Gender Differences in Computer Training and Computer Efficacy Among Indian College Students

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Abstract

The present study examined the impact of variables like gender and computer training on computer efficacy for Indian College students. A sample of 795 students from the University of Bombay completed surveys regarding computer training and computer efficacy (Computer User Self-Efficacy Scale, Cassidy & Eachus, 2002). The results indicated that more females (65.4%) had attended a computer training course than males (58.0%). Gender differences were obtained for computer efficacy, with males in general having higher efficacy than females. Of the 30 items on the Computer User Self-efficacy Scale, males scored significantly higher on 20 items than females. Regression analyses indicated that gender and computer training were predictors of computer efficacy. Implications of the results are discussed.

1. *Introduction*

This empirical study examines three areas of research for Indian College students: (a) gender differences in computer training, (b) gender differences in perceptions of computer efficacy; and (c) the impact of gender and computer training on computer efficacy. Each of these is briefly reviewed.

1.1. Gender Differences and Computer Training

Numerous empirical studies have indicated a significant effect of computer training on computer efficacy and computer attitudes. When examining computer attitudes of 238 business students from a university in Saudi Arabia, Al-Jabri & Al-Khaldi (1997) found a significant positive relationship between computer attitude and number of computer-using courses, with greater computer-using courses translating to more computer confidence, greater usefulness and overall positive computer attitudes. Medvin, Reed, & Behr (2002) examined the impact of computer experience on computer efficacy, anxiety, and values with 38 head start teachers and day care providers (1 male, 37 female). A three-hour computer workshop that aimed at facilitating social skills was conducted. The results indicated that "self-efficacy was positively correlated to computer values, and negatively correlated with computer anxiety." (p. 7). Additionally, the workshop was effective in reducing computer anxiety and increasing computer self-efficacy and values.

In a study of 202 undergraduate college students (87 males, 115 females), Shashaani (1997) found that one semester of computer training increased attitudes for both male and female students towards computers. Additionally, "By the end of the semester, students were more interested in working with computers and were more confident in their ability to use them." (p. 47). Torkzadeh, Pflughoeft, & Hall (1999) found that training programs were more effective with students who held positive attitudes than students who held negative attitudes, where "Positive attitudes toward computer technology may be reinforced through continuous improvement training programmes." (p. 307). Other studies examining the relationship between computer training and computer efficacy have found that computer training tended to increase computer efficacy (Cassidy & Eachus, 2002), however, males exhibited higher efficacy than females in both the trained and untrained groups. Salanova, Grau, Cifre, & Llorens (2000) found that computer training and frequency of usage were positively associated with computer efficacy, while Torkzadeh & Van Dyke (2002) found that that internet efficacy was higher for both males and females after completing computer training. Beas & Salanova (2006) found that more computer training translated to greater self-confidence.

1.2. Gender Differences and Computer Efficacy

Self-efficacy is defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with the judgments of what one can do with the skills one possesses." (Bandura, 1986; p. 391). According to Bandura (1986) self-efficacy theory posits that it is mainly perceived inefficacy in coping with potentially aversive events that gives rise to both fearful expectations and avoidance behavior. People who judge themselves as efficacious in managing potential threats neither fear nor shun them. In contrast, if people judge themselves as inefficacious in exercising control over potential threats, they view threats anxiously, conjure up possible calamities were they to have any commerce with them, and avoid them (p. 1390).

When extrapolated to computers and computer use, Compeau & Higgins (1995) found that individuals with high self-efficacy experienced less computer anxiety, used and enjoyed using computers more. On the other hand, individuals who have anxiety when using computers, are fearful of interacting computers, and or have low efficacy when using them, may shun and refrain from using them completely. Karsten & Roth (1998) indicate that "Prior research consistently indicates that computer self-efficacy (CSE) is positively correlated with an individual's willingness to choose and participate in computer activities, expectations of success in such activities, and persistence or effective coping behaviors when faced with computer-related difficulties" (pp. 61-62).

