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The Influence of User Perceptions on Software Utilization: Application and Evaluation of a Theoretical Model of Technology Acceptance

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This paper presents and empirically evaluates a Technology Acceptance Model (TAM) which can serve as a simple to use, and cost-effective tool for evaluating applications and reliably predicting whether they will be accepted by users. After presenting TAM, the paper reports on a study designed to evaluate its effectiveness at predicting system use. In the study the researchers presented 76 novice users with an overview and hands-on demonstration of Netscape. Following this demonstration, data on user perceptions and attitudes about Netscape were gathered based on this initial exposure to the system. Follow up data was then gathered two weeks later to evaluate actual use of Netscape following the demonstration. Results suggest that TAM is an effective and cost effective tool for predicting end user acceptance of systems. Suggestions for future research and conclusions for both researchers and practitioners are offered.

(Keywords: usabiliy, technology acceptance, user perceptions, Technology Acceptance Model)

The Influence of User Perceptions on Software Utilization: Application and Evaluation of a Theoretical Model of Technology Acceptance

Introduction

Both practitioners and researchers have a strong interest in understanding why people resist using computers so that they can develop better methods for designing technology, for evaluating systems and for predicting how users will respond to new technology (Gould, Boies, and Lewis, 1991). Although practically intertwined, design and evaluation are logically independent issues, as noted by Dillon (1994) and it remains an open question in many instances how to translate usability evaluation results to specific interface design improvements. Acceptance theory seeks to extend the traditional model of user-centered design espoused in usability engineering approaches (e.g., Nielsen, 1993) from questions of interface improvement towards predictions of likely usage, in short to change emphasis from can people use a system, to will people use a system?

This paper presents a theoretical model of technology acceptance drawn from the Management Information Systems (MIS) literature and reports on a study designed to test the efficacy of the model in predicting software utilization among a set of potential users of that software.

Predicting use

Davis et al's (1989) Technology Acceptance Model (TAM) has been widely used in the MIS literature, but has received little attention among HCI practitioners and system designers. This is unfortunate as it would appear that TAM offers HCI professionals a theoretically-grounded approach to the study of software acceptability that can be directly coupled to usability evaluations Moreover, TAM's parsimony makes it a potentially

useful, yet cost-effective tool for those interested in predicting whether a particular software product is likely to be accepted by its intended users.

Theoretical Foundations

Current models of technology acceptance have their roots in a number of diverse theoretical perspectives, most noticeably Innovation Diffusion Theory (Rogers, 1983; Tornatzky and Klein, 1982; Moore and Benbasat, 1991) which seeks to identify salient perceived characteristics of technology which may be expected to influence user adoption of that technology. However, in social psychological research, theorists seek to identify determinants of behavior within the individual rather than the technology The Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975) has been used to more fully develop how user beliefs and attitudes are related to individual intentions to perform.

According to TRA, attitude toward a behavior is determined by behavioral beliefs about the consequences of the behavior (based on the information available or presented to the individual) and the affective evaluation of those consequences on the part of the individual. Beliefs are defined as the individual's estimated probability that performing a given behavior will result in a given consequence. Affective evaluation is "an implicit evaluative response" to the consequence (Fishbein and Ajzen, 1975, p. 29). This represents an information processing view of attitude formation and change which states that external stimuli influence attitudes only through changes in the person's belief structure (Ajzen and Fishbein, 1980). Thus, the Theory of Reasoned Action provides a complete rationale for the flow of causality from external stimuli (such as system design features) through user perceptions to attitudes about the technology, and finally to actual usage behavior (Fishbein and Ajzen, 1975, pg. 302). TRA is presented in Figure 1 below.

