



# Why people benefit from e-learning differently: The effects of psychological processes on e-learning outcomes

Zeying Wan<sup>\*</sup>, Yinglei Wang, Nicole Haggerty

Richard Ivey School of Business, The University of Western Ontario, London, ON N6A 3K7, Canada

## ARTICLE INFO

### Article history:

Received 27 August 2007  
Received in revised form 25 July 2008  
Accepted 12 August 2008  
Available online 14 October 2008

### Keywords:

Social cognitive theory  
E-learning outcomes  
ICT experience  
Virtual competence

## ABSTRACT

Using social cognitive theory, we opened up the black box of psychological processes in which e-learners engage. We believed that prior experience with ICT and virtual competence were two influential factors that affected e-learning and had a positive influence on its outcomes. We tested our hypotheses on a sample of 383 Chinese students participating in online courses. Our findings confirmed the effect of virtual competence and revealed a nuanced mechanism by which experiences with ICT affected e-learning outcomes. We discussed the implications of this in e-learning practice.

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## 1. Introduction

In the U.S., over 90% of all public institutions offered some form of e-learning courses in 2004 and 96.2% of them agreed that e-learning was critical to the long-term strategies of their institutions [26]. Nearly 3.2 million students in the U.S. were taking at least one online course during the Fall 2005 term [4]. However, past failures have shown that investments in e-learning do not necessarily lead to financial returns and training outcomes. Understanding learners' psychological processes is crucial for institutions to provide effective e-learning programs [2]. In response to this, we examined e-learners' prior ICT experience and virtual competence, theorizing that they were major factors in the psychological processes that were of special importance to e-learning.

We argued that e-learners' psychological processes operate on the set of cognitive structures represented by virtual competence [28] when engaging in e-learning activities. We believed that prior experiences with ICT-related activities influenced e-learning outcomes through this competence. People who have prior experiences with ICT-related activities have developed ways to accomplish new learning tasks, resulting in better learning outcomes. We designed a study to test these effects.

Our goal was to contribute to the e-learning literature in two ways. We first identified and distinguished among types of individual experience with ICT as antecedents of e-learning outcomes. Secondly, we applied social cognitive theory (SCT) to explain the effects of different types of ICT experience on virtual competence and consequently on learning outcomes.

## 2. Research background

As described in Alavi and Leidner's research framework, e-learning is a virtual learning environment in which a learner's interactions with materials, peers and/or instructors are mediated through information and communication technologies. It is different from the traditional environment because ICT are used as tools to support the learning process. Taking advantage of network infrastructures, learning can occur anywhere using many types of resources. This suggested that IT, instructional strategy, learners' psychological processes, and contextual factors together influenced e-learning outcomes.

Many general technology features such as perceived flexibility, convenience, and availability have been shown to affect e-learning outcomes [6,10].

Instructional strategy includes teaching methods and models that help to present, sequence, and synthesize learning materials, which determines the content, sequence of different topics, and the relationships among them [23]. E-learning allows easy adoption of innovative strategies to enhance learners' performance. For instance, learner control makes use of features

<sup>\*</sup> Corresponding author at: Room 0N60, 1151 Richmond Street N., London, ON N6A 3K7, Canada. Tel.: +1 647 476 8018; fax: +1 519 661 3955.

E-mail addresses: [zwan@ivey.uwo.ca](mailto:zwan@ivey.uwo.ca) (Z. Wan), [ywang@ivey.uwo.ca](mailto:ywang@ivey.uwo.ca) (Y. Wang), [nhaggerty@ivey.uwo.ca](mailto:nhaggerty@ivey.uwo.ca) (N. Haggerty).

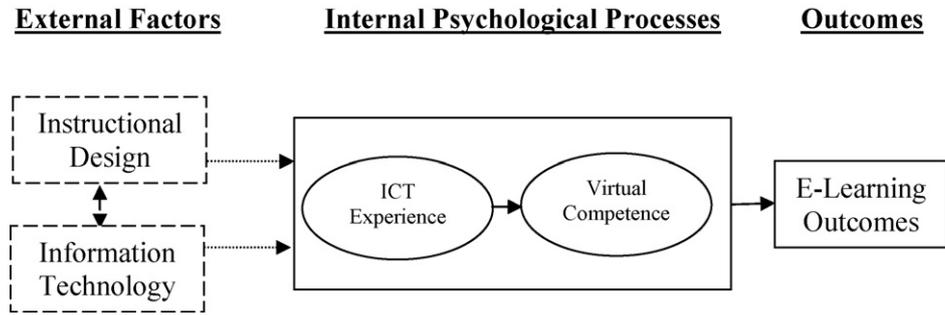


Fig. 1. An extended framework of e-learning.

such as hyperlinks that allow learners to navigate through text and multi-media content in their preferred sequence. Learners can skip familiar content and spend more time on topics of interest, as well as scheduling according to their own needs. Furthermore, new ways of presenting learning content can provide richer and more dynamic information display and animation [8].