Compeau & Higgins (1995) define computer efficacy as a judgment of one's capability to use a computer. It is not concerned with what one has one has done in the past, but rather with judgments of what could be done in the future. Moreover, it does not refer to simple component subskills, like formatting diskettes or entering formulas in a spreadsheet. Rather, it incorporates judgments of the ability to apply those skills to broader tasks… (p. 192).

Numerous studies have examined the relationship between gender differences in computer efficacy. These differences in turn influence may one's attitude towards using computers. In a study of 147 business administration undergraduate students (67 men, 80 women), Busch (1995) found gender differences in perceived self-efficacy, with male students having significantly higher efficacy expectations for complex computer tasks (word processing and spreadsheet software) than female students. Male students also reported greater computer experience in programming and computer games than did female students, they also exhibited significantly lower computer anxiety and higher computer confidence than female students. Additionally, computer efficacy and computer attitudes were strongly correlated. Durndell & Haag (2002) in a study of 74 female and 76 male students

from Romania found males experienced more positive attitudes towards the internet, reported longer internet use, higher computer efficacy, and lower computer anxiety than females. Halder & Chaudhuri (2011) in a study of 84 secondary school teacher trainees at the University of Calcutta (43 males and 41 females) found that male trainees had higher computer efficacy and lower computer anxiety than female trainees. Muira (1987) in a study of 386 students (104 males, 264 females) found males rated themselves higher on the self-efficacy scale than females and indicates that "self-efficacy perceptions appear an important consideration when examining gender differences in computer interest and use" (p. 309).

Smith (2001) examined the relationship between computer efficacy and computer-related tasks performance with 10 undergraduate college students (6 males and 4 females) found high efficacy for word processing and telecommunication units and low efficacy for database and presentation units. However, no gender differences in computer self-efficacy were examined and Smith (2001) indicates that "awareness of computer efficacy that relates to computer performance tasks will enhance classroom learning and instruction." (p. 7).

In related research on computer efficacy, Eduljee (1999) examined the impact of computer efficacy on computer attitudes with 341 College students in the United States and 264 Indian College Students. The results indicated that students with greater computer experience and high computer efficacy tended to have more positive attitudes towards computers. Additionally, computer efficacy was found to be a significant predictor of computer attitudes for both U.S. and Indian college students. Similar results were obtained by Eduljee (2000) in a study of 101 Indian college students, who found that students with high computer efficacy had more positive computer attitudes (less anxiety, more confidence, more liking and greater usefulness of computers) than students with low computer efficacy.

In a study of 350 senior level college students from 4 different majors (business, education, forest/wildlife, and liberal arts), Chung, Schwager, & Turner (2002) found that business majors possessed significantly higher computer self-efficacy and positive attitudes towards computers than did the other majors (education, forest/wildlife, and liberal arts). Yalcinalp (2005) in a study of 88 first year Turkish students enrolled in a computer literacy course found "a high and positive relation between students' attitudes towards computers and self-efficacy, and also between students' performance and their self-efficacy in computers. It can be said that students' self-efficacy is important in predicting their attitudes towards computers." (p. 3)

Khorrami-Arani (2001) examined computer efficacy and computer attitudes with 105 students (44 males, 61 females) in year 8 IT classes. The results indicated that the students exhibited low anxiety and high comfort with using computers and a significant relationship between computer efficacy and computer attitudes (anxiety, confidence and liking) was obtained. Zhang & Espinoza (1998) found that student's comfort or anxiety about computers was a predictor of computer efficacy. Ramalingam & Wiedenbeck (1998) administered the Computer Programming Self-efficacy Scale to 421 students (324 males, 96 females, 1 gender unreported) who were enrolled in an introductory computer science course. Subjects were asked to rate their level of confidence on a 7 point scale (1 = not at all confident) to 7 (absolutely confident). The scale was administered in the first week of the semester and later in the thirteenth week of the semester. The results indicated that "prior experience did not differ between males and females. Females had lower self-efficacy than males with respect to a subset of skills queried." (p. 379).

