ABSTRACT

This study explores the mediating role of knowledge update in the context of an ERP simulation game, i.e. a gamified simulation system for ERP training. Based on the expectancy-confirmation model, this study suggests relationships among individual efforts, perceived knowledge update, and involvement, which finally influence willingness to learn ERP systems. The hypotheses were tested using 166 subjects who participated in an SAP ERP simulation game. This study finds the significant effects of individual efforts on perceived knowledge update and involvement. In addition, perceived knowledge update significantly influences involvement and willingness to learn ERP systems.

KEYWORDS: Expectation confirmation model, Knowledge Update, Involvement, ERP Simulation Game, ERP Training

INTRODUCTION

The implementation of an enterprise resource planning (ERP) system is one of the more popular and radical organizational changes that can result in significant modifications to nearly 30% of key routines in contemporary firms (Davenport & Beck, 2013; Herold, Fedor, & Caldwell, 2007; Jarvenpaa & Stoddard, 1998). Some other estimates also show high adoption rates of ERP systems, such as 75 percent among service oriented companies, 60 percent in medium to large manufacturing firms, and 80 percent among Fortune 500 firms (Phelan, 2014). Prior studies have found that ERP systems result in multiple benefits including lowering costs and reducing inventories, enhancing firm’s productivity (Olson, 2003), improving in operational efficiency (Benders, Batenburg, & Van der Blonk, 2006; Häkkinen & Hilmola, 2008), gaining competitive advantage (Beard & Sumner, 2004), and promoting internal resources’ restructuring (Stratman, 2007). In addition, past research highlights the critical role of ERP systems as organizational resources and indicates their importance in designing the information system of a company (Ko, Kirsch, & King, 2005; Xu & Tian, 2014).
In order to maximize the benefits of implemented ERP systems, it is crucial to enhance individuals’ expertise and skills in employing such systems by providing proper training (Gardiner, Hanna, & LaTour, 2002); since, ineffective utilization of systems is mainly due to insufficient training (Zinner Henriksen & Viborg Andersen, 2008). The importance of training has been found to have significant effect on the success of IS systems (Chou, Chang, Lin, & Chou, 2014). Especially in the case of ERP systems, users have to learn both a new package, and also a totally novel way of conducting business. In a recent study Sykes, Venkatesh, and Johnson (2014) found support for this argument contending that for maximal benefit, organizations could design training interventions and support services so that the early focus is on the technical side of the systems, with later stages focusing on routines and processes.

In the last decade, researchers have encouraged the use of simulation games for the purpose of learning and instruction (Hainey, Connolly, Stansfield, & Boyle, 2011; Kebritchi, Hirumi, & Bai, 2010). Anecdotal and empirical findings suggest that computer-based simulation games are effective for enhancing employees’ skill sets. Companies like Canon and Cold Stone Creamery developed simulation games to teach to their employees various technical and managerial skills. Employees who played the game obtained training assessment scores 5% to 8% higher than those trained with older techniques, such as manuals (Sitzmann, 2011). Learning the concepts and developing competencies underlying an ERP system is a difficult task. Researchers found that adopting a learning-by-doing approach through employing simulation games to train ERP users is an effective method (Léger et al., 2011). This process focuses on guiding the learning experience in a situated context through a series of realistic and potentially complex open-ended problems. Such problem-based learning motivates the participant to gain a set of competencies by actively resolving the task (David Merrill, 2007).

The ERP simulation game (ERPsim) has been designed based on the concept of situated cognition. Research results in this area suggest that such a realistic learning environment is associated with higher levels of learner involvement and motivation, which leads to higher understanding and better knowledge transfer (Lave & Wenger, 1991). An active learner is highly involved, and plays a dynamic and self-motivated role in how and what needs to be learned (Trigwell, Ellis, & Han, 2012). Prior research has found that simulation games improve the learning process of individuals by promoting their psychological involvement (Anderson & Barnett, 2011). However, the complexity of ERP systems limits the amount of knowledge those users can absorb before they actually use an ERP system (Yi & Davis, 2003). Users have to continue to learn in order to obtain the knowledge and skills required for effective ERP usage.

