Assessing Pre-Service Teachers' Computer Phobia Levels in terms of Gender and Experience, Turkish Sample

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Abstract—In this study it is aimed to determine the level of pre-service teachers' computer phobia. Whether or not computer phobia meaningfully varies statistically according to gender and computer experience has been tested in the study.

The study was performed on 430 pre-service teachers at the Education Faculty in Rize/Turkey. Data in the study were collected through the Computer Phobia Scale consisting of the "Personal Knowledge Questionnaire", "Computer Anxiety Rating Scale", and "Computer Thought Survey".

In this study, data were analyzed with statistical processes such as t test, and correlation analysis. According to results of statistical analyses, computer phobia of male pre-service teachers does not statistically vary depending on their gender. Although male pre-service teachers have higher computer anxiety scores, they have lower computer thought scores. It was also observed that there is a negative and intensive relation between computer experience and computer anxiety. Meanwhile it was found out that pre-service teachers using computer regularly indicated lower computer anxiety. Obtained results were tried to be discussed in terms of the number of computer classes in the Education Faculty curriculum, hours of computer class and the computer availability of student teachers.
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Keywords—Computer Phobia, Computer Anxiety, Computer Thought, Pre-Service Teachers.

I. INTRODUCTION

COMPUTERS are increasingly omnipresent, influencing many aspects of our social existence from our life, schools to our work environment, as well as many of our leisure activities. As more tasks involve human-computer interaction, computer literacy should become more and more positively correlated with both occupational and personal successes.

Information technology (IT) has made a considerable impact upon almost every aspect of society. A working familiarity with IT is becoming increasingly important, particularly in business and educational contexts. Computers are now prevalent on university campuses, businesses, and secondary schools and many of our homes, thus computers and technology have become an integral part of our life [18].

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A. Computer Phobia

There is no consensus in the literature on the use of the terms such as computer anxiety, computer phobia, and technophobia. In the studies performed so far this subject has been handled under some titles, computer phobia, technostress, syberphobia, computer aversion, technophobia, and computer anxiety [13], [44], [8], [34], [36], [41]. Although technophobia is becoming a commonly used term, appearing in newspapers and popular magazines with increasing frequency, in a pioneering work, [12] defined computer phobia as: (a) a resistance to talking about computers or even thinking about computers, (b) fear or anxiety toward computers, and (c) hostile or aggressive thoughts about computers. Afterwards, technophobia has come to be known as computer phobia, and has been defined by [32] as: "(a) anxiety about present or future interactions wit computers or computer related technology, (b) negative global attitudes about computers, and their operation or their societal impact; and/or, (c) specific negative cognitions or self-critical internal dialogues during actual computer interaction or when contemplating future computer interaction" (p.8).

B. Teachers and Computer Phobia

Educational technology and computers play an important role in education. Since the use of technology is no longer confined to computer science majors, it is essential for all students and future teachers to use and understand computers and implement technology in order to be successful in their future careers [27]. Although an increasing number of teachers are using computers in education, not all of these teachers feel comfortable themselves for computer use. In other words, as [31] stated "all of the teachers are not likely to be heavy computer users".

Teaching and learning activities have a huge impact on educational technology. The way teachers view technology, how they respond to it, how they present it, and how it helps to accomplish their vision of teaching and learning, will affect the future implementation of educational technology [28]. Some teacher training programs remain problematic due to the amount of time spent on the courses with technological contents. As mentioned in literature, many pre-service teachers believe that they are not adequately trained and often are not given appropriate tools in order to implement educational technology in their classroom [20].

According to [31] many teachers exhibit high levels of

computer phobia. While most teachers agree that computers are very useful tool, few of them use computers extensively in the classroom. Computer-phobic teachers either avoid teaching with computers; or, if they do teach with them, pass their anxiety and negative attitudes to their students [31].

In literature, computer phobia is examined in terms of the correlates such as gender, age, computer experience, computer courses, and learning styles [7].

C. Gender

There have been a number of studies concerning gender and computer anxiety report inconsistent results [16], [22], [37], [15], [6], [9], [31], [7], [21]. The results of some studies [15]; [4], [3], [22] indicated that women have higher computer anxiety than men. However, [10] and [1] found there was no significant difference between gender and computer anxiety. [30] and [31] also found women slightly more, but not significantly more, computer anxiety than men. Since the mixed results within the studies of the relationship between gender and computer anxiety, [39], [2] and [29] considered the role of psychological gender and its effect on computer anxiety. As a result of these researchers' studies indicated that psychological gender rather than biological gender had more of an impact on computer anxiety or computer phobia. Therefore, the gender factor on computer anxiety is still inconclusive.

