ELEMENTARY EFL TEACHERS' COMPUTER PHOBIA AND COMPUTER SELF-EFFICACY IN TAIWAN

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ABSTRACT
The advent and application of computer and information technology has increased the overall success of EFL teaching; however, such success is hard to assess, and teachers prone to computer avoidance face negative consequences. Two major obstacles are high computer phobia and low computer self-efficacy. However, little research has been carried out in this area, especially from instructors' perspectives. This study aimed to determine the levels of computer anxiety and computer self-efficacy, and their correlations to classroom teaching among 300 elementary EFL teachers in Taiwan. Data were collected through survey method. Results indicated that teachers have moderate to high computer phobia and low computer self-efficacy. It is evidenced that computer phobia is negatively associated with computer self-efficacy. Also, it was found that teachers who frequently used computers showed lower computer phobia. Male teachers perceived themselves as having higher computer self-efficacy, and younger teachers tended to have a lower level of computer phobia and higher computer self-efficacy. High accessibility of computers at school for teachers would significantly lower computer anxiety and raise computer self-efficacy. In addition to investigating these two specific factors, evidence and implications for practice and directions for further research are also discussed.
Keywords: Computer phobia, Computer anxiety, Computer self-efficacy, elementary EFL teachers, Taiwan

INTRODUCTION
Computer assisted language learning (CALL) is increasingly being used for educational purposes throughout the world. Extensive research has supported the proposal that the effectiveness of their research results correlated with the use of CALL on ESL /EFL education (Rosen, Sears, & Weil, 1987; Tsou, Wang, & Li, 2002; Ybarra & Green, 2004). In Taiwan, in light of the government's imperative to integrate CALL into the teaching of English as a foreign language (EFL) to elementary school students, CALL has proved to be an essential aid for schools to facilitate teaching and learning (Chen, T. C., 2002). The integration of CALL has also been reported to provide a number of benefits for EFL teaching by educators in creating a learning environment, inspiring learning motivation, decreasing learning anxiety, minimizing individual learning differences, and increasing learning achievement (Ma, Andersson, & Streith, 2005).

Many scholars have focused their attention on the use of CALL and computer phobia on students, but rarely on the teachers themselves (Rosen & Macguire, 1990). Yet it is the teachers who serve as the agents of change for the students in the adoption and use of CALL by bringing the new concepts, ideas, and equipment into the classroom. These teachers, however, cannot serve in this role without the necessary skills, knowledge, and attitudes required to introduce and to integrate CALL successfully into the curriculum (Baylor & Ritchie, 2002). If teachers are unsure of their computer knowledge and skills, they can be cautious about implementing CALL in the classroom teaching for their respective students. One possible result of this caution is computer phobia, which is anxiety about interactions with computers that results in a negative attitude, such as fear and avoidance (Blank & White, 1984; Gunter, Gunter, & Wiens, 1998; Jay, 1981; Reznich, 1996; Yang, 1996). Ultimately, they might see themselves as victims of CALL and lose the opportunity to acquire and manipulate this useful resource.

Computer anxiety, which has often been linked computer phobia, refers to negative feelings associated with the use of computers (Cantrell, 1982; Chua, Chen, & Wong, 1999). Jay (1981) defined computer phobia as the negative attitude toward computers that results from computer anxiety. Rosen and Weil (1992) further defined computer phobia as anxiety and a negative attitude toward present and future interactions with computers. People suffering from computer phobia often hold a negative attitude toward computers, which in turn eventually causes avoidance of computers (Harrington, McElroy, & Morrow, 1990; Heinssen, Glass, & Knight, 1987; Rachman, 1998; Todman, 2000; Torkzadeh & Angula, 1992; Weil & Rosen, 1995). It is also associated with technophobia, which refers to a phobia toward technology, and cyberphobia, which refers to a phobia toward computers (Brosnan, 1998). In the present study, computer phobia is also referred to technophobia and cyberphobia.

The characteristics variables of computer phobia have also been widely researched over the last few decades. With regard to age, Laguna & Babcock (1997) indicated that younger people are less likely to suffer from computer phobia. Some studies have suggested that females have a higher level of computer phobia or negative

attitude toward computers than males (Levin & Gordon, 1989; McIlroy et al, 2001; Rosen, Sears & Weil, 1987). In addition, students are less likely to have a high level of computer phobia than those who are not students, although one study found that about one quarter of the students had computer phobia ((Pancer, George, & Gebotys, 1992; Weil & Rosen, 1995).

