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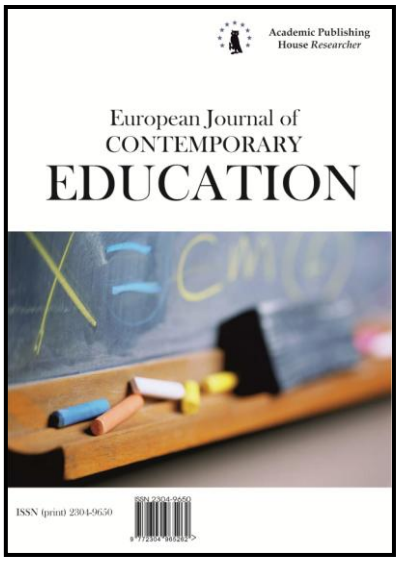

Faculty of Education Students' Computer Self-Efficacy Beliefs and their Attitudes towards Computers and Implementing Computer Supported Education

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Abstract

This study investigates faculty of education students' computer self-efficacy beliefs and their attitudes towards computers and implementing computer supported education. This study is descriptive and based on a correlational survey model. The final sample consisted of 414 students studying in the faculty of education of a Turkish university. The results show that male students have higher computer self-efficacy beliefs; major and class level variables do not affect students' computer attitudes and self-efficacies; students who have their own PC have more positive computer attitudes and higher computer self-efficacies; and the time spent on a computer each day and computer experience are correlated with computer attitudes and self-efficacies.

Keywords: Self-efficacy belief; attitudes; computer; computer supported education; faculty of education students.

Introduction

The concept of self-efficacy is emphasized in Albert Bandura's social cognitive theory (Bandura, 1977). Self-efficacy is related to people's beliefs about their ability to practice control over their own operations or over situations that influence their lives. Self-efficacy is accepted as a key factor affecting student behavior and learning. It works through influencing cognitive and affective processes and driving students' behavioral settings. The higher the perceived self-efficacy, the more a person behaves effectively (Bandura, 1994). Both optimistic and pessimistic thoughts in academic areas come from students' perceived self-efficacies (Bandura, 2006). Students' beliefs in their efficacy to promote their learning and succeed in academic work shape their goals. Teachers'

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beliefs in their efficacy to stimulate and support learning affect the kind of teaching-learning environment they create and their students' academic achievements (Bandura, 1993).

Self-efficacy is correlated with the use of computers in learning (Teo & Koh, 2010). Because of the variety of technological devices available in daily life and classrooms, the ability to use computers is becoming increasingly important. Computer self-efficacy regulates students' affective reactions such as their attitude to computers; this in turn affects their use of computers (Compeau & Higgins, 1995). Attitudes can be defined as generalized reactions to psychological images. These images may consist of people, objects, concepts, living things, values, events, and so forth. Attitude is closely related to behavior and may be affected by the nature of objects, cognitive structure, strength of attitude, and characteristics of verifiability (Satish, 1994). Attitudes also affect information processing and cognitive behaviors (Chenoby, 2014). Kao, Tsai, and Shih (2014) suggest that there is a correlation between computer self-efficacy and attitude. Attitude is correlated with computer use and can be increased by using computer software (Yavuz, 2007). Attitude, as an affective characteristic, can affect other behaviors. For example, either directly or indirectly it may lead to computer anxiety which can lead to computer avoidance (Burkett, Compton, & Burkett, 2001). The more skilled teachers are in information technology, the more they use computers in education and the happier they are with the use of them as educational tools (Bilbatua & Herrero de Haro, 2014).

Technology attitude is one of the main factors affecting computer use and is a predictor of teacher candidates' attitudes towards computer supported education (Çelik & Yeşilyurt, 2013). Teachers' use of technology is affected by their beliefs (Teo & Koh, 2010). Teacher candidates need to have attitudes and self-efficacy beliefs about computers because when they become teachers they are expected to use computers effectively in classroom activities. According to Hakverdi, Gücüm, and Korkmaz (2007), educational computer use is affected by pre-service science teachers' self-efficacies in teaching with computers. For example, computer-based science lessons can be designed using programmed learning principles (Berkant & Efendioğlu, 2010) and the use of computers in science teaching helps teachers to develop different teaching strategies (Morse, 1991). Classroom teachers can also use computers for presenting videos, photos, concept maps, simulations, programmed instruction, and so forth.