The key objective of the study is to examine the shift of individual’s knowledge perceptions from the pre-training to the post-training stage in order to understand the user’s belief change. In doing so, the study highlights that limited attention has been given to users’ perceptions of knowledge update offered by the IT artifact in prior longitudinal studies. We defined perceived knowledge update as individuals’ perceptions of their improved abilities to perform their daily work using the ERP system after taking the relevant training programs. Although, perceived knowledge and training were found to promote an individual’s ability in performing challenging tasks (Torkzadeh, Pflughoeft, & Hall, 1999), there has been little research on how updated knowledge leads to continuous learning intentions and what determines individual’s perception of knowledge update in ERPsim setting. In other words, the difference between an individual’s knowledge about ERP before attending an ERPsim training session and after that, as we argue, has positive relationship with learning behaviors.

Given the above noted research gaps, our study answers the following questions: What does influence a user’s perception of knowledge update? What are consequences of perceived knowledge update? To answer the research questions, our model is based on the expectation-
confirmation model (ECM) (Bhattacherjee, 2001), which was used as an analytical lens to explain how an individual’s judgment of his/her improved knowledge affects his/her involvement, which in turn influences continuance intention. As ECM highlights the prominence of both pre and post behaviors of individuals on their subsequent usage behaviors, we recognize the variance of pre and post knowledge levels, and test the level’s central role on learner’s post training behavior.

The paper is organized as follows. First, we provide the theoretical background for the study. Next, we present the research hypotheses and methodology for our research followed by the analysis and the results. Finally, we conclude with a discussion of research findings and implications for theory and practice.

BACKGROUND

In the early stage of an ERP implementation, i.e. acceptance of system phase, employees begin to learn and understand how to apply the new technology to the updated work practices. Through the accumulation of relevant skills in early stages, individuals are able to use the system in a more sophisticated manner. A successful learning process provides them with the ability to exploit the fullest potential of the ERP, and to innovate with the system to meet existing needs and apply them to new job demands—in the later stages of ERP usage. Highlighting the importance of the learning outcome of ERP, this study explores the importance of knowledge update and identifies its antecedent and consequences in the context of an ERP simulation game.

Expectation–Confirmation Model

Individuals are likely to engage with a new technology if they perceive that the new system has benefits for them. If potential users understand that the technology is useful for them, they will more likely accept and use it in the future (Bhattacherjee, 2001). In the literature, the intent to adopt again is referred to as continuance intention. The expectation-confirmation model (ECM) has been widely employed to examine continuance intention. Originally, ECM was drawn upon expectation confirmation theory (Oliver, 1980), the technology acceptance model (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) and the theory of planned behavior (Fishbein & Ajzen, 1980). The above-mentioned theories focus on the motivations of users in accepting a new technology, instead of continual usage of that technology. Deriving from these theories and consumer behavior literature ECM focuses on three main variables—expectation, satisfaction and confirmation in determining continued usage intention (Bhattacherjee, 2001). This model suggests that that initial use does not automatically result in continued use, which has a more vital role in determining the success of a system than initial use. Confirmation indicates a cognitive belief that is salient to Information System (IS) usage. It is defined as the degree to which an individual’s initial expectation about the performance of a system is being confirmed after having an experience with the system (Bhattacherjee, 2001). Confirmation describes individual’s affective state and is the consequence of a cognitive assessment of the potential discrepancy between initial expectation and experienced performance. Individuals in the later stage form a level of satisfaction based on their degree of confirmation and expectation on which that confirmation was established. Finally, all these interactions may lead to continued and repeated usage of a system. In sum, the difference between expectations (pre-usage) and perceived benefits (post-usage), determines the confirmation or disconfirmation level, which consequently affects satisfaction and usage continuance behavior.
The ECM and its adaptations have been applied to a variety of technology-related contexts (Brown, Venkatesh, & Goyal, 2012; Stone & Baker-Eveleth, 2013). Moreover, the ECM has been used to improve our understanding about the role of the technology on learning as well as adoption. For example, Limayem and Cheung (2008) included information system habits in ECM and studied their interaction with continuance intentions in context of Internet-based learning technologies. Furthermore, Wu, Tsai, Chen, and Wu (2006) surveyed continuance of e-learning technologies by integrating computer self-efficacy into the ECM and found a significant relationship between elements of the model and self-efficacy. Likewise, in an e-learning context it was found that the components of perceived performance, usability, quality, and value influence satisfaction and consequently intention to continuance and ultimately intention in an e-learning environment (Chiu, Hsu, Sun, Lin, & Sun, 2005). Upon realizing the above applications of the ECM from the literature to a variety of technology environments, we grounded our argument mainly based on ECM. In doing so, we adopted and contextualized the main relationships of ECM elements into our study’s setting, an ERP simulation game, and proposed a model.

