DOCUMENT RESUME

ED 466 603 IR 021 338

AUTHOR Lazar, Jonathan; Norcio, Anthony

TITLE End-User Satisfaction in Training Novice Users To Surf the Web.

PUB DATE 2001-00-00

NOTE 7p.; In WebNet 2001: World Conference on the WWW and Internet Proceedings (Orlando, FL, October 23-27, 2001); see IR 021 310.

PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)

EDRS PRICE EDRS Price MF01/PC01 Plus Postage.

DESCRIPTORS Comparative Analysis; *Instructional Design; *Teaching Methods; *Training; User Needs (Information); *User Satisfaction (Information); *Users (Information); *World Wide Web

IDENTIFIERS Errors; Novices; Training Needs

ABSTRACT

The user population of the World Wide Web is increasing rapidly. People who have never had experience with computers are logging on, and, therefore, the novice user population is very large. These new users need to be trained in using this new technology. It is therefore important to investigate which training methods leave the users most satisfied. This paper presents the results of an experiment designed to assess user satisfaction with different training methods. Over 250 users took part in this experiment, measuring user satisfaction with eight different training methods: networked error training; conceptual error training; conceptual exploratory training; conceptual training; error training; error management training; exploratory training; and traditional training. There were not major differences in user satisfaction across training methods, but overall satisfaction scores were very high. This might mean that the users were in serious need of training and were satisfied to have received training, regardless of the type of training. (Contains 34 references.) (Author/MES)

End-User Satisfaction in Training Novice Users to Surf the Web

Dr. Jonathan Lazar
Department of Computer and Information Sciences
Towson University
8000 York Road
Towson, MD 21252, USA
jlazar@towson.edu

Dr. Anthony Norcio
Department of Information Systems
University of Maryland Baltimore County
1000 Hilltop Circle
Baltimore, MD 21250, USA
norcio@umbc.edu

Abstract

The user population of the world wide web is increasing rapidly. People who have never had experience with computers are logging on and therefore, the novice user population is very large. These new users need to be trained in using this new technology. It is therefore important to investigate which training methods leave the users most satisfied. This paper presents the results of an experiment designed to assess user satisfaction with different training methods. Over 250 users took part in this experiment, measuring user satisfaction with eight different training methods. There were not major differences in user satisfaction across training methods, but overall, satisfaction scores were very high. This might mean that the users were in serious need of training, and were satisfied to have received training, regardless of the type of training.

Introduction

As the popularity of the World Wide Web grows, many people without previous computing experience are getting on the web (Lazar, 2001). The user population of the web includes people of all ages, gender, educational experience, computing experience, and disabilities (Shneiderman, 2000). Because the number of people who need to use the web is increasing, the number of people taking training classes related to the web is also increasing. Computer training is an important component of implementing a new technology. In some cases, professionals such as teachers are being required to take training classes in using the web (Wax, 2000). Newspaper articles are heralding the importance of computer training for using the World Wide Web (Mendels, 1999). In most cases, without appropriate training, users will not be able to effectively use the technology (Hoffer, George & Valacich, 1999; Lazar & Norcio, 2000a; Office of Technology Assessment, 1995; Whitten & Bentley, 1997).

Since training in using the web has become necessary for a large number of people, it is important to research the effectiveness of different training methods for the web. Training can be presented in a number of different ways. For instance, training sessions can differ in how the material is presented to the users, what documentation is provided, or the amount of instructor participation. For instance, will the training be presented by telling users to type in certain commands, or will users be encouraged to explore? Will users be instructed on what errors could occur, and on how to respond to those errors? Which training methods will leave the user most satisfied? These are important research questions which this paper will address.

Training Users in Responding to Errors

In addition to the many considerations in a training session (such as room layout, lighting, time of day, documentation), there are a number of different approaches for presenting the training itself. For instance, users could be told exactly what to type in, or users could be encouraged to explore on their own. Training approaches can differ depending on whether they address the issue of errors, and if so, how they address those errors. Errors need to be addressed when training novice users, because errors occur frequently with novice users who are attempting a new comp uter task, and in the networked environment of the World Wide Web, there is an increased likelihood of error occurring (Greif & Keller, 1990; Lazar & Norcio, 1999b; Lazar & Norcio, 2000b; Lazonder & Meij, 1995). Errors can frustrate novice users, who tend to blame themselves for errors (Arnold & Roe, 1987; Carroll &

Mack, 1984; Frese, Brodbeck, Zapf & Prumper, 1990; Lewis & Norman, 1986). In addition, novice users may spend a lot of time attempting to recover from an error sequence (Carroll & Carrithers, 1984). Even though errors are such a problem for novice users, unfortunately, most training methods for novice users do not address the errors that can occur (Frese & Altmann, 1989).