The effects of some factors on computer self-efficacy beliefs and attitudes have been tested in a number of studies. According to Agbatogun (2010), there is a significant correlation between computer attitude and gender, and most of the results of the studies show significant differences in favor of male students and teachers. On the other hand, Teo (2010) did not find any significant difference between male and female teachers' computer attitudes. Sam, Othman, and Nordin (2005) documented no significant difference between male and female students' computer self-efficacies and their attitudes towards the Internet. In addition, they did not find a meaningful correlation between the duration of time spent using the Internet and self-efficacy and attitudes. However, Karsten and Roth (1998) showed that students' training experience, consisting of time spent on a computer, increased their self-efficacies significantly. In the same study, gender was not found to be a factor that affects self-efficacy. But Miura (1987) argues that male students rate themselves higher than women for perceived computer self-efficacy. Similarly Durndell and Haag (2002) found that male students tended to report greater computer self-efficacy and a more positive attitude towards the Internet. Çelik and Yeşilyurt (2013) state that teacher candidates' attitudes towards technology and computer self-efficacy beliefs are important predictors of their attitude towards implementing computer supported education. Cassidy and Eachus (2002) found computer experience to be an effective variable on computer self-efficacy and that male students show higher computer self-efficacy than females. According to Yavuz (2007), cooperative learning projects in interactive learning environments positively affect students' technology attitude.

The Purpose of Study

The main purpose of this study was to investigate faculty of education students' computer self-efficacy beliefs (CSEB), their attitudes towards computers (ATC) and their attitudes towards implementing computer supported education (ATICSE) focusing on a number of variables. To achieve this purpose, the following research questions were determined:

1. Are there significant differences between students' CSEB, ATC, and ATICSE in terms of gender, study major, class level, and personal computer ownership?

2. Are there significant correlations between the time students spend on a computer each day and their CSEB, ATC, and ATICSE?

3. Are there significant correlations between students' computer experience and their CSEB, ATC, and ATICSE?

4. Are there significant correlations between students' grade point average and their CSEB, ATC, and ATICSE?

5. Are there significant correlations between students' CSEB, ATC, and ATICSE?

Methodology

This study is descriptive and based on a correlational survey model. In this model, the correlations between dependent and independent variables are examined (Karasar, 2011).

Population and Sample

The population of the study consisted of students studying at the Faculty of Education at Kahramanmaraş Sütçü İmam University in the 2015–2016 educational years. The final sample consisted of a total of 414 students selected by convenience sampling method. The demographic information of the sample is presented in Table 1.

As shown in Table 1, most of the participants were junior, female students who were studying a classroom teaching major and had a personal computer (PC), tablet, or so forth.

Table 1. Demographic information of data

		Frequency	Percent
Gender	Male	74	17.9
	Female	340	82.1
Major	Classroom teacher major (CTM)	237	57.2
	Science teacher major (STM)	177	42.8
Class level	Freshman	101	24.4
	Sophomore	101	24.4
	Junior	109	26.3
	Senior	103	24.9
Having PC, tablet, etc.	Yes	249	60.1
	No	165	39.9
	Total	414	100

Data Collection Tools

For collecting data, the Computer Attitude Scale (CAS) (Ekici & Bahçeci, 2006), the Scale of Attitude toward Implementing Computer Supported Education (SAICSE) (Arslan, 2006), and the Computer Self-Efficacy Scale (CSES) (Ekici, 2004) were used. The CAS includes 18 items, the SAICSE includes 20 items, and the CSES includes 10 items with a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). For determining the reliabilities of the scales, their Cronbach's alpha coefficients were recalculated with the data collected from the sample and determined to be .85 for CAS, .91 for SAICSE, and .90 for CSES. According to these results, the scales could be accepted as reliable.

Data Analysis and Interpretation

The data were analyzed with an independent samples t-test, a one-way analysis of variance (ANOVA), and a Pearson's correlation analysis using SPSS 17.0. The correlation coefficients from 0 to 0.30 or from 0 to -0.30 are regarded to indicate low correlation, coefficients from .031 to 0.70 or from -0.31 to -0.70 point to medium correlation, and coefficients from .071 to 1 or from -0.71 to -1 indicate high correlation (Büyüköztürk, 2010). Partial eta-squared effect sizes of the significant differences were calculated. For partial eta-squared, .01 was considered a small effect size, .06 a medium effect size, and .14 a large effect size (Büyüköztürk, Çokluk, & Köklü, 2010). An increase in total points of the scales was interpreted as an increase in attitude and self-efficacy belief while a decrease in points was accepted as a decline in attitude and self-efficacy belief.