While many studies have demonstrated gender differences in computer efficacy, Chao (2001) conducted a study with 200 preservice teachers in Taiwan who were administered a Computer Self-Efficacy (CSE) scale. The results indicated no gender differences were obtained for computer self-efficacy; however, a significant correlation was obtained between computer experience and computer efficacy. Sam, Othman, & Nordin (2005) found no gender differences in computer self-efficacy for 148 undergraduate students (67 males, 81 females) in Malaysia. Undergraduates from the Faculty of Computer Science and Information Technology tended to have higher computer self-efficacy than undergraduates from the Faculty of Creative Arts. Adebowale, Adediwura, & Bada (2009) in a study of 123 males and 92 females found no differences in computer efficacy. Johnson & Wardlow (2004) found "no significant differences in computer self-efficacy by the main effect of gender." (p. 59)

Various empirical studies have examined the relationship between computer experience and computer efficacy. In a study of 156 college students (84 males 64 females), Karsten & Roth (1998) found no significant differences in pretest computer self-efficacy scores based on gender. Additionally, prior computer experience was significantly correlated with pretest computer self-efficacy scores, and "students with more computer experience tend to have higher initial levels of computer self-efficacy." (p. 65). In a study of 163 students (131 males, 32 females) from Trinity College in Dublin, Doyle, Stamouli, & Huggard (2005) found a positive correlation between computer experience and self-efficacy, indicating that as students gain more computer experience, they "become more self confident and their level of self-efficacy increases." (p. 4)

1.3. Measures of Computer Efficacy

Numerous studies have used a variety of measures to study individual's perceptions of computer efficacy. The measure used for this study was the Computer User Self-Efficacy Scale (CUSE, Cassidy and Eachus, 2002). The 30 item scale of the CUSE investigates "the relationship between computer efficacy, and computer experience, use of software packages (i.e., *familiarity*), computer training, computer ownership, gender (Cassidy & Eachus, 2002, p. 140). The rationale for the development of the CUSE relates "to the impact computers are having on many aspects of life and in particular to the increasing reliance in higher education on computer technology to support learning." (p. 137). The CUSE has been used by numerous researchers like Christian (2000), Langana (2008), Magliaro & Ezeife (2007), Mutchler, Anderson, Taylor, Hamilton, & Mangle (2006).

Given the limited research on the relationship between gender, computer training, and computer efficacy with Indian college students, it was felt that this study was contribute significantly to the literature. Keeping in mind the present context and lack of research, the study examined the impact of computer efficacy and computer training for Indian male and female college students. The research questions addressing the relationship between gender, computer training, and computer efficacy were investigated:

1. Would males and females differ in their level of computer training?
2. Would males and females differ in their perceptions of self-efficacy?
3. Would there be differences in computer efficacy between males and females who had prior computer training vs. those who had no prior computer training?
4. What are the individual and collective contributions of gender and computer training with regard to computer efficacy?

2. Method

2.1. Sample

The subjects in the study included 795 Indian college students from the University of Bombay. There were 257 males (32.3%) and 537 females (67.5%). The mean age of for males was 18.12 (SD = 1.37) and for females was 18.41 (1.64). When asked about the kind of computer used in the past, 172 males (66.9%) and 402 females (74.9%) indicated that they had used a personal computer. When asked if they had access to a computer when not at college or work, 174 males (68.0%) and 380 females (70.9%) indicated yes.

2.2. Instrumentation

2.2.1. Computer Training

In order to assess computer training, students were asked a yes/no question if they had attended a computer training course.