Among all the computer phobia scales, the computer anxiety rating scale (CARS-S) and computer thoughts survey (CTS) developed by Rosen and Weil (1992) are most widely used. The present study adopted this scale due to its widespread acceptance. Other commonly used instruments include the Computer Anxiety Index by Simonson, Matt, & Maurer (1987); the Computer Anxiety Rating Scale by Heinssen, Glass, & Knight (1987); the Computer Anxiety Rating Scale by Heller & Martin (1987); the Computer Anxiety Scale by Marcoulides (1989); the Computer Anxiety Scale by Kernan & Howard (1990); and the Computer Anxiety and Learning Measure by McInerney, McInerney, & Sinclair (1994).

Computer self-efficacy commonly refers to individuals' judgment of their knowledge and capabilities to use computers in diverse situations (Bandura, 1986; Compeau & Higgins, 1995; Murphy, Coover & Owen, 1989). People with high computer self-efficacy tend to believe that they are competent in operating computers and are eager to attend to computer related activities (Davis et al., 1989; Delcourt & Kinzie, 1993; Hill , Smith & Mann, 1987). In addition, Kinzie, Delcourt, and Powers (1994) stated that computer self-efficacy is associated with self confidence. The perceived computer self-efficacy of teachers will have an influence on their attitudes toward computers (Griffin, 1988; Zhang and Espinoza, 1998) and on CALL created for students (Ertmer at el, 1999). However, each teacher's belief in their own efficacy is related to teaching experience, and it is focused on their individual capabilities and time to perform tasks in the classroom. Furthermore, many research results have shown that males tend to have higher computer self-efficacy than females (Todman, 2000; Torkzadeh & Koufteros, 1994).

There are some commonly used computer self-efficacy scales (CSES) by researchers: Hill, Smith, and Mann (1987), Murphy, Coover, and Owen (1989), Delcourt and Kinzie (l993), Busch (1995), Compeau and Higgins (1995), and Durndell, Haag, and Laithwaite (2000). Among them, the CSES from Durndell, Haag, and Laithwaite (2000) used in the present study is the most up-to-date CSES, revised from versions of the CSES from Torkzadeh & Koufteros (1994) and Murphy, Coover, and Owen (1989). It has high validity and reliability.

Extensive research has supported the proposal that the two major obstacles to CALL implementation among teachers are computer phobia and computer self-efficacy (Gressard & Loyd, 1986; Harrison and Rainer, 1992; Woodrow, 1992). High computer phobia is strongly associated with low computer self-efficacy (Brosnan, 1998; Doyle et al, 2005; Joncour, Sinclair & Bailey, 1994). However, few studies to date have attempted to relate computer phobia measures to some index of computer self-efficacy (Szajna, 1994). Furthermore, to our knowledge, no studies have investigated elementary EFL teachers' computer phobia and computer self-efficacy in Taiwan, which lends support to the importance of and need for the present study. The present study is aimed to determine the level of Taiwanese elementary EFL teachers' computer phobia and computer self-efficacy, and the relationship between these two variables. Specifically, in this research, the following research questions are investigated:

1.   What are the computer phobia levels of Taiwanese elementary EFL teachers?
2.   What are the computer self-efficacy levels of Taiwanese elementary EFL teachers?
3.   What are the relationships between computer phobia and computer self-efficacy of Taiwanese elementary EFL teachers?
4.   Do the computer phobia levels and computer self-efficacy of Taiwanese elementary EFL teachers differ due to their background characteristics?

METHOD
Background Characteristics of Participants
Questionnaires were sent to 300 EFL teachers working in elementary schools located throughout Taiwan, and 215 (71.67%) valid responses were returned. Questions about teachers' background included gender, age, educational background, school information, computer usage, computer accessibility, etc. Computer usage and computer accessibility were included especially due to the fact that they have strong effects on teachers' attitudes toward computers (Gattiker & Hlavka, 1992; Harvey & Wilson, 1985).

According to the data analysis, the majority of the respondents were female (90.6%), with over 44% between the ages of 31 and 40 and just under about one-fifth (19.7%) between the ages of 41 and 50. The majority (61.3%) held undergraduate degrees, 37.7% had between 6 and 10 years of teaching experience, and 53.3% were working

in urban areas with 11-20 classes (39.2%) in the entire school. Most participants responded that they had more than 10 years of computer experience; most reported using computers every day at home (64.1%) and at work (74.5%). When asked whether schools provided them with sufficient computer related equipment, less than half (47.8%) replied in the affirmative about hardware, 45.9% about software, and 57.9% about the internet.