Findings

In this section, the findings of the analyses for the dependent variables (CSEB, ATC, ATICSE) in terms of some independent variables (gender, study major, class level, PC ownership, time spent on a computer each day, computer experience, grade point average) are given.

The Findings for the Gender Variable

According to the findings of Levene's test, equal variances were assumed in terms of the gender variable for students' CSEB (F=.333, p>.05), ATC (F=.003, p>.05), and ATICSE (F=.708, p>.05). The findings of an independent samples t-test for the students' CSEB, ATC, and ATICSE in terms of gender are presented in Table 2.

Table 2. The findings for the students' attitudes and self-efficacy beliefs in terms of gender

Variable	Gender	N	$\overline{X}$	SD	t	df	p	η^2
CSEB	Male	74	30.9	7.4	-2.5	412	.01*	.01
	Female	340	28.4	7.7				
ATC	Male	74	61.4	9.4	-1.75	412	.08	
	Female	340	59.2	9.7				
ATICSE	Male	74	70.2	12.0	.043	412	.96	
	Female	340	70.3	12.1				

*p<.05

As shown in Table 2, a significant difference between the students' CSEB, with a low effect size of gender on CSEB, was found in favor of male students [t(412)=-2.5, p<.05], but no significant difference was found for students' ATC [t(412)=-1.75, p> .05] and ATICSE [t(412)=.043, p>.05] in terms of gender. These findings show that the gender variable had an effect on students' CSEB and that the male students had significantly higher CSEB than female students, but the gender variable had no effect on students' ATC and ATICSE.

The Findings for the Major Variable

According to the findings of Levene's test, equal variances were assumed in terms of the major variable for students' CSEB (F=2.905, p>.05), their ATC (F=.782, p>.05) and their ATICSE (F=1.879, p>.05). The findings of an independent samples t-test for the students' CSEB and their ATC and ATICSE in terms of study major are presented in Table 3.

Table 3. The findings for the students' attitudes and self-efficacy beliefs in terms of study major

Variable	Major	N	$\overline{X}$	SD	t	df	p
CSEB	CTM	237	28.5	7.4	-1.01	412	.31
	STM	177	29.3	8.1			
ATC	CTM	237	59.1	9.7	-1.08	412	.27
	STM	177	60.2	9.7			
ATICSE	CTM	237	71.0	11.7	-1.38	412	.16
	STM	177	69.3	12.6			

As shown in Table 3, significant differences were not found for the students' CSEB [t(412)=-1.01, p>.05], ATC [t(412)=-1.08, p>.05], and ATICSE [t(412)=-1.38, p>.05] in terms of their study major. These findings show that the study major variable had no effect on students' CSEB, ATC, or ATICSE.

The Findings for the Class Level Variable

According to the findings of Levene's test, equal variances were assumed in terms of the class level variable for students' CSEB (F=1.202, p>.05). The findings of an ANOVA for the students' CSEB in terms of class level are presented in Table 4.

As shown in Table 4, there was no significant difference between students' CSEB in terms of class level [F(3,410)=1.94, p>.05]. This finding shows that the class level variable had no effect on students' CSEB.

Table 4. The findings for the students' CSEB in terms of class level

Class Level	N	$\overline{X}$	SD	Source of Variance	SS	df	MS	F	p
Freshman	101	27.3	8.1	Between Groups	348.9	3	116.3	1.94	.12
Sophomore	101	29.0	8.0	Within Groups	24478.9	410	59.7		
Junior	109	29.8	7.2	Total	24827.9	413			
Senior	103	29.3	7.5						

According to the findings of Levene's test, equal variances were assumed in terms of the class level variable for students' ATC (F=1.748, p>.05). The findings of an ANOVA for the students' ATC in terms of class level are presented in Table 5.

Table 5. The findings for the students' ATC in terms of class level

Class Level	N	$\overline{X}$	SD	Source of Variance	SS	df	MS	F	p
Freshman	101	58.6	10.8	Between Groups	268.6	3	89.5	.93	.42
Sophomore	101	60.5	9.6	Within Groups	39098.7	410	95.3		
Junior	109	60.3	8.8	Total	39367.4	413			
Senior	103	59.0	9.5						

As shown in Table 5, there is no significant difference between students' ATC in terms of class level [F(3,410)=.93, p>.05]. This finding shows that the class level variable had no effect on students' ATC.

