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## **The Effects of Error Management, Exploration, and Conceptual Models on Learning to Use the Internet**

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### **Abstract:**

When novice users learn new computer tasks, they frequently make errors. These errors tend to frustrate novice users, who may not be able to recover from the errors. The research literature has defined three methods for training novice users to respond to errors: error management, exploration, and conceptual models. This short paper describes an experiment-in-progress that is testing the effects of error management, exploration, and conceptual models on novice users learning to use the Internet.

### **Introduction**

Novice users frequently make errors when learning a new computer task [Greif & Keller 90; Lazonder & Meij 95; Norman 83]. Novice users spend a large portion of their time trying to recover from errors [Carroll & Carrithers 84]. When novice users learn tasks in a networked environment, such as the Internet, the probability for making errors increases [Lazar & Norcio 98]. These errors are stressful and tend to frustrate novice users [Arnold & Roe 87]. Furthermore, traditional training methodologies for novice users focus on avoiding errors, by providing users with a step-by-step list of how to perform a task (this is also called "procedural training") [Carroll 84; Frese & Altmann 89; Wendel & Frese 87]. Users are expected to follow the steps exactly, to avoid making errors. Not only do users have problems following steps exactly, but this method does not realistically model their work environment [Arnold & Roe 87; Carroll 90; Greif & Keller 90; Lazonder & Meij 95]. Errors occur frequently in the workplace and users need to be prepared to deal with them.

### **Responding to Errors**

Three methodologies for helping novice users respond to errors have been presented in the literature: error management training, exploratory training, and conceptual models. In error management training, errors are presented as opportunities for learning [Dormann & Frese 94; Frese & Altmann 89; Frese et al. 91; Nordstrom, Wendland & Williams 98]. In error management training, users are instructed in strategies for coping with errors. In exploration, users are given an overview of their environment [Greif & Keller 90; Wendel & Frese 87]. Instead of being given step-by-step directions, users are taught how to navigate through their task environment. Conceptual models are graphical or mathematical representations of a system that correspond closely to the real-world system [Santhanam & Sein 94]. Conceptual models assist users in understanding systems, and predicting the actions of systems.

### **Current Experiment**

We have created a research framework, which shows that there are many possible approaches to training that have yet to be explored. Furthermore, most of the published literature focuses on the user application of word processing. There is a paucity of published research focusing on user errors in network-based applications such as e-mail and web browsing. The goal of our study is to learn more about the effects of error management training, exploratory training, and conceptual models on learning to use the Internet. Based on our research framework, we will test the effects of eight possible approaches to training novice users to use the Internet. After training sessions, the subjects will attempt to perform ten tasks

on the World Wide Web. Our study will measure user performance in two forms: the accuracy of task performance and time needed to complete the tasks. The number of errors will not be measured, as what constitutes a user error in the networked environment is not well-defined [Lazar & Norcio 98]. After attempting the tasks, subjects will fill out the Questionnaire for User Interaction Satisfaction, a standard tool that has been tested and validated in the literature [Harper, Slaughter & Norman 97; Norman et al. 98]. By the time of the WebNet 1998 Conference, we expect to have preliminary results from our experiment.

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