Instrument

The 85-item questionnaire had four sections: background characteristics, computer anxiety, computer thoughts, and computer self-efficacy. A questionnaire, the "EFL Teachers' Computer Phobia and Computer Self-Efficacy Questionnaire," was developed using the computer anxiety rating scale (CARS-S) and computer thoughts survey (CTS) by Rosen and Weil (1992), and the computer self-efficacy scale (CSES) by Durndell, Haag, & Laithwaite (2000). The CARS-S and the CTS are the most comprehensive research tools for identifying computer phobia. The CSES is used worldwide for classifying computer self-efficacy. This study used these three scales because they are widely recognized for their validity and reliability. Responses to items in these three sections were recorded along a five-point Likert scale. Background Characteristics are as described in the background characteristics of the participant section above. The scale results are explicated in the following.

Computer anxiety rating scale (CARS-S)

The CARS-S is a 20-item scale in a 5-point Likert format, and respondents are asked to express how they feel "at this point in time" about their anxiety levels toward computers: 1 = "not at all", 2 = "a little", 3 = "a fair amount", 4 = "much" and 5 = "very much". According to Rosen and Weil (1992), the issues addressed in this questionnaire are: (1) anxiety related to the machines themselves; (2) their role in society; (3) computer programming; (4) computer use; and (5) problems with computers and technology. They also reported that all alpha coefficients for this measure were in the range of 0.90–0.95, and the Cronbach's Alpha for this measure in the present study was 0.91. The CARS-S has been conducted with thousands of students and teachers from 22 countries all over the world. The norms established by Rosen and Weil for computer phobia are as follows: no computer phobia, 20–41; low computer phobia, 42–49; moderate to high computer phobia, 50–100.

Computer thoughts survey (CTS)

The CTS is also a 20-item scale in a 5-point Likert format with 11 items phrased in the negative direction and 9 items in the positive direction. Respondents are asked to express how often their thoughts are in accord with each statement. Responses are scored as follows: 1 = "not at all", 2 = "a little", 3 = "a fair amount", 4 = "often" and 5 = "very often". It contains three categories: Negative Computer Cognitions (11 items), Positive Computer Learning Cognitions (5 items) and Computer Enjoyment (4 items). Rosen and Weil (1992) reported reliabilities above 0.8 for the CTS, and the Cronbach's Alpha for the measure in the present study was 0.89. The CTS has been administered to more than 12,000 people from America and another 22 countries worldwide. The norms established by Rosen and Weil for computer phobia are as follows: no computer phobia, 69–100; low computer phobia, 61–68; moderate to high computer phobia, 20–60. These ranges are in contrast to the CARS, wherein high scores are indicative of computer phobia.

Computer Self-efficacy (CSES)

This instrument consists of 29 items and is scored in a 5-point Likert format (ranging from 1 = strongly agree to 5 = strongly disagree). The measure was originally used by Murphy, Coover, and Owen (1989), and was refined by Torkzadeh and Koufteros (1994). Durndell et al. (2000) made further slight modifications to allow for changes in computer-related practice and terminology. Reliability for the scale was reported to be 0.97, which was supported in the present study by a high Cronbach's Alpha of 0.94. All the reliabilities in the study were above the standard criterion of 0.7. These ranged from (a) 29 to 57, as not confident; (b) 58 to 86, as having little confidence; (c) 87 to 115, as confident; and (d) 116 to 145, as very confident.

Data Collection and Analysis

EFL Teachers' Computer Phobia and Computer Self-Efficacy Questionnaire was administered to the participants over a period of 8 weeks. Collected data were then compiled and analyzed using the SPSS statistical package (v.17). Descriptive data analysis, One-Way ANOVA, and the Pearson correlation coefficient were the primary statistical tests used in this study.

RESULTS

This section presents a statistical analysis of the data collected from the participants. The data was analyzed to look at the factors both individually and in combination to answer the research questions that guided the study.

