2009

An Investigation Into The Relationship Between Gender Perception Of Computing, Computer Self-efficacy, And Computer Anxiety: A Comparison Study Between Chinese Females And American Females

Kittipong Laosethakul
Sacred Heart University

AN INVESTIGATION INTO THE RELATIONHISP BETWEEN GENDER PERCEPTION OF COMPUTING, COMPUTER SELF-EFFICACY, AND COMPUTER ANXIETY: A COMPARISON STUDY BETWEEN CHINESE FEMALES AND AMERICAN FEMALES

Kittipong Laosethakul

Department of Accounting and MIS, Sacred Heart University, Fairfield, CT 06825

ABSTRACT

It is believed that the perception that computing is a male domain has discouraged American women to participate in computing fields. Like the U.S., computing is also dominated by men in China. However, unlike the U.S., information technology is ranked the highest compared with other industries in term of career choices for Chinese female university graduates. This study investigates how computer anxiety and computer self-efficacy influence gender perception toward computing of Chinese female in comparison to American female. One of the findings indicated computer anxiety directly impacts gender perception toward computing of females in both cultures.

Keywords: Gender Perception, IT, Computer Self-efficacy, Computer Anxiety, China

INTRODUCTION

Information technology (IT) fields are dominated by men in China. This male-dominated-IT situation could discourage women to participate in computing fields, which, in return, affects diversity in IT-related work places even more. In the U.S. it is believed that the impact of male-dominated-computing perception can be seen through the decline of female participation in most IT-related education fields/careers [20]. Surprisingly, IT is ranked the highest compared to other industries in terms of career choices for Chinese female university/college graduates [4]. It would be interesting to understand gender perception toward IT-related occupations/activities of Chinese female in comparison to that of American female. Studies showed that computer self-efficacy and computer anxiety have a close relationship with gender and/or gender perception toward computing [17]. However, a model demonstrating relationship between gender perception toward computing, computer anxiety, and computer self-efficacy has not yet been investigated. By understanding how these constructs influence each others, a guideline/suggestion to lessen gender perception toward computing in organizations/educational institutions could be developed. The objective of this study is to investigate the model demonstrating relationship of these three psychological factors of Chinese female in comparison to that of American female.

THEORETICAL DEVELOPMENT AND RESEARCH HYPOTHESES

Gender Stereotyping of Computing

For this study, computing is defined as activities/occupations that relate to mathematics, engineering, and other technology/information technology related fields. A gender-typed activity/occupation is defined as one where males and females are perceived as possessing different abilities or levels of ability, personality attributes, and/or interpersonal interaction styles [1, pp. 4, 8]. Activities/occupations that require abilities, attributes, and interaction styles expected of masculine are gender type male, and those expected of feminine are gender type female [1, pp.4]. Based on the gender schema theory developed by Bem [3], the gender difference in roles is mediated by cognitions as children encode and organize incoming information according to the definition of "male" and "female" behavior current and active in the society at that time.

In the U.S., a number of studies show that computing is a male domain. In a study with grades K-12, Smith [19] found significant difference between males and females with females showing stronger beliefs in equity of ability and competencies in use of the computer. Rosen and Maguire [18] found that women seemed to suffer greater computer phobia than men did. Wilder et al [25], in a study with children and youth, determined that the computer was perceived to be more suitable for males than females. Using a gender stereotyping of computing scale to measure perceptions, Astone [1] reported that overall computing was viewed as slightly feminine. Following Astone's study, Rainer et al. [17] investigated how gender perception toward computing of college students had changed between the years 1995 and 2002. They found that

computing was perceived as a female domain in 1995, but the perception had changed to a male domain in 2002.

Computer Anxiety

Computer anxiety is defined as "The tendency of an individual to be uneasy, apprehensive, or fearful about the current or future use of computers" [10, pp. 375]. Several studies indicate that women have higher computer anxiety than men (e.g. [9], [21], [25], [7]). Based on these findings, individuals' perception that computing is more suitable to one gender over the others may be influenced by the difference of computer anxiety between genders. When individuals have high computer anxiety, they would perceive that computing is more suitable to the opposite gender. Most recent research indicates that computing is still a male domain and men have less computer anxiety than women. Thus, for women, the higher the computer anxiety they have, the stronger the perception that computing is suitable to male than female. This leads to the following second hypothesis.

H1: For women, computer anxiety will be positively related to gender perception toward computing.