**Perceived Knowledge Update**

The critical issue pertains to the assessment of how user perceptions about knowledge of a new system evolve over time. Prior studies on information systems acceptance have relied on the technology acceptance (TAM) and expectancy confirmation models in order to understand the change in user perceptions. They highlight the belief change process as the core theme and propose that a better understanding of how user beliefs evolve from the pre-usage to the post-adoption stage is critical (Kim & Malhotra, 2005). TAM related studies show that the influence of perceived usefulness on intention to use persists at the post-adoption stage (Venkatesh & Davis, 2000). ECM delves deeper into the belief change process and proposes confirmation as an intermediate process between pre-usage and post-adoption perceptions regarding IS (Bhattacherjee & Premkumar, 2004). In the context of learning the confirmation can be assessed through evaluating the difference between individual’s knowledge improvement perceptions. In fact confirmation happens when people’s perceptions on their post knowledge has been improved considerably compared to their prior training/usage knowledge perception. In other words, after the users gain firsthand experience by using ERPsim; their succeeding knowledge perceptions are revised to achieve better alignment between initial expectations, formed by their levels of effort, and beliefs after the actual use experience.

In the same vein, Kim et al. (2005) suggest that the belief change process may be established through a sequential updating mechanism, which is grounded on the premise that a user’s perceptions are updated in the context of prior perceptions. The sequential updating mechanism proposes that post-adoption perceptions are a function of pre-adoption perceptions. The basic beliefs are updated based on new information that is now available.

The literature review highlights two important gaps. First, special attention needs to be given to user knowledge perceptions regarding IS features that determine further intentions of users. Most prior studies focused on aggregate usefulness perceptions. The approach proposed in the study offers a more granular assessment of perceived knowledge as an influential determinant of individual learning behaviors in the context of ERPsim. Second, limited research focuses on how users’ perceptions change over time as they gain experience in utilizing a system. Therefore, by defining perceived knowledge update as the difference between pre-training and post-training knowledge levels of a learner, we attempt to investigate the mechanism, which leads from perceived knowledge update to repeated learning behaviors.
RESEARCH MODEL AND HYPOTHESES

The ECM is grounded on the relationship among an individual's effort, the individual's performance, and the attractiveness of outcomes and consequences associated with high performance. Hence, this model involves determining whether putting effort into a task will lead to high perceptions of performance and confirmation, and determining whether successful performance will lead to the desired outcome in terms of satisfaction and continual usage (Oliver, 1980).

Drawing on the background literature reviewed above, we provide the research model underlying our study in Figure 1. The specific hypotheses are discussed below. Adapting ECM into the context of an ERP simulation game, we may observe similar patterns and relationships. As the learners put effort into engaging with system, they build some levels of expectations about the impact of the simulation game on their skills. In the case of perceived improvement (confirmation) in their knowledge to use ERP systems, they will be satisfied, as ECM posits. In our setting, such satisfaction will be translated into the involvement of learners, which results in continuance learning of the system by the individuals.

According to MacInnis and Jaworski (1989) there are several levels of cognitive efforts in information processing, which demonstrate the degree of cognitive effort on the side of the individual. At higher levels of motivations to process information users employ more cognitive capacity and try to integrate their own prior knowledge and experience to the message (i.e. training in our context), also they add positive or negative attributes to the it, which activates a more effortful route of processing the message. We may apply the elaboration likelihood model (ELM: Petty & Cacioppo, 1986) to describe how individuals who spend more cognitive resources and capabilities are likely to experience higher levels of knowledge update. As ELM posits that the nature of the message determines the strength and persistence of its consequences. In the case of higher individual effort, an individual's information processing mechanism will activate higher cognitive levels by going beyond simply paying attention or comprehending the argument in the message. Such elaborative processes involve generating updated judgments in response to the information to which the learner is exposed.

