform an activity ('behavioral intention'). In turn, this is influenced by: (1) attitude to outcomes — the person's attitudes to the results of performing the action; (2) social pressure — the influences resulting from the individual's environment and (3) perceived behavioral control — the extent to which a person believes he or she has control over his or her behavior. The theory of planned behavior is the foundation of models examining people's intentions to utilize organizational systems [6].

Various measures of the three general categories of influence on technology use are possible.

1. One measure of attitude toward using a specific information technology, such as the Web, would be the extent to which an individual believes that using the Web will improve his or her performance. Another would be perceptions of how much using the Web is interesting, enjoyable, or a productive experience.
2. Social influence may be measured by identifying sources from which potential users may experience pressure to use the Web (possibly weighting beliefs according to the individual's motivation to comply with these pressures). Pressures to use the Web may come from peers, the workplace and the media.
3. Perceived behavioral control may be measured by identifying potential costs of, and barriers to, Web usage, such as the cost of using the Web, accessibility to a computer with an Internet connection, understanding the Internet, legal implications, fear of being monitored and poor response time.

However, one important construct is not included in this model: the tasks for which the Web is used. Insofar as usage of the Web is optional, the decision to use it may be based on an individual's expectation that the Web may have some impact on the task or that using the Web to solve an information-based task may be a satisfying experience. There must be some degree of *fit* between the task and the technology that has been chosen to accomplish it. In a response to unresolved issues in studying user evaluations of systems, Goodhue and Thompson [13] proposed a user-specific construct: TTF. The essence of this model is the assertion that IS will have a positive impact on individual performance if the system is used, and it is a good fit with the tasks it supports. The authors derived this model by analyzing the limitations of two streams of research that have proposed models of technology use: utilization and TTF. While each of these perspectives provides insight into the impact of IS on performance, each alone has some important limitations. First, usage may be more a function of how jobs or tasks are designed than of the quality or usefulness of systems, or of the attitudes of users toward using them. Mathiesona and Keil [23] similarly argue that TTF issues may override interface design and system accessibility issues. Second, DeLone and McLean's [7] study investigating the many aspects of IS success lends support to the TTF model, but also concluded that there is not one, but many, measures of success, including: system quality, information quality, use, user satisfaction, individual impact and organizational impact. Other studies show that user satisfaction may be a more powerful influence on performance outcomes than technology utilization [11,12]. Dishawa and Strong [8] also emphasize the value of integrating multiple models, such as the technology acceptance model, with its emphasis on attitudes developed through perceptions of usefulness and ease of use, and the TTF model, with its emphasis on matching IS functionality with user needs. Thus, the fit model can benefit from the addition of this richer understanding of the nature and forms of utilization.

2.3. An integration

Our research argues that the focus of the Goodhue and Thompson [13] model matches the environment of Web usage. This is a technology for which use is optional; at the same time usage is dependent on user perceptions of the impact of the Web on the task, as well as a host of social and contextual factors. The following integration of the prior constructs suggests a model for explaining usage and evaluation of the Web in voluntary situations, and thus identifies potential

concepts and scales that should be used to study Web usage.

Tasks are broadly defined as the actions carried out by individuals in turning inputs to outputs in order to satisfy their information needs. Characteristics of the *individual* (knowledge, expertise, motivation) could affect how easily and well he or she will utilize the Web. *Technologies* are tools (hardware, software and data) used by individuals in carrying out their tasks, and the technology's attributes (accessibility, response time) can affect usage. TTF is the correspondence between task requirements, individual abilities, and the functionality of the Web. *Social norms* are the external factors that influence use of the Web (peer pressure, others using the Web at their workplace, using the Web as an educational tool, or media coverage). *Control factors* may limit the use of the Web, such as cost, accessibility of hardware and software, local, institutional or legal restrictions, and concerns over monitoring by others of usage and sites visited. *Utilization* is the behavior employed in completing tasks (finding information, entertainment, extrinsic or intrinsic). *Performance impact* involves accomplishing a portfolio of tasks by an individual. High performance implies a high level of TTF, and satisfaction with the IS [12] (here, the Web). *Feedback* through actual use is of course an important aspect of the model, as it may change users' perceptions of possible consequences, and thus both their future utilization and performance outcomes [12].

This model leads to the following research questions.

Q1. What constitutes valid and reliable scales measuring user evaluation of the Web for non-work based activities?

Q2. How are such scales related to the performance impact of Web usage for non-work based activities?

3. Method

The derivation of a scale measuring user evaluation of the Web must be ecologically valid, incorporate diverse concepts and identify underlying dimensions [9]. To that end, we developed the final survey items based on

- an initial set of focus groups;
- a small pilot survey;
- a first large sample survey;
- a second large sample survey;
- a third sample survey using the same survey as the second sample.

We report results from the combined second and third samples. Details from the other samples are available from the second author.

3.1. Focus groups

Focus groups provide ecological validity and insightfulness in identifying salient attitudes or perceptions [21]. The focus group method involves bringing together one or more groups of subjects to discuss an issue in the presence of a moderator. To this end, four focus groups were convened. The participants of the groups were undergraduate and postgraduate students of a major Australian university. This kind of sample is reasonable for this study, as a study at that time period reported that 42% of Internet users were 18–24-year-old and 56% of people with a bachelor's degree used the Internet [4]. The gender distribution across the four focus groups was 70% male (18 of 26).

The focus groups were facilitated by the researcher and were managed in accordance with standard procedures [21]. Questions asked about the influences on Web usage summarized above, and dimensions of the Goodhue and Thompson TTF scale that are relevant to Web usage, including: *quality* (Is it current enough to meet needs? Does is maintain necessary data?); *locatability* (Is it easy to determine what data is available? Is it easy to interpret?); *compatibility* (data from different sources can be consolidated or compared without inconsistencies); *system reliability* (system access is dependable and consistent) and *ease of use/training* (How easy is it to do what you want to do using the system hardware and software?). Questions specifically emphasized non-work based tasks.

The transcripts of the focus groups' comments were analyzed using both ex post facto and a priori content categories. The 70 items that emerged from the content analysis demonstrated that the Web usage and TTF dimensions were of interest to the participants in the focus groups. Duplicate items were dropped, and statements were reworded to reflect common issues.

3.2. Pilot survey

Based on the items from the focus groups, a pilot survey was constructed. The following items were added, to include other concepts from the task–technology to performance chain model: compatibility, system reliability, ease of use/training and individual performance impact. The following controls were also included: Web usage, location where the Web was accessed, respondent's sex, number of years using a PC, overall expertise with PCs/applications/Internet/Web and respondent's age. The draft instrument was pre-tested using 11 master's students at a major American north eastern university. Based on comments and responses to the draft, further duplicate items were dropped, 'double barreled' questions were modified and ambiguities were resolved.

3.3. The first sample survey

We administered the revised survey to a large freshman course; this was part of an extra credit opportunity with 100% of the students (295) attending that class completing the survey.

3.4. The second sample survey

Based on analyses of the first sample survey data, we again revised the survey. To address the problem with disappointing reliabilities of the 52 TTF items, a second version of the scale was developed. It only included items that loaded highly on principal components, and were involved in significant correlations with performance.

In an attempt to improve the validity and reliability of the items, we generated additional items representing locatability, control, and anonymity. We also added two items to the performance scale, as well as items reflecting the social influence construct, to allow for further testing of the task to performance model. These changes resulted in a smaller survey consisting of 50 items. We then administered the revised survey to a large course for juniors, again as an extra credit opportunity, using consent forms (in all cases, we also returned to summarize the class responses). All participated, for a final sample size of 121.

3.5. Third sample survey

To assess the robustness of the results, we administered the survey to a smaller section, with different students, of the initial large first-year course. We

Table 1
Percentages for usage and demographic items for combined (2 and 3) samples[a]

Used	
Ever used the Web	97.8
Web access location	
Where you live	68.5
School computer lab	86.0
School library	79.8
At work	34.8
At parents' home	65.2
At friend's place	74.2
Sex	
Male	28.7
Female	71.3
Percent of people you know who use Web	
0–20	1.1
21–40	10.7
41–60	16.3
61–80	36.0
81–100	35.4
Hours per week using Web	
<1 h	22.5
1–2 h	24.2
2–4 h	35.4
4–6 h	9.0
>6 h	9.0
Years experience using PC-Internet	
<1 Year	2.8
1–2 Years	6.7
2–4 Years	22.5
4–6 Years	33.7
>6 Years	34.3
Computing expertise	
None	0
Novice	6.2
Somewhat familiar	24.2
Familiar	46.1
Very familiar	23.0
Age	
<18	0
18–19	11.8
20–21	61.8
22–25	17.4
>25	9.0

[a] $N = 178$.

received responses from 57 of the 67 students. After analyzing the third sample, and finding no significant differences from the second sample, we combined the second and third samples for the combined analysis.