Computer Self-Efficacy

Self-efficacy refers to "beliefs in one's capabilities to organize and execute the courses of action required to attain designated types of performance. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses." [2]. Correspondingly, computer self-efficacy refers to "an individual's perceptions of his or her ability to use computers in the accomplishment of a task" [6, pp. 191]. Several studies indicated that men have stronger computer self-efficacy than women (e.g. [5], [13], [16]). Based on these findings, individuals' perceptions that computing is more suitable to one gender over the other may be influenced by the difference of computer self-efficacy between genders. When individuals have low computer self-efficacy, they would perceive that computing is more suitable to the opposite gender. Most recent research indicates that computing is still perceived as a male domain and men have stronger computer self-efficacy than women. Thus, for women, the lower computer self-efficacy, the stronger perception that computing is suitable to male than female. This leads to the first hypothesis.

H2: For women, computer self-efficacy will be inversely related to gender perception toward computing.

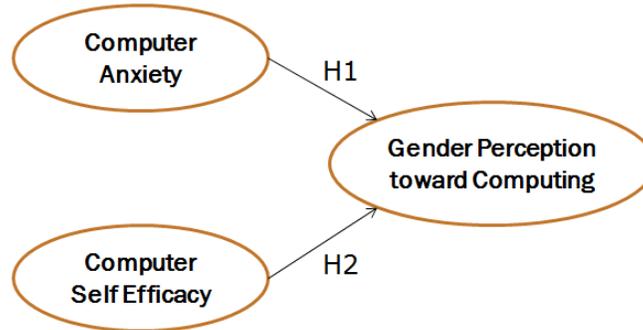Based on these hypotheses, the study's proposed model is depicted in Figure 1.

Figure 1: The Proposed Model

Female and Information Technology Situation in the U.S. and China

An article by InfoWorld reported that men still dominate computing-related careers/educations in the U.S [15, pp.1]. The number of jobs in the IT professional workforce increased drastically from 1.2 million in 1983 to almost 3 million in 1996. However, only 30 percent of these positions were women [15]. The number of women nearly all across computing job categories and those who are heading to college to pursue computing-related degrees is actually on the decline [20]. Tahmincioglu [20] reported that the low female participation in computing in the U.S. is caused by the perception that computing is a male activity and a "geeky and nerdy" profession. A situation of Chinese women in IT industries is different from the US. There is a perception that IT jobs are more suitable to men, and women are more suitable to customer and technical support jobs. Gender employment patterns vary significantly among foreign and domestic IT-related companies. The male to female employment ratio is close to 1:1 in some foreign companies, whilst 4:1 in domestic companies [4]. Despite this gender perception and disproportion of male and female in IT-related jobs, Chinese women believed that they are equal to Chinese man, and there was no stereotype that IT was men's work [23]. According to the Investigation Report on the Living Conditions and Competitiveness of Women in IT, 80% of the IT women believe the female gender is no longer the biggest factor that limits their career development. The obstacle, however, is the 'weakness' inherit in the female gender. This weakness ranges from mood swings, emotions, dependence on other people's help, tendency to give up when under pressure, to the lack of self confidence [4, pp.3]. Based on this information, it is possible that the model explaining gender perception toward computing (Figure 1) based on studies in the U.S. may not apply to gender perception toward computing for Chinese females.

METHODOLOGY

The researchers examined four samples of university students with non-IT business majors, three from the US (125 female students) and one from China (137 female students). All samples were from four year institutions. The survey instrument gathered demographic and computer usage data on respondents. The questionnaire also contained three psychological constructs. The Gender-Typing Scale (GTS) was developed by Astone [1]. The GTS is developed to capture a perception of current gender roles in computing careers and activities. The GTS measures how individuals perceive current gender roles on technical and managerial aspect of computing, clerical and office uses of computers, and affective responses to computing. The questionnaires employed two versions of the survey to mitigate survey-wording bias in the GTS section. The first version listed all GTS items as "female first." For example, "I believe that more women than men seek careers in computing". The second version reversed the GTS items. For example, "I believe that more men than women seek careers in computing". The researchers tried to distribute each version equally to respondents. The second version's scores were reversed, so that all scores used and reported in the data analysis are in the "men first" direction. The Computer Anxiety Rating Scale (CAR) was developed by Heinssen et al. [9]. The CAR measures high anxiety toward computer use and confidence, enthusiasm and/or anticipation toward computer use [8]. The Computer Self-Efficacy Scale (CSE) was developed by Murphy et al. [14]. The CSE measures computer self-efficacy on two levels of computer skills: beginning computer skills and conceptual computer skills. Each construct was measured on a 5-point Likert scale.

RESULTS

Demographic and Computer/Internet Usage

The average age of Chinese and American female respondents was 22. Most Chinese female respondents were senior students and American female respondents were junior students. Chinese and American respondents have been using computers for 9 years and 11 and half years respectively. Both have taken two computer courses.