2.2.2. Computer Efficacy

In order to assess computer efficacy, the Computer User Self-Efficacy (CUSE) scale which was developed by Cassidy & Eachus (2002) was used. The CUSE is a 30 item instrument that was "designed to measure general self-efficacy in an adult student population." (p. 137). The CUSE has 13 positively worded items where 1 = strongly disagree to 6 = strongly agree. Examples of positively worded items include "Most difficulties I encounter when using computers, I can usually deal with" and "I enjoy working with computers." The remaining 17 items are negatively worded and scores for these items are reversed. Examples of negatively worded items include "Computers frighten me" and "I find working with computers very frustrating." Scores on the CUSE range from a minimum of 30 to a maximum of 180. A total self-efficacy score is obtained by summing scores for all 30 items, where a total high score indicates more positive computer self-efficacy beliefs. Cassidy & Eachus (2002) indicate that the internal consistency of the CUSE is high (Cronbach's Alpha = .97).

3. Findings

3.1. Gender Differences in Computer Training

Of the 237 males who participated in the study, when asked if they had attended a computer training course, 149 (58.0%) of males said yes, 107 (41.6%) said no. Of the 537 females who participated in the study, 351 (65.4%) indicated that they had attended a computer training course, while 185 (34.5%) indicated that they had not attended a computer training course.

3.2. Gender Differences in Computer Efficacy

Means and standard deviations were computed for males and females for the items of the Computer User Self-Efficacy Scale (CUSE). The mean scores for males was 129.91 (SD = 21.93) and for females was 120.66 (SD = 24.52). An analysis of variance (ANOVA) indicated that males had significantly higher computer efficacy than females, F (1, 791) = 26.31, p = .000.

	Computer Efficacy Score		*F*	p
	Mean	**SD**		
Male	121.91	21.93	26.31	.000 **
Female	120.66	24.52		

** p < .01

Table 1. F test results by Gender for Computer Efficacy

A careful examination of gender differences with regard to the items on the CUSE reveals some interesting findings. Out of the 30 items on the CUSE, males scored significantly higher than females on 20 items on the CUSE. Females scored significantly higher than males on one item: "I find computers get in the way of learning."

	Item	**Males**		**Females**		**F**
		Mean	**SD**	**Mean**	**SD**	
1.	Most difficulties I encounter when using computers, I can usually deal with.	3.66	1.55	3.44	1.34	NS
2.	I find working with computers very easy.	4.59	1.43	4.12	1.33	20.19 **
3.	I am unsure of my abilities to use computers.	4.16	1.61	3.83	1.58	7.47**
4.	I seem to have difficulties with most the packages I have tried to use.	4.14	1.54	3.92	1.48	NS
5.	Computers frighten me	5.29	1.35	5.06	1.35	5.03*
6.	I enjoy working with computers.	5.34	1.12	4.84	1.31	27.75**
7.	I find computers get in the way of learning	3.27	2.10	4.01	2.02	22.33**
8.	DOS-based computer packages don't cause any problems for me.	4.16	1.55	3.89	1.43	5.77*
9.	Computers make me much more productive.	4.99	1.31	4.63	1.39	11.28**
10.	I often have difficulties when trying to learn how to use a computer package.	3.52	1.63	3.23	1.46	6.22*
11.	Most of the computer packages I have experience with, have been easy to use.	4.21	1.48	4.08	1.41	NS
12.	I am very confident in my abilities to make use of computers.	4.60	1.53	4.01	1.44	27.09**
13.	I find it difficult to get computers to do what I want them to do.	4.10	1.58	3.96	1.43	NS
14.	At times I find working with computers very confusing.	3.91	1.64	3.51	1.48	11.71**
15.	I would rather that we did not have to learn how to use computers.	4.87	1.57	4.84	1.56	NS
16.	I usually find it easy to learn how to use a new software package.	4.03	1.45	3.56	1.39	18.60**
17.	I seem to waste a lot of time struggling with computers	4.53	1.56	4.18	1.54	8.29**
18.	Usually computers makes learning more interesting.	5.20	1.34	4.97	1.27	5.52*