4. Results

Tables 1 and 2 provide descriptive statistics for the combined samples. The respondents most strongly agreed with the following statements: I see that other people benefit from using the Web; I can find information related to my hobbies and interests on the Web; the information on the Web is current enough to meet my needs and Web search engines are useful in helping me to find the information I need. The two most highly rated performance items were I have increased my knowledge about topics of interest to me because of my Web use and using the Web has had a positive impact on my ability to get things done.

Table 2
Item and scale descriptive statistics for combined (2 and 3) sample[a]

Number	Variable	Mean	S.D.
14	I am more likely to find specific kinds of information on the Web than from other information sources	3.90	1.06
15	Web search engines are useful if I do not know which sites to go to directly for specific information	1.62	0.87
16	The information on the Web is current enough to meet my needs	4.42	0.76
17	It is easier to find information I need on the Web than in a library	4.03	1.06
18	I can find information related to my hobbies and interests on the Web	4.61	0.68
19	I see that other people benefit from using the Web	4.62	0.59
20	Web search engines (Yahoo, Lycos, etc.) are useful in helping me find the information I need	4.37	0.87
21	By using the Web I can avoid going to a store	2.64	1.34
22	It is easy to know which Web sites to go to directly to find the information I need	2.90	1.15
23	Free information is not as reliable as information that you pay for	2.15	1.09
24	I use the Web because it is necessary for my work or classes	3.76	1.15
25	By using the Web I can avoid in-store sales people	2.57	1.30
26	The Web is useful for finding information that is difficult to locate elsewhere	4.14	0.84
27	I have complete control over what sites I visit on the Web	3.85	1.16
28	It is not easy to find very specific information on the Web	2.97	1.15
29	It is not easy to find very specific information on the Web	4.13	0.85
30	I would use the Web even if none of the people I know were using it	1.73	0.99
31	I have very easy physical access to a computer with Web connections	4.49	0.85
32	I prefer visiting sites on the Web that do not require me to identify myself	4.17	0.96
33	I have complete control over how I use the Web	3.92	1.01
34	I need to develop my skills more to use search engines on the Web better	3.45	1.33
35	Being anonymous on the Web is important to me	3.97	1.02
36	More training would make my Web use more effective	3.89	1.15
37	I use the Web because many of my friends do	2.24	1.18
38	I use the Web for entertainment	4.06	1.00
39	I would use the Web more if I had greater computer or Internet knowledge	3.23	1.30
40	Using Web is fun	4.13	0.89
41	The Web gives me access to information that I cannot find elsewhere	3.82	1.05
42	If my Web usage was monitored by the system administrator I would not visit certain sites	3.24	1.33
43	I use the Web because of all the attention it receives in the media	1.98	1.06
	Performance		
44	Using the Web has a positive impact on my ability to get things done	3.85	1.07
45	Because of my Web use, the number of people I communicate with has increased	3.37	1.46
46	The quality of my work has improved because of using the Web	3.16	1.18
47	I make better decisions because of information I get from the Web	2.97	1.11
48	I can accomplish things more quickly because of my Web use	3.77	1.08
49	I have increased my knowledge about topics of interest to me because of my Web use	3.91	1.12
50	Because of my Web use, I am better informed in general	3.70	1.14

[a] Item ranges were 1 (strongly disagree) to 5 (strongly agree).

Table 3 shows the factors (emerging from a principal components factor analysis), loadings and resultant scale reliabilities. Usage and experience loaded on a single factor but with low alpha of 0.51. Thus, we chose to use just the single-item measure of number of hours per week using the Web. The access variables loaded on two factors: access from residences and from school sites and friends' place. The six performance items loaded on one factor.

