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Students' self confidence and attitude regarding computer: an international analysis based on computer availability and gender factor

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Abstract

The attitude of students towards the ICT and the self-confidence are of the factors influencing positive or negative their technology using. At this research, the students' self-confidence and attitudes connected with computer as a component of ICT used most commonly were analyzed. At the research, the data which belong to 287503 elementary senior 15 years and over from the 44 country gathered by Information and Communication Technology Survey (2009) and Programme for International Student Assessment (PISA) are analyzed. The Q8 item of Student Questionnaire is connected computer using with self-confidence and Q10 item is connected with the attitude toward computer. It was tested whether it seems different according to the belonging the computer availability and gender factor also students' self confidence and attitude. Generally, obtained findings show that gender factor is effective on both students' attitude and self-confidence. It was determined owing the computer availability at school and home have a separately effective.

Keywords: Self-confidence, attitude regarding computer, elementary students.

1. Introduction

Present education systems have to deal with a wide variety of problems compared to the past systems. Sometimes it is impossible to solve these problems with traditional tools and methods due to the fact that they reached to a level of crisis. If appropriate conditions are provided, ICT offers many solutions to solve current education problems. For example, by means of these technologies, learning and information resources have remarkably increased and got varied, therefore, it has got easier to access to these resources. Being able to access and use these facilities more widely and more effectively primarily depends on users' developing positive attitude towards these technologies.

Attitude can be defined in various ways, for example, systematic long-term emotion, belief and opinion tendency (Baker, 1992), the tendency to show positive or negative attitude towards any person, incident, place or object (Baker, 1992). It is also the state of being ready for the individual to act (Baker, 1992). According to Fraser, (1994) attitude is a person's beliefs about the objects around him considering which ones are good, bad, acceptable or unacceptable. Actually, these definitions indicate that attitude has a considerable effect on human behavior.

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According to many research findings, positive attitudes motivate students to use computer and other information technologies. It also makes it easier and make them more familiar with these technologies. Negative attitudes that students have cause avoidance from these technologies. Other study findings indicate that attitudes develop as a result of learning and they are open to the effects of various factors. Gender (Volman et.al., 2005; Comber, Colley, Hargreaves & Dorn, 1997; Meelissen, & Drent, 2008; Teo, 2008), experience (Comber, Colley, Hargreaves & Dorn, 1997; Deniz, 2000; Arslan, 2006), the level of knowledge (Koseoglu et.al., 2007), accessibility (Winter, Chudoba, & Gutek, 1998), the frequency of usage (Winter, Chudoba, Gutek, 1998; Celik & Bindak, 2005; Roussos, 2007) are the variables that were reported to have been effective on the attitudes towards computer.

Besides, one of the factors that affect students' use of ICT is their self confidence about using these technologies. In many circumstances, self-confidence is used with the same meaning of self-efficacy (Tømte & Hatlevik, 2011).

Self-efficacy perception is one of the basic concepts of Bandura's social-cognitive learning theory. Bