行政院國家科學委員會專題研究計畫 成果報告

探討女性大學生於資訊科學領域之自我效能感
研究成果報告(精簡版)

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公 開 資 訊 ：本計畫涉及專利或其他智慧財產權，2 年後可公開查詢

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中文摘要：

在資訊科學領域裡性別不平衡之現象時來已久了，這對社會、經濟及科學各方面皆會造成負面影響。因此，本研究針對高堅持、低堅持及無堅持於資訊科學相關領域中女性大學生之自我效能感進行探討，以台灣地區在四年制大學中曾主修或正在主修資訊科學相關領域三年級以上之女性大學生作為研究對象。高堅持者為畢業之後還繼續留在資訊科學相關領域，而低堅持者則計畫畢業之後離開資訊科學相關領域。另外，無堅持者則指轉系至別的領育的學生。本研究發現高堅持者比低堅持者與無堅持者知覺到較高的學習自我效能及程式設計自我效能。

英文摘要：

Psychologists and computer science educators have concerned with gender inequality in computing. The study aimed to investigate self efficacy of undergraduate women with high persistence, low persistence, and non persistence in computing. Participants in the study were undergraduate women who have completed a minimum of two years of study in computing. High persisters would like to continue pursuing computing as their future career whereas low persisters considered not pursuing computing in their future. Non-persisters were those who have switched to another major. Findings showed that students who persisted perceived self-efficacy for leaning and C programming self-efficacy more than those who had planned to drop out of the computer science pipeline or had switched out of the majors.

Understanding Self-efficacy of Undergraduate Women in Computing

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Abstract: *Psychologists and computer science educators have concerned with gender inequality in computing. The study aimed to investigate self efficacy of undergraduate women with high persistence, low persistence, and non persistence in computing. Participants in the study were undergraduate women who have completed a minimum of two years of study in computing. High persisters would like to continue pursuing computing as their future career whereas low persisters considered not pursuing computing in their future. Non-persisters were those who have switched to another major. Findings showed that* students *who persisted perceived self-efficacy for leaning and C programming self-efficacy more than those who had planned to drop out of the computer science pipeline or had switched out of the majors.*

Keywords: self-efficacy, women, persistence, computer science education

1. Introduction

Psychologists and computer science educators have concerned with gender inequality in computer science (Whitley, 1997). Camp (1997) used the term "Shinking Pipeline" to describe the phenomenon that the proportion of women has been declined from enrolling in computer science program, to completing computer science program, to aspiring to graduate degree in computer science, and even to pursue professional practice in the field of computer science. Several researchers have found that the attrition rate of college women majoring in computer science has been higher than men (Campbell & McCabe, 1984; Cohoon, 2001; Cohoon, 2002; Sproull, Zubrow, & Kiesler, 1986). That is, women's persistence in computer science has been lower.

In discussion of women's failure to persist in computer science, researchers who examined gender differences on academic performance found no significant difference on academic performance between male and female students (Werth, 1986, Clarke & Chambers, 1989). Some studies have indicated that female students in computer science have performed better than male students (Lu, 2007; Anderson 1987; Fan, Li, & Niess, 1998). However, female students have perceived lower ability and academic achievement than male students (Clarke & Chambers, 1989; Fisher, Margolis, & Miller, 1997; Selby, Fisher, & Young, 1997). Hackett (1995) indicated women is unlikely to persist in the male dominated filed when they had lower self-efficacy. Hence, Galpin (1992) have suggested perceived self-efficacy of women may provide valuable insight for understanding the underrepresentation of women in computer science.

Self-efficacy is a component of Bandura's social cognitive theory. According to Bandura (1986), perceived self-efficacy refers to "people's judgment of their capabilities to organize and execute courses of action required attaining designated types of performances" (p.391). Self-efficacy represents individuals' judgments about what they believe and expect that they can accomplish in a given situation rather than their actual ability or skills. Perceived self-efficacy can be influenced by four major sources of information: 1) mastery experiences, 2) vicarious experiences, 3) social persuasion, and 4) physiological states (Bandura, 1995, 1977).