According to the findings of Levene's test, equal variances were assumed in terms of the class level variable for students' ATICSE (F=1.414, p>.05). The findings of an ANOVA for the students' ATICSE in terms of class level are presented in Table 6.

Table 6. The findings for the students' ATICSE in terms of class level

Class Level	N	$\overline{X}$	SD	Source of Variance	SS	df	MS	F	p
Freshman	101	68.9	12.7	Between Groups	797.4	3	265.8	1.82	.14
Sophomore	101	69.3	13.4	Within Groups	59869.3	410	146.0		
Junior	109	72.5	10.5	Total	60666.7	413			
Senior	103	70.2	11.5						

As shown in Table 6, there is no significant difference between students' ATICSE in terms of class level [F(3,410)=1.82, p>.05]. This finding shows that the class level variable had no effect on students' ATICSE.

The Findings for the PC Ownership Variable

According to the findings of Levene's test, equal variances were assumed in terms of the PC ownership variable for students' CSEB (F=.615, p>.05), their ATC (F=.536, p>.05) and their

ATICSE (F=1.887, p>.05). The findings of an independent samples t-test for the students' CSEB, ATC, and ATICSE in terms of whether they had a PC or not are presented in Table 7.

Table 7. The findings for the students' attitudes and self-efficacy beliefs in terms of PC ownership

Variable	PC ownership	N	$\overline{X}$	SD	t	df	p	η^2
CSEB	Yes	249	30.0	7.5	3.57	412	.000*	.03
	No	165	27.2	7.8				
ATC	Yes	249	61.7	9.7	5.54	412	.000*	.07
	No	165	56.4	8.9				
ATICSE	Yes	249	71.8	12.4	3.26	412	.001**	.03
	No	165	67.9	11.2				

*p<.001 **p<.01

As shown in Table 7, there are significant differences between the students' CSEB with a small effect size [t(412)=3.57, p<.001], between their ATC with a medium effect size [t(412)=5.54, p<.001], and between their ATICSE with a small effect size of PC ownership [t(412)=3.26, p<.01] in favor of the students with their own PC. These findings show that the PC ownership variable had an effect on students' CSEB, ATC, and ATICSE. The students who had their own PC had significantly higher CSEB, ATC, and ATICSE than the students who did not.

The Findings for the Time Spent on a Computer Each Day Variable

The findings for the correlations between the time spent on a computer by students each day and their CSEB, ATC, and ATICSE are presented in Table 8.

Table 8. The findings for the correlations between the time spent by students on a computer each day and their self-efficacy beliefs and attitudes

Correlation	N	Pearson Cor.	p
CSEB*Time spent on computer each day	347	.21	.000*
ATC*Time spent on computer each day	347	.30	.000*
ATICSE*Time spent on a computer each day	347	.19	.000*

*p<.001

As shown in Table 8, there are significant, positive, and low correlations between the time spent by students on a computer each day and their CSEB, ATC, and ATICSE (p<.001). These findings show that students' CSEB, ATC, and ATICSE change in parallel with time spent on computers by students, so an increase in time spent on a computer may be expected to increase students' CSEB, ATC, and ATICSE, while a decrease in time spent on a computer may be expected to decline students' CSEB, ATC, and ATICSE.

The Findings for the Computer Experience Variable

The findings for the correlations between the students' computer experience and their CSEB, ATC, and ATICSE are presented in Table 9.

Table 9. The findings for the correlations between the students' computer experience and their self-efficacy beliefs and attitudes

Correlation	N	Pearson Cor.	p
CSEB*Computer experience	343	.29	.000*
ATC*Computer experience	343	.26	.000*
ATICSE*Computer experience	343	.18	.001**

*p<.001 **p<.01

As shown in Table 9, there are significant, positive, and low correlations between the students' computer experience and their CSEB (p<.001), ATC (p<.001), and ATICSE (p<.01). These findings show that students' CSEB, ATC, and ATICSE change in parallel with computer experience, so an increase in computer experience may be expected to increase students' CSEB, ATC, and ATICSE while a decrease in computer experience may be expected to decline students' CSEB, ATC, and ATICSE.

The Findings for the Grade Point Average Variable

The findings for the correlations between the students' grade point average and their CSEB, ATC, and ATICSE are presented in Table 10.