D. Computer Experience

According to literature, correlation between computer experience and computer anxiety is the most consistent finding [7]. Computer experiences defined such as computer usage level, usage level, usage frequency, computer ownership are generally used as indicators of computer experience [17], [5], [35], [19].Experience has been defined as regular practice with a computer at home, and/or whether a computer course has been successfully completed [7].Researchers found a decline in the level of computer anxiety and increase level of computer thoughts as computer experience increased [14], [17], [36], [19]. [7] implied that computer anxiety can be reduced by exposing people to computers, but that depends on type of exposure. Consequently, these findings indicate that when individuals' computer experiences increase their computer anxiety scores significantly decrease.

The present study is aimed to determine the level of pre-service teachers' computer phobia based on gender and computer experiences. Specifically, in this research the following research questions are investigated:

1. What are the computer phobia levels of pre-service teachers?
2. Do the computer phobia levels of the pre-service teachers differentiate due to their gender?
3. Do the computer phobia levels of the pre-service teachers differentiate due to their computer experiences?
4. What are the relationships between the components of computer phobia?

II. METHODOLOGY

A. Participants and procedure

The sample was comprised of pre-service teachers at the Faculty of Education in Rize University, Turkey (n= 430; females= 227, males= 203). The mean age of the sample was 21.87, SD= 2.87.

The participants completed the questionnaire booklet during scheduled learning activity sessions, and the exercises were typically completed in around twenty minutes. All participation was voluntary and no time limit was imposed for task completion. Instructions for accomplishing the task were present in both written and verbal forms. Students completed three clusters of measures including demographic variables (age, gender, home use etc.), computer anxiety (CARS) measure and computer thoughts (CTS) measure.

B. Data Gathering

"Computer Anxiety Rating Scale and Computer Thoughts Survey" were used as data gathering instrument. These instruments were originally developed and used by [29] . These instruments reflect anxious attitudes (Computer Anxiety Rating Scale) and positive/negative cognitions (Computer Thoughts Survey) to computing. These instruments are used extensively to ascertain the level of computer phobia in student research [18].

The original CARS and CTS were translated from English into Turkish by linguists who were competent and experienced in both languages. After this task was accomplished, the Turkish version of the CARS and CTS were distributed to the 110 Turkish students, and after preliminary data analysis, acceptable Cronbach's Alpha reliability coefficient values for the CARS (.90) and CTS (.81) were obtained in plot study.

C. Instrument

1. Computer Anxiety Rating Scale

CARS is a 20-item scale in 5-point Likert format, and respondents are asked to express how they feel ``at this point in time": 1=``not at all", 2=``a little", 3=``a fair amount", 4=``much" and 5=``very much". Among 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. [32] reported that all alpha coefficients for this measure were in the range of 0.90 to 0.95. Factor analysis has led to three emergent factors labeled as ``Interactive Computer Learning Anxiety" (11 items), ``Consumer Technology Anxiety" (4 items) and ``Observational Computer Learning Anxiety" (5 items). Higher scores represent more anxious attitudes. Norms established by empirical research and reported by Rosen and Weil for computer phobia scores are as follow; No Computer phobia: 20–41. Low Computer phobia: 42–49. Moderate to High Computer phobia: 50–100.

2. Computer Thoughts Survey

The CTS is also a 20-item scale in 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''. These are reversed for the negative items and higher scores represent more positive computing cognitions. Factor analysis led to three emergent subscales labeled as, Negative Computer Cognitions (11 items), Positive Computer Learning Cognitions (5 items) and Computer Enjoyment (4 items). Rosen and Weil (1992) report reliabilities above 0.8 for the CTS (ranging from 0.81 to 0.93), for the three factors. The present study found reliabilities of 0.9,0.7 and 0.7 for the CTS factors 1, 2 and 3, respectively. CTS is in contrast to CARS where high scores are indicative of Computer phobia. Norms established by empirical research and reported by Rosen and Weil for computer phobia scores are as follow; No Computer phobia: 69–100. Low Computer phobia: 61–68. Moderate to High Computer phobia: 20–60.

