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Cognitive engagement with a multimedia ERP training tool: Assessing computer self-efficacy and technology acceptance

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ABSTRACT

Computer self-efficacy (CSE) is a person's judgment of his or her ability to use a computer system. We investigated cognitive engagement, prior experience, computer anxiety, and organizational support as determinants of CSE in the use of a multimedia ERP system's training tool. We also examined the impact of CSE on its acceptance. We determined the benefits of a sequential multi-method approach using structural equation modeling and neural network analysis. High reliability predictions of individual CSE were achieved with a sequential multi-method approach. Specifically, we obtained almost 68% perfect CSE group prediction overall, with almost 85% perfect CSE group prediction using fuzzy sets and over 94% accuracy within one group classification. The resulting CSE assessment and classification enables management interventions, such as allocating users to appropriate instruction for more effective training.

1. Introduction

ERP systems are deployed in over 70% of all U.S. medium to large corporations; they spent about $51 billion on formal training in 2004 and 38.4% of that was for end-users. End-user training normally accounts for 30% of ERP project costs, but organizations that spend less than 15% are likely to have inadequately trained users resulting in implementation delays and escalating costs. However, very little research has focused on the use of multimedia technology for training. Given this gap, we decided to investigate user engagement and acceptance of a multimedia ERP training tool.

We built on past research by incorporating user engagement in TAM. In fact, perceived ease of use (PEOU) is strongly anchored to general beliefs about computers, such as CSE, an individual self-assessment of ability to use a computer. Low CSE may hinder computer learning. Consequently, assessing CSE and its determinants could help an organization understand the role of PEOU on acceptance of a multimedia ERP training tool.

The training tool we tested was professionally produced for an ERP vendor; it included movie clips, audio enhanced presentations and screen cams. Prior research had suggested that experience, computer anxiety (CA), and organizational support were important antecedents to CSE, though empirical results had shown inconsistency. We analyzed this and proposed cognitive engagement as a critical determinant of CSE in the use of a multimedia-training tool. Therefore, our goal was to improve understanding of the role of multimedia technology in user engagement during ERP training and to assess CSE as potential inhibitors or enablers of the use and acceptance of a training tool.

Our research questions were: (1) "Does engagement influence CSE?," (2) "What other factors affect CSE?," (3) "Does CSE in a multimedia ERP training context affect system acceptance?" and (4) "How can CSE classification be derived from engagement and support measures?".

To examine these questions, we employed two analytic methods, with the results from the first, SEM, feeding into a neural network analysis, NN. This was therefore a sequential multi-method research design. SEMs strength in path analysis was used to help answer the first three research questions while NNs strength in classification was needed to answer the last question. Since different analytic methods focus on different aspects of reality, a richer understanding of the topic could be gained by combining methods. Mingers advocated that research situations were inherently complex and multidimensional and would benefit from a range of methods [18]. By combining methodologies we can develop a method where "the advantages of one analysis technique offset the disadvantages of another" [4].

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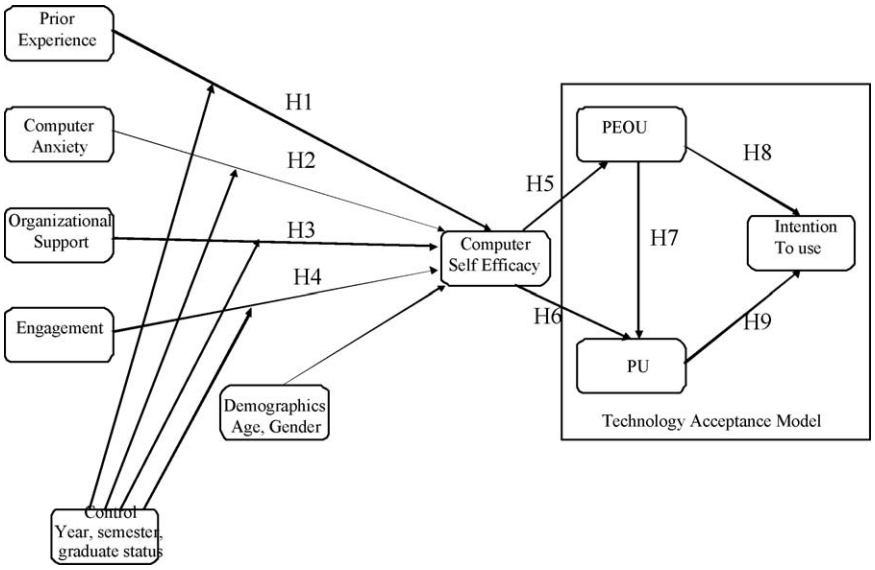

Fig. 1. Antecedents to computer self-efficacy model.

2. Conceptual development

CSE is personal judgment of ability to use a computer. Obviously it is affected by the users' perception of the task and the training received [17]. CSE is thus influenced by expectations of the outcomes of using a computer, and emotional reaction to the activity [8]. CSE predicts user acceptance of the Internet and perception of multimedia-training effectiveness. Judgments of self-efficacy serve as key antecedents of PEOU. Similarly, initial general CSE belief will strongly predict subsequent *specific* CSE belief [3] and an individual's PEOU of a particular system affects his/her general CSE. Empirical results show CSE is one of the strongest factors of use.

In our study we focused on CSE as a malleable state that was an outcome of using the training tool.

2.1. Antecedents to CSE

Prior research has identified prior experience, CA, organizational support and constructs related to engagement as antecedents to CSE. See Tables 1–5 for references. Individuals vary in these factors, while organizations vary in the amount of support they provide to users.

CA and cognitive engagement (sustained attention to a task requiring mental effort, intrinsic interest and curiosity) are associated with emotions. On the other hand, absorption, enjoyment and playfulness may satisfy basic human needs for competence and autonomy. Intrinsic motivation makes the activity interesting and likely to be performed for its own sake. In contrast, social influence, such as organizational support is a form of extrinsic motivation, because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity.

The model for our study and its hypotheses are shown in Fig. 1. We hypothesized that one can predict the CSE outcome from four antecedents: prior experience, CA, engagement with the system, and organizational support. We controlled for demographic (age and gender) and data collection variables.

2.1.1. Prior experience

We hypothesized that if the prior experience was relevant and involved enactive mastery then:

Table 1
Prior experience as an antecedent to computer self-efficacy.

Computer experience measures	Study and findings
My past performance with computers has been good; My past experience with computers has been good; My past attitude toward computers has been positive	Results are significant at $p < 0.01$ [21]
Windows 95; Windows 3.1; DOS; and PC experience	Affects general CSE ($p < 0.05$) not Specific CSE (Windows 95 & Lotus 123) [3]
Not explicitly measured; coded at point of measurement	Experience makes a difference [26]
10 questions on different software and Excel skills	Results significant $p < 0.01$; predicted Excel performance; gender insignificant [13]
Training experience in a computer course measured after 10–12 weeks.	Results were significant $p < 0.001$ No significant difference for gender [25]
Years computer experience Current computer use Prior computer courses completed	Results not significant; Relevance more important than quantity of experience [14]
Experience with Application systems; Word processing; Spreadsheets; Financial modeling software; 3rd generation language; 4th generation language; Requirements analysis	Overall experience was sum of 7 items and was significant $p < 0.01$ [12]
Performance in prior day's training on Word Perfect or Lotus 123	Significant only for Lotus 123 $p < 0.05$ [7]
Prior experience in using computer lab Two models compared experienced users to novices	Results showed experience moderates theoretical TAM linkages [23]