Figure 1: Proposed Model

In the context of ERPsim training and adapting the ELM, we argue that individuals with motivation and ability put more effort to process the external information. Likewise, they
consider and evaluate the details of the arguments presented to them during the learning process, which results in creation of evaluative perceptions on the acquired knowledge through central processing. Whereas, those who engage in the training due to lack of time or resources may employ lower levels of their cognitive capacity to treat the information and arguments. In this case, they will rely on their judgments on the peripheral route, which is less stable, less persistent, more prone to counterinfluence, and less predictive of long-term behaviors (Petty & Cacioppo, 1986).

Contextualization of these notions to the setting of our study, we argue that if learners invest the necessary effort to adequately scrutinize and evaluate the provided information, which reflects their level of effort in learning the new skills, they will view the acquired knowledge as being relevant and important to the target behavior and they will more likely to have higher perceived knowledge improvement. Thus, we hypothesize that:

**H1**: Individual effort will be positively associated with perceived knowledge update.

Past studies found that simulation games improve the learning process of individuals by promoting their psychological involvement (Anderson et al., 2011). Moreover, higher levels of involvement in the learning process positively impacts individual’s understanding and promotes knowledge transfer (Lave et al., 1991). Through applying ELM and ECM we attempt to describe the association between effort invested by a person on acquiring new skills and the psychological involvement in the learning process.

According to ELM, information recipients can vary widely in their ability and motivation to elaborate on an argument’s central merits, which in turn may constrain how a given influence process impacts their attitude formation or change. Thoughtful evaluation of information will activate the central processing route (Petty et al., 1986), in which the learner processes the relevant information at higher cognitive levels. Activated central processing requires that a larger portion of the cognitive capacity of an individual needs to be engaged in scrutinizing the arguments and information. This mechanism generally results in more stable and enduring attitudes. Relating this notion to the ERPsim we need to underscore its design specifications, which are based on the concept of situated cognition. By focusing on realistic and situated context, ERPsim provides a learning process in which individuals can identify more relevancies of communicated information. As they invest more cognitive effort to process the information, the probability that they find more connections between the arguments and prior experience and knowledge is higher, which in turn may increase the participant’s involvement (i.e. motivation in the context of ELM) in the process of learning. An active learner is emotionally and cognitively involved, and plays a dynamic and self-motivated role in how and what needs to be learned (Trigwell et al., 2012).

According to ECM, user expectation is positively related to user satisfaction. The model contends that expectation is another determinant of satisfaction, because expectation provides the reference level or baseline for individuals to form evaluative judgments about the focal product or service (Bhattacherjee, 2001). ECM posits that a high baseline level or expectation tends to enhance an individual’s satisfaction, while low expectation shrinks resulting satisfaction. Similarly, marketing studies found that apart from the association between expectation and perceived performance, which determines confirmation, expectations (i.e. individual effort) also effect customer satisfaction (Spreng & Chiou, 2002). Drawing on this argument, a recent study of multimedia web sites found that extensive effort leads users to involve and interact more with the content of web sites (J.-S. Lim, Al-Aali, Heinrichs, & Lim, 2013). Thus, involvement may be seen in relation to the level of motivation of the individual in putting effort into learning a new skill. Based on above arguments we hypothesize that:
**H2:** Individual effort will be positively associated with involvement with the ERP simulation game.

Research on behavior changes (Bandura, 1997) posits that individuals’ behavior is affected by their judgments of their skills and capabilities to perform a given task. It discusses that psychological procedures alter expectations of personal perceptions of abilities. Moreover, it describes the procedure of determining what actions to take, how long to preserve, and what strategies to apply when individuals attempt to balance their abilities with the challenges of a task. Consistent with Bandura’s self-efficacy theory, when individuals feel a sense of mastery in a domain, they tend to believe that they can achieve a desired performance level. Hence, higher perceptions of knowledge improvement may lead to higher degrees of perceived capability for ERPsim players. This argument has been validated by empirical studies in a variety of contexts including IS and acceptance of technology (Agarwal & Karahanna, 2000). In the context of IS, researchers (Mun & Hwang, 2003) suggest that individuals with higher degrees of self-efficacy usually form more positive perceptions of IT and have higher levels of pleasure, which lead to subjective perceptions of positive affects and satisfaction (Lim, Pan, & Tan, 2005). By finding the difference between self-efficacy levels of learners at two different times, i.e. prior and after conducting the ERPsim, we created a perceived knowledge improvement construct, which is representing the confirmation notion of ECM. Therefore, drawing on the above-mentioned arguments we hypothesize that:

**H3:** Individual’s perceived knowledge update will be positively associated with their involvement with the ERP simulation game.

The difference stemming from different levels of self-efficacy is all the more apparent in the ERP context because of the renowned complexity of an ERP system makes users feel that it is difficult to learn. Whereas, individuals with higher degrees of belief in their abilities tend to both have a higher intention of using an IS and actually use the IS more frequently (Compeau, Higgins, & Huff, 1999). In a learning context, it was found that self-efficacy motivates individuals’ learning intentions through the self-regulatory processes, such as self-evaluation, goal setting, and self-monitoring (Zimmerman, 2000). Similarly, in a recent study of the role of self-efficacy in ERP learning Chou et al. (2014) found that post-training self-efficacy significantly facilitates ERP learning outcomes, in particular, they identified that higher self-efficacy increased learning willingness and learning capability.

Furthermore, Bandura (1982) indicated that self-efficacy influences individuals’ choice of activities and skill acquisition strategies. Put it differently, an individual with high self-efficacy will be more willing to work harder in a committed way in order to acquire a skill and also will be emotionally more stable in case of any obstacle (Bandura, 1997). Translating those findings into the setting of this study, we claim that those with high perceptions of knowledge improvement and ability (i.e. a greater difference between pre and post ERPsim self-efficacies) will exhibit more tendencies to learn challenging concepts in a more persistent way. In contrast, individuals with lower perceptions of knowledge improvement will experience more anxiety and frustration, and consequently exhibit less determination in learning a challenging task (i.e. ERP system) and will consequently have lower levels of learning intentions. Hence, we hypothesize that:

**H4:** Individual’s perceived knowledge update will be positively associated with willingness to learn.

User involvement found to be a strong predictor of continuance intention (Shiau & Luo, 2010). Empirical evidence in the simulation game field suggests that players who experience higher levels of involvement during a game will have increased learning (Sitzmann, 2011). Likewise, in the ERP setting involvement is posited to be positively related to usage intention (Amoako-Gyampah, 2007). In the same vein, previous research suggested a direct connection between
affective and cognitive dimensions of attitude and intention to use (Lee, Chen, & Ilie, 2012; Van der Heijden, 2004). The theory of reasoned action (Fishbein & Ajzen, 1975) and the technology acceptance model (Davis, 1989) also supported these relationships. Moreover, in the IS learning setting, some recent studies found that learning intention will be increased by the large amount of time spent navigating in the software as well as by the high level of motivation and involvement in the activity displayed by learners (Wrzesien & Raya, 2010). Thus, we hypothesize that:

**H5**: An individual’s involvement with the ERP simulation game will be positively associated with willingness to learn.

### METHOD

#### Sample and Procedure

An experimental study in a controlled environment was chosen to simulate an authentic integrated business process supported by a real ERP system (i.e., SAP). Students who took an introductory level of IS class at a large Midwestern public university participated in this game as a part of the course requirements. A total of 166 undergraduate students from 6 classes participated. In each class, the participants were randomly assigned to eight teams of two to four students. The sample was composed of approximately 38% females and the average age was 20.5 years.

The research methodology involved the use of simulation game called ERPsim (Léger, 2006; Léger et al., 2011), designed to recreate a realistic business context and manage the main business processes of an organization using the ERP system SAP. Several similar studies have used this ERP simulation (e.g. Caya, Léger, Grebot, & Brunelle, 2014; Cronan, Léger, Robert, Babin, & Charland, 2012). Within this overall product (ERPsim) there are several different ERP simulation games (e.g., distribution game, logistics game, and manufacturing game), we chose the basic distribution game because student participants had little previous knowledge and experience of ERP simulation games or ERP systems.