Table 10. The findings for the correlations between the students' grade point average and their self-efficacy beliefs and attitudes

Correlation	N	Pearson Cor.	p
CSEB*Grade point average	313	-.03	.60
ATC*Grade point average	313	-.02	.68
ATICSE*Grade point average	313	.07	.19

As shown in Table 10, significant correlations were not found between the students' grade point average and their CSEB, ATC, and ATICSE (p>.05). These findings show that any change in students' grade point average does not result in change to their CSEB, ATC, and ATICSE.

The Findings for the Correlations between CSEB, ATC, and ATICSE

The findings for the correlations between the students' CSEB, ATC, and ATICSE are presented in Table 11.

Table 11. The findings for the correlations between the students' self-efficacy beliefs and attitudes

Correlation	N	Pearson Cor.	p
CSEB*ATC	414	.55	.000*
CSEB*ATICSE	414	.69	.000*
ATC*ATICSE	414	.32	.000*

* p<.001

As shown in Table 11, there were significant, positive, and moderate correlations between the students' CSEB, ATC, and ATICSE (p<.001). These findings show that the changes between the students' CSEB, ATC, and ATICSE moved in the same direction.

Results, Discussion and Proposals

Self-efficacy, not only as a personal characteristic but also as an important factor in education, influences the use of technology in teaching and learning environments (Gilakjani,

2013) and can be affected by different factors. Gender is one of the factors which may affect computer self-efficacy. Although there has been progress in gender equality over the past few years, a significant gap is still observed between males and females regarding computer use (Hsiao, Lin, & Tu, 2010). In this study, male students' computer self-efficacies were found to be significantly higher than those of female students. This difference may result from social expectation and acceptance of the male tendency to use technological devices. Similarly, according to some studies (Busch, 1996; Hsiao et al., 2010; Öztürk, Bozkurt, Kartal, Demir, & Ekici, 2011; Şimşek, 2011; Topkaya, 2010), male students have higher computer self-efficacy scores than females. On the contrary, Adalıer (2013), Adebowale, Adediwura, and Bada (2009), Busch (1995), Embi (2007), Johnson and Wardlow (2004), Pamuk and Peker (2009), Sam et al. (2005), and Ünlü and Süel (2014) do not document any significant difference between male and female students' computer self-efficacies.

Apart from gender, students' computer self-efficacies may differ according to their study majors. In some majors, pre-service teachers may use computers in the course of their training. In this study, CTM and STM were used as independent variables of computer self-efficacy and no effect was found. This may be a result of there being similar requirements for CTM and STM students and similar patterns of computer use in these majors. In contrast to this result, Şahin and Göçer (2013) found a significant difference between teachers' computer self-efficacies in terms of their branch of study and Adalıer (2013) found a significant difference between students' computer self-efficacies based on their study majors. Similarly, Sam et al. (2005) documented the effect of academic major on students' computer self-efficacies. Adebowale et al. (2009) also showed a correlation between major and computer self-efficacy.

At first sight, an increase in computer self-efficacy may be expected to increase in parallel with class level. But in this study, no significant difference concerning class level was found. When taking into consideration the content of the teacher training being undertaken by the participants, which includes first-year computer education only, this result is not surprising. Correlatively, Ünlü and Süel (2014) did not find any relationship between class level and computer self-efficacy. But Pamuk and Peker (2009), Şimşek (2011) and Öztürk et al. (2011) found that students' computer self-efficacy decreased in parallel with their school level. In Topkaya's (2010) study, a significant difference was found between students' computer self-efficacies, in favor of fourth-grade students when compared with preparatory class students.

The age of technology we live in requires ownership of a smart phone, laptop, or desktop computer. It can be expected that when a student has a computer, more time is dedicated to learning how to use it and this may lead to an increase in computer self-efficacy. This assumption is highlighted in this study by significantly higher self-efficacy scores for students who have their own computer. This result is compatible with other studies (Pamuk & Peker, 2009; Topkaya, 2010; Ünlü & Süel, 2014) which also found that students with their own PC had higher self-efficacies than those who did not.

It may be expected that a student who spends more time on a computer each day will gradually gain self-efficacy towards computer use. This association is supported by the significant positive correlation documented in this study between time spent on a computer each day and computer self-efficacy. This result shows that students accustomed to the use of computers gain self-efficacy in daily life and in education when they spend more time on a computer. Similarly, Bebetsos and Antoniou (2008) argue that students are occupied more with their computers. Topkaya (2010) reports a significant difference between computer self-efficacies of students who use computers frequently and less frequently, in favor of frequent use.