	Item	Males		Females		F
		Mean	SD	Mean	SD	
19.	I always seem to have problems when trying to use computers.	4.39	1.57	4.09	1.49	6.46*
20.	Some computer packages definitely make learning easier.	5.03	1.32	4.99	1.88	NS
21.	Computer jargon baffles me.	4.05	1.54	3.70	1.53	8.57**
22.	Computers are far too complicated for me	4.66	1.55	4.31	1.53	8.74**
23.	Using computers is something I rarely enjoy.	4.07	1.97	4.20	1.75	NS
24.	Computers are good aids to learning.	5.44	1.09	5.18	1.19	7.83**
25.	Sometimes, when using a computer, things happen and I don't know why.	3.33	1.61	3.11	1.51	NS
26.	As far as computers go, I don't consider myself to be very competent.	3.82	1.58	3.42	1.55	10.73**
27.	Computers help me save a lot of time.	4.89	1.40	4.70	1.39	NS
28.	I find working with computers very frustrating.	4.91	1.38	4.60	1.41	8.51*
29.	I consider myself to be a skilled computer user.	3.71	1.61	2.96	1.48	40.77**
30.	When using computers, I worry that I might press the wrong button and damage it.	4.33	1.88	3.76	1.82	16.89**

* $p < .05$, ** $p < .01$

Table 2. Means, SD's and F values by Gender for the Computer User Self-Efficacy (CUSE) Scale

3.3. Gender Differences, Computer Training, and Computer Efficacy

The results indicated significant ANOVA effects for gender and computer training on computer efficacy. For computer efficacy, the main effect was found for gender, F (1, 791) = 31.95, $p < .01$, and for computer training, F (1, 791) = 7.48, $p < .01$. No significant effects were obtained for the gender and computer training interaction, F (1, 791) = 1.57, $p > .05$.

Source	df	MS	F
Computer Efficacy			
Main Effects			
Gender	1	17395.17	31.95 **
Computer Training (CT)	1	4075.31	7.48 **
Interaction			
Gender X CT	1	856.29	1.57
Error	786	544.32	

** $p < .01$

Table 3. ANOVA summary for Gender and Computer Training on Computer Efficacy

When examining whether computer training had an impact on computer efficacy, the results indicated that significant differences in computer training were obtained, F (1, 792) = 21.76, $p < .05$. In general, students who attended a computer training course had higher computer efficacy (Mean = 126.56, SD = 23.61) than students who had not attended a computer training course (Mean = 118.50, SD = 24.00).

3.4. Predictors of Computer Efficacy

In order to examine the individual and collective contributions of gender and computer training with regard to computer efficacy, a regression analysis was conducted. The analysis of variance of the multiple regression data revealed an F (2, 791) = 23.72, $p < .01$, thus indicating that a combination of variables significantly predicts computer efficacy.

The results of the regression analysis on the relationship between the dependent variable (computer efficacy) and a combination of gender and computer training indicated a multiple R of .238, with an R^2 of .057.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	150.73	4.017		37.524	.000
Gender	-9.87	1.785	-.192	-5.531	.000
Computer Training	-7.65	1.690	-.157	-4.527	.000

Multiple R = .238, R^2 = .057

Table 4. Regression Analysis Using Computer Efficacy as the Dependent Variable.

The individual contributions of gender and computer training are presented in Table 4. An analysis of the regression analysis indicates that both gender and computer training were significant predictors of computer efficacy for Indian college students.

4. Discussion

The objective of the present study was to investigate gender differences in computer training and computer efficacy for Indian college students. Three major findings emerged from the study:

- Computer training had a significant effect on computer efficacy.

- Males tended to have higher computer efficacy than females, even though more females had completed a computer training course.
- Regression analyses indicated that both gender and computer training were predictors of computer efficacy.