None of the subjects had any previous experience with the system and all attended the same ERP training session. In this way, we were able to isolate the effect of prior experience of individuals on the relationships, which we were testing. One week before the experiment, the participants were asked to complete the pre-test survey that measured their prior knowledge about ERP systems.

A threat to internal validity may occur when we assigned different participants to different teams, with different team sizes, and in different classes, which could produce groups of individuals with noticeably different characteristics. Hence, we checked assignment bias to rule out this possible confounding effect, and found that there were no significance differences in knowledge of ERP systems across six classes (F = .537, P = .780) and team sizes (F = .761, P = .469), suggesting there was no assignment bias.

#### Construct Measurement

The measurement items used in this study were adapted from previous studies as shown in Table 1.
Data Analysis and Results

We used structural equation modeling (SEM) to analyze the proposed model. SEM is a flexible technique, applicable to both experimental and non-experimental data (Kline, 2011). Regarding the degree of complexity of the proposed model, we argue that SEM will provide a more accurate analysis. To conduct SEM, we used AMOS 22.0 since it allows us to simultaneously calculate the model parameters and it also takes into account measurement errors for each indicator, which improves its accuracy (Kline, 2011).

Table 2: Confirmatory Factor Analysis Results

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Mean</th>
<th>SD</th>
<th>CR</th>
<th>AVE</th>
<th>Factor Loading Ranges</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Individual Effort</td>
<td>5.94</td>
<td>.97</td>
<td>.93</td>
<td>.81</td>
<td>.72-.86</td>
<td>.90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Knowledge Update*</td>
<td>1.31</td>
<td>1.70</td>
<td>.85</td>
<td>.65</td>
<td>.88-.95</td>
<td>.44</td>
<td>.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Involvement</td>
<td>5.33</td>
<td>1.35</td>
<td>.94</td>
<td>.85</td>
<td>.87-.94</td>
<td>.33</td>
<td>.29</td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>(4) Willingness to Learn</td>
<td>5.01</td>
<td>1.46</td>
<td>.93</td>
<td>.81</td>
<td>.87-.94</td>
<td>.67</td>
<td>.34</td>
<td>.37</td>
<td>.90</td>
</tr>
</tbody>
</table>

*Knowledge Update = Difference between post-knowledge and pre-knowledge

Square-root of AVE values represented along the diagonal

Measurement Model

Before analyzing the structural model, a confirmatory factor analysis (CFA) was conducted, in AMOS, to check the reliability and validity of the constructs. Composite Reliability (CR) is
commonly used to check the internal validity of the construct. Table 2 shows the CR values of the measurement items in the research model. All have CR's greater than 0.7, which is the normally agreed upon minimum value (Hair, Black, Babin, & Anderson, 2010). As shown in Table 2, average variance extracted (AVE) values are greater than 0.5, indicating that the model has convergent validity (Fornell & Larcker, 1981). Discriminant validity was assessed by the square root of AVE for each construct exceeding the construct's correlations with other constructs (Chin, 1998). As demonstrated in Table 2 the constructs discriminant validity can be concluded as acceptable.

To evaluate the results of the CFA, we checked several commonly used goodness-of-fit indices (Table 3). As can be seen in Table 3, all tested indices of the model for both measurement and structural models were satisfactory (Hair et al., 2010).

| Table 3: Goodness of Fit Indices |
|-------------------|-----------------|----------------|----------------|-----------------|------------------|-----------------|
| Good Model Fit Ranges | $\chi^2$(DF) | $\chi^2$/DF | GFI | AGFI | NFI | CFI | SRMR | RMSEA |
| Measurement Model | 64.08(48) | 1.34 | .94 | .91 | .96 | .99 | .036 | .045 |
| Structural Model | 117.32(79) | 1.19 | .92 | .88 | .93 | .98 | .066 | .054 |

**Structural Model**

We tested the hypothesized causal relationships among the constructs of the model. The created model yielded a good fit to the data (See Table 3). Figure 2 shows the path diagram for the model as well as the estimated standardized parameters for the causal paths, the square multiple correlations and the level of significance of constructs. The findings of this study support the conceptual model where all the hypotheses were supported.