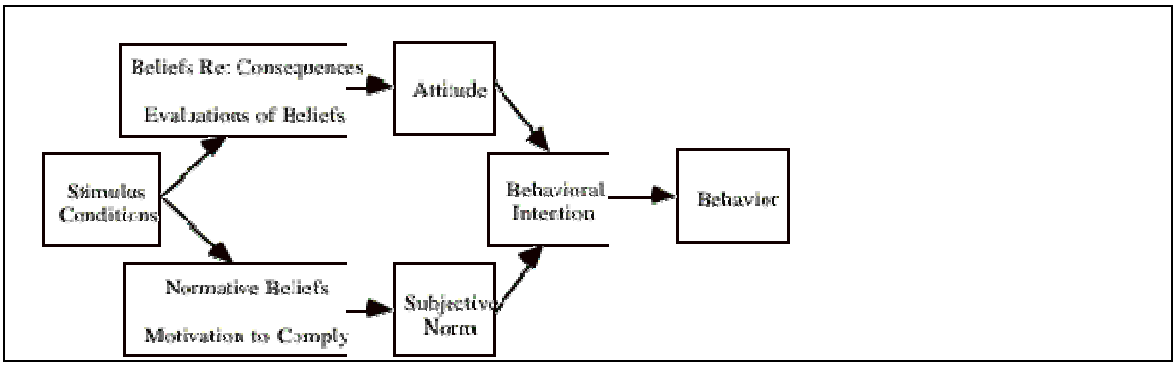

Figure 1. Theory of Reasoned Action (Fishbein and Ajzen, 1975)

The Technology Acceptance Model (TAM)

Davis' (1989) Technology Acceptance Model (TAM) is derived from TRA and predicts user acceptance based on the influence of two factors: *perceived usefulness* and *perceived ease of use*. TAM posits that user perceptions of usefulness and ease of use determine *attitudes toward using* the system. Consistent with TRA, *behavioral intentions to use* is shown to be determined by these *attitudes toward using* the system. According to the model, *behavioral intentions to use* in turn determine *actual system use*. In addition, a direct relationship between *perceived usefulness* and *behavioral intentions to use* is also proposed by TAM. TAM is presented in Figure 2.

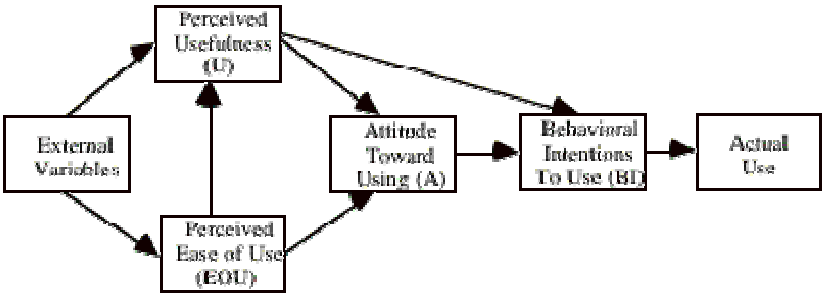

Figure 2. Technology Acceptance Model (Davis et al., 1989)

Within TAM, *perceived usefulness* (U) is defined as the degree to which a user believes that using the system will enhance his/her performance. *Perceived ease of use*

(EOU) is defined as the degree to which the user believes that using the system will be free from effort. Both U and EOU are modeled as having a significant impact on a user's *attitude toward using the system* (A). *Behavioral intentions to use* (BI) are modeled as a function of A and U. BI then determines *actual use*. Research has consistently shown that BI is the strongest predictor of actual use (Davis et al., 1989, Taylor and Todd, 1995).

According to Davis, there exists a direct effect of *perceived ease of use* on *perceived usefulness*. [1] In other words, between two systems offering identical functionality, a user should find the one that is easier to use more useful. Davis (1993) states that because some of a users' job content includes use of a computer system *per se*, if a user becomes more productive via ease-of-use enhancements, then he or she should become more productive overall. *Perceived usefulness* is not hypothesized to have an impact on *perceived ease of use*. Davis states that "...making a system easier to use, all else held constant, should make the system more useful. The converse does not hold, however" (pg. 478).

The goal of TAM is to predict information system acceptance and diagnose design problems before users have any significant experience with a system (Davis, 1989). Davis has developed scales to measure *perceived usefulness*, *perceived ease of use*, *attitude toward using*, and *behavioral intentions to use*. These scales have been validated in previous research and were adapted for use in this study. These tools allow researchers and practiotioners the ability to apply scales which have already been developed and empirically validated in previous research, thereby avoiding the potentially time-consuming and costly effort required to develop a new measurement instrument. Thus, the variables presented in TAM (as measured by the aforementioned scales) offer practitioners a practical, cost-effective method for evaluating new

technology and predicting the degree to which end-users will actually *use* that technology before the system is actually implemented.

