

The Study of Computer Self-efficacy, Internet Self-efficacy, Computer Attitude in Computer and Information Technology Course

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ABSTRACT

Bangkok University has changed the teaching strategy of the Computer and Information Technology course by applying the e-learning system and problem-based learning. To evaluate the learning effectiveness, computer self-efficacy, Internet self-efficacy and computer attitude were used as factors. This research also studied the effect of computer attitude on student learning outcomes. A questionnaire was distributed at the beginning and the end of the semester. After the class finished, 425 participants answered the questionnaire. The results showed that learning Computer and Information Technology significantly improved computer self-efficacy, Internet self-efficacy, and computer attitude. In addition, computer attitude also played an important part of learning outcomes in terms of change in computer and Internet self-efficacy.

บทคัดย่อ

มหาวิทยาลัยกรุงเทพพัฒนาหลักสูตรวิชาคอมพิวเตอร์และเทคโนโลยีสารสนเทศขึ้นใหม่โดยใช้ระบบอิเล็กทรอนิกส์ ร่วมกับการเรียนรู้โดยการแก้ปัญหาเป็นหลัก การวัดประสิทธิผลการเรียนรู้ดำเนินการโดยวัดจากปัจจัยด้านการประเมินตนเองด้านคอมพิวเตอร์และอินเทอร์เน็ตร่วมกับทัศนคติด้านคอมพิวเตอร์ การวิจัยครั้งนี้ยังได้ศึกษาถึงผลกระทบของทัศนคติด้านคอมพิวเตอร์ต่อผลการเรียนรู้แบบสอบถามถูกแจกให้กับกลุ่มตัวอย่างในตอนเริ่มและสิ้นสุดภาคการศึกษา ผลปรากฏว่าสามารถรวบรวมแบบสอบถามได้ทั้งสิ้น 425 ราย ผลการวิจัยพบว่าการเรียนวิชาคอมพิวเตอร์และเทคโนโลยีสามารถเพิ่มผลการประเมินตนเองด้านคอมพิวเตอร์และอินเทอร์เน็ต และทัศนคติด้านคอมพิวเตอร์อย่างมีนัยสำคัญ โดยทัศนคติด้านคอมพิวเตอร์มีผลกระทบต่อผลการเรียนรู้ เมื่อพิจารณาจากการเปลี่ยนแปลงผลการประเมินตนเองด้านคอมพิวเตอร์และอินเทอร์เน็ต

INTRODUCTION

Bangkok University offers the Computer and Information Technology course as a general education course for students in most faculties. In the past, the course was delivered to students by means of face-to-face teaching. The class size was as big as 160 students. However, the evolution of technology has changed the learning philosophy. E-learning has become an alternative tool to deliver content and knowledge to students. Therefore, Bangkok University has proposed a new paradigm for the Computer and Information Technology course. The class size was decreased to 40 students and an e-learning system was used as a tool. Collaborative learning and problem-based working were added to the teaching strategies. The course content was revised based on real-life experiences. In addition, software, such as Microsoft Office, antivirus, and Internet tools, was also taught in the class. To evaluate the effectiveness of the new teaching strategies, computer self-efficacy, Internet self-efficacy and computer attitude are assessed.

Bandura (1986) defined the term self-efficacy as “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances”. When applied to the computer domain, computer self-efficacy is defined as “an individual’s perceptions of his or her ability to use computers in the accomplishment of a task” (Compeau and Higgins, 1995). People who are not comfortable using computers normally have poor computer self-efficacy (Cassidy & Eachus, 2002). However, computer self-efficacy is not a measurement of existing computer skills but the reflection of what people believe about using a computer (Eastin & LaRose, 2000). Many researchers found that people with a high level of computer self-efficacy have been shown to be more willing to accept and use an information system (Hill, et al., 1987; Venkatesh & Davis, 1996). Compeau and Higgins (1995) also found that computer self-efficacy effects an individual’s expectation of the outcomes of using computers and ultimately effects his/her decision to use computers. In addition, the activity and the

effort in challenging situations are also influenced by computer self-efficacy (DeTure, 2004; Igbaria & Ilvari, 1995; Marakas et al., 1998).

When extended to the World Wide Web domain, the term Internet self-efficacy is considered. Internet self-efficacy is not concerned only with the computer skill but also the Internet skill such as using e-mail, browsing the WWW, etc. Internet self-efficacy is defined as the belief that one can successfully perform a distinct set of behaviors required to establish, maintain and utilize effectively the Internet over basic personal computer skills (Eastin and LaRose, 2000).

Attitude is one of the determining factors in predicting people's behavior (Ajzen & Fishbein, 1980). It also influences the positive or negative response to a specific object, situation, institution, or person (Aiken, 2000). Therefore, attitude plays an important role in education (Yushau, 2006). Computer attitude is a people's thought that influences the use of computers. Awareness of the student attitudes towards computers is a critical factor in course evaluation. To be successful in computer course, it is necessary to consider the student's computer attitude (Torkzadeh et al., 1999, Zoltan & Chapanis, 1982).

This research is, therefore, designed to study the effect of learning in the Computer and Information Technology course on computer self-efficacy, Internet self-efficacy, and computer attitude. Additionally, the effect of computer attitude on learning outcomes in the form of changes in computer self-efficacy and Internet self-efficacy are also examined.

RESEARCH MODEL AND HYPOTHESIS

Hypotheses 1: Learning Computer and Information Technology course improves computer self-efficacy.

Hypotheses 2: Learning Computer and Information Technology course improves Internet self-efficacy.

Hypotheses 3: Learning Computer and Information Technology course improves computer attitude.

Hypotheses 4: Computer attitude affects student learning outcomes measured in terms of change in computer self-efficacy.

Hypotheses 5: Computer attitude affects student learning outcomes measured in terms of change in Internet self-efficacy.

METHODOLOGY

Participants

The participants in this study were undergraduate students enrolled in the Computer and Information Technology course at Bangkok University. The course covered the fundamental aspects of computer and technology, technology infrastructure, hardware and software, telecommunications and networks. There were approximately 100 sections in this course. Six hundred students were randomly selected from multiple sections. Each section size ranged from 30 to 40. All participants were asked to answer a questionnaire before the course started at the beginning of the semester (pre-test) and after the course finished at the end of the semester (post-test). After the class finished, there were only 425 participants who responded to the survey. Table 1 provides participants' demographic data.

Table 1: Participant's Demographic Data

Characteristics	Frequency	Valid Percent (%)
Gender		
Male	155	36.5
Female	270	63.5
Age		
17	1	0.2
18	109	25.6
19	209	49.2
20	68	16.0
21	18	4.2
22	12	2.8
23	6	1.4
24	2	0.5
Faculty		
Accounting	3	0.7
Business Administration	160	37.6
Communication Arts	216	50.8
Economics	1	0.2
Fine and Applied Arts	3	0.7
Humanities	1	0.2
Laws	35	8.2
Science	6	1.4
Total	425	100

INSTRUMENTS

The data for this study were gathered by means of a questionnaire. The questionnaire included four major constructs: (a) demographic information, (b) computer self-efficacy, (c) Internet self-efficacy, and (d) computer attitude. The items for measuring computer self-efficacy were adopted from a modified version of Murphy (1998) by Khorrami-Arani (2002). The internet self-efficacy scale is adapted from Torkzadeh and Van Dyke (2002). To evaluate computer attitudes, a widely-used computer attitude scale (Loyd & Loyd, 1985) was modified. A re-

vision of those scales was necessary to suit the participants involved in this study. The questionnaire is a 5-point Likert scale ranging from "1" = "Strongly disagree" to "5" = "Strongly agree".

RELIABILITY ASSESSMENT

To examine the item reliability in each scale, Cronbach's alpha was used to confirm the adequacy of the measures. The reliability results confirmed the confidence for internal consistency as shown in Table 2

Table 2: Reliability of Measures

Construct	No. of items	Alpha	
		Pre-test	Post-test
Computer Self-efficacy	10	0.961	0.952
Internet self-efficacy	15	0.961	0.955
Computer attitude	7	0.951	0.934

RESULTS

For examining hypotheses 1, 2, and 3, a paired-samples t-test method was conducted to check the difference of mean scores. Table 3 displays the results of mean scores and the t-value for computer self-efficacy, Internet self-efficacy, and computer attitude. The results indicated that all mean scores of the post-test are higher than those of the pre-test.

According to the t-test method, the differences of the pre-test and the post-test on computer self-efficacy, Internet self-efficacy, and computer attitude are significant at the significant level 0.001. Therefore, learning Computer and Information Technology course significantly improve students' computer self-efficacy, Internet self-efficacy, and computer attitude, indicating hypotheses 1, 2, and 3 were supported.

Table 3: The Effect of Learning Computer Course on Computer and Internet Self-efficacy

	Pre-test		Post-test		t-value
	Mean	S.D.	Mean	S.D.	
Computer Self-efficacy	3.75	0.79	3.93	0.70	-6.994***
Internet Self-efficacy	3.68	0.78	3.87	0.70	-8.009***
Computer Attitude	3.82	0.85	3.96	0.75	-5.162***

***p<0.001

In order to examine the influences of computer attitude on learning outcomes in terms of change in computer self-efficacy and Internet self-efficacy, participants were grouped by computer attitude scale into 'high', 'medium', or 'low' using the mean score of 3.82 (S.D. = 0.85) on the pre-test computer

attitude scale. The Analysis of Variance (ANOVA) was conducted to test the difference between groups. Together with the analysis, the assumption of homogeneity of variance was examined using Levene statistic and found to be violated as shown in Table 4.

Table 4: Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Computer Self-efficacy	13.077	2	422	.000
Internet Self-efficacy	30.423	2	422	.000

Since the equal variances assumption was violated, the Welch method was used and the results are displayed in Table 5. The results revealed the significant difference of students with 'high', 'medium', and 'low' computer attitude for both computer self-efficacy and Internet self-efficacy

with the significant level 0.001. This implies that computer attitude has an effect on the student learning outcomes in terms of change of both computer self-efficacy and Internet self-efficacy. Therefore, hypotheses 4 and 5 are supported.