Computer Phobia Levels of Teachers

Outcomes from a descriptive data analysis of teachers' computer anxiety levels are shown in Table 1. About half

of the teachers (50.2%) reported no computer phobia, as evidenced by the CARS. Yet a substantial majority of teachers (89.9%) could be designated as low to highly computer phobic, as evidenced by the CTS. However, it is difficult to ascertain what percentage of computer activity is dedicated to personal use (e.g., through email and the internet), and how much is devoted to use associated with their teaching.

Table 1: Overall Computer Phobia Levels

Computer phobia levels	CARS	CTS
None	20–41 (50.2%)	69–100 (10.0%)
Low	42–49 (21.9%)	61–68 (42.1%)
Moderate/high	50-100(27.9%)	20-60 (47.8%)

Computer Self-Efficacy Levels of Teachers
Table 2 displays the levels of computer self-efficacy among teacher participants. Over 96% of the respondents showed that their levels of computer self-efficacy were in the confident or very confident categories. The overall mean score and standard deviation on computer self-efficacy were 116.73 and 18.09, respectively. Both the mean and median scores (118.50) were in the very confident category.

Table 2: Overall Computer Self-Efficacy Levels

Computer self-efficacy levels	N	Percentage (%)
Not confident	0	0
Little confidence	8	3.8
Confident	88	41.5
Very confident	116	54.7

The Relationships between Computer Phobia and Computer Self-Efficacy of Teachers
Pearson correlation analysis was used to assess the association between computer anxiety, computer thoughts, and computer self efficacy as measured by the CARS, CTS, and CSES. Table 3 displays the one way ANOVA results of the variables. The CSES correlates negatively with both CARS-S and CTS measures. The output also shows that there is moderately negative correlation between the CARS-S and CSES, with a coefficient of r = -0.618, which is also significant at $p < 0.001$. It can be concluded that teachers with high positive cognition and high anxiety may be likely to have low self-efficacy, which presents as a lower perceived ability to understand, use, and apply computer knowledge and skills.

Table 3: Pearson Correlation Analysis Results of the CARS-S, CAS, and CSES.

	CARS-S	CTS	CSES	Mean	SD
Computer Anxiety (CARS-S)	1	.184[*]	-.618[*]	2.0891	.65559
Computer Thoughts (CTS)	.184[*]	1	-.246[*]	3.0502	.29550
Computer Self Efficacy (CSES)	-.618[*]	-.246[*]	1	3.9263	.60337

* P<0.001.

Background Characteristics and Teachers' Computer Phobia
Table 4 shows that teachers' computer phobias differed significantly in terms of their age, PC usage, and computer accessibility at school. Teachers in the age group of 51-60, $F_{(3, 208)}$ =3.148, p=.026, had higher computer anxiety than did teachers in other age ranges. Teachers who used computer at home every day, $F_{(5, 203)}$ =11.38, p=.000, tended to perceived themselves as having lower computer anxiety. Teachers working at a school with medium to high accessibility of computer hardware, $F_{(5, 205)}$ =3.201, p=.024, tended to have lower computer anxiety. Finally, teachers with higher internet accessibility at school, $F_{(2, 206)}$ =9.603, p=.000, had significantly lower computer anxiety.

Table 4: One-way ANOVA Results for Comparison of Means, by Gender, Age, School location, PC Usage, and Computer accessibility at school

		SS	df	MS	F	Sig.
Gender	BG	510.401	1	510.401	2.961	.087
	WG	36197.467	210	172.369		
Age	BG	1594.225	3	531.408	3.148	.026*
	WG	35113.643	208	168.816		
PC usage (home)	BG	7629.088	5	1525.818	11.038	.000*
	WG	28060.530	203	138.229		

		SS	df	MS	F	Sig.
PC usage (school)	BG	1126.106	3	375.369	2.194	.090
	WG	35581.762	208	171.066		
Computer accessibility (Hardware)	BG	1638.620	3	546.207	3.201	.024*
	WG	34984.012	205	170.654		
Computer accessibility (Software)	BG	1240.923	3	413.641	2.397	.069
	WG	35381.709	205	172.594		
Computer accessibility (Internet)	BG	3123.242	2	1561.621	9.603	.000*
	WG	33499.389	206	162.618		

BG=between group; WG=within group
* P<0.05.

Table 5 shows that teachers' computer thoughts differed significantly only in terms of their PC usage. Teachers who used computers at home frequently (at least 2 to 3 times a week), $F(5, 197) = 3.312$, $p=.010$, tended to perceive themselves as having higher computer thoughts. Teachers who used computers at school every day, $F(3, 202) = 4.566$, $p=.004$, also tended to perceive themselves as having higher computer thoughts.