TAM has been found to be extremely robust and has been replicated using different tasks and tools (Adams, Nelson, and Todd, 1992; Mathieson, 1991). In a comparison of several models, Mathieson (1991) found that TAM predicted intention to use a spreadsheet package better than alternative models. The paths suggested by TAM each explained a high degree of variance. Similarly, in another comparison of theoretical models, Taylor and Todd (1995) found that TAM provided a good fit to data on the use of a Computing Resource Center, explaining 34% of the variance in behavior, 52% of the variance in intention, and 73% of the variance in attitude.

TAM's value lies in its parsimony--the model is strongly grounded in existing psychological theory, yet is easy (and thus, cost-effective) to apply. Furthermore, it makes explicit links to the concept of usability via the ease-of-use construct. The following section outlines specific hypotheses derived from the theoretical model offered above.

Testing TAM: Predicting Student Use of Netscape

This research employed a field study using subjects in a beginning computer skills course in a major university in the American Midwest. The technology which was examined was the use of Netscape, a World Wide Web browsing tool, chosen because subjects' use of Netscape was discretionary and was not tested as part of the computer skills course. To control for initial user experience, previous experience with Netscape was measured at the outset and only respondents with no initial experience using Netscape were included in the data analysis.

Variables

A questionnaire utilizing scales for each of the variables included in TAM was developed and administered to subjects (questionnaire is included at Appendix A). Each of the scales had been used in previous MIS research (reported reliabilities (Cronbach Alpha) for the scales exceeded .80.) Table 1 summarizes the scales used in this study and their associated reliabilities based on previous research.

Table 1. Variable Summary

Variable	Definition	Operationalization	Reported Reliability
Perceived Usefulness	The degree to which a user believes that using the system will enhance performance.	Perceived Usefulness 4-item scale (Davis et. al, 1989)	.92
Perceived Ease of Use	The degree to which a user believes that using the system will be free from effort.	Perceived Ease of Use 4-item scale (Davis et. al, 1989)	.90
Attitude Toward Using	Feelings of favorableness or unfavorableness towards using the technology.	Attitude 4-item scale (Taylor and Todd, 1995)	.85
Behavioral Intentions to Use	The strength on one's intentions to use the technology in the future.	Behavioral Intentions 2-item scale (adapted by authors from Taylor and Todd, 1995)	.91
Usage	The amount of usage over a fixed unit of time.	Self-reported hours of use per month.	N/A

The authors recognize the limitations associated with self-report measures of usage. However, as indicated by Davis et al., self-reported usage measures have often

been used in IS research to operationalize system usage, particularly when objective usage metrics are not available (as is the case in this research).

Procedure

All students enrolled in a beginning computer skills course agreed to participate in this study, resulting in a sample of 101 potential users of Netscape. Subjects with prior experience using the World Wide Web or Netscape were eliminated from further analysis resulting in a final sample of 76 users. Subjects received experimental participation credit, which was required of all students as part of the course. Subjects had the option of not participating and were able to fulfill their experiment participation requirements through other means. Neither author was an instructor in the course.

During the first week of class, one of the authors provided subjects with an overview of Netscape as part of their classroom training. This overview included a demonstration of Netscape. Following the demonstration, subjects were given a "treasure hunt" exercise in which they were asked to use Netscape to search for information on various topics (see Appendix B).

At the end of the class period, all subjects received and completed the questionnaire designed to capture perceptions of Netscape's usefulness, perceptions of its ease of use, students' attitudes toward using Netscape, and their intentions to use Netscape over the remainder of the term. At the end of the two week period, one of the authors returned to the class and had subjects estimate the number of hours spent using Netscape over the two week interval since being exposed to Netscape.

Analytical Techniques

The primary analytical technique used in testing the hypotheses in this study was hierarchical multiple regression. For scale assessment, a combination of confirmatory factor analysis and reliability analysis was used. Confirmatory factor analysis was used to assess construct validity for the variables considered in this research.