Some research has indicated that students who complete a computer training course or program tend to have greater computer efficacy. These findings are similar to those obtained by other researchers (Cassidy and Eachus, 2002 and Torkzadeh, Chang, and Demirhan, 2006). It is likely that students who complete these training courses/programs are often comfortable and gain more experience with computers which in turn could translate to greater computer efficacy. Torkzadeh, Pflughoeft, & Hall (1999) found that training increased self-efficacy and that "Research efforts that control for content, format, and duration of training programs are encouraged." (p. 307).

The issue of gender differences is intriguing. While more females had completed a computer training course than males (65.5% vs. 58.0%), this did not translate to females having greater computer efficacy. It is possible that the computer training courses have a focus on providing training on computer tasks such as computer applications, programming and database management – tasks that are typically considered masculine. Busch (1995) found that males had higher efficacy for tasks that complex computer tasks (spreadsheet software) but not for simple computer tasks, while females had less computer experience in computer games and programming. In the present study, females had lower computer efficacy and perhaps did not believe in their perceptions of efficacy to complete a computer task successfully. This lower efficacy in turn could cause females to shun computers and affect their computer usage and their attitudes towards computers.

Several studies have shown gender differences in terms of computer efficacy and this study supports those results. In terms of computer efficacy, males tended to have higher computer efficacy than females. A possible reason for this may relate to the levels of computer usage by males and females. In the present study, more males tended to use the computer for more diverse purposes like word processing (59.9% vs. 53.6%), videogames (73.9% vs. 65.2%), database management (23.0% vs. 17.9%), educational software (32.3% vs. 24.6%), programming (43.2% vs. 36.1%), and multimedia (31.5% vs. 24.2%) than females. This greater computer usage may translate to greater computer experience and which in turn may translate to greater efficacy. Hasan (2003) found that support for the relationship between computer experience and computer efficacy and "experiences with programming and computer graphics applications have the strongest effects on CSE beliefs." (p. 447). Applying Bandura's (1986) work to computers, if males judge themselves as having greater

efficacy than females, they will then expend more effort and persist longer with computer related tasks than females who have lower efficacy. Thus, it is crucial that researchers direct attempts to have females experience greater computer efficacy.

It was interesting to note that while gender and computer training were both significant predictors of computer efficacy, they contributed only 5% of the variance in computer efficacy. Thus, one can surmise that other personal characteristic variables like computer experience, amount of prior usage, computer anxiety, and locus of control may add significantly to predicting computer efficacy.

5. Recommendations and Conclusions

5.1. Addressing Gender Differences in Computer Efficacy

1. Provide opportunities for females to gain computer experience which can translate to more confidence and greater computer efficacy. Eduljee (1999, 2000, 2001) found that students who had greater computer experience tended to have less anxiety and in general more positive computer attitudes. Along those lines, it is crucial to devise strategies that allow females to experience success when working with an interacting with the computer.

2. Encourage females to enroll in computer training courses and provide opportunities for females to persist with a computer related task. The training courses should focus on having females not only gaining basic computer skills and knowledge, but also considering the usefulness of technology in their future work. Lokken, Cheek, & Hastings (2003) suggest that "computer anxiety is lessened by exposure to computers through training and use." (p. 21).

3. Encourage females to persist with and allow them to experience success as they work and interact with computers. Muira (1987) states that "For women, persistence may be encouraged if efforts to increase perceived self-efficacy are incorporated into computer science courses." (p. 309). Al-Jabri & Al-Khaldi (1997) indicate that "educators should stress the hands-on use of computers in their courses." (p. 11).

   While it was interesting to note that more females had attended a computer training course than males (65.5% to 58%), this did not translate to females having more positive attitudes towards computers.

4. Examine student's locus of control and consider the link between causes for failures and successes with regard to computer efficacy and use.

While this study yielded interesting findings, caution should be used in interpreting the results due to variables like the study being conducted at an urban setting. Future research should investigate questions like: Are there gender differences in locus of control and computer efficacy for Indian college students? Could prior computer usage and computer experience affect computer efficacy? Further research should examine perceptions of computer efficacy with a more diverse Indian population.

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