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# THE ROLE OF GENDER AND PRIOR EXPERIENCE IN JUDGMENTS OF GENERALIZED COMPUTER SELF-EFFICACY

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## Abstract

*Computer self-efficacy is frequently used as an explanatory variable in software training and technology acceptance investigations. It has been frequently used to predict training and learning outcomes and some investigations have examined the malleability of computer self-efficacy in response to positive and negative training experiences. Computer self-efficacy models identify prior experience with computers as an important determinant of self-efficacy judgments; however, few studies have systematically examined this. Gender and frequency of computer use have been identified as other predictors of generalized computer self-efficacy. In this investigation, proficiency ratings on nineteen dimensions of computer knowledge are used to measure prior experience/knowledge of computers. These were collected from more than 300 university students at the same time that they completed an online generalized computer self-efficacy scale. This data is used to test two predictions: 1) that greater prior experience with computers is directly related to higher computer self-efficacy scores and 2) that for comparable levels of prior experience/knowledge, males will have higher self-efficacy scores than females. Preliminary results provide support for the first prediction but not the second. Initial results also suggest that less common types of prior experience/knowledge are especially important to self-efficacy judgments.*

**Keywords:** Computer self-efficacy, computer skill levels, gender differences

## Introduction

Computer self-efficacy has emerged in recent years as an important explanatory variable in studies of the effectiveness of software training programs (Campeau and Higgins, 1995). Originally developed in Cognitive Social Learning Theory (Bandura, 1986), the construct, with reference to computing, refers to an individual judgment of one's capability to use a computer (Marakas, Yi, and Johnson, 1998).

In recent years, some researchers have divided the construct of computer self-efficacy in two. Generalized Computer Self-Efficacy (GCSE) refers to an individual's judgment of efficacy across multiple computer application domains, and is associated with a lifetime of computing experiences (Marakas, Yi, and Johnson, 1998). Task Specific Computer Self-Efficacy (SCSE), on the other hand, refers to an individual's perception of efficacy in performing specific tasks within the larger general computing domain (Marakas, Yi, and Johnson, 1998), for instance, perception of one's skill level with respect to an individual software package. In the present research, the primary source of hypotheses will be GCSE, and its value as an explanatory variable. Self-reported proficiency levels for a variety of computer applications will be measured (see Appendix 1 for examples).

While the explanation of training outcomes (e.g., Hartzel, 2003; Quinonez and Guthrie, 2002), and the development of explanatory models (e.g., Campeau and Higgins, 1995; Gist and Mitchell, 1992; Johnson, 1998; Marakas, Li, and Johnson, 1998) for these outcomes have been the most popular topics within this research area, there is room for further research into the factors that contribute to the development of one's perceptions of computer self-efficacy.

## Background

Campeau and Higgins (1995), in their original model of computer self-efficacy, suggested that prior experience with computers plays a critical role in self-efficacy judgments. Henry and Stone (1995) found that providing opportunities for users to gain experience using a computer system had a positive effect on their computer self-efficacy and that initial negative impressions of the system can be very hard to reverse with subsequent training. This relationship has been empirically demonstrated in studies of computer use by teacher education students (Albion, 2001), in the effectiveness of computer based training in a general university population (Quinonez and Guthrie, 2002), and in the training and use of an individual software package in MBA students (Hartzel, 2003).

A second factor contributing to individual perceptions of self-efficacy is gender. While past research has suggested differences among men and women in their self-efficacy ratings, with men more likely to rate themselves higher than women (Busch, 1995; Murphy, Coover, and Owen, 1989; Quinonez and Guthrie, 2002), this has usually been the case only in those who rated their computer skills as moderate to advanced. In addition to these factors management support and ease of use have been observed to have a significant positive impact on the end-user's sense of computer self-efficacy (Henry and Stone, 1995).

The present study will build on the previously cited research to examine the role of two antecedent variables of perceptions of computer self-efficacy, prior experience and gender, in a general university population. Specifically, 1) those with greater amounts of prior experience are expected to score significantly higher on a measure of computer self-efficacy, and 2) for comparable levels of prior experience, males will have significantly higher scores on a measure of computer self-efficacy than females.

## Methodology

### *Participants*

The online questionnaire constructed for this study was available to undergraduate students enrolled in four different sections of IS-related courses at a regional university in the southeastern United States during Fall Semester. Over 200 students participated in this investigation. The IS courses were instructed by three professors using WebCT to supplement traditional course activities. All student participant were familiar with WebCT the questionnaires were available to them online throughout much of the semester using WebCT's survey feature. This survey allows enabled students to read and submit answer the questions online. Extra credit was offered to students as an incentive for participation.