3. Analysis of Data

In order to test the research questions data analysis were made throughout the SPSS version 13. In statistical analysis independent groups t-tests was made in order to test the differences across the various demographic variables. Moreover correlation analysis was performed to describe the relationship among the dimensions of CARS and CTS.

III. RESULTS

The ages of the participants (n = 430) in this study age ranged from 17 to 35 (M = 21.38, SD = 2.87). The participants were undergraduate students in Rize University, Turkey.

Rosen and Weil define three levels of comfort with computers and technology based on the Computer Anxiety Rating Scale(CARS) and Computer Thoughts Survey(CTS): no computer phobia, low computer phobia and moderate/high computer phobia [31], [32].

TABLE I THREE CATEGORIES FOR TECHNOPHOBIA (NORMS) ON THE CARS AND CTS MEASURES, AND THE PERCENTAGE OF STUDENTS

	Technophobia Levels	CARS	CTS
Pre-service Teachers	No	20-41 (68%)	69-100 (79%)
	Low	42-49 (11%)	61-68 (16%)
	Moderate/High	50-100 (21%)	20-60 (5%)

In relation to the CARS reported in Table I, it is evident that 68 percent of the pre-service teachers report no computer phobia, and 32 percent of them report computer phobia from Low to Moderate/High levels. On the other hand, in terms of CTS, 79 percent of the respondents report no computer phobia, while 21 percent of them are reporting computer phobia from Low to Moderate/High levels.

The relationship between the computer anxiety and computer thought levels and the gender of the pre-service teachers are investigated by using independent t-test. Test results are given in Table II.

TABLE II GENDER EFFECTS ON COMPUTER THOUGHT AND COMPUTER ANXIETY AND THEIRS SUBSCALES

	CTS	NCC	PCLC	CE	CARS	ICLA	CTA	OCLA
Male Mean (sd)	76.80 (10.73)	40.86 (7.03)	20.22 (3.50)	15.72 (2.99)	37.65 (14.73)	21.79 (8.77)	7.41 (3.11)	10.09 (4.81)
Female Mean (sd)	75.98 (10.01)	40.05 (6.87)	20.58 (2.87)	15.84 (2.91)	38.47 (13.44)	22.88 (8.08)	7.41 (2.86)	9.69 (4.63)
t-test	0.82	1.19	-1.16	1.33	-0.60	-1.34	0.02	0.82

Code: CTS = Computer Thoughts Survey, NCC = Negative Computer Cognition, PCLC = Positive Computer Learning Cognitions, CE = Computer Enjoyment, CARS = Computer Anxiety Rating Scale, ICLA = Interactive Computer Learning Anxiety, CTA = Consumer Technology Anxiety, OCLA = Observational Computer Learning Anxiety.

As seen in Table II, no statistical meaningful differences have been found either in computer anxiety and computer thought or three other subscales regarding to gender.

The relationship between the computer anxiety and computer thought levels and the computer experiences of the pre-service teachers are investigated by using independent t-test. Test results are given in Table III.

As it may be seen in Table III, computer experience has significant effects on the computer thoughts and also on its three subscales (NCC, PCLC, CE). However, computer experience has only significant effect on the OCLA subscale of the computer anxiety.

TABLE III EFFECTS OF COMPUTER EXPERIENCE ON COMPUTER THOUGHT AND COMPUTER ANXIETY

	CTS	NCC	PCLC	CE	CARS	ICLA	CTA	OCLA
Regular Users Mean (sd)	79.64 (9.85)	42.81 (6.66)	21.01 (3.09)	15.82 (3.03)	36.48 (13.01)	21.60 (7.98)	7.08 (2.70)	9.23 (4.29)
Non Regular Users Mean (sd)	74.95 (10.26)	39.41 (6.83)	20.15 (3.19)	15.39 (2.91)	38.78 (14.45)	22.70 (8.60)	7.55 (3.08)	10.16 (4.86)
t-test	4.40***	4.77***	2.57*	1.38	-1.55	-1.24	-1.52	-1.87*

* Correlation is significant at the 0.05 level (2-tailed)
*** Correlation is significant at the 0.001 level (2-tailed).

Code: CTS = Computer Thoughts Survey, NCC = Negative Computer Cognition, PCLC = Positive Computer Learning Cognitions, CE = Computer Enjoyment, CARS = Computer Anxiety Rating Scale, ICLA = Interactive Computer Learning Anxiety, CTA = Consumer Technology Anxiety, OCLA = Observational Computer Learning Anxiety.