In comparison, there is less understanding of learners' internal factors. A few individual internal psychological states apparently affect e-learning outcomes, including learners' prior computer experience, computer self-efficacy, motivation, computer anxiety, and communication apprehension [20,27]. We thus wished to contribute by linking individual psychological factors to learning outcomes and by considering the theoretical mechanisms at work.

SCT represents a broad approach to understanding human behavior and advanced capacities for learning [7]. According to SCT, learning is affected by experience. Individuals learn from the consequences of their own and others' actions and develop new cognitive structures and behavioral routines. When actions produce positive outcomes, they tend to reinforce the cognitive structures and routines, but when past actions produce negative consequences, individuals adjust their cognition and routines to produce more positive outcomes. These produce rules of behavior that serve as guides in future situations. In this way, past experience serves to shape future actions via cognitive processes they engage when facing new contexts.

Following SCT, we focus on learners' experience with ICT and virtual competence, which we felt were engaged in psychological processes during e-learning. While they contribute to the understanding of the determinants of e-learning outcomes, one may develop insight into the individual psychological factors important to e-learning.

**3. Research model and hypotheses**

Fig. 1 indicates the position of our research in Alavi and Leidner's framework. In the context of e-learning, we were particularly interested in prior experience with ICT and the development of virtual competence to guide cognition and learning activities that enhanced learning outcomes. Therefore, we held external factors constant and tested the factors and relationships shown in the solid lines. Fig. 2 shows our research model with hypotheses.

*3.1. Experience with ICT and e-learning outcomes*

We investigated individual psychological processes with a focus on learning outcomes because they are the ultimate goals of people in learning environments. Such outcomes have generally been measured by an individual's learning effectiveness and satisfaction; these outcomes are usually highly correlated, but not always. For example, people may learn effectively but be unsatisfied because the material did not achieve what they expected. Thus, we believed they tap into different aspects of learning outcomes and included both as dependent variables.

We highlighted a learner's ICT related experience as important in influencing the outcomes due to the technology aspect of e-learning. Learners with experience in Web-based courses are likely to embrace the learning process, thereby enhancing their learning outcomes [21]. On the other hand, a lack of ICT experience and skills may hinder e-learning; without some ICT experience, learners may suffer from anxiety and be unable to function properly [15]. Generally, individuals with more ICT experience tend to perform better.

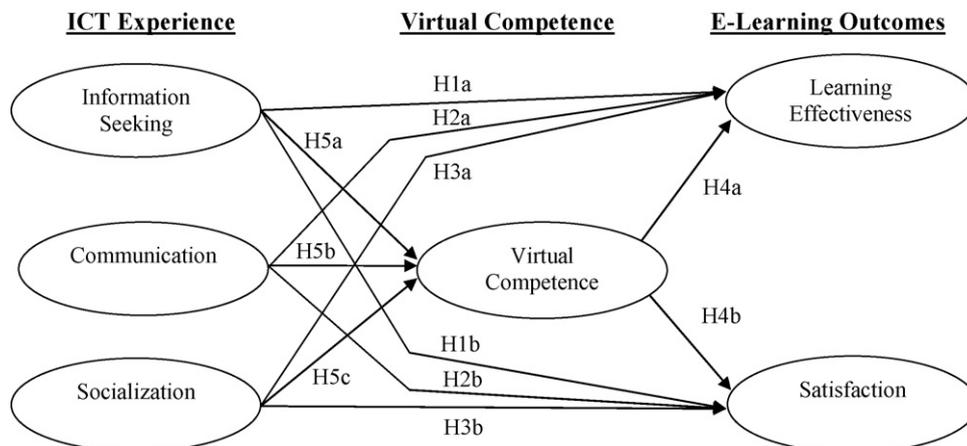


Fig. 2. Research model.

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