A number of methods for addressing errors in novice user training have been presented in the literature (Lazar & Norcio, 1999a). Some of the different approaches to training users to respond to errors include error management training, exploratory training, and conceptual models. In error management training, errors are presented as opportunities for learning (Dormann & Frese, 1994; Frese & Altmann, 1989; Frese et al., 1991; Nordstrom, Wendland & Williams, 1998). In error management training, users are informed about the errors that may occur, and are instructed in strategies for coping with errors. Errors are presented as a positive step, rather than a negative setback. In exploration, users are given an overview of their environment (Greif & Keller, 1990; Wendel & Frese, 1987). Instead of being given step-by-step directions, users are taught how to navigate through their task environment. For instance, instead of being told to type in a specific command, such as Acd WWW,≅ the user will be presented with an explanation of what the Acd≅ command is, and what options exist. The idea behind exploration is that users will have a better understanding of their environment, and therefore be better prepared to respond to the unexpected. Conceptual models are graphical or mathematical representations of a system that correspond closely to the real-world system (Santhanam & Sein, 1994). For instance, a conceptual model of the Internet might display how the user=s computer communicates with numerous servers, to access the web page that the user has requested. Conceptual models assist users in understanding systems, and predicting the actions of systems.

An important consideration related to the presentation of training is which training methods will leave the users with a high level of satisfaction. Since novice users are frustrated by errors, the expectation is that training methods that address errors should have higher levels of satisfaction, since the users will be better able to address errors, and therefore will become less frustrated. For instance, in two studies on error training in non-networked applications, subjects who received training in how to respond to errors reported lower levels of frustration than subjects who did not receive any training in responding to errors (Frese et al., 1991; Nordstrom et al., 1998). Users should leave a training session with a high level of satisfaction, confident that they will be able to tackle the computer tasks when they return to their standard (workplace or home) computing environment.

We have created a research framework, which shows that by examining the training methods previously discussed in the research literature, some new hybrid methods of training have yet to be explored (Lazar & Norcio, 1999a). In addition, only one of these training methods (conceptual training) has been tested in the networked environment, where there is an increased opportunity for error. The resulting combinations of training methods can be seen in Figure 1.

Research Methodology

The research framework was used as the basis for the present experiment. Based on this research framework, eight different approaches for training novice users to use the web were tested. In total, 263 subjects (novice users) participated in the experiment. A novice user was defined as someone who has 1) not previously taken a class in using the Internet, and 2) does not use the Internet as a regular part of their job. In addition, university students were excluded from the experiment, because they do not accurately represent the average novice user. The treatment groups in the experiment are displayed in Figure 1. The subjects were randomly assigned to treatment groups. Treatment group H is the control group, where subjects did not receive any assistance in responding to error. The average age of the subjects taking part in the experiment was 50.3 years old (std. dev. 9.9 years)

Treatment Group	Conceptual Model (CM)	Error Management (EM)	Exploratory Training (ET)	Training Methodology Name
A	Yes	Yes	Yes	Networked Error Training
B	Yes	Yes	No	Conceptual Error Training
C	Yes	No	Yes	Conceptual Exploratory Training
D	Yes	No	No	Conceptual Training
E	No	Yes	Yes	Error Training
F	No	Yes	No	Error Management Training

G	No	No	Yes	Exploratory Training
H	No	No	No	Traditional Training

Figure 1. Treatment Groups

Each training session lasted four hours. The same protocol was followed in all of the training sessions:

1. Subjects filled out human subjects forms, describing their rights in the experiment, as required by university policy and federal law.
2. Subjects received a three hour training session. The training presented to them depended on which treatment group the training session belonged to.
3. Subjects were given a list of 10 information gathering tasks on the World Wide Web, and subjects were given an hour in which to complete these tasks. The correct answers to these tasks could not be guessed, and there was only one correct answer for each task. The specific tasks, as well as the results of the information gathering tasks, have been reported in (Lazar & Norcio, 2001).
4. As soon as the subjects had completed the tasks, they completed the satisfaction questionnaire.

