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Role of Computer Self-Efficacy in Predicting User Acceptance and Use of Information Technology

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Introduction

The productivity gains and organizational benefits expected to be delivered by information systems (IS) cannot be realized unless systems are actually used. The utilization of IS has been identified as one of the most critical issues among IS executives (Niederman, et al., 1991) and IS researchers (DeLone & McLean, 1992).

One important concept that can explain individual differences in IS acceptance and utilization of systems is computer self-efficacy (CSE), "a judgment of one's capability to use a computer" (Compeau & Higgins, 1995, p. 192). In this research, we review the different models that explain the role of computer self-efficacy in predicting user intentions and usage behavior, and attempt to integrate the conflicting models in a more coherent way.

Theoretical Development

Social Learning Theory (Bandura, 1977, 1986) posits that self-efficacy, a belief in one's capability to perform certain actions, is a major determinant of choice of activities, degree of effort, period of persistence, and level of performance in the face of challenging situations. In addition to the clinical settings to treat phobics (Bandura & Adams, 1977; Bandura, Adams, & Beyer, 1977; Bandura, Adams, Hardy, & Howells, 1980), many empirical studies have validated this proposition in a wide variety of settings such as employee attendance management (Frayne & Latham, 1987), idea generation among managers (Gist, 1989), complex decision making (Wood & Bandura, 1989), computer skill acquisition (Gist, et al., 1989; Mitchell, Hopper, Daniels, George-Falvy, & James, 1994), military volunteering (Eden & Kinnar, 1991), job search training (Eden & Aviram, 1993), and socialization training (Saks, 1995).

When we apply the concept of self-efficacy to understanding users' behavior in accepting IS, we may expect that an individual who has a strong sense of her or his capability in dealing with computers is more willing to accept and use the systems. This speculation has been tested and verified by some researchers (Compeau & Higgins, 1995; Hill, et al., 1987; Taylor & Todd, 1995; Venkatesh & Davis, 1994, forthcoming), but the way self-efficacy influences user intentions and actual use has been proposed differently across studies. Some found that CSE directly determines user intentions or use while others showed that it indirectly influences user intentions through mediating variables such as perceived behavioral control (PBC), which refers to people's "perceptions of internal and external constraints on behavior" (Taylor & Todd, 1995, p. 149) or perceived ease of use (EOU), "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p.320).

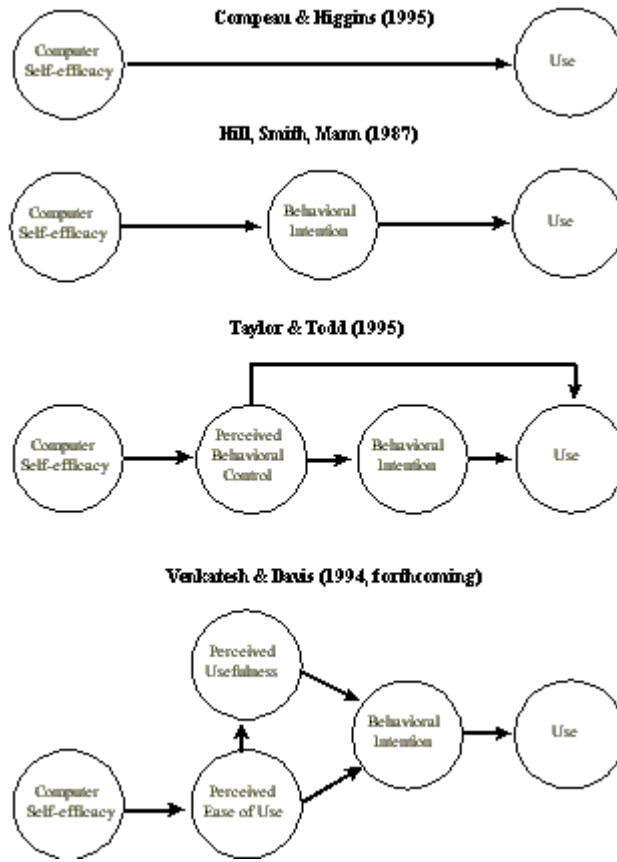
More specifically, Compeau and Higgins (1995) found that CSE was a significant determinant of IS usage and Hill, Smith, Mann (1987) reported that CSE was a significant determinant of behavioral intentions (BI), "a person's subjective probability that he will perform some behavior" (Fishbein & Ajzen, 1975, p. 288), to adopt computer technology, independent of beliefs regarding the instrumental value of using computers. Taylor and Todd (1995) developed a model in which CSE is a determinant of PBC, which in turn is a determinant of BI and usage and empirically validated the model. In a series of studies, Venkatesh and Davis (Venkatesh & Davis, 1994, forthcoming) studied and found a support for the role of CSE as an