Table 5: One-way ANOVA Results for Comparison of Means, by Gender, Age, School location, PC Usage, and Computer accessibility at school

		SS	df	MS	F	Sig.
Gender	BG	11.820	1	11.820	.333	.565
	WG	7240.942	204	35.495		
Age	BG	49.215	3	16.405	.460	.711
	WG	7203.547	202	35.661		
PC usage (home)	BG	531.971	5	106.394	3.132	.010*
	WG	6692.768	197	33.973		
PC usage (school)	BG	460.588	3	153.529	4.566	.004*
	WG	6792.174	202	33.625		
Computer accessibility (Hardware)	BG	226.195	3	75.398	2.151	.095
	WG	6977.026	199	35.060		
Computer accessibility (Software)	BG	136.412	3	45.471	1.280	.282
	WG	7066.810	199	35.512		
Computer accessibility (Internet)	BG	211.056	2	105.528	3.018	.051
	WG	6992.166	200	34.961		

BG=between group; WG=within group
* P<0.05.

Background Characteristics and Teachers' Computer Self-Efficacy
Table 6 shows that teachers' computer self-efficacy differed significantly in terms of their gender, age, and PC usage. Male teachers, $F(1, 210) = 4.583$, $p=.033$, perceived themselves as having higher computer self-efficacy. Teachers in the age group of 20-30, $F(3, 208) = 5.253$, $p=.002$, had higher computer self-efficacy than did teachers in other age ranges. In addition, teachers who used computers at home every day, $F(5, 203) = 21.557$, $p=.000$, tended to perceived themselves as having higher computer self-efficacy. Teachers who used computers at school every day, $F(3, 202) = 3.204$, $p=.024$, also tended to perceive themselves as having higher computer self-efficacy.

Table 6: One-way ANOVA Results for Comparison of Means, by Gender, Age, School location, PC Usage, and Computer accessibility at school

		SS	df	MS	F	Sig.
Gender	BG	1475.332	1	1475.332	4.583	.033*
	WG	67598.800	210	321.899		
Age	BG	4864.829	3	1621.610	5.253	.002*
	WG	64209.303	208	308.699		

PC usage (home)	BG	23281.491	5	4656.298	21.557	.000*
	WG	43848.872	203	216.004		
PC usage (school)	BG	3051.038	3	1017.013	3.204	.024*
	WG	66023.094	208	317.419		
Computer accessibility (Hardware)	BG	1212.837	3	404.279	1.223	.302
	WG	67776.666	205	330.618		
Computer accessibility (Software)	BG	1860.327	3	620.109	1.894	.132
	WG	67129.175	205	327.459		
Computer accessibility (Internet)	BG	717.307	2	358.653	1.082	.341
	WG	68272.196	206	331.418		

BG=between group; WG=within group
* P<0.05.

CONCLUSION AND DISCUSSION

This study investigated whether elementary EFL teachers in Taiwan suffer from computer phobia and low self-efficacy. Some background characteristics of the teachers were also examined, since the literature in this field has indicated possible relationships between these factors. The study was conducted with elementary EFL teachers from all parts of Taiwan, and the findings confirmed that teachers suffer from the expected levels of computer phobia. Additionally, low self-efficacy levels are very common among the teachers. Based on the results, a negative relationship was observed between computer phobia and computer self-efficacy. The teachers' level of computer self-efficacy decreases as their computer phobia level increases.

As for the relationship of teachers' computer phobia, a statistically significant positive correlation was identified among computer anxiety and teachers' age, PC usage, and computer accessibility at school. It should be noted that the accessibility of computers apparently is highly associated with teachers' computer phobia and computer self-efficacy. This reveals the importance of providing teachers with sufficient computer equipment. It is also highly suggested that teachers be encouraged to use computers in order to decrease computer phobia and raise computer self-efficacy levels. Future researchers could expand this research by including more samples. Researchers may also be interested in comparing groups of teachers with different demographic backgrounds and from different countries.

REFERENCES

Bandura, A. (1986). *Social foundations of thought and action: A social-cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Baylor, A. L. & Ritchie, D. (2002). What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? *Computers and Education, 39*, 395-414.

Blank, S. S., & White, R. B. (1984). Teachers and technological innovation. *B. C. Journal of Special Education, 8* (1), 71-80.