In the experiment, data was collected on the task performance of the subjects, as well as the time performance of the subjects. In a previously published paper, it was reported that exploratory training was the most effective for improving task performance, and exploratory training and conceptual models were most effective for improving time performance (Lazar & Norcio, 2001). Data on user satisfaction was collected as part of this experiment. The goal was to learn if there are any differences in user satis faction related to the type of training method presented. This paper reports on the findings of the satisfaction data.

The satisfaction questionnaire was based on the Questionnaire for User Interaction Satisfaction (QUIS) (Norman, Shneiderman, Harper & Slaughter, 1998). The QUIS is a standard tool for evaluation of user satisfaction, which is used widely and has been previously validated in the literature (Chin, Diehl & Norman, 1988; Harper, Slaughter & Norman, 1997; Shneiderman, 1998; Slaughter, Harper & Norman, 1994). The QUIS is relatively long, and therefore only certain parts of the QUIS were used in the experiment. The different sections of the QUIS are designed to be used separately, as needed (Norman et al., 1998). The part of the QUIS that was used in the study is Part 3 (Overall User Reactions). The other parts of the QUIS, such as questions about teleconferencing, technical manuals, and software installation, are not relevant to this study, and therefore were not included. The parts of the QUIS used in the satisfaction questionnaire are the dull-stimulating scale, the terrible-wonderful scale, the difficult-easy scale, the frustrating-satisfying scale, and the rigid-flexible scale. These scales represent overall user satisfaction with their experience. The actual satisfaction questionnaire used in the experiment is displayed in Appendix A. An earlier pilot study of 16 users found that there were no problems in the clarity of the satisfaction questionnaire.

Results

The mean satisfaction scores of subjects are displayed in figure 2, organized by the training methods that the subject received. ANOVA tests were then performed to determine if there were any statistically significant differences (Maxwell & Delaney, 1990). There are no statistically significant differences between any of the training groups on the dull-stimulating scale, the terrible-wonderful scale, or the difficult-easy scale.

Figure 2. User responses on scales of satisfaction

Group	Terrible	Frustrating	Dull	Difficult	Rigid
A	7.9429	7.1714	7.8889	6.4167	8.0833
B	7.1905	7.0000	7.4762	6.3182	7.4762
C	7.3182	6.2727	7.5000	6.1364	8.0476
D	7.6000	7.1522	7.7045	6.2045	8.0930
E	7.5641	7.2895	7.7632	6.9487	8.2895
F	7.6522	6.7826	7.6522	5.9565	7.4783

G	7.9143	7.6857	7.8824	6.8000	8.2857
H	7.9375	7.6774	8.1250	7.0625	8.3750
Avg.	7.6746	7.1912	7.7760	6.5217	8.0723

Figure 2. User responses on scales of satisfaction

On two satisfaction scales, the frustrating-satisfying scale and the rigid-flexible scale, statistically significant differences were found. A Duncan=s post-hoc test was run to determine where the statistically significant differences were. On the frustrating-satisfying scale, there is a significant difference between Conceptual Exploratory Training (Group C, with a mean of 6.2727) and Exploratory Training (Group G, with a mean of 7.6857) and Traditional Training (Group H, with a mean of 7.6774). On the rigid-flexible scale, there is a significant difference between Conceptual Error Training (Group B, with a mean of 7.4762) and Error Training (Group E, with a mean of 8.2895), Exploratory Training (Group G, with a mean of 8.2857) and Traditional Training (Group H, with a mean of 8.3750). There is also a significant difference between Error Management Training (Group F, with a mean of 7.4783) and Error Training (Group E, with a mean of 8.2895), Exploratory Training (Group G, with a mean of 8.2857) and Traditional Training (Group H, with a mean of 8.3750).

Discussion

In this experiment, subjects were asked to fill out 5 different scales of satisfaction from the QUIS, the dull-stimulating scale, frustrating-satisfying scale, terrible-wonderful scale, difficult-easy scale, and the rigid-flexible scale. There were only a small number of statistical differences in satisfaction between training groups, and these statistically significant differences appear only in two of the five scales of satisfaction. In the two scales where statistically significant differences did appear, the statistically significant difference is generally between the highest and lowest groups, not between one or two groups and ALL of the other groups. If there are truly significant differences in satisfaction, it is expected that it would appear on more scales of satisfaction, or statistically significant differences would appear between more of the training groups. Therefore, it does not appear that there are any meaningful differences in the user satisfaction of the subjects related to training methods. It is important, however, to note that all of the satisfaction scores were very high.