Table 4 shows the factors, loadings and resultant scale reliabilities for the TTF variables. The scales included: training (F1); interests (F2); information (F3); shopping cost (F4); use Web to locate difficult to find information (F5); fun and entertainment (F6); social influence (F7); identity control (F8) and use control (F9).

Table 3
Factor loadings (principal components analysis) and reliability of computer use/expertise, access, and performance items for combined (2 and 3) samples

Usage		
Hours per week	0.66	
Years using PC	0.66	
Computing expertise	0.84	
Eigenvalue	1.60	
Percent variance	0.53	
Alpha	0.51	
Access	**School**	**Home**
Where you live	−0.14	0.83
School computer lab	0.76	−0.26
School library	0.69	−0.03
Where you work	0.09	0.02
Parents' home	0.24	0.78
Friends' place	0.69	0.20
Eigenvalue	1.60	1.40
Percent variance	0.27	0.23
Alpha	0.53	0.51
Performance		
Positive impact on my ability to get things done	0.73	
Quality of my work has improved	0.81	
Better decisions because of information from Web	0.78	
Accomplish things more quickly	0.84	
Increased knowledge about topics of interests	0.79	
Better informed	0.85	
Eigenvalue	3.85	
Percent variance	0.65	
Alpha	0.89	

Table 5 shows the correlations among usage, access, task technology, and performance scales. Bivariate predictors of the mean scales in the combined sample include: for F1 (training): less weekly usage, less expertise; F2 (interests): greater expertise; F6 (fun): greater weekly usage, greater expertise; F7 (social influence): less expertise and F9 (use control): more people I know use the Web. Bivariate predictors of performance included: greater *weekly usage*, F2 (interests), F3 (information), F4 (shopping cost), F5 (difficult information) and F6 (fun).

The final regression predicting performance explained 28% of the variance ($F = 11.2$, $P < 0.0001$). Significant predictors (with standardized beta coefficients) were *weekly use* (0.19, $P < 0.01$), F5 (difficult information, 0.19, $P < 0.01$), F6 (fun, 0.13, $P < 0.1$), F4 (shopping cost, 0.17, $P < 0.01$), F3 (information, 0.17, $P < 0.05$) and F2 (interests, 0.15, $P < 0.05$). However, the reliabilities of some of these scales are low. Fig. 1 summarizes the significant relationships.

5. Conclusion

This study has presented some perspectives and research issues about the evaluation and impact of the Web for non-work based information tasks. Some consideration should be given to the nature of the sample. The samples used in the final surveys consisted entirely of college students, though the items were developed using a variety of samples including professionals taking master's courses. Moreover, the tests were given to a large number of subjects. Cross-cultural issues may also affect the validity [25], as the focus groups were held in Australia while the pilot and surveys were administered in both Australia and the United States.

This exploratory work demonstrates that it is possible to develop preliminary scales for measuring user evaluation of the Web, and that such scales are multidimensional. The dimensions that emerge indicate that users of the Web need to be addressed by developers of Web based systems if those systems are to be successful. Factors identified by this research may be of interest to other researchers and providers interested in the evaluation of Web-based services. The reliabilities for some of these scales were low, however, so the scales need further development.

Table 4
Factor loadings (principal components analysis) and reliabilities of task–technology items, combined (2 and 3) sample[a]