The correlations among computer thoughts and computer anxiety and their subscales are measured and results are given in Table IV.

TABLE IV CORRELATION COEFFICIENTS AND DESCRIPTIVE STATISTICS FOR SELF-REPORTED STUDENTS' COMPUTER PHOBIA SCALES

	CTS	NCC	PCLC	CE	CARS	ICLA	CTA	OCLA
CTS	1	.88***	.75***	.61***	-.37***	-.38***	-.34***	-.27***
NCC		1	.45***	.25***	-.35***	-.37***	-.34***	-.22***
PCLC			1	.51***	-.22***	-.21***	-.18***	-.18***
CE				1	-.23***	-.24***	-.17***	-.19***
CARS					1	.96***	.77***	.90***
ICLA						1	.64***	.77***
CTA							1	.66***
OCL								1
Mean	76.37	40.43	20.41	15.52	38.08	22.37	7.41	9.88
SD	10.35	6.95	3.18	2.95	14.05	8.43	2.98	4.71

*** Correlation is significant at the 0.001 level (2-tailed).

As it is seen in Table IV, a negative and significant correlation is measured between computer thought and computer anxiety (r= -37). At the same time the correlations between the subscales of computer thought and the subscales of computer anxiety are measured statistically significant and negative. However, the CTS and CARS correlates positively with their own subscales. Apart from the high correlations between each scale and its own subscales ($r = 0.61$ to 0.96), almost all the other correlations, with a few marginal exceptions, range from weak to moderate ($r = 0.17$ to 0.45) level.

IV. DISCUSSION

Results reported in Table I demonstrate that, although 68% and 79% of the pre-service teachers reported no computer phobia, and 11% and 16% of them reported low computer phobia, 21% and 5% of the respondents stated moderate to high computer phobia on the Computer Anxiety Rating Scale and Computer Thoughts Survey respectively. When the low and moderate respondents' percents are calculated, the percentages rise to 32 and 21 percent. Similar studies in other countries show a wide range of computer phobia levels. This is generally consistent with previous study [33], [1], [25]. Although these results are comparable with previous researches [21], [31], the cross-cultural similarities found are not mirrored in the CTS findings. This may be explained by the fact that the pre-service teachers in Turkey may have inadequate knowledge about computers and may think that computers can do everything and can help them in every field. As a result these people may have high positive thought and low negative thought about computers. However, while information level on computer is increasing, people realize that computers are under the control of the human beings and do not overestimate it. At the same time they realize the harmful impacts of the computers besides their beneficial impacts. For this reason in terms of the Computer Thought Scale results, in contrary to other study results [24], [31] pre-service teachers in Turkey overestimate computers and think that computer is materials which can be help them in every field. It can be summarized as that although Turkish students have anxiety about computers; they have high confidence due to their beliefs about computers and its benefits.

This research also investigated whether pre-service teachers' computer phobia levels differentiate significantly based on their genders and computer experiences. The independent groups t-tests was used to test the differences between the dependent variable (computer phobia) and each independent variable (gender, computer usage). Gender is one of the most studied variables in computer phobia research. Gender effects no significant differences were found for the variable of gender. But female students relatively scored higher on the computer anxiety scale than males did. This findings support the results attained in previous [11], [26], [38], [43]. Gender effect in the present study support studies that found girls have lower levels of computer thoughts compared to boys [22], [21], [23].

Computer experience has been defined as regular practice with a computer at home, and/or whether a computer course has been successfully completed or not [7]. Although computer usage has significant effect on computer thought; there was no significant difference between the computer experience and computer anxiety except for its subscale named as Observational Computer Learning Anxiety. These results showed that experienced computer user has higher computer thought and less computer anxiety.

The relationship measured between computer anxiety and computer thought, and between the subscales of them demonstrates a negative correlation. The correlations are strong and statistically significant at the 0.001 Alpha levels.

V. CONCLUSION

The main finding of this study is that computer experience of the pre-service teachers has significant effects on their computer phobia level. As it was discussed above, more experienced pre-service teachers have higher computer thoughts and less computer anxiety. Regular computer usage and the computer courses completed successfully are known as the indicators of the computer experience. On the basis of these findings, the following suggestions are made:

1. To increase the computer courses at the Faculty of Education
2. To supply more opportunities to the pre-service teachers for reaching computer facilities at the Faculty of Education
3. To give computer based homework or project to pre-service teachers at the Faculty of Education

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