

## Chapter 5.38

# Training Sequences and their Effects on Task Performance and User Outcomes

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### **ABSTRACT**

This chapter introduces the concept of information technology (IT) training sequences and examines how sequencing of conceptual and procedural training impact IT task performance, user satisfaction and users' self-efficacy. Using assimilation theory, we develop four hypotheses related to training sequences. These hypotheses were then tested in a database design context using a quasi-experimental study involving student subjects. Empirical results demonstrate improved far-transfer and near-transfer task performance and higher self-efficacy for subjects trained in the conceptual-procedural sequence

vs. the reverse sequence, though user satisfaction was not significantly different between the two sequences. Implications for IT training research are discussed.

### **INTRODUCTION**

As IT has been widely adopted by firms as a potent means of improving task performance and user productivity in today's IT-dominated workplace, such adoption has also imposed substantial pressure on firms to continuously train internal users in the knowledge and skills needed to use these systems effectively. Despite innovations

in the training domain, such as computer-based, CD-based and online training, the core issue still remains how training programs should be structured to improve IT users' knowledge retention and task performance given predefined technologies, tasks and potential users (Davis & Bostrom, 1993).

Several approaches to IT training have been proposed in the literature, such as instruction-based vs. exploration-based training (Davis & Bostrom, 1993), applications-based vs. construct-based training (Olfman & Bostrom, 1991), and conceptual vs. procedural training (e.g., Olfman & Mandviwalla, 1994; Santhanam & Sein, 1994). Of these, the last taxonomy seems to have gained the broadest acceptance. *Conceptual training* is a "top-down" approach where IT users are trained in the nature and associations of semantic objects required for comprehending and solving a problem, while *procedural training* is a "bottom-up" approach focusing on action-plan sequences that users should learn to complete specific tasks. Because of the direct and immediate applicability of procedural knowledge in specific task situations, procedural training has emerged as the approach of choice for many corporate IT training programs (Atlas, Cornett, Lane, & Napier, 1997).

Prior research on conceptual and procedural training has compared the relative effects of these approaches on IT task performance, reporting mixed results (e.g., Olfman & Mandviwalla, 1994; Santhanam & Sein, 1994). However, researchers tend to agree on the importance of both forms of training. Santhanam and Sein (1994) note that procedural training is more useful when the target system is easy to operate; however, these users tend to perform poorly on novel tasks. They also note, "conceptual training is likely to provide a better opportunity for a user to form a coherent mental model compared to procedural training" (p. 382). Elaborating the gaps in extant IT training research, Olfman and Mandviwalla (1994, p. 407) state, "some *combination* of concepts and procedures is needed ... It is the relative quantity

and *sequencing* of the two kinds of content that has not been fully established" (emphasis added).

Defining *training sequence* as the ordering of conceptual and procedural training, the objective of this study is to examine whether the conceptual-procedural sequence improves IT task performance and user outcomes, such as satisfaction and self-efficacy, compared to the reverse sequence. Though the importance of training sequences was noted by Olfman and Mandviwalla (1994), to date, empirical analysis of such sequences has remained unexplored in the IT training literature. The idea of training sequences, however, has some support in learning theory (Glaser, 1990) and instructional design theory (Reiguluth & Stein, 1983), where leading proponents have long advocated that user training be conducted in a holistic manner to include both conceptual and procedural components. The rationale is that this strategy integrates two complementary forms of knowledge (concepts and procedures) that are both required for the performance of many complex organizational tasks.

To examine the above research objective, we draw on Ausubel's (1978) assimilation theory in the educational psychology literature to develop four research hypotheses relating training sequences to near- and far-transfer IT task performance (defined later), user satisfaction and user self-efficacy. These hypotheses are then tested empirically via a quasi-experimental laboratory study in a database design context. Results of the analysis confirm that the conceptual-procedural training sequence improves task performance and self-efficacy more than the reverse sequence, though user satisfaction is not significantly different between the two sequences.

The rest of this chapter proceeds as follows: The next section formulates research hypotheses by drawing on assimilation theory and prior IT training research. The third section describes experimental research design, subjects, treatments and measurement. The fourth section describes statistical data analysis techniques and results.

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