Number	Item	Factors								
		F1	F2	F3	F4	F5	F6	F7	F8	F9
14	More likely to find information on the Web	0.08	−0.09	0.66	0.30	0.17	−0.14	−0.06	−0.03	0.14
15	Search engines useful if do not know sites	−0.05	−0.17	0.09	−0.06	−0.15	−0.01	0.20	−0.12	0.01
16	Web information current enough to meet my needs	0.00	0.12	0.65	−0.09	0.02	0.10	−0.11	−0.08	0.17
17	Easier find information Web than library	−0.07	0.35	0.34	0.13	0.19	−0.17	0.13	0.01	0.06
18	I can find information hobbies and interests	−0.04	0.70	0.04	0.12	0.08	0.16	−0.05	0.13	0.13
19	I see other people benefit from using Web	0.08	0.83	0.03	0.03	0.06	0.05	0.02	−0.03	0.08
20	Search engines useful in helping find information	0.00	0.30	0.15	−0.17	0.00	0.35	−0.13	−0.16	−0.01
21	Can avoid going to a store	−0.06	0.05	0.04	0.85	0.12	0.07	−0.03	0.13	0.00
22	Easy find Web sites go to directly	−0.08	−0.04	0.39	0.31	−0.13	0.14	0.17	0.26	0.08
23	Free information not reliable as information paid for	−0.04	−0.06	0.02	0.09	0.08	−0.08	0.10	0.07	0.04
24	Use Web because necessary work or class	−0.02	0.20	0.59	−0.20	−0.01	0.10	0.30	0.16	−0.22
25	Can avoid in-store sales people	0.03	0.15	0.03	0.84	−0.07	0.04	0.01	0.05	0.03
26	Useful finding information difficult to locate elsewhere	−0.06	0.44	0.22	0.12	0.57	−0.21	0.01	−0.12	0.01
27	Complete control over sites I visit	−0.05	0.06	0.14	0.09	−0.08	0.09	0.06	0.02	0.85
28	Not easy find specific information on Web	0.45	0.01	−0.08	−0.15	0.01	0.13	−0.14	0.20	−0.07
29	Web provides information that is important to me	0.17	0.30	0.37	0.20	0.39	0.21	−0.10	0.04	0.21
30	Would use Web even if no-one I knew was	0.18	−0.15	−0.12	−0.02	−0.43	−0.26	0.55	−0.04	−0.16
31	Very easy access to complete world Web connection	−0.08	0.44	0.03	0.09	−0.01	0.40	−0.16	−0.01	0.18
32	Prefer visit sites where I do not identify	0.01	0.08	−0.01	0.12	0.00	0.07	−0.13	0.84	0.11
33	Complete control over how I use Web	−0.19	0.21	0.06	−0.05	0.11	0.04	−0.10	0.04	0.84
34	Develop skills more use engines	0.81	0.02	0.07	−0.09	−0.03	−0.20	0.01	0.03	−0.13
35	Anonymous on Web import to me	0.07	−0.02	0.00	0.06	0.05	0.02	0.05	0.90	−0.06
36	More training make my use more effective	0.81	−0.05	0.05	0.05	−0.08	0.01	0.12	−0.04	−0.03
37	Use Web cause many my friends do	0.13	−0.22	0.00	0.17	0.06	0.29	0.69	−0.08	0.04
38	Use Web for entertainment	−0.01	0.14	−0.01	0.01	−0.09	0.85	0.05	0.08	0.03
39	Would use Web more greater complete/information knowledge	0.71	0.05	−0.07	0.03	0.18	0.09	0.31	0.07	−0.07
40	Using Web is fun	−0.08	−0.03	0.07	0.23	0.39	0.64	−0.04	0.05	0.15
41	Web access information cannot find elsewhere	0.06	−0.01	0.41	0.06	0.69	0.00	−0.07	−0.01	−0.07
42	Web usage monitor would not visit certain sites	0.04	0.04	−0.29	−0.12	0.61	0.08	0.20	0.12	0.01
43	Use Web cause attention receives in media	0.17	0.13	0.00	−0.09	0.10	−0.08	0.78	−0.02	0.00
	Eigenvalue	4.5	2.7	2.1	1.9	1.6	1.4	1.4	1.3	1.2
	Percent variance	15.1	9.1	7.0	6.2	5.5	4.8	4.8	4.4	4.1
	Cronbach's alpha reliability	0.74	0.61	0.45	0.78	0.58	0.61	0.58	0.78	0.73

[a] F1: training; F2: interests; F3: information; F4: shopping cost; F5: difficult information; F6: fun; F7: social influence; F8: identity control; F9: use control.

Table 5
Correlations of usage, access and demographics with task–technology factors, and correlation of all variables with performance, for combined (2 and 3) samples[a]

Variables	F1	F2	F3	F4	F5	F6	F7	F8	F9
Correlations with task–technology factors									
Sex	0.03	0.01	−0.02	−0.02	0.05	−0.08	0.00	−0.01	0.00
People	−0.12	0.07	0.03	−0.10	0.04	0.11	0.00	−0.03	0.20*
Weekly hour	−0.18*	0.03	0.04	0.12	0.12	0.36**	−0.09	0.17	0.06
PC experience	−0.13	0.12	0.01	0.14	0.08	−0.09	−0.03	−0.00	0.01
Expertise	−0.41**	0.23*	0.03	0.16	0.00	0.23*	−0.20*	0.16	0.12
Access home	−0.08	0.13	−0.14	0.07	0.09	0.14	−0.00	0.02	0.12
Access school	−0.02	−0.11	0.08	−0.04	0.03	0.06	0.03	−0.11	0.09
Correlations with performance									
Sex		0.06							
People		0.00							
Weekly hour		0.29**							
PC experience		−0.03							
Expertise		0.10							
Friends		0.00							
Access home		0.07							
Access school		0.10							
F1 training		0.02							
F2 interests		0.29**							
F3 information		0.31**							
F4 shopping cost		0.30**							
F5 difficult information		0.35**							
F6 fun		0.29**							
F7 social influence		0.10							
F8 identity control		0.13							
F9 use control		0.17							

[a] $N = 165$.
* $P < 0.01$.
** $P < 0.001$.

Over a quarter of the variance in reported performance impacts of using the Web was explained by several task–technology factors, along with the number of hours per week spent using the Web. Several influences are of particular interest. First, greater use of the Web appears to be directly related to both using the Web for fun/entertainment and to performance outcomes. Thus, Web usage has both intrinsic and extrinsic purposes and both are associated with positive performance outcomes. Further, greater expertise increases perceived fun/entertainment and finding of information related to hobbies and interest, indicating that intrinsic purposes require technical knowledge. Further, the inherent power of Web expertise is reinforced by the fact that greater expertise is associated with less need for training, as well as less susceptibility to social influence; thus greater expertise promotes greater independence of motivation, as well as increased use for intrinsic purposes. While social influence is diminished by greater expertise, the number of people you know who use the Web increased the perception of one's control over use of the Web. This implies two different kinds of social influence: one based on susceptibility to influence from others because of one's limited expertise, and one based on increased independence and confidence because of a social context of fellow Web users. Note that the issue of anonymity, or of controlling one's identity online, while a notable social concern, seems unrelated to either influences or outcomes, implying this is a personal trait not much influenced by external factors. Also note that general personal computer expertise, as well as the location where one accesses the Web, have not influence on TTF factors or