Follow-up reliability analysis was used to further assess the stability of the scales used. Cronbach's Alpha was used to assess scale reliability. This analysis helped further establish the validity and reliability of the scales used in the context of this study. Hierarchical multiple regression was used to assess the overall model and the impact of each variable in determining actual system use. This technique allowed the researchers to statistically control for the influences of other variables in the model in order to examine the unique contribution made by each individual variable of interest.

Hypotheses

Based on Figure 2 and the description of TAM offered above, the following hypotheses were developed for this study:

H1: *Perceived ease of use* (EOU) will have a significant positive influence on *perceived usefulness* (U).

H2: *Perceived usefulness* will have a significant positive influence on *attitude toward using* (A).

H3: *Perceived ease of use* will have a significant positive influence on *attitude toward using*.

H4: *Perceived usefulness* will have a significant positive influence on *behavioral intentions to use* (BI).

H5: *Attitude toward using* will have a significant positive influence on *behavioral intentions to use*.

H6: *Behavioral intentions to use* will have a significant positive influence on *actual use* (USE).

The following section presents the methods and procedures used to empirically test these hypotheses, and thus, the efficacy of TAM in general.

Results

This section reports on the results of the statistical analyses conducted to verify the purity of the measures used and to test hypotheses 1 through 6.

Scale Assessment

Table 2 presents the results of the confirmatory factor analysis and reliability analysis performed on each of the scales used in this research.

Table 2. Factor and Reliability Analysis

Factor 1: Perceived Ease of Use (Eigenvalue = 6.96; alpha = 0.93)	Loadings
5. Learning to operate Netscape would be easy for me	.872
7. I would find it easy to get Netscape to do what I want it to do.	.862
9. It would be easy for me to become skillful at using Netscape.	.895
12. I would find Netscape easy to use.	.894
Factor 2: Perceived Usefulness (Eigenvalue = 3.77; alpha = 0.93)	
6. Using Netscape would improve my performance in college.	.914
10. Using Netscape would enhance my effectiveness in college.	.887
13. Using Netscape would increase my productivity in college.	.870
15. I would find Netscape useful in college.	.797
Factor 3: Attitude Toward Using (Eigenvalue = 1.67; alpha = 0.80)	

8.	Using Netscape is a(n) (good/bad) idea.	.792
11.	Using Netscape is a(n) (wise/foolish) idea.	.723
14.	I (like/dislike) the idea of using Netscape.	.829
17.	Using Netscape would be (pleasant/unpleasant).	.532
Factor 4: Behavioral Intentions to Use (Eigenvalue = 1.11; alpha = 0.91)		
20.	I intend to use Netscape during the remainder of the semester.	.869
23.	I intend to use Netscape frequently this semester.	.867

As indicated in Table 2, the scales used exhibited desirable psychometric properties, with all scale reliabilities greater than .80 and all factor loadings exceeding .7 (with the exception of one item in the *attitude toward using* scale which exceeded the recommended cutoff of .5). Based on these results, the authors were confident that the scales used in this research were both construct valid and reliable.

Hypothesis Testing

Hypothesis 1 stated that *perceived ease of use* would have a significant positive influence on *perceived usefulness*. Hypothesis 1 was tested by regressing *perceived ease of use* on *perceived usefulness*. Table 3 presents the regression results used to test this hypothesis.

Table 3. Regression Results for Hypothesis 1

	β	**Std. Err. of β**	**t**	**p**	**R2**
EOU	.188	.098	1.922	.058	.047

As indicated in Table 3, *Perceived ease of use* has a marginally significant (p = .058) influence on *perceived usefulness*, although it is slightly higher than a traditional .05 significance level. Thus, Hypothesis 1 receives only marginal support.

Hypotheses 2 and 3 stated that *perceived usefulness* and *perceived ease of use* would have significant positive influences on *attitude toward using*, respectively. These hypotheses were tested by regressing both *perceived usefulness* (H2) and *perceived ease of use* (H3) on *attitude toward using*. Table 4 provides results from the regression analysis for both Hypothesis 2 and 3.