Perceived self-efficacy has been demonstrated to affect several aspects of human actions, such as choice of activities, effort, persistence, thought patterns, and emotional reactions (Bandura, 1977; Pajares, 1996). According to Schunk (1991), self-efficacy influences behavior and motivation for academic achievement as well. For example, students with high self-efficacy to achieve a task are more likely to engage a task enthusiastically than those with low self-efficacy, who may try to avoid the task altogether. Individuals who perceive high self-efficacy put forth more effort and persist longer when they confront obstacles than those who perceive low self-efficacy. People who feel inefficacious might overestimate the degree of difficulty in tasks.

Considerable research has focused on the influence of self-efficacy on academic behaviors in traditional academic settings, such as one's choices about what activities to engage (Waldman, 2003), choices about what careers to pursue (Zeldin & Pajares, 2000), persistence of the individual upon encountering difficulties (Zeldin & Pajares, 2000), and performance (Finney & Schraw, 2003; Warkentin, Griffin & Bates, 1994).

2. Purpose of the research

The study aims to investigate efficacy for learning, computer programming self-efficacy and computer self-efficacy of undergraduate women with high persistence, low persistence, and non persistence in computing.

3. Methods

3.1. Participants

A total of 223 undergraduate women who major / majored in computer science in Taiwan were recruited across twenty second universities. These universities selected for the study taught C programming language in their computer science required courses. Individual instructors of computer science required courses for junior students in each participating university were contacted for granting premising for scheduling the dates and time to administer the questionnaire to those computer science majors during break time of courses. Relatively, major-change undergraduate women were sought by using a snowball sampling technique and lists of acceptance of change of major announced by universities and later were personally invited to participate in the study via email, social networking sites, or phone. All participants received incentives in the form of cash for participating in the study. According to persistence level, participants further were classified as high presisters, low presisters and non- presisters. High and low presisters have completed a minimum of two years of study in computer science. High presisters would like to continue pursuing computing as their future career whereas low persisters have considered not pursuing computing in their future. Non-persisters were those who have changed their majors to other fields after entry.

3.2. Measures

Three scales were administered to measure self-efficacy for learning, computer self-efficacy and C programming self-efficacy. All items on the questionnaires are rated on 6 point Likert scales (1 = strongly disagree to 6 = strongly agree). The self-efficacy for learning scale consisting of eight items was modified from the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich & DeGroot, 1990). The Alpha coefficients for the self-efficacy scale of the MSLQ are 0.93 (Duncan & McKeachie, 2005). The computer self-efficacy scale consisting of ten items was developed by Compeau and Higgins (1995). The Alpha coefficients for the computer self-efficacy scale are 0.95. The C programming self-efficacy scale with eighteen items was developed from the computer programming self-efficacy scale of Ramalingam and Weidenbeck (1998) and was asked participants to rate their self-efficacy in performing specified C programming related tasks. The original scale overall reliability of the self-efficacy scores for their C++ scale was 0.98. In addition, persistence was measure by a survey item that asked those computer science majors to report whether they planned to pursue their career in computer science after their graduation. Based on the responses to the item, respondents were characterized as “high presisters” or “low presisters”.

3. Results

Ten cases that could not make a decision for their future career plan and eleven cases with missing values were excluded from the analysis. The rest of data were screened for univariate outliers defined as standardized scores in excess of 3.29. Five cases with univaraite outlier were found and were deleted. As a result, the dataset comprised 197 cases for the final data analysis. Among 197 students, 163 (82.74%) were high presisters, 28 (14.21%) were low presissters and 6 (3.05%) were non-presisters. Among 163 high persister, 33 (20.24 %) planned to hunt a computer science related job after graduation, 112 (68.71 %) planned to seek a graduate degree in computer science, and 15 (9.20%) planned to prepare for the national exams for being public servants. The rest of 3 (1.84%) planned to do two or all of them.

The internal consistency of the three scales varied from 0.95 to 0.9. The reliability coefficients satisfied the criteria of reliability, where Cronbach’s alpha values were either close to or over .70 (Bowers & Courtright 2002), and thus indicated good internal consistency. Descriptive statistics for the three groups on self-efficacy for learning, computer self-efficacy, and C programming self-efficacy are presented in Table 1.