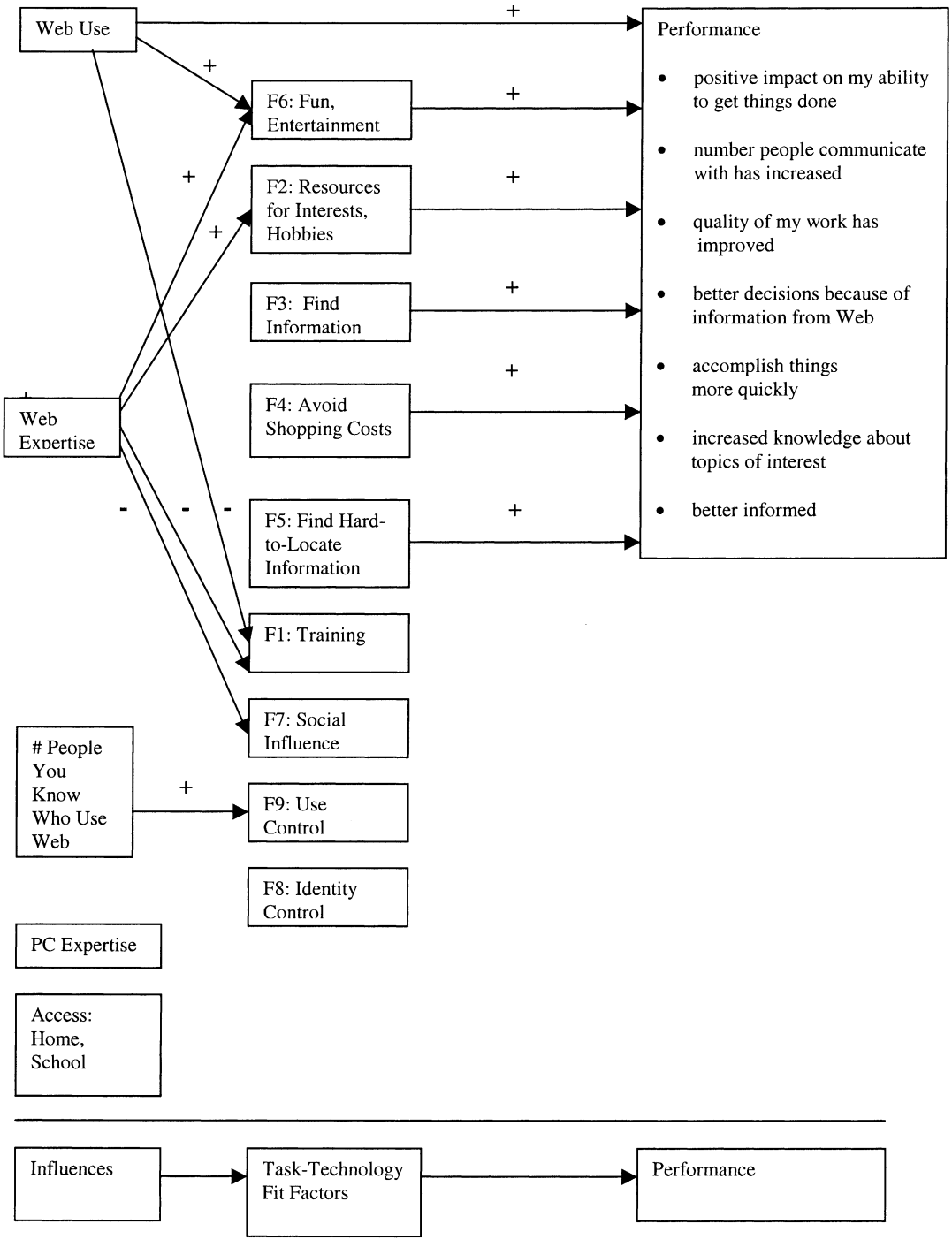

Fig. 1. Summary of significant relations among influences, TTF factors, and performance outcomes of Web usage.

performance outcomes. This implies that Web expertise is qualitatively different from computer expertise per se, and that the virtual experience and results from the Web are largely independent of the access location.

Concerning performance outcomes, they are influenced directly by usage of the Web, implying that some kinds of benefits are not dependent on a TTF. Rather, simply using the Web more generates positive outcomes. However, several TTF factors do themselves directly increase the performance outcomes. Intriguingly, the two more intrinsic purposes, fun and hobbies, mediate use and expertise, while the three more extrinsic purposes — finding information, avoiding shopping costs, and finding hard to locate information — influence performance outcomes independently of Web usage or Web expertise. This implies that intrinsic purposes — often seen as secondary or less instrumental applications of the Web — require greater use and expertise in order to convert that activity into a productive one. So 'surfing' or using the Web for fun can be of two types: 'mindless', infrequent, or uninformed, and thoughtful, frequent, and knowledgeable. Finally, perceived need for training, usage due to social influence, and concerns for control of one's identity online and of control over how one uses the Web, do not seem to affect performance outcomes. Training would seem to be relevant to performance outcomes, but perhaps its influence is captured by the prior influence of Web expertise, mediated by intrinsic purposes. Social influence may serve personal needs for acceptance or social conformity, but does not seem to have much to do with actual performance outcomes. Need for control of one's identity seems to be a more personal trait unrelated to influences or performance outcomes, while perceived control over Web site usage appears to be more of a sense of social efficacy built up by a social context of other users, but not a real indicator of how well one uses or applies the Web.

Overall, then, the results support a model whereby Web usage as well as Web expertise influence several intrinsic and extrinsic TTF factors, and those factors, along with Web usage, directly influence positive performance outcomes. The intrinsic TTF factors seem dependent on prior usage and expertise, while the extrinsic, instrumental factors seem to be more general information purposes. Finally, some factors seem to be primarily socially- or individually-oriented traits unrelated to performance outcomes, and possibly related to greater susceptibility due to low levels of prior expertise. A simpler model (and set of survey items) would remove the factors of training, social influence, identity control and use control. Further analysis needs to be undertaken to extend and refine the relationships and the tentative model suggested in Fig. 1. In the end, however, this study indicates that real performance benefits accrue from non-work related Web usage and intrinsic purposes, and that TTF factors substantially mediate the influence of Web usage and Web expertise on those benefits.

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