Because of the ubiquitous availability of technology, even if students do not have a personal computer, they can gain experience in computer use in other ways. In general, experience is related to self-efficacy (Bandura, 1977); this study shows a significant positive correlation between self-efficacy and computer experience, thereby supporting this general view. Some other studies (Busch, 1996; Hsiao, et al., 2010; Topkaya, 2010) show a significant relationship between computer experience and computer self-efficacy. Şahin and Göçer (2013) found that computer self-efficacy increases when computer experience improves.

Grade point averages which indicate students' academic achievements may be interpreted by some educators as indicators of various acquisitions. But some achievements that are supposed to be gained by students cannot be related to the scores indicated by these evaluation processes.

In this study, students' grade point averages were tested for their correlation with computer self-efficacy beliefs but no significant relationship was found. As is already known, the educational instruction of science and classroom teachers is not based on computers. So, the ineffectiveness of grade point average as an indicator of computer self-efficacy could be expected. On the contrary, Öztürk et al. (2011) found a significant positive correlation between general academic achievement and computer self-efficacy.

Apart from the CSEB variable, students' ATC and ATICSE were tested as dependent variables in this study. These variables take into account the kinds of attitudes that students may have of the teaching-learning process, and as affective characteristics they can be influenced by internal and external factors. Gender, as an internal factor and an independent variable, was tested on ATC and ATICSE and no significant effect was found. This result might be driven by male and female students' having similar requirements for computer use in daily life and for education purposes. Similarly, in some studies (Adalıer, 2013; Adebowale et al., 2009; Busch, 1995; Chenoby, 2014; Gujjar, Naeemullah, & Tabassum, 2013; Kitchakarn, 2015; Pamuk & Peker, 2009; Sam et al., 2005; Yıldırım & Kaban, 2010) gender was not found to be an effective variable on computer attitude. Tılfarlıoğlu and Ünaldı (2006) did not find any correlation between gender and computer aided instruction. Önder, Çelik, and Sılay (2011) found that students had a positive attitude towards implementing computer supported education, but they did not find gender to be an effective factor on this attitude. On the contrary, there are also some studies that have found gender to be related to computer attitude (Tsai & Tsai, 2003). Male dominance is still prevalent with respect to computer attitudes (Kay, 2007), so it can be observed in the literature that male students have more positive attitudes towards computers than females (Bebetsos & Antoniou, 2008; Daigle & Morris, 1999; Pektaş & Erkıp, 2006; Sadık, 2006; Shashaani, 1997; Smith, 2012). Looking at a different effect, results of some studies (Kaplan, Öztürk, Altaylı, & Ertör, 2013) indicate a significant difference in favor of females in attitudes towards implementing computer supported education. Fančovičová and Prokop (2008) found a significant but weak effect of gender on attitudes towards computer use.

Students' attitudes may vary according to the major they study. The students in majors that naturally involve computer use, such as computer teaching, would be expected to have more positive attitudes towards computers. In this study, CTM and STM students' ATC and ATICSE were investigated. No significant differences were found between the students' of these two majors. This result may be due to the similar level of computer use in the teacher training programs of these majors. This is in accordance with Önder et al. (2011), who found that students' majors do not affect their attitudes towards implementing computer supported education. Similarly, according to Tılfarlıoğlu and Ünaldı (2006), major has no effect on attitude towards computer aided instruction. Adalıer (2013), Sam et al. (2005), and Smith (2012) did not document any significant difference between students' computer attitudes in terms of their academic major. However, in the literature some results can be found that show significant differences in computer attitudes across majors (Adebowale et al., 2009).

Class level could be expected to affect computer attitude due to students' development over time. However, this study found that students' ATC and ATICSE were not affected by their class level. This result may be driven by the constancy of qualitative and quantitative factors related to computer use during educational training. It is compatible with the results of other researchers (Al-Jabri & Al-Khaldi, 1997; Önder et al., 2011; Smith, 2012; Yıldırım & Kaban, 2010), indicating no significant correlation between students' class level and computer attitude.