Table 4. Regression Results for Hypotheses 2 and 3.

	β	**Std. Err. of β**	**t**	**p**	**R2**
					.285
U	.256	.066	3.899	<.001	
EOU	.159	.057	2.796	.007	

As indicated in Table 4, both *perceived usefulness* and *perceived ease of use* have a significant influence on *attitude toward using*. Thus, Hypotheses 2 and 3 are both supported.

Hypotheses 4 and 5 stated that *perceived usefulness* and *attitude toward using* would each have a significant positive influence on *behavioral intentions to use*. Because each of these hypotheses contained the same dependent variable, the same regression model was used to evaluate each hypothesis. However, because *perceived usefulness* was modeled as having a direct influence on *attitude toward using* (as evaluated in Hypotheses 2), it was important to statistically control for the direct influence of *perceived usefulness* on *behavioral intentions to use* before evaluating the independent contribution of *attitude toward using*. Failing to control for the direct influence of

perceived usefulness could result in the relationship between *attitude toward using* and *behavioral intentions to use* being artificially inflated due to the indirect influences of the perceptual variable. Thus, *perceived usefulness* was entered into the regression model during step one, with *attitude toward using* being entered in a second step. This allowed the researchers to tease out the influence of *perceived usefulness* before considering *attitude toward using*.

Results for Hypotheses 4 and 5 are presented in Table 5.

Table 5. Regression Results for Hypotheses 4 and 5.

		β	Std. Err. of β	t	p	R2 (by step)
Step 1						.186
	U	.322	.078	4.118	<.001	
Step 2						.282
	A	.401	.128	3.123	.002	

Both *perceived usefulness* and *attitude toward using* exhibited significant positive influences on *behavioral intentions to use*. Therefore, Hypotheses 4 and 5 are both supported.

Perhaps the most important hypothesis for practical purposes, Hypotheses 6 stated that *behavioral intentions to use* would have a significant positive influence on *actual use* of the system. To evaluate this hypothesis *behavioral intentions to use* were regressed on the *actual usage* figures reported by subjects two weeks after the initial demonstration of Netscape. The regression results are presented in Table 6.

Table 6. Regression Results for Hypothesis 6

	β	Std. Err. of β	t	p	R^2
BI	1.920	.464	4.136	<.001	.188

Consistent with the previous results, *behavioral intentions to use* appears to have a strong, positive influence on *actual usage* behavior; thus, Hypothesis 6 is also strongly supported.

Summary of Hypothesis Testing

In most cases, each of the hypotheses derived from the Technology Acceptance Model were strongly supported. Hypothesis 1, which examined the influence of *perceived ease of use* on *perceived usefulness* was only marginally supported ($p < .06$). In addition, the amount of variance explained (indicated by R^2) for each variable was high, ranging from 19 to 29%, with the exception of Hypothesis 1, which had an R^2 of just under 5%. With this single exception, the results reported here offer strong support for the Technology Acceptance Model. Table 7 presents a summary of the hypothesis testing results.

Table 7. Summary of Hypothesis Testing.

Hypothesis	Hypothesized Relationship	Result
1	EOU ---> U	Marginally Supported (p = .058)
2	U ---> A	Supported (p < .001)
3	EOU ---> A	Supported (p = .007)
4	U ---> BI	Supported (p < .001)
5	A ---> BI	Supported (p = .002)
6	BI ---> USE	Supported (p < .001)

Discussion

Based on the results of this study, the Technology Acceptance Model appears to offer researchers a theoretically grounded model which can be used to predict the degree to which users unfamiliar with a particular piece of software will actually use that software after being introduced to it.

In this particular example, users unfamiliar with Netscape or the World Wide Web rated their perceptions of the Netscape after being shown a demonstration of its capabilities. Based on these results, one might conclude that first impressions are indeed lasting--that is, users' initial perceptions of Netscape's usefulness and ease of use had significant influences on their attitude toward using Netscape as well as their intentions to use it. As suggested by the Theory of Reasoned Action (and carried forward into TAM), individual's intentions are the strongest predictor of future behavior. Such was also the case in this research, as subjects' intentions to use Netscape accurately predicted their actual use of the tool.