There are no major differences in satisfaction across the training methods of the experiment, but all satisfaction scores were very high. This is a very interesting finding. One of the requirements for subjects was that they had not previously taken a training class on using the Internet. It is possible that subjects had been staring at their computers, wondering about what the web is, and how they could use the Internet, for months before taking part in the training session. In this study, the training was offered to the employees at no cost. These employees might have been Astarved≅ for training, and might have simply been satisfied with having received training - *any type of training*- at no cost. Although the task and time performance varied greatly depending on the type of training received (Lazar & Norcio, 2001), the satisfaction level did not. Subjects might have been satisfied simply because *they had received training*, and now had more knowledge and felt more confident using the web. This concurs with a number of recent newspaper articles, which described users who were worried and uncomfortable using the web because they had not received training (Mendels, 1999; Wax, 2000). At this point of rapid growth in computer technology, the important factor in user satisfaction may not be related to the TYPE of training, but rather to having received training at all.

Systems analysis and design and management information systems textbooks note that training is a very important factor in the user having a successful computing experience (Hoffer et al., 1999; Martin, DeHayes, Hoffer & Perkins, 1994; Whitten & Bentley, 1997). It is therefore distressing to note that in many cases, training may not be affordable or might be the first thing to be cut out of the budget, especially for schools and other non-profit organizations (Lazar & Norcio, 2000a; Mendels, 1999; United States General Accounting Office, 1998). When non-profit organizations do spend money on training users, the training budgets are usually very low (Benton Foundation, 1997; Office of Technology Assessment, 1995). More community partnerships and unique approaches need to be developed to ensure that users receive the training that they need, to ensure that the technology gap between the Ahaves≅ and Ahave-nots≅ does not grow wider (Lazar & Norcio, 2000a).

Summary

An important finding of this study is that users want training. There were not major differences in the user satisfaction related to the different training methods. Rather, the novice users were very satisfied to received training at all, regardless of how the training was presented. This concurs with findings that without training, users are not successful in effectively utilizing information technology. Training needs to be made a priority in information technology budgets, to ensure that users can effectively use new technologies.

References

Arnold, B., & Roe, R. (1987). User errors in human-computer interaction. In M. Frese, E. Ulich, & W. Dzida (Eds.), *Human computer interaction in the workplace* (pp. 203-220). Amsterdam: Elsevier Science Publishers.

Benton Foundation. (1997). *The learning connection: Schools in the information age* . Washington, D.C.: Benton Foundation.

Carroll, J., & Carrithers, C. (1984). Training wheels in a user interface. *Communications of the ACM, 27*(8), 800-806.

Carroll, J., & Mack, R. (1984). Learning to use a word processor: By doing, by thinking, and by knowing. In J. Thomas & M. Schneider (Eds.), *Human Factors in Computer Systems* (pp. 13-51). Norwood, N.J.: Ablex Publishing.

Chin, J., Diehl, V., & Norman, K. (1988). Development of an instrument measuring user satisfaction of the human-computer interface. *Proceedings of the CHI: Human Factors in Computing Systems*,213-218.

Dormann, T., & Frese, M. (1994). Error training: Replication and the function of exploratory behavior. *International Journal of Human-Computer Interaction, 6*(4), 365-372.

Frese, M., & Altmann, A. (1989). The treatment of errors in learning and training. In L. Bainbridge & S. Quintanilla (Eds.), *Developing skills with information technology* (pp. 65-86). Chichester, England: John Wiley & Sons.

Frese, M., Brodbeck, F., Heinbokel, T., Mooser, C., Schleiffenbaum, E., & Thiemann, P. (1991). Errors in training computer skills: On the positive function of errors. *Human-Computer Interaction, 6*(1), 77-93.

Frese, M., Brodbeck, F., Zapf, D., & Prumper, J. (1990). The effects of task structure and social support on users' errors and error handling. *Proceedings of the Human-Computer Interaction - INTERACT '90*,35-41.

Greif, S., & Keller, H. (1990). Innovation and the design of work and learning environments: The concept of exploration in human-computer interaction. In M. West & J. Farr (Eds.), *Innovation and creativity at work: Psychological and organizational strategies* (pp. 231-249). Chichester, England: John Wiley & Sons.

Harper, B., Slaughter, L., & Norman, K. (1997). Questionnaire Administration via the WWW: A Validation & Reliability Study for a User Satisfaction Questionnaire. *Proceedings of the WebNet97: International Conference on the WWW, Internet and Intranet*

Hoffer, J., George, J., & Valacich, J. (1999). *Modern systems analysis and design*. Reading, MA: Addison-Wesley.