Students' attitudes towards computers can be observed through their exhibition of different desired or undesired emotions. Expressions, such as computer anxiety and computer-phobia, are used to categorize these emotions (Burkett, Compton, & Burkett, 2001). Having a personal computer may be a solution for overcoming undesired emotions and may lead to some changes in students' cognitive or affective domains; hence computer ownership should affect ATC and ATICSE. In this study, this was validated by the significant difference between ATC and ATICSE, in favor of the students with a computer. This was an expected result due to the contribution of computer ownership on computer use. In a parallel result, Gujjar, Naeemullah, and Tabassum (2013) documented that students who have a computer at home are significantly better than their counterparts on fear of using computer. According to Al-Jabri and Al-Khadi (1997), Pamuk and Peker (2009), and Tsai and Tsai (2003) those who own computers have a higher degree of attitude

than those who do not. Shashaani (1997) reports a significant relationship between computer ownership and computer attitude. But some studies (Fančovičová & Prokop, 2008; Sadık, 2006) did not find any correlation between students' ownership of a computer and their attitude towards computers.

Due to computer ownership, students can spend more time on computers, and therefore be more experienced in using them. In this way an increase in students' ATC and ATICSE may be expected in parallel with computer experience. In this study, significant positive correlations are documented between the students' ATC and ATICSE and the time they spend on computers and their computer experience. Similarly, Shashaani (1997) found a significant positive correlation between computer attitude and the hours spent using a computer in school, and between students' PC experience and their attitudes towards computers. The findings of Fančovičová and Prokop (2008) indicate that time spent on a computer increases students' computer attitudes. Al-Jabri and Al-Khaldi (1997) suggest that more experienced users are likely to have more positive attitudes towards computers. Also, results of some studies (Sadık, 2006; Tsai & Tsai, 2003) show that computer experience affects computer attitude. But Kitchakarn (2015) documents that students' attitudes towards using computers as learning tools are positive, regardless of how long they have been using computers.

Attitudes not only consist of affective components but also cognitive ones (García-Santillán, Moreno-Garcia, Carlos-Castro, Zamudio-Abdala, & Garduño-Trejo, 2012). Thus, scores which show cognitive behavior, such as grade point averages, may be correlated to ATC and ATICSE. In this study, this correlation was tested and found to be significant and positive. In support of this, Wong, Ibrahim, and Ayub (2012) found that some factors affecting grade point average, such as information processing and selecting main ideas, are correlated to computer attitude.

As discussed above, three dependent variables were tested in this study: students' CSEB, their ATC, and their ATICSE. These variables can operate interrelatedly on students' affective, cognitive, and behavioral learnings. For meaningful data, correlations among these variables are required. These correlations were tested in this study and significant positive correlations were found among CSEB, ATC, and ATICSE. As expected, this result shows close relationships between self-efficacy and attitude and is parallel with results of some similar studies (Compeau & Higgens, 1995; Pamuk & Peker, 2009). Pektaş and Erkıp (2006) argue that students' attitude towards computer use in classroom studies is highly related to their general attitude towards computers. Adalıer (2013) found a moderately positive significant correlation between computer self-efficacy and computer attitude.

According to the findings of this research, the following proposals may be put forward:

- Because of the findings about the male dominancy of computer self-efficacy, some activities that would be preferred by females should be organized within a computer-based environment.
- Due to the significant correlation between PC ownership, time spent on a computer each day, computer experience and students' CSEB, ATC, and ATICSE, suitable environments and conditions for sufficient interaction time with computers for educational purposes should be provided.
- In this study, no significant correlation is found between grade point average and CSEB, ATC, and ATICSE. Thus, teachers may be sure that students' academic achievements do not guarantee their attitude and self-efficacy towards computers. Therefore, teachers should take into consideration specific activities which enhance students' self-efficacy and attitudes rather than academic achievement.
- This study involved the students of two study majors (CTM and STM). The students of different majors could be compared in further studies.
- In further studies, a mixed model using qualitative data collection techniques such as interview and observation could be used alongside the quantitative techniques of this research.
- As it is well known, experimental studies of educational sciences can contribute greatly to the implementation of theories. For example, Topal and Akgün (2015) have trialed an educational program for increasing prospective teachers' Internet use self-efficacy and found the program to be effective. In further studies, experimental methods may be preferred more than descriptive ones because of their ability to increase students' or teachers' self-efficacy beliefs and attitudes towards computers.

- This study is based on students' views. The views of instructors working in education faculties could be investigated in future studies.

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