Table 1. Descriptive Statistics

Vairable	High Presisters	Low Presisters	Non Presisters
Self-efficacy for learning	3.74 (0.72)	3.26 (0.92)	3.25 (0.83)
C programming self-efficacy	4.45 (0.64)	4.23(0.73)	3.67(0.88)
Computer self-efficacy	4.54 (0.70)	4.33(0.71)	4.47(0.86)

ANOVA were performed to compare groups on self-efficacy for learning, computer self-efficacy, and C programming self-efficacy, and the Tukey test was used for post hoc comparisons. The analysis revealed a significant effect on C programming self-efficacy, F (2, 194) = 6.57, p < 0.01 and on self –efficacy for learning, F (2, 194) = 5.70, p < 0.01, however, a non significant effect on computer self-efficacy, F (2, 194) = 1.06, p > 0.05. Pairwise comparisons, adjusted for multiple comparisons using the Bonferroni method, showed that the mean scores of learning self-efficacy for high persistence group (*M = 3.74, SD = 0.72*) were significantly different from the mean scores for low persistence group (*M = 3.26, SD = 0.92*), but not for non-persistence group (*M = 3.25, SD = 0.83*). Moreover, the mean scores of C programming self-efficacy for high persistence group (*M = 4.45, SD = 0.64*) were significantly different from the mean scores for low persistence group (*M = 4.23, SD = 0.73*) and non-persistence group (*M = 3.67, SD = 0.88*).

4. Discussions and conclusions

The study aimed to investigate self-efficacy for learning, C programming and computer among female undergraduate students with high-, low, non- level of persistence in computing. Findings suggested that students persisting in computer science were more likely to set a master's degree goal. Students who persisted perceived self-efficacy for leaning and C programming self-efficacy more than those who had planned to drop out of the computer science pipeline or had switched out of the majors. However, the study did not find any differences No differences in computer self-efficacy of high-, low- and none persisters. The results of research can provide parents, teachers, counselors, university professors and university administrators more effective strategies to help guide undergraduate women in the male-dominated field of computing to establish and develop stronger self-efficacy in order to ensure gender equality in education.

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出席國際學術會議報告

本計畫主持人林冠妤參與於馬來西亞檳城所舉辦的Global Learning 2010年會，此年會自2010年5月17日至20日，共計四天之會議行程。此次參與Global Learning 2010年會，主要是以第一作者的身分以口頭報告方式發表論文” A Collaborative Problem Posing and Solving Learning System in Statistics”。另外，也參加於中國上海舉辦的 ICETC 2010年會，此研討會自2010年6月22日至24日，共計三天之會議行程。此次參與ICETC 2010年會，主要是以第一作者的身分以口頭報告方式發表論文”Evaluating Satisfaction Regarding Interaction with a Collaborative Problem Posing and Solving Learning System”。在這兩次研討會中除了發表論文之外，在研討會中也聆聽其他研究者的研究成果報告，並且，和其他研究者互相交流，交換研究心得、經驗以及目前國內外*研究*環境之情況，並且，由此了解及學習到在數位學習及教育心裡領域中的最新的研究概念與趨勢。在此兩次研討會中所獲得的寶貴之經驗將有助於本計畫主持人下階段的研究方向之擬定。以下為本計畫主持人在此兩次研討會中所發表之論文。

A Collaborative Problem Posing and Solving Learning System in Statistics

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Abstract: This article illustrates a collaborative problem posing and solving learning system (CPPSLS) developed to support collaborative problems solving with computer-supported cooperation script in statistics learning and its usability testing results. The usability testing was conducted with two experts and nine students at the undergraduate and graduate levels in education. Both were observed to use the system during the testing. After testing the CPPSLS, experts evaluated the system based on ten usability principles and students filled out evaluation questionnaires. The features of the CPPSLS and its results of usability testing were presented in the paper.

Introduction

Collaborative problems solving has been suggested as a way of improving students' statistics learning (Qin, Johnson & Johnson, 1995). However, it needs an effective computer-supported collaborative learning approach and its associated computer-mediated learning environment in order to facilitate problem solving ability through collaborative learning. As for the challenges to achieve desired learning outcomes for computer-supported collaborative learning, researchers have suggested that the use of cooperation scripts among collaborators would improve effectiveness of collaborative learning and learning outcomes (Dillenbourg, 2002; Hron, Hesse, Cress, & Giovis, 2000; Mäkitalo, Weinberger, Häkkinen, Järvelä, & Fischer, 2005; Weinberger, Reiserer, Ertl, Fischer, & Mandl, 2005). Moreover, statistics education has recently attracted increasing attention. Educators found that student had difficulties in learning statistics and have suggested using collaborative problem solving instead of traditional statistics learning (Curcio & Artzt, 1997; Garfield, 1995; Lovett & Greenhouse, 2000; Moore, 1997; Snee; 1993). Hence, the study has involved designing and developing an online Collaborative Problem Posing and Solving Learning System (CPPSLS) that has integrated into open-source Moodle (Modular Object Oriented Dynamic Learning Environment) system to better facilitate collaborative problem solving with computer-supported cooperation script in statistics.