### *Structure of Questionnaire*

The online survey in this investigation consisted of 56 items. Most of the items were part of a widely used generalized computer self-efficacy scale. Nineteen items on the questionnaire consisted of items from the Beginning CODE 77 rubrics (Johnson, 2002). These items asked students to provide a rating of their proficiency levels on each of 19 dimensions of computer knowledge and use. Appendix A provides examples of the items used to measure the students' prior computer knowledge/experience.

## Preliminary Results

The results reported in this section are preliminary. The statistical analyses described below were performed on 198 responses for students enrolled in two sections of an introductory computing course taught by one instructor. The students in this course were predominantly freshmen and sophomores. Data was all collected from students enrolled in two sections of junior-senior level MIS courses; their data was not available at the time these preliminary analyses were performed.

A composite prior experience/knowledge score was calculated by summing the student's knowledge/proficiency level ratings on each of the 19 dimensions (rubrics). The median composite score was 50 and respondents with scores less than or equal to 50 were categorized as being low in overall prior computer knowledge/proficiency while those with scores above the median were categorized as being high in prior computer/knowledge proficiency. A generalized self-efficacy total score was also calculated for each student.

A one-way ANOVA was used to test the first prediction -- that students with high levels of prior computer knowledge/proficiency would be higher in expressed generalized self-efficacy than students with low levels of prior computer knowledge/proficiency. The test statistic [ $F(1,196) = 60.13$ ] was highly significant ( $p < .001$ ) thereby providing

support for this prediction. Students with high levels of prior computer knowledge/proficiency (n=94) had a significantly higher mean self-efficacy score (147.81) than students with low levels of prior computer knowledge/proficiency (mean = 124.6; n = 104).

The second prediction (that given comparable levels of prior knowledge/proficiency, males would have greater expressed self-efficacy than females) was tested via two one-way ANOVAs: one for students with composite prior experience/knowledge scores at or below the median and a second for the set of students with composite prior experience/knowledge scores above the median. Neither test statistic was significant. Hence, no support was found for the second prediction in the preliminary analyses.

Two regression analyses were performed to get a preliminary assessment of the main aspects of prior computer experience/knowledge that drive self-efficacy expressions. Both used the generalized self-efficacy total score as the dependent measure. The first regression employed several classification variables as predictors: student age, computer experience (from 1= one to 5=extensive), computer ownership (yes, no), prior computer training (yes, no), and access to a computer beyond outside of college or work (yes, no). The resultant regression model was highly significant [ $F(1,196) = 18.65; p < .001$ ] and yielded an R of .61 and a R Square of .37. Computer experience was the only significant predictor in the model [ $t(1, 191) = 9.64; p < .001$ ; beta value = .593]. This suggests that overall experience with computers is more important to expressed self-efficacy than computer ownership, prior computer training, computer access, and student age.

The second regression employed the 19 computer knowledge/proficiency dimensions (rubrics) as predictors. The resultant regression model was highly significant [ $F(17, 180) = 13.53; p < .001$ ] and yielded an R of .744 and a R Square of .561. Five of the computer knowledge/proficiency dimensions were found to be significant predictors. These are summarized in Table 1.

**Table 1: Significant Predictors of Expressed Self-Efficacy**

<b>Knowledge/proficiency dimension</b>	<b>Beta</b>	<b>t</b>	<b>p &lt;</b>
Basic computer operation	.228	3.75	.001
File management	.120	2.40	.05
Graphics and digital image use	.191	2.78	.01
Network and Internet use	.170	2.71	.01
Computer Ethics issues	.136	2.17	.05

It is interesting to note the absence of widely used office (word processing, spreadsheets, databases) and communication applications (e-mail and WWW) in the list of significant predictors. While these are the applications that students, especially freshmen and sophomores, typically have the most experience with, they do not seem to systematically contribute to generalized computer self-efficacy.

## Potential Contributions and Future Directions

Computer task performance in today's workforce is a major contributor to end-user productivity. Computer self-efficacy is widely viewed as an important predictor of computer task performance. This investigation sheds some light on the degree of consistency between pre-existing proficiency/skill levels (as measured by this subset of the Beginning CODE 77 rubrics (Johnson, 2002) and student confidence in their computer skills (as measured by the generalized computer self-efficacy scale). Our preliminary results suggest that prior knowledge of and experience with computers contributes to computer self-efficacy judgments. However, our preliminary results fail to replicate previous findings (e.g. Busch, 1995; Murphy, Coover, and Owen, 1989; Quinonez and Guthrie, 2002) that given comparable levels of computer experience and backgrounds, males are more likely than female to have high self-efficacy scores. Perhaps, with the passage of time, gender differences in computer self-efficacy have dissipated.

Our preliminary results suggest that extent of prior computer use, knowledge of basic computer operations, file management proficiency, proficiency in graphics and digital image use, network and Internet use, and knowledge of computer ethics issues are some of the most important aspects of prior computer experience/knowledge that contribute to generalized self-efficacy judgments regardless of gender. It is notable that several of these are examples of computer experience/knowledge that are less common (ordinary) than is experience with office and communication applications. Perhaps, with the passage of time,

less common/ordinary computing knowledge/experiences have emerged as important determinants of generalized self-efficacy judgments. Such experiences may be those that set one's level of computer competency apart from that of other computer users, especially when peers are almost universally proficient in office (word processing, spreadsheet, and presentation graphics) applications and communication applications (e-mail, Web browsers, instant messaging, etc.)

The robustness of these findings will be observed when the statistical analyses reported in the Preliminary Results section are repeated on the complete data set (the combination of the data sets for the students in the classes of all three of the instructors). The student data to be added to the set used for the preliminary analyses come from courses that are predominantly populated by juniors and seniors. The addition of data from such students, who may have more years of computer experience and greater experience/proficiency with applications such as Excel, could result in a different mix of self-efficacy predictors than those reported here. However, if the pattern of results does not change when data from these students is added, there will be stronger evidence for the notion that less common computer knowledge/experience play a greater role in self-efficacy judgments than does computer knowledge/experience that is commonplace. Such a finding is certain to trigger future investigations focused on the antecedents of self-efficacy judgments.

The use of Johnson's CODE 77 rubrics to measure prior knowledge and skill levels is another potential contribution of this investigation. Three examples of the rubrics used in this investigation are reproduced in Appendix A. Their content/format suggests that these rubrics might be valuably employed by IS researchers and educators in a variety of model driven and/or curricular-oriented investigations.

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## Appendix A

### *Examples of Self-Reported Knowledge/Skill/Proficiency Levels.*

Source: CODE 77 Rubrics ([www.doug-johnson.com/dougwri/rubrics2002.html](http://www.doug-johnson.com/dougwri/rubrics2002.html))

#### **Click the button that best reflects your current level of knowledge/skill attainment with basic computer operation**

- I do not use a computer.
- I know the basic operations of using a mouse, clicking, and working with windows. I can use the computer to open, run and close a few specific, preloaded programs. Computer use has little effect on how I work. I am somewhat anxious I might damage the machine or its programs.
- I can set-up my computer and peripheral devices, load software, print, and use most of the operating system tools like the clipboard, clock, note pad, find command, and trash can (recycling bin). I can format a data disk, connect to my school's network, and run programs that require a CD. I have a virus protection program that scans my files on a regular basis.
- I can run several programs simultaneously, and have multiple windows open at the same time. I can customize the look and sounds of my computer. I use techniques like shift-clicking to work with multiple files. I look for programs and techniques such as using virtual memory to maximize my computer system. I feel confident enough to teach others some basic operations.

#### **Click the button that best reflects your current level of knowledge/skill attainment with database use**

- I do not use a database, nor can I identify any uses or features it might have which would benefit the way I work.
- I understand the function of a database and can locate information within one that has been pre-made. I can add or delete data in a database.
- I use databases for professional applications. I can create a simple original database that has a professional application such as an address book by defining fields and creating layouts. I can find, sort and print information that is useful to me.
- I can use formulas with my database to create summaries of numerical data. I can use database information to do mail merge in a word processing document

#### **Click the button that best reflects your current level of knowledge/skill attainment with e-mail and electronic mailing lists**

- I do not use email.
- I understand the concept of email and can explain some administrative and educational uses for it.
- I use email regularly and can:
  - read and delete messages
  - send, forward and reply to messages to
  - create nicknames, mailing lists, and a signature file
  - send and receive attachments
  - use electronic mailing lists and understand the professional uses of them
  - read and contribute to a professional electronic mailing list
- I can send group mailings and feel confident that I could administer an electronic mailing list. I can locate lists of subject-oriented mailing lists.