Brosnan, M. (1998). *Technophobia: The psychological impact of informational technology*. London: Routledge.

Busch, T. (1995). Gender differences in self-efficacy and attitudes toward computers. *Journal of Educational Computing Research, 12* (2), 147-158.

Cantrell, M. J. (1982). *An assessment of attitudes, needs, and delivery system for microcomputer applications by agricultural and extension educators in Mississippi.* Dissertation Abstract International, 43, 3488A.

Chen, T. C. (2002). *A survey of practices and beliefs of fifth and sixth grade English teachers concerning elementary English education in Taiwan.* UMI Doctoral dissertation, University of South Dakota, USA.

Chua, S. L., Chen, D., & Wong, A. F. L. (1999). Computer anxiety and its correlates: A meta-analysis. *Computers in Human Behavior, 15* (5), 609–623.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly, 19*, 189-211.

Davis, F., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35* (8), 982-1003.

Delcourt, M. A. B., & Kinzie, M. B. (1993). Computer technologies in teacher education: The measurement of attitudes and self-efficacy. *Journal of Research and Development in Education, 27* (1), 35-41.

Durndell, A., Haag, Z., & Laithwaite, H. (2000). Computer self-efficacy and gender: a cross cultural study of Scotland and Romania. *Personality and Individual Differences, 28*, 1037–1044.

Doyle E., Stamouli, I., & Huggard, M. (2005). Computer anxiety, self-efficacy, computer experience: An investigation throughout a computer science degree, 35th ASEE/IEEE Frontiers in Education Conference, October 19 – 22, 2005, Indianapolis, IN.

Ertmer, P. A., Addison, P., Lane, M., Ross, E., &Woods, D. (1999). Examining teachers' beliefs about the role of technology in the elementary classroom. *Journal of Research on Computing in Education, 32* (1), 54-72.

Gattiker U. E., & Hlavka A. (1992). Computer attitudes and learning performance: issues for management education and training. *Journal of Organizational Behavior, 13*, 89-101.

Gressard, C.P., & Loyd, B. H. (1986). Validation studies of a new computer attitude scale. *Association for Educational Data Systems Journal, 18* (4), 295-301.

Griffin, J. (1998). CAL innovation as viewed by purchasers of computer software in secondary schools. *Journal of Computer Assisted Learning, 4* (1), 34 – 43.

Gunter, G. A., Gunter, R. E., & Wiens, G. A. (1998). Teaching pre-service teacher's technology: An innovative approach. Proceedings of SITE 98, Washington, DC.

Harrington, K. V., McElroy, J. C., & Morrow, P. C. (1990). Computer anxiety and computer-based training: A laboratory experiment. *Journal of Educational Computing Research, 6*, 343-358.

Harrison, A. W., & Rainer, R. K. (1992). An examination of the factor structures and concurrent validates for the computer attitude scale, the computer anxiety rating scale, and the computer self-efficacy scale. *Educational and Psychological Measurement, 52*, 735-744.

Harvey T., & Wilson B. (1985). Gender differences in attitudes towards microcomputers shown by primary and secondary school pupils. *British Journal of Educational Technology, 16*, 183-187.

Heinssen, R. K., Glass, C. R., & Knight, L. A. (1987). Assessing computer anxiety: Development and validation of the computer anxiety rating scale. *Computers in Human Behavior, 3*, 49-59.

Heller, R. S., & Martin, C. D. (1987). Measuring the level of teacher concern over microcomputers in instrument, *Education and Computing, 3*, 133-139.

Hill, T., Smith, N. D., & Mann, M. F. (1987). Role of efficacy experiences in predicting the decision to use advanced technologies: The case of computers. *Journal of Applied Psychology, 72*, 307-313.

Jay, T. (1981). Computerphobia: What to do about it. *Educational Technology, 21*, 47-48.

Joncour, N., Sinclair, K., & Bailey, M, (1994). Computer anxiety, computer experience and self-efficacy, in Proc. Annual Conference of the Australian Association for Research in Education, Newcastle, New South Wales.

Kernan, M. C., & Howard, G. S. (1990). Computer anxiety and computer attitude: An investigation of construct and predictive validity issues, *Educational and Psychological Measurement, 50*, 618-690.