Design Rationales of CPPSLS

Schoenfeld (1992) proposed a problem solving process model in mathematics consisting of six key episodes: analyzing and reading the problem, exploring knowledge related to problem, making a plan, carrying out the plan, and verifying the solution for mathematical problem solving. Researchers have stressed the importance of problem solving process in order to turn novices into experts (Heller & Reif, 1984). Moreover, problem posing was regarded as important for scientific thinking. Some researchers have suggested problem posing could be an evaluation tool to assess students' concepts (English, 1998; Leung, 1996; Mestre, 2002). Hence, the computer supported collaboration scripts designed in the study has integrated problem posing into Schoenfeld (1992)'s problem solving episodes. Hence, the scripts designed in the study include five phases: posing a problem, exploring knowledge related to problem, making a plan, carrying out the plan, and verifying the solution for statistics problem solving. Lastly, learners are required to write a report collaboratively for their solutions. The CPPSLS system is designed and developed accordingly with the designed computer supported collaboration scripts.

Features of CPPSLS

The CPPSLS allows two types of users to access: teachers and students. Teachers in the CPPSLS system can set up a collaborative problem posing and solving task for students, decide how many problem students have to pose, and provide task descriptions and explanations for each step of the designed computer supported collaboration script. They also can monitor problem solving processes of groups. On the other hand, students are required to go through each step of predetermined problem solving process and use wiki to co-write their final report.

Formative Evaluation and Usability Testing on the CPPSLS

After completing the beta version of the CPPSLS, the usability testing was conducted with two experts and nine students at the undergraduate and graduate levels in education. Both were observed to use the system during the testing. After testing the CPPSLS, experts evaluated the system and categorized the usability problems of the CPPSLS based on ten usability principles developed according to Nielsen (1994), and Athanasis and Andreas (2001). These usability principles were (a) visibility of system status; (b) matching between system and the real world; (c) user control and freedom; (d) consistency and standards; (e) error prevention; (f) recognition rather than recall; (g) flexibility and efficiency of use; (h) aesthetic and minimalist design; (i) helping user recognize, diagnose, and recover from errors; and (j) help and documentation. Students who participated in the testing filled out a nine-point questionnaire for user interaction satisfaction (QUIS) developed at the University of Maryland in the 1980s after the testing to understand their opinions about the overall reaction to the CPPSLS, screen design and layout, terminology and system information used in the CPPSLS, learnability and system capacities. The mean response for all questions by all users was 6.29 (SD = 0.82). Table 1 shows the mean user response for each dimension of the QUIS.

QUIS Dimension	Mean	SD
Overall to the system	5.76	1.16103
Screen design and layout	5.92	1.08253
Terminology and system information	6.18	.93255
System learnability	6.58	1.13774
System capacities	7.07	.82462

Table 1: Mean User Response for Each QUIS Dimension.

Conclusion and Future Research

Results from usability testing confronted us with some usability problems in CPPSLS and guided us to modified CPPSLS in order to achieve the right environment for learning activities. The next step of the study is to implement the system in a real statistics classroom. As the system matures, it will have potential of developing and improving problem solving ability through online collaborative learning and establishing an effective computer-supported collaborative problem solving model which has potential to contribute to future research, instructional design, and system development.