Lazar, J. (2001). *User-Centered Web Development*. Sudbury, MA: Jones and Bartlett Publishers.

Lazar, J., & Norcio, A. (1999a). A Framework for Training Novice Users in Appropriate Responses to Errors. *Proceedings of the International Association for Computer Information Systems Conference*,128-134.

Lazar, J., & Norcio, A. (1999b). To Err Or Not To Err, That Is The Question: Novice User Perception of Errors While Surfing The Web. *Proceedings of the Information Resource Management Association 1999 International Conference*,321-325.

Lazar, J., & Norcio, A. (2000a). Service-Research: Community Partnerships for Research and Training. *Journal of Informatics Education and Research, 2*(3), 21-25.

Lazar, J., & Norcio, A. (2000b). System and Training Design for End-User Error. In S. Clarke & B. Lehaney (Eds.), *Human-Centered Methods in Information Systems: Current Research and Practice* (pp. 76-90). Hershey, PA: Idea Group Publishing.

Lazar, J., & Norcio, A. (2001). Training Novice Users in Developing Strategies for Responding to Errors When Browsing the Web. *paper under review.*

Lazonder, A., & Meij, H. (1995). Error-information in tutorial documentation: Supporting users' errors to faciliate initial skill learning. *International Journal of Human-Computer Studies, 42*(2), 185-206.

Lewis, C., & Norman, D. (1986). Designing for error. In D. Norman & S. Draper (Eds.), *User-centered system design* (pp. 411-432). Hillsdale, NJ: Lawrence Erlbaum Associates.

Martin, E., DeHayes, D., Hoffer, J., & Perkins, W. (1994). *Managing information technology: What managers need to know*. New York: Macmillan Publishing Company.

Maxwell, S., & Delaney, H. (1990). *Designing Experiments and Analyzing Data*. Pacific Grove, California: Brooks-Cole Publishing.

Mendels, P. (1999). Survey finds teachers unprepared for computer use. *The New York Times*, September 8, 1999, .

Nordstrom, C., Wendland, D., & Williams, K. (1998). To err is human: An examination of the effectiveness of error management training. *Journal of Business and Psychology, 12*(3), 269-282.

Norman, K., Shneiderman, B., Harper, B., & Slaughter, L. (1998). *Questionnaire for User Interaction Satisfaction* .College Park, MD: University of Maryland.

Office of Technology Assessment. (1995). *Teachers and Technology: Making the Connection* . Washington, D.C.: U.S. Government Printing Office.

Santhanam, R., & Sein, M. (1994). Improving end-user proficiency: Effects of conceptual training and nature of interaction. *Information Systems Research, 5*(4), 378-399.

Shneiderman, B. (1998). *Designing the User Interface: Strategies for Effective Human-Computer Interaction.* (3rd ed.). Reading, Masssachusetts: Addison-Wesley.

Shneiderman, B. (2000). Universal Usability: Pushing Human-Computer Interaction Research to Empower Every Citizen. *Communications of the ACM, 43*(5), 84-91.

Slaughter, L., Harper, B., & Norman, K. (1994). Assessing the Equivalence of Paper and On-line versions of the QUIS 5.5. *Proceedings of the 2nd Annual Mid-Atlantic Human Factors Conference*,87-91.

United States General Accounting Office. (1998). *School technology: Five school districts' experiences in funding technology programs* (GAO/HEHS-98-35). Washington, D.C.: United States General Accounting Office.

Wax, E. (2000). Teachers' High-Tech Trek. *The Washington Post*, June 29, 2000, pp. B1.

Wendel, R., & Frese, M. (1987). Developing exploratory strategies in training: The general approach and a specific example for manual use. *Proceedings of the Human-Computer Interaction- INTERACT '87*,943-948.

Whitten, I., & Bentley, L. (1997). *Systems Analysis and Design Methods.* Boston: Irwin McGraw-Hill.

Appendix A. Satisfaction questionnaire

Please circle the numbers which most appropriately reflect your impressions about this training experience. (Not Applicable = NA)

terrible wonderful
1 2 3 4 5 6 7 8 9 NA

frustrating satisfying
1 2 3 4 5 6 7 8 9 NA

dull stimulating
1 2 3 4 5 6 7 8 9 NA

difficult easy
1 2 3 4 5 6 7 8 9 NA

rigid flexible
1 2 3 4 5 6 7 8 9 NA

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

Reproduction Basis

☒ This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

☐ This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").