Therefore, the Technology Acceptance Model offers a theoretically sound and parsimonious method for evaluating systems in existence or under development. By gathering user perceptions of a system's usefulness and ease of use, developers can more accurately assess whether that system will ultimately be accepted by users. While this study examined a system which was already available for use, there is no reason why developers could not gather user perceptions of a system's usefulness or ease of use based on prototypes or storyboards earlier in the development lifecyle. In fact, given TAM's low cost and ease of application, developers could easily collect data at various points during system development and monitor shifting user attitudes about the system as it moves from conceptual design stages to actual implementation.

We have suggested that the questionnaire presented in this paper works well throughout the product development lifecycle; however, this does not diminish the value of traditional usability testing in most circumstances. Ideally, the instrument presented here may be augmented with performance data from users. This allows designers to maximize the amount and type of usability information obtained during iterative test and design of the technology. Solely relying on subjective data may be problematic in many circumstances--particularly if that subjective data is gathered under "laboratory" conditions. While TAM may be used in either a laboratory or field environment, augmenting TAM's perceptual data with actual user performance data may provide additional value to the designer.

While HCI researchers have traditionally focused on usability and system ease of use, this research has introduced an equally important, yet frequently overlooked variable--usefulness. Based on this research, user perceptions of usefulness had even stronger influences on attitudes toward use than user perceptions of the system's ease of use, and user perceptions about the system's usefulness explained just under 19% of the

variation in user intentions to use the system--a very high figure for most behavioral research. Thus, TAM recognizes the importance of ease of use in user decisions to use or reject technology; however, it also suggests that usefulness (the extent to which the system is able to help the user perform his/her job) may be just as important, if not more so.

The purpose of this paper has been to present and empirically evaluate a theoretically grounded model of software use from the MIS literature. The Technology Acceptance Model is interesting because it offers both researchers and practitioners a relatively simple and cost-effective means predicting the ultimate measure of system success--whether or not that system is actually used. TAM is a predictive, not a descriptive, model. That is, it can be used to predict system acceptability; however, it cannot be used to diagnose specific system design flaws. For example, TAM might predict that a system would not be utilized because user's perceive that it would not help them very much in their jobs (i.e., it has low usefulness); however, it cannot tell the designer what he/she should change to positively affect usefulness. Nonetheless, such information is potentially extremely valuable for the designer. Knowing that user's do not feel the system will help them in their jobs, the designer might revisit the task analysis stage to be sure the system under development adequately addresses the key aspects of the user's job that the system is designed to support.

Similarly, TAM might indicate that user's perceive the system to be difficult to use (i.e., it has low ease of use); however, it cannot tell the designer what he/she should do to the user interface to make the system more usable. Again, however, knowing that there is an ease of use problem with the system, designers can begin a series of more detailed and diagnostic usability evaluations to uncover specific design flaws.

Conclusion

In conclusion, TAM has been shown to be a valid means of predicting system acceptability (as measured by system use). It suggests that user perceptions of a system are formed very early, after only minimal exposure to the system. Nonetheless, these early perceptions have a very powerful influence on whether users will actually use that system in the future. In particular, TAM suggests that designers must consider not only the system's ease of use, but also its usefulness in order to encourage end user acceptance of that system.

Despite its relative simplicity, TAM has been shown to be extremely successful in predicting whether systems will be successful. Because of its simplicity, it offers designers a cost-effective tool which can be used to evaluating systems throughout the system design lifecycle.