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Evaluating Satisfaction Regarding Interaction with a Collaborative Problem Posing and Solving Learning System

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***Abstract*—A collaborative problem posing and solving (CPPS) learning system has been developed to support collaborative problems solving with computer-supported cooperation script in statistics learning. A preliminary study has been conducted to evaluate satisfaction of undergraduate students enrolling in an Educational Statistics course regarding interaction with the collaborative problem posing and solving learning system and understand their intention to use. Results taken from questionnaires and open-ended questions revealed that the participants were satisfied with the CPPS and high intention to use the CPPS in the future.**

Keywords-CSCL; statistics problem solving; user interaction satisfaction

I. INTRODUCTION

Recently socially inspired theories on learning, supported by the growing development of computer and network technology, have resulted in a tendency of employing computer-supported collaborative techniques in the classroom and an increase of research on computer-supported collaborative learning. Collaborative learning activities usually involve different tasks, such as, problem solving. Qin, Johnson and Johnson indicated collaborative problem solving could enable learners to exchange information and thoughts, form a collective understanding and interpretation of problem, and generate various problem solving strategies [1]. Although collaborative learning is considered to facilitate learning and improve problem solving, however, practically, not all collaborative learning could achieve its expected effects. Hence, it needs an effective computer-supported collaborative learning approach and its associated computer-mediated learning environment in order to facilitate problem solving ability through collaborative learning.

As for the challenges to achieve desired learning outcomes for computer-supported collaborative learning, researchers have suggested that the use of cooperation scripts among collaborators would improve effectiveness of collaborative learning and learning outcomes [2, 3, 4, 5]. However, difficulties exist in designing computer supported cooperation scripts. First, script designer should avoid over-scripting. Over scripting learning may be harmful to the natural interaction and the natural problem solving process [2]. Also, script designer should consider how to make learners to employ scripts as planned. Veerman has suggested that the interface of online learning environment for cooperation script should be designed according to the task structure [6]. Such structured interface could reduce cookie loading of learners without investing effort in memorizing procedures of scripts and enable them to concentrate on learning tasks at hand. Researchers have suggested that computer-supported collaborative scripts and its associated computer-mediated learning environment should be planned and designed appropriately [2, 6, 7, 8]。

Recently, statistics education has recently attracted increasing attention. Educators found that student had difficulties in learning statistics [9, 10, 11, 12]. For example: Onwuegbuzie pointed out that even graduate students have felt difficult to understand statistics concepts introduced in the statistics classrooms and highly anxious about statistics, which has resulted in low statistics achievement [13]. Hence, researchers have suggested using collaborative problem solving instead of traditional statistics learning [9, 10, 11, 12, 14]. Although collaborative problem solving is not new, it is rarely applied into research on statistics teaching. Hence, the study has involved designing and developing an online Collaborative Problem Posing and Solving (CPPS) learning system that has integrated into open-source Moodle (Modular Object Oriented Dynamic Learning Environment) system to better facilitate collaborative problem solving with computer-supported cooperation script in statistics.

II. DESIGN RATIONALES OF CPPS

Schoenfeld proposed a problem solving process model in mathematics consisting of six key episodes: analyzing and reading the problem, exploring knowledge related to problem, making a plan, carrying out the plan, and verifying the solution for mathematical problem solving [15]. Researchers have stressed the importance of problem solving process in order to turn novices into experts [16]. Guiding novices to experience key episodes of problem solving could enable learners to be aware of what they have neglected during problem solving, which could enhance their self-regulatory behaviors [17]. For collaborative problem solving groups, problem solving process might enable members to form the consensus toward how to perform problem solving tasks [17]. Harskamp and Ding designed cooperation scripts based on Schoenfeld's model [17]. They found that students with cooperative scripts performed in solving physics problems better than those did alone.

Moreover, problem posing and problem solving are very important to research activities or scientific thinking. In traditional classroom, teachers usually play a role as problem poser. English suggested including problem solving in classroom activities, and transferring the responsibility of problem posing to students [18]. Leung has believed that educators could understand knowledge and skills learners possess from problems they posed [19]. Hence, problem posing could be an evaluation tool to assess students' concepts [19, 20].

The computer supported collaboration scripts designed in the study has integrated problem posing into Schoenfeld's problem solving episodes [15]. According to Schoenfeld's problem solving process, problem solver are required to read and analyze problems when they solve problem others pose [15]. If problem solvers are also problem posers, they will read and analyze problems while posing problems. Hence, the scripts designed in the study include five phases: posing a problem, exploring knowledge related to problem, making a plan, carrying out the plan, and verifying the solution for statistics problem solving. Lastly, learners are required to write a report collaboratively for their solutions. The CPPS learning system is designed and developed accordingly with the designed computer supported collaboration scripts.