antecedent and determinant of EOU. The variable EOU is a significant determinant of perceived usefulness (U), "the degree to which a person believes that using a particular system would enhance her or his job performance" (Davis, 1989, p. 320), and both variables are salient beliefs that determine BI according to the Davis, et al. (1989)'s Technology Acceptance Model (TAM). TAM posits that the impact of other external variables on BI is fully mediated by these two beliefs. Table 1 lists some of the variables that have been used in previous studies and Figure 1 shows the different roles of CSE that have been proposed. Some other variables in the models not directly related to the relationship between computer self-efficacy and behavioral intentions or use have been omitted.

Table 1. Some antecedents examined to explain IS acceptance and usage behavior

Variable	Definition
Computer Self-efficacy (CSE)	a judgment of one's capability to use a computer
Perceived Behavioral Control (PBC)	people's perceptions of the extent to which the resources and skills required are actually available
Perceived Ease of Use (EOU)	the degree to which a person believes that using a particular system would be free of effort
Perceived Usefulness (U)	the degree to which a person believes that using a particular system would enhance his or her job performance
Behavioral Intention (BI)	a person's subjective probability that he will perform some behavior

Figure 1. Models Explaining the Role of Computer Self-efficacy in User Acceptance Research



These conflicting models and findings indicate that, while recognizing the importance of self-efficacy in predicting user intentions, we are far from a complete understanding of how self-efficacy influences IS acceptance and use behavior. This research empirically compares the different models that have been proposed to explain the role of CSE in predicting users' intentions to accept information technology and examines the possibility of integrating these different models in a more coherent way.

Research Questions

1. Is there a direct impact of computer self-efficacy on users' intentions to use and actual use of technology over and above the impact mediated by other variables such as perceived usefulness, perceived ease of use and perceived behavioral control?
2. What is the relationship among the variables through which computer self-efficacy has been posited to influence users' intentions and actual use?
3. What is the most appropriate representation of the role computer self-efficacy plays in predicting user's technology acceptance and use behavior?

Integrated View of the Role of Computer Self-Efficacy

Significant evidence supporting TAM has been accumulated in MIS research (Adams, et al., 1992; Chin & Gopal, 1993; Davis, 1986, 1989, 1993; Davis, et al., 1989; Davis & Venkatesh, 1995, forthcoming; Hendrickson, et al., 1993; Mathieson, 1991; Moore & Benbasat, 1991; Olfman & Bostrom, 1991; Segars & Grover, 1993; Sjazna, 1994; Taylor & Todd, 1995; Trevino & Webster, 1992; Venkatesh & Davis, 1994, forthcoming). Thus, in our basic integrated view, we keep the basic hypotheses of TAM that U and EOU determine BI, which in turn determines usage behavior. In addition, we also hold on to the TAM hypothesis that EOU has an indirect effect on BI through U. Hence, the following links are retained.

EOU → U → BI

EOU → BI

BI → Use

Venkatesh and Davis (Venkatesh & Davis, 1994, forthcoming) have empirically demonstrated that computer self-efficacy is a significant determinant of EOU. The finding is consistent with TAM which posits that the impact of other external variables on BI is fully mediated by EOU and U. We retain that hypothesis in the integrated view. Thus, the link is as follows.

CSE → EOU

Taylor and Todd (1995) examined the role of self-efficacy as a significant determinant of PBC and found empirical support for the link. Thus, CSE is hypothesized to be a common determinant of EOU and PBC.

CSE → PBC

One unclear link in the Taylor and Todd's (1995) study was the PBC-BI and PBC-Use link. Previous research, including Mathieson (1991) and Taylor and Todd (1995), did not compare the link between PBC and BI to assess the explanatory power above and beyond the U-BI link. Given the strength of the U-BI link in TAM, it is questionable if the link between PBC and BI will be significant over and above the U-BI link. This also follows from the basic TAM notion that U and EOU will mediate the effect of external variables on BI. Thus, we expect no causal link between PBC and BI. However, we recognize the possibility of significant relationship between PBC and actual usage as suggested by Theory of Planned Behavior (TPB) (Ajzen, 1989). Thus, the possible link is as follows.

PBC → Use

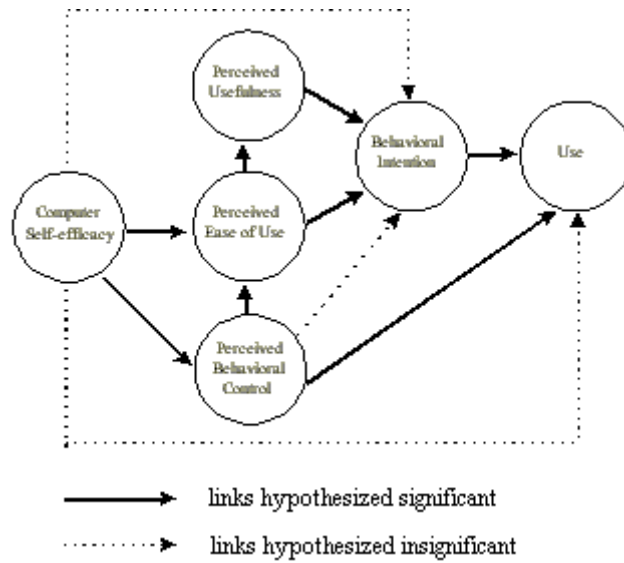
Although Mathieson (1991) claimed that PBC goes beyond TAM's EOU construct to consider other constraints on system use, he also acknowledged that people might have already taken resource availability and control issues into account when they respond to EOU items such as "I would find <particular system> easy to use." This interesting speculation has not been explicitly studied by previous research. Thus, the following link is hypothesized.

PBC → EOU

Further, prior research has not examined the extent of mediation of CSE by other constructs such as EOU and PBC. Compeau and Higgins (1995) established a direct CSE-Use link, and Hill, et al. (1987) an indirect CSE-Use link via BI. TAM posits, however, that the impact of other external variables on BI is fully mediated by U and EOU. Consistent with this viewpoint, we hypothesize that the impact of CSE would be completely mediated by PBC, EOU, and U.

Figure 2 depicts our proposed model. The model contains several links that have not studied before: 1) the role of PBC as a significant determinant of EOU; 2) the insignificant impact of PBC on BI in the presence of EOU and U; 3) the insignificant impact of CSE on BI and Use in the presence of PBC, EOU, and U.

Figure 2. Proposed Model



Method

The participants in this study are 94 part-time MBA students. Two E-mail systems are used in the study: Minuet and CC:Mail. All participants received five weeks of training, about 3 hours per week, on the two systems before filling out the questionnaire. The training was conducted by a person who had no knowledge of the research and its objectives. The measurement scales used in this study were drawn from past research. The constructs of U, EOU, and BI were measured by using the seven-point Likert scales adapted from Davis (1989). The construct of CSE was measured by using the scales developed by Compeau and Higgins (1995), and the scales used by Taylor and Todd (1995). The construct of PBC was measured by three items drawn from Taylor and Todd (1995). Data about usage behavior is still being collected using self-reports from subjects and actual usage data from system administrators and system logs. This will allow us, in the larger context, to examine the predictive validity of CSE.

Discussion

This research has significant implications for researchers. It extends previous studies by integrating different CSE models in user acceptance research and investigating the possibility of relating various variables in a more consistent way from the perspective of basic notions of TAM. This research also provides some valuable implications for practitioners because computer self-efficacy is an important factor that can be used as a leverage point in increasing user acceptance and use of technologies in the workplace.

References available upon request