ABSTRACT

Advances in technology-mediated learning (TML) have created opportunities to personalize learning, based on the assumption that individual differences affect one’s ability to learn. However, cumulative research on individual differences is equivocal, and largely excludes the learning process. The authors argue that without a model that incorporates the process of learning, the authors cannot empirically assess how individual differences influence learning outcomes. This study first models the learning process in terms of two sub-processes: process appropriation and content assimilation. Second, it partially tests the model within a technology-mediated learning (TML) environment used to provide end-user IT training. The results support the efficacy of individual differences’ influence on learning outcomes, while shedding light on how this effect occurs. Individual differences affect the appropriation of TML supplied structures, which in turn impacts learning outcomes. The research method used in the study is a laboratory experiment. Data was analyzed using SEM.

Keywords: Appropriation, Content Assimilation, E-learning, End-User Training, Individual Differences, Learning Process, Personalization, SEM, Technology Mediated Learning

Employee training has been found to be one of the most pervasive methods for enhancing individual productivity and communicating organizations’ goals to new personnel (Arthur, Bennett, Edens, & Bell, 2003). More recently though, the availability of advanced information technology has led to a tremendous increase in the use of information technology to support the training process (Mayer, Fennell, Farmer, & Campbell, 2004). A recent ASTD study found that 30% of all training in 2010 was done through technology-mediated learning (TML) such as computer-based training, webinars, streaming video tutorials, or podcasts (ASTD, 2011). Chief among these was IT training; over 37% of all IT training is done using TML. (To avoid confusion, this paper will refer to these types of training methods with the term TML.)

An important trend facilitated by the growth in the technology relates to personalization of training for organizational employees (Cantrell & Smith, 2010). Personalization refers to the customization of training goals, approaches, presentations, etc., based on individual require-
ments and aptitudes/differences (Riecken, 2000). The practitioner literature argues for four personalization methods to improve outcomes: segmenting the workforce to provide training; offering modular training program choices that can be assembled to create different learning paths; providing broad goals for training instead of specific training modules; fostering employee-defined personalization where the employee is free to choose their own training path (Cantrell & Smith, 2010). However, all of these approaches are based on the tenuous assumption that individual differences influence the learning process.

In fact, the learning process has not been extensively empirically studied in either IS or Education. Instead, research on individual differences has emphasized how learning outcomes are affected by different training methods, individual differences, or the interaction between these methods and differences. Results from this stream of research have been equivocal (Gupta, Bostrom, & Huber, 2010). More importantly, excluding the learning process from this research leaves it without a solid theoretical conceptualization of how individual differences actually influence learning outcomes, as well as how—and why—personalization of the training methods might be justified to achieve the desired outcomes.

This study focuses on understanding the impact of such personalization. Previous studies have used input-output research designs to investigate and develop support for the direct effects only. We argue that individual differences may have indirect effects on learning outcomes via their influence on learning processes. The guiding research question was: *do individual differences have an indirect effect on learning outcomes through the impacts on the learning process? If yes, what is the nature of such an effect?* This is the first study to examine both the direct and indirect effects of individual differences.

The study investigated five individual difference variables that had been researched in IT contexts. In the next section, we review the literature on individual differences in end-user training. Section 3 outlines the research model and hypotheses. Section 4, outlines the experimental methodology. Sections 5 and 6 outline the analysis findings and their interpretation. The final section summarizes the research and outlines future directions.

**LITERATURE REVIEW**

Ever since the early days of research into end user computing, researchers have argued for the importance of individual differences (Gupta et al., 2010; Sun, Zang, Galletta, & Zhang, 2005). The principle argument is that the effectiveness of any training method depends on interactions with individual idiosyncrasies. This is consistent with the predictions of the aptitude-training interaction paradigm in education psychology (Lehtinen, Hakkarainen, Lipponen, Rahikainen, & Muukkonen, 2001). Researchers have argued that these individual characteristics could influence learning outcomes by influencing the formation of mental models, or by interacting with training methods (Olfman & Pitsatron, 2000). Empirically though, while many individual difference constructs have been investigated in Education and IS (summarized in Gupta et al. (2010)), this stream of research has had limited success in either explaining the effects or influencing training method designs. Consequently, some researchers have called for focusing on constructs that are more in line with the targeted outcomes of the training, i.e., individual differences that are more oriented toward technology use in the context of end user training (Bostrom, Olfman, & Sein, 1993).

The context of this study is IT training in a TML environment. To this end, we use a set of four individual difference variables (personal innovativeness, computer self-efficacy, computer anxiety, and motivation to learn the specific end user application) that are specific to learning about technology and learning with technology. In addition, critics of training research have conceded that certain non-technology based variables, such as learning style, might also be important in IT training contexts (Kettanurak,
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