III. OVERVIEW OF THE CPPS

The CPPS allows two types of users to access: teachers and students.

Teachers in the CPPS learning system can set up a collaborative problem posing and solving task for students (see Figure 1), decide how many problem students have to pose (see Figure 2), and provide task descriptions and explanations for each step of the designed computer supported collaboration script. They also can monitor problem solving processes of groups.

On the other hand, student's interactions with the CPPS are managed at the team level. In order to complete the collaborative problem posing and solving tasks set up by the teacher, they are required to go through each step of predetermined problem solving process and use wiki to co-write their final report. Figure 3 shows student view of problem posing step.

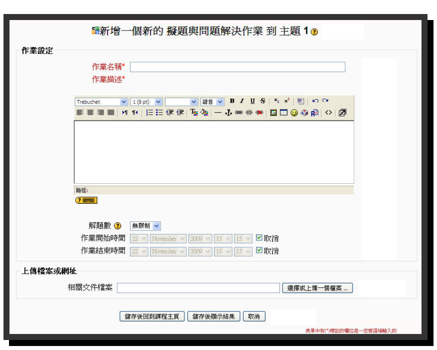

Figure 1. Teacher view of adding new CPPS task.

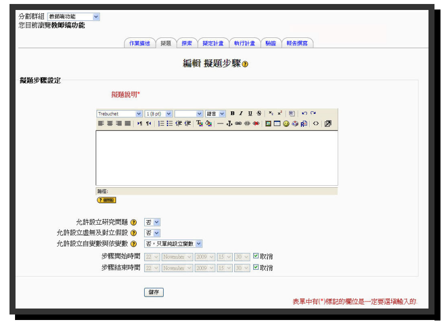

Figure 2. Teacher view of eding "problem posing" step.

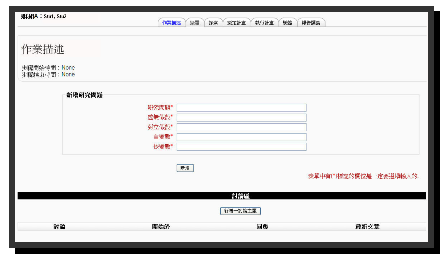

Figure 3. Student view of "problem posing" step.

IV. PURPOSE OF STUDY

The purpose of the study was to evaluate satisfaction of undergraduate students regarding interaction with the collaborative problem posing and solving learning system and understand their intention to use the system.

V. METHODOLOGY

A. *Participants*

The study included a sample of thirty three Taiwanese undergraduate students enrolled in a three credit hour undergraduate course "Educational Statistics". Participants were randomly assigned into small groups of three or two members to perform assignments of cooperative problem posing and problem solving.

B. *Procedure*

By practicing the acquired subject matter on real-life data they collected according to their choice.
During the first lesson of the semester, students were instructed about data collection on a topic
of interest to them. They were told that they would be expected to investigate and describe the
data they collected with the help of the tools for statistical analysis they would acquire in the
course. They were also told that the quality of their analysis and the effort they invested in the
analysis would play an important role in determining their final grades.

At the beginning of the semester, all students received a demonstration of Moodle. Prior to the study, all the students employed the assignment activity module of Moodle to complete their individual outside class assignments to get familiar with Moodle. Students participated in the study by complete two required outside class assignments each lasting one week. One topic of two assignments was associated with the "Correlation" unit and the other one with the "Regression" unit. The instructions for the assignments included an instruction with script. With the CPPS, all the students were required to collaboratively pose and solve problems based on the instructions. A set of self-reported questionnaires was disseminated to students to be completed individually in the week after finishing the assignments.

C. Instrucments

The questionnaires used in the study were listed as follows.

1) Demogrphic survey: The demographic survey included gender, grade level, and major.

2) Questionnare for user interaction satisfaction (QUIS): The QUIS was developed by Shneiderman and was refined by Norman and Chin in 1988 to evaluate user satisfaction with interactive computer sytems [21]. The QUIS included twenty six items divided into five dimensions of four to six items each. The dimentions included overall user reaction, screen design and layout, terminology and sytem information, learning, and system compacity. The questionnaire used a semnatic differential on a scale from 1 (the lowest rating) to 9 (the highest rating), including " Not applicable" wer as an opnion. The overall reliability of the QUIS is a Cronbach alpha of 0.95 [22].