Kinzie, M. B., Delcourt, M. A. B., & Powers, S. M. (1994). Computer technologies: Attitudes and self-efficacy across undergraduate disciplines. *Research in Higher Education, 35*, 745-768.

Laguna, K., & Babcock, R. L. (1997). Computer anxiety in young and older adults: implications for human–computer interactions in older populations. *Computers in Human Behavior, 13* (3), 317–326.

Levin, T., & Gordon, C. (1989). Effect of gender and computer experience on attitudes toward computers. *Journal of Educational Computing Research, 5* (1), 69–88.

Ma, W. K., Andersson, R., & Streith, K. O. (2005). Examining user acceptance of computer technology: an empirical study of student teachers. *Journal of Computer Assisted Learning, 21*, 387-395.

Marcoulides, G. A. (1989). Measuring computer anxiety: The computer anxiety scale, *Educational and Psychological Measurement, 49*, 733-739.

McIlroy, D., Bunting, B., Tierney, K., & Gordon, M. (2001). The relation of gender and background experience to self-reported computing anxiety and cognitions. *Computers in Human Behavior, 17* (1), 21-33.

McInerny, V., McInerny, D. M. & Sinclair, K. E. (1994). Student teachers, computer anxiety and computer experience, *Educational Computing Research, 11* (1), 27-50.

Murphy, C. A., Coover, D., & Owen, S. V. (1989). Development and validation of the computer self-efficacy scale. *Educational and Psychological Measurement, 49*, 893-899.

Pancer, S. M., George, M., & Gebotys, R. J. (1992). Understanding and predicting attitudes towards computers. *Computers in Human Behavior, 8*, 211–222.

Rachman, S. (1998). *Anxiety*. East Sussex, UK: Psychology Press Ltd.

Reznich, C. (1996). Applying minimalist design principles to the problem of computer anxiety. *Computers in Human Behavior, 12* (2), 245-261.

Rosen, L. D., & Macguire, P. A. (1990). Myths and realities of computerphobia: a meta-analysis. *Anxiety Research, 3,* 175–191.

Rosen, L. D., Sears, D. C., & M. M. Weil. (1987). Computerphobia. *Behavioral Research Methods, Instruments, and Computers, 19* (2), 167-179.

Rosen, L. D., & Weil, M. M. (1992). *Measuring Technophobia. A manual for the administration and scoring of the computer anxiety rating scale, the computer thoughts survey and the general attitude toward computer scale.* USA: Chapman University.

Simonson, M.R., Matt, A., & Maurer, M. M. (1987). Development of standardized test of computer literacy and a computer anxiety index, *Journal of Education Computing Research, 3* (2), 231-247.

Szajna, B. (1994). An investigation of the predictive validity of computer anxiety and computer attitude,

Educational and Psychological Measurement, 54 (4), 926–934.

Todman, J. (2000). Gender differences in computer anxiety among university entrant since 1992. *Computers and Education, 34,* 27–35.

Torkzadeh, G.., & Angula, I. E. (1992). The concept and correlates of computer anxiety. *Behavior and Information Technology, 11*, 99-108.

Torkzadeh, G.., & Koufteros, X. (1994). Factorial validity of a computer self-efficacy scale and the impact of computer training, *Educational and Psychological Measurement, 54* (3), 813-821.

Tsou, W. & Wang, W. & Li, H. Y. (2002). How computers facilitate English foreign language learners acquire English abstract words, *Computers and Education, 39,* 415-528.

Weil, M. M., & Rosen, L. D. (1995). The psychological impact of technology from a global perspective: a study of technological sophistication and technophobia in university students from twenty three countries. *Computers in Human Behavior, 11* (1), 95–133.

Woodrow, J. E. (1992). The influence of programming training on the computer literacy and attitudes of pre-service teachers. *Journal of Research on Computing in Education, 25* (2), 200-219.

Ybarra, R. & Green, T. (2004). Using technology to Help ESL/EFL students develop language skills. *The Internet TESL Journal, 9*(3), Retrieved February 20, 2009, from, http://iteslj.org/Articles/Ybarra-Technology.html

Yang, H. (1996). *An investigation of computer anxiety among vocational-technical teachers in Dade County, Florida.* Doctoral dissertation, Florida International University, Miami.

Zhang, Y., & Espinoza, S. (1998). Relationships among computer self-efficacy, attitudes toward computers, and desirability of learning computing skills. *Journal of Research on Technology in Education, 30* (4), 420-436.