Table 5: The Effect of Computer Attitude on Computer and Internet Self-efficacy

	Statistic(a)	df1	df2	Sig.
Computer Self-efficacy	25.330	2	273.593	.000
Internet Self-efficacy	23.807	2	264.445	.000

a Asymptotically F distributed.

However, when using the Games-Howell method, the results of both computer self-efficacy and Internet self-efficacy showed that there were significant differences between students from the low computer attitude group to the medium and high computer attitude group. For computer self-efficacy, there was a significant difference between the medium computer attitude group and the high computer attitude group. For Internet self-efficacy, however, there is no significant difference between students from the medium computer attitude group

to students from the high computer attitude group, as shown in Table 6.

In addition, Table 7, 8, and 9 display the differences of mean scores between pre-test and post-test in low, medium, and high computer attitude group, respectively. The results showed that there were significant differences of mean scores between students in the low and medium computer attitude group but there were no significant differences between students in the high computer attitude group.

Table 6: The Result from Games-Howell Method

Dependent Variable	(I) Computer Attitude	(J) Computer Attitude	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Computer Self-efficacy	Low	Medium	.30955(*)	.06476	.000	.1569	.4622
		High	.45460(*)	.06387	.000	.3040	.6052
	Medium	Low	-.30955(*)	.06476	.000	-.4622	-.1569
		High	.14506(*)	.05500	.024	.0155	.2746
	High	Low	-.45460(*)	.06387	.000	-.6052	-.3040
		Medium	-.14506(*)	.05500	.024	-.2746	-.0155
Internet Self-efficacy	Low	Medium	.35319(*)	.06249	.000	.2057	.5006
		High	.41706(*)	.06083	.000	.2735	.5607
	Medium	Low	-.35319(*)	.06249	.000	-.5006	-.2057
		High	.06386	.04443	.323	-.0408	.1685
	High	Low	-.41706(*)	.06083	.000	-.5607	-.2735
		Medium	-.06386	.04443	.323	-.1685	.0408

* p<0.05

Table 7: The Effect of Computer and Internet Self-efficacy in Low Computer Attitude Group

	Pre-test		Post-test		t-value
	Mean	S.D.	Mean	S.D.	
Computer Self-efficacy	2.98	0.55	3.43	0.64	-8.711***
Internet Self-efficacy	2.90	0.56	3.36	0.69	-8.633***

***p<0.001

Table 8: The Effect of Computer and Internet Self-Efficacy in Medium Computer Attitude Group

	Pre-test		Post-test		t-value
	Mean	S.D.	Mean	S.D.	
Computer Self-efficacy	3.75	0.48	3.88	0.53	-3.449***
Internet Self-efficacy	3.73	0.43	3.84	0.46	-3.178***

***p<0.001

Table 9: The Effect of Computer and Internet Self-Efficacy in High Computer Attitude Group

	Pre-test		Post-test		t-value
	Mean	S.D.	Mean	S.D.	
Computer Self-efficacy	4.45	0.55	4.44	0.55	0.220
Internet Self-efficacy	4.34	0.58	4.38	0.57	-1.379

DISCUSSION AND CONCLUSIONS

The purpose of this study is to evaluate the effectiveness of the new proposed Computer and Information Technology course. Computer self-efficacy, Internet self-efficacy, and computer attitude were used as factors. All participants had to take the test twice regarding their computer self-efficacy, Internet self-efficacy, and computer attitude by taking a pre-test at the beginning of the semester and a post-test at the end of the semester in order to record changes of all factors. Later, the computer attitude was used as the determinant factor along with the classroom learning to explore the effect on the student learning outcomes in terms of change in computer self-efficacy, and Internet self-efficacy.

The new teaching strategy for the Computer and Information Technology course has proved to be good for students. The findings of this study suggest that when students learn the Computer and Information Technology course, their computer self-efficacy, Internet self-efficacy, and computer attitude increase significantly. Consistent to the literature review, this also implies that students have the potential to be successful in using information and communication technology in the future.

Computer attitude is another important factor on student computer and Internet self-efficacy. This study indicates that there are significant differences between students from the low, medium, and high computer attitude group. However, the major difference occurs from students in the low computer attitude group to medium and high computer attitude group. According to the t-test method, the results show that there are only significant differences between pre-test and post-test for students in the low and medium computer attitude group but not in the high computer attitude group. One plausible explanation is that the content of the Computer and Information Technology course, as a general education course, is just the fundamental content. Therefore, it may be assumed that students who are in the high computer attitude group already

know most of the contents which results in the minimum improvement of students in this high computer attitude group. In contrast, students in the low and medium computer attitude groups have less knowledge in computer and information technology. Therefore, there are more spaces for them to improve their computer and information technology knowledge.

Although the study provides meaningful implications, the limitation in this study is that it only focused on the new teaching strategy and there was no comparison between the old teaching strategy and the new teaching strategy. In addition, student grades might also be used as an evaluation tool to test the course effectiveness.

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