3) Interntion to use: A single item asking about whether the respondent agree to continue using the system next semester with a 6-point Likert scale (from "1" meaning "Strongly Disgree" to "6" meaning "Strongly Agree") was included in the study.

4) Tow open ended questions: Two open ended questions asking the difficulty and the advantage of using the system were also indcluded in the study.

VI. FINDINGS

A. Data Prepartion

Two cases that did not complete the cooperative problem posing and problem solving assignments were excluded from the analysis. The rest of data were screened univariate outliers and missing values. No univaraite outlier was found, however, several missing data were found in five QUIS items answered "Not applicable". Table I shows percentages of missing value in five dimensions of QUIS. It was noted that the data is not missing completely at random in the preliminary analysis. Hence, a regression substitution was used to generate replacement values for all missing data. As a result, the dataset comprised 31 cases for the final data analysis.

B. Scale consisteny

The consistency of the QUIS used in the study is shown in Table I. The internal consistency of the scales varied from 0.75 to 0.88. The reliability coefficients satisfied the criteria of reliability, where Cronbach's alpha values were either close to or over .70 [23], and thus indicated good internal consistency.

TABLE I. CONSISTEY OF SCALES

Scale	N	Missing %	Cronbach's alpha (# items)
Overall user reaction	31	0	.86 (6)
Screen design and layout	31	0	.83 (4)
Terminology and sytem Info	27	12.9	.86 (6)
Learning	30	3.2	.88 (5)
Sytem compacity	23	25.8	.75 (5)

C. Sample description

A sample of thirty one participants was used to perform statistical analyses for this study. Among the thirty one students, twenty two (71 %) were female and nine (29 %) were male. In the sample, twenty nine (93.5 %) were sophomores, and two (6.5 %) were seniors. Also, twenty nine (93.5 %) were majored in education and two were in (6.5 %) in non-education.

D. Descriptive Statistics

The mean response for all QUIS items was 5.59 (SD=1.05). Descriptive statistics for the five QUIS dimensions and the variable of using system again are presented in Table II.

TABLE II. DESCRIPTIVE STATISTICS

Scale	Mean	SD
Overall user reaction	5.04	1.27
Screen design and layout	5.40	1.41
Terminology and sytem Info	5.75	1.09
Learning	5.59	1.26
Sytem compacity	6.18	1.20
Intention to use	4.26	.86

VI. DISCUSSIONS

The study was to understand satisfaction regarding interaction with the collaborative problem posing and solving learning system developed by the researcher. The system scored highest in the dimension of "system capacity" and lowest in the dimension of "overall user reaction".

Results from open-ended questions showed that the advantage of the system most participants mentioned was to clearly specify the steps that that participants have to proceed. However, responses from open-ended questions also confronted us with some usability problems with the CPPS which could guide us to modify the CPPS. Overall, participants' intention to use the system in the future is high. The next step of the study is to examine the effect of the system in students' cognitive and affective in statistics.

ACKNOWLEDGMENT

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國科會補助計畫衍生研發成果推廣資料表

日期:2011/09/30

國科會補助計畫	計畫名稱: 探討女性大學生於資訊科學領域之自我效能感
	計畫主持人: 林冠妤
	計畫編號: 98-2629-S-194-002-　　學門領域: 資訊教育一電腦輔助教學

無研發成果推廣資料

98 年度專題研究計畫研究成果彙整表

計畫主持人：林冠妤			計畫編號：98-2629-S-194-002-				
計畫名稱：探討女性大學生於資訊科學領域之自我效能感							
成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	1	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	3	3	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	0	1	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	1	100%		
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		

其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)	無

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

■達成目標

□未達成目標（請說明，以 100 字為限）

　　□實驗失敗

　　□因故實驗中斷

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說明：

2. 研究成果在學術期刊發表或申請專利等情形：

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3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）（以 500 字為限）

在資訊科學領域裡性別不平衡之現象時來已久了，這對社會、經濟及科學各方面皆會造成負面影響，因此，本研究計畫之結果能夠提供父母、學校老師、諮商者、大學教授及大學管理階層一個更有效的策略來引導主修於男性主導領域—資訊科學的女性大學生建立及發展更正向的自我效能感，以確保教育的性別分布均衡及平等。