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Appendix A: Questionnaire

5. Learning to operate Netscape would be easy for me.

1	2	3	4	5	6	7
Extremely Likely	Quite Likely	Slightly Likely	Neither	Slightly Unlikely	Quite Unlikely	Extremely Unlikely

6. Using Netscape would improve my performance in college.

1	2	3	4	5	6	7
Extremely Likely	Quite Likely	Slightly Likely	Neither	Slightly Unlikely	Quite Unlikely	Extremely Unlikely

7. I would find it easy to get Netscape to do what I want it to do.

1	2	3	4	5	6	7
Extremely Likely	Quite Likely	Slightly Likely	Neither	Slightly Unlikely	Quite Unlikely	Extremely Unlikely

8. Using Netscape is a(n) _____ idea.

1	2	3	4	5	6	7
Extremely Good	Quite Good	Slightly Good	Neither Good Nor Bad	Slightly Bad	Quite Bad	Extremely Bad

9. It would be easy for me to become skillful at using Netscape.

1	2	3	4	5	6	7
Extremely Likely	Quite Likely	Slightly Likely	Neither	Slightly Unlikely	Quite Unlikely	Extremely Unlikely

10. Using Netscape would enhance my effectiveness in college.

1	2	3	4	5	6	7
Extremely Likely	Quite Likely	Slightly Likely	Neither	Slightly Unlikely	Quite Unlikely	Extremely Unlikely

11. Using Netscape is a(n) _____ idea.

1	2	3	4	5	6	7
Extremely Foolish	Quite Foolish	Slightly Foolish	Neither Foolish Nor Wise	Slightly Wise	Quite Wise	Extremely Wise

12. I would find Netscape easy to use.

1	2	3	4	5	6	7
Extremely Likely	Quite Likely	Slightly Likely	Neither	Slightly Unlikely	Quite Unlikely	Extremely Unlikely

13. Using Netscape would increase my productivity in college.

1	2	3	4	5	6	7
Extremely Likely	Quite Likely	Slightly Likely	Neither	Slightly Unlikely	Quite Unlikely	Extremely Unlikely

14. I _____ the idea of using Netscape.

1	2	3	4	5	6	7
Strongly Like	Like	Slightly Like	Don't Care About	Slightly Dislike	Dislike	Strongly Dislike

15. I would find Netscape useful in college.

1	2	3	4	5	6	7
Extremely Likely	Quite Likely	Slightly Likely	Neither	Slightly Unlikely	Quite Unlikely	Extremely Unlikely

16. Using Netscape is entirely within my control.

1	2	3	4	5	6	7
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

17. Using Netscape would be _____.

1	2	3	4	5	6	7
Extremely Pleasant	Quite Pleasant	Slightly Pleasant	Neither Pleasant Nor Unpleasant	Slightly Unpleasant	Quite Unpleasant	Extremely Unpleasant

18. People who influence my behavior would think that I should use Netscape.

1	2	3	4	5	6	7
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

19. I would be able to use Netscape.

20. I intend to use Netscape during the remainder of the semester.

21. I have the resources and the knowledge and the ability to make use of Netscape.

22. People who are important to me would think that I should use Netscape.

23. I intend to use Netscape frequently this semester.

Appendix B: "Treasure Hunt" Exercise

Instructions:

The following exercise is designed to get you acquainted with Netscape and the World Wide Web. There are 6 questions listed below which you should answer using Netscape. In each case, please provide the **answer** to the question, along with the **URL** where you found the answer.

For each question, you should have an answer like the following:

Sample Question: What is the e-mail address of a student at (name removed) University named John Doe?

Answer: jdoe

URL: http://(address removed)

Be sure to include your name and ID number at the top of this page and the next page. Please turn to page 2 and begin. Good luck!

1. What is the call number in the (name removed) library of a book titled *Group support systems: new perspectives* written by Leonard M. Jessup and Joseph S. Valacich?

Answer:

URL:

2. One of David Letterman's favorite topics is the New York Mets baseball team. How many different Top Ten lists have the word "Mets" somewhere in them?

Answer:

URL:

3. How many miles of hiking trails are in Glacier National Park (Montana)?

Answer:

URL:

4. What score (out of 100) does “Mr. Showbiz” give Meg Ryan’s new film *French Kiss*?

Answer:

URL:

5. Apple Computer has recently introduced a new product, the QuickTake 150. What type of product is this and what is its weight?

Answer:

URL:

6. The Spin Doctors are touring this summer. Where will they be playing on

May 27, 1995?

Answer:

URL:

Biographical Sketches

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The path from EOU to U is technically not a “difference” between TAM and TRA since TRA is more general, and does not specify relationships *between* different beliefs held by users.