**Figure 2: Results of Structure Model**

- Individual Effort
  - Knowledge Update 8.8%
  - Involvement 23.9%
  - Willingness to Learn 47.5%
- Controls
  - Gender: -.10 (ns)
  - Age: .01 (ns)
  - Previous ERP Learning: .11(ns)

** p<.001; * p <.01
On the path from individual effort to perceived knowledge update the coefficient is .30 (p < 0.001), to involvement the coefficients is 0.38 (p < 0.001). These coefficients, thus, support H1 and H2. The results indicate that knowledge update has significant effect on involvement (β = .21; p < 0.01), and on willingness to learn (β = .20; p< 0.01), which support H3 and H4. And finally, the relationship between involvement and willingness to learn is also significant with a positive coefficient of 0.58 (p < 0.001), supporting H5.

The structural model shows that individual effort explains 8.8 percent of the variance in perceived knowledge update, and those two variables together explain 23.9 percent of the variance in involvement. Lastly, 47.5 percent of the variation in willingness to learn was jointly explained by perceived knowledge update and involvement.

DISCUSSION AND CONCLUSION

Implications for Research

The results of this study contain several implications for researchers. The empirical findings demonstrate that employing perceived knowledge update and individual involvement would be a worthwhile extension of the ECM, as both were found to be influential in predicting behavioral intention of further learning. Specifically, alongside IS users’ belief (i.e. perceived knowledge update), individual involvement has a strong influence on intentions.

Our findings add to the concept of belief updating by defining a new construct, which measures the variance between prior and post training knowledge. This way we recognize the role of knowledge update in the process of ERPsim training. Hence, a primary contribution of this study is that it extends the temporal notion of user's perceptions, through defining and empirically testing the new concept of perceived knowledge update. Such an addition provides insights on the temporal change in user’s cognitions, as ECM discusses.

We made reference to the ELM to explain the effect of individual’s motivation and ability in processing the external information. By testing individual effort as the antecedent of knowledge update and involvement, we provide insight on how individuals who spend more cognitive resources and capabilities are likely to experience higher levels of knowledge update and involvement. These two constructs have been used in the study to represent the concept of elaboration likelihood, which suggest that people add something of their own to the specific information provided in the communication (Petty et al., 1986).

Implications for Practice

ERP systems are typically complex in nature; and hence, their users have to acquire new knowledge and skills to perform their jobs, presenting them with more challenges than those presented in legacy systems (Morris & Venkatesh, 2010). As a result, it is desirable for managers to encourage individuals with higher cognitive competencies to interact more with the system. Based on our findings, managers may consider adapting specific incentives and rewards for their target employees in order to motivate them to employ higher levels of effort in learning the new systems. Since, higher effort will boost their self-knowledge perceptions and depth involvements, which in turn results in repeated learning and usage of the ERP system.

Further, to get the users excited about the new system and ensure its sustainability it is important to design proper training courses which maximize the gap between learner's pre and post knowledge about the a new system at the post-adoption stage. In other words, recognizing the role of knowledge update, employees should be exposed to the levels of information, which
considerably increase their post training knowledge perceptions in order to enhance both involvement and continual usage behaviors. For example, by offering more customized and timely training courses for individuals who are classified based on their prior knowledge levels, through re-activation of cognitive effort, learners will experience a higher level of knowledge update and involvement intensities.

In the effectiveness of simulation game in learning, the current study shows that ERP simulation could be a useful tool to develop interventions that improve user’s perceptions and attitudes. As the number of schools using ERP to integrate their business curricula is increasing (Cronan et al., 2012), designers of similar simulation games should emphasize the features of the game that infuse high positive perceptions and beliefs, the factors which affect the success of a new system implementations in industry.

Limitations

Some limitations of the study should be noted. The study may lack external validity in the subjects and setting. We used student subjects from a large public university, and conducted controlled lab experiments. Although student subjects likely represent the target population of the phenomenon being examined, additional studies with actual customers in real e-business environments are needed to strengthen the generalizability of our findings. Second, we used self-reported measures to assess acquired knowledge and skills, which might be affected by self-presentation bias. However, such measures are frequently used in prior research mainly for practical reasons.
REFERENCES