Measurement Model Results and Path Analysis

For a model to be compared across groups – Chinese females and American females, the researchers used the model comparison technique in SEM to develop the proposed model demonstrating relationship among three psychological factors (Figure 1). Based on a configural invariance test, the results from a confirmatory factor analysis and a nested model from SEM show a satisfied result. To improve reliability and validity of the scales, certain items from three constructs were removed from two groups. Remaining items and alpha reliabilities for GTS, CSE, and CAR after these adjustments ranged from 0.67 to 0.99, indicating acceptable reliability for the constructs. For the path analysis, a two-group comparison feature from AMOS 17 was

used on the proposed model. A direct cross-sample comparison of paths allowed analysis of the path differences across the two samples. Figure 2 and 3 demonstrate all models of the four groups. All fit indices indicate that the proposed model performs a good fit. The Cmin/DF of the three factor model is below 2 (1.49, 1.30). The comparative fit index (CFI) is near .90 range (.98, .99). The internal consistency (RMSEA) is below .08 (.04, .05). Based on these result, the model is hold across both Chinese and American groups.
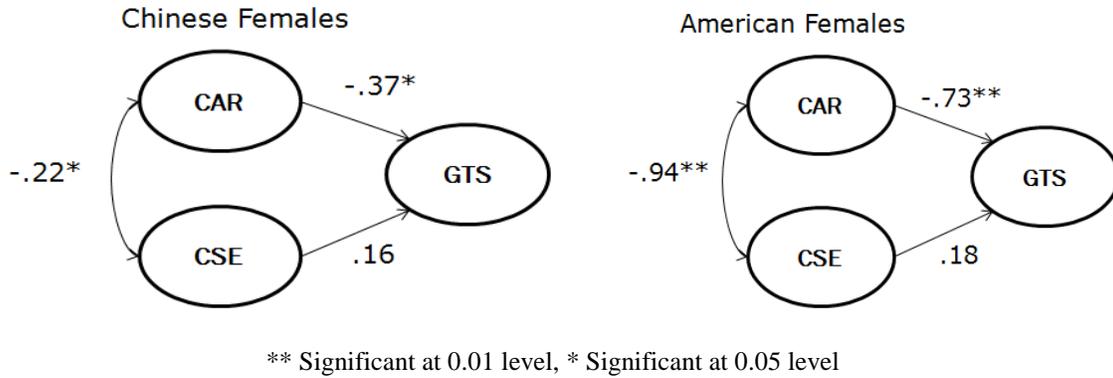

** Significant at 0.01 level, * Significant at 0.05 level

Figure 2: The Proposed Model for Chinese Female   Figure 3: The Proposed Model for American Female

FINDINGS AND DISCUSSION

The path estimates between computer anxiety and gender perception toward computing for Chinese female and American female groups are significant at the 0.05 level, but both have inverse relationship. Thus, the first hypothesis (H1) is not supported for both Chinese females and American females. For them, the higher the computer anxiety, the stronger the perception that computing is for female, instead of male. One possible explanation may lie in the insecurity of female. Influenced by their computer anxiety, it is possible that female students feel insecure about females' roles in computing, and thus their survey answers contain bias. The second hypothesis (H2) was not supported for both Chinese females and American females. There is no significant relationship between computer self-efficacy and gender perception toward computing in both groups. It means that for them computer self-efficacy has no direct influence to gender perception toward computing. Another result shows a significant inverse relationship between computer self-efficacy (CSE) and computer anxiety (CAR) at the 0.01 level. This finding is supported by a number of studies (e.g. [11], [12], [22], [24]). Based on the path estimate, this inverse relationship could be explained as increasing levels of computer self-efficacy results in decreasing levels of computer anxiety. Correspondingly, increasing levels of computer anxiety results in decreasing levels of computer self-efficacy.

CONCLUSIONS AND MANAGERIAL IMPLICATION

For researchers, we now understand how computer anxiety influences gender perception toward computing for American male and female students. Computer anxiety and insecurity in female roles in computing is probably one of the causes that discourage female to participate in IT. The fact that a path estimate between computer anxiety and gender perception toward computing for Chinese female students (-.37) is higher than that for American female (-.73) means that computer anxiety has weaker influence to gender perception toward computing for Chinese female students than American female students. That may explain why Chinese women are not discouraged to participate in IT as much as American women. The study also found that computer self-efficacy has a relationship with computer anxiety. This finding gives a hint that it is possible that computer self-efficacy may have mediating relationship with gender perception toward computing through computer anxiety. To see a more complete picture of the relationship among these three psychological factors, a further investigation to identify which one between computer anxiety and computer self-efficacy would be a real antecedent (mediation-moderation effect) of the phenomenon is needed. Practitioners should find the study useful as well. Educational institutions in the U.S. should provide basic computer skills in addition to foundation knowledge of computing. This will lessen their computer anxiety, which in return influence perception of computing toward gender neutral for American students, especially female students.

REFERENCES

References available upon request from Kittipong Laosethakul, laosethakulk@sacredheart.edu.