

# Proposing CAPS as a Link in the Bridge Across the Divide

Ms. Cynthia Y. Lester<sup>1</sup> ([clester@cs.ua.edu](mailto:clester@cs.ua.edu)) and Dr. Marcus Brown ([mbrown@cs.ua.edu](mailto:mbrown@cs.ua.edu))

The University of Alabama, Computer Science Department  
Box 870290, Tuscaloosa, Alabama 35487-0290

## Abstract

The decline of women in technology disciplines has been given many different labels in current literature such as “the pipeline shrinkage,” “the gender gap,” and the “gender divide.” Research in the area of gender differences in computer-related use and behavior has grown significantly. While there are numerous suggested reasons for the decline of women in technology-related disciplines, the perceptions that women hold about their computing capabilities continue to be of interest. The research seeks to explore how a computer assisted peer-modeling software application, hereafter referred to as CAPS, can be used to influence females’ level of computer self-efficacy and performance and hence affect their perceptions on computing. *Keywords: self-efficacy, vicarious learning, peer-modeling software, gender*

*Keywords that describe the area and subareas of the research include human-computer interaction, cognitive science, and human performance engineering.*

## 1. Introduction

Self-efficacy has been used by information technology researchers to investigate computer usage and behavior and has been found to be a significant factor in the decision to use the computer. Self-efficacy is a core construct of Albert Bandura’s Social Cognitive Theory, which explains human functioning as the product of dynamic interplay between behavior, personal, and environmental influences. Self-efficacy is defined as the belief in one’s capability to organize and execute the courses of actions required to produce given attainments.

There are four sources that influence efficacy information:

- *Enactive mastery experiences* - interpreted results of one’s past performance
- *Vicarious experiences* – observing others performing a task
- *Verbal persuasion*
- *Affective states* – physiological conditions

*Enactive mastery experiences* are thought to be the most influential source of efficacy information, because they are the interpreted results of one’s past performance. While researchers support the contention that past performance has a significant impact on self-efficacy, studies have also found that gender differences exist. The results from several studies that explored the difference between gender and the sources of efficacy information found that mastery experience was the most influential source of efficacy information for males and that verbal persuasion and vicarious learning impacted female self-efficacy. The results from these studies have lead some researchers to conclude that for females, the roles that vicarious experiences and verbal encouragement play on self-efficacy may be more important than past performance.

There are several types of modeling influences that vicarious experiences use that are thought to alter efficacy information. One of those influences is social modeling in which people learn by observing a model, mentally coding the information for retention, and then reproducing the modeled actions. It is suggested that the greater the assumed similarity between model and observer, the more persuasive will be the model’s successes and/or failures. It has been further suggested that even the smallest similarities and dissimilarities between observer and model can significantly impact self-efficacy and corresponding behavior.

The present study investigates the impact that vicarious learning has on computer self-efficacy and performance level. Social modeling depicting a peer is being used to create the vicarious experience.

## 2. Statement of the Problem

*The overall goal of the research is to investigate the influence that vicarious learning has on computer self-efficacy and performance level. More specifically, the research seeks to prove that vicarious learning impacts female computer self-efficacy and performance level more than male computer self-efficacy and performance level.*

Additional goals of the study include:

- Exploring the influence of peer-modeling software on self-efficacy and performance level
- Exploring the relationship of computer self-efficacy on computing performance
- Contrasting the peer-modeling training approach with a non-modeling training approach to investigate the difference the training methods have on performance level and computer self-efficacy

### 3. Experimental Approach

To explore, using social modeling, the influence that vicarious learning has on females' computer self-efficacy and performance level, the researcher examined many tutorials and training materials. Since many tutorials and training materials exist for microcomputer software applications and are readily available as freeware through the Internet and are used in introductory college computer application courses, the content for the tutorial is on the use of a popular microcomputer software application. Furthermore, the impetus was to find a tutorial with a female modeling computer-based instruction on the software application. However, the researcher was not able to locate any training environment with the aforementioned characteristics. Therefore, *CAPS* was designed and developed.

*CAPS* is a computer assisted peer-modeling software application in which a female provides instruction and demonstrates tasks on a popular microcomputer software application. The model provides step-by-step instructions that are synchronized with dynamic screen images and text. *CAPS* was developed to run on microcomputers, both Windows and Mac environments, and is viewed using the QuickTime™ Player. The tutorial is approximately 11 minutes in length.

#### 3.1 Training Environments

To investigate the influence that *CAPS* has on female computer self-efficacy and performance level, two additional training environments are incorporated into the experimental approach. One training environment is the *control environment* in which only written instructions are provided. The other training environment is a *standard tutorial environment*. Instruction in the *standard tutorial environment* consists of static screen captures with synchronized text. The standard tutorial environment has design features that are consistent with *CAPS*, however it is approximately 10 minutes in length.

#### 3.2 Measures and Tools

*Computer self-efficacy.* To assess change in self-efficacy, a computer self-efficacy scale was developed based on two measures proposed by Bandura, the weight lifting efficacy scale and the problem solving efficacy scale.

*Performance.* To assess change in performance, a pretest measure and a posttest measure have been developed. Time data is documented using timestamps on the pretest and posttest measures.

*Background Data.* A background survey has been developed which collects demographic information including average computer use and computer experience.

### 4. Contributions

The current study is a work in progress. However, there are several anticipated contributions of the research on the influence of vicarious learning on female computer self-efficacy and performance level. For example, results from the study can help educators to understand how introducing a more interactive vicarious learning experience into their computing curricula can increase a female's level of computer self-efficacy and can impact her performance. Additionally, software designers can use the study as an impetus to design help systems and on-line tutorials that include a vicarious experience to make software more user-friendly and gender inclusive. Lastly, information technology and computer-related disciplines will benefit from the improvement of females' level of computer self-efficacy, thus, adding one more link in the bridge across the gender divide.

---

<sup>1</sup> About the Author

Cynthia Lester is the primary author and investigator of the research. She is a doctoral student studying human-computer interaction. Her plans are to complete her degree by December 2004. Cynthia's research focus is on gender issues in computer-related use and behavior and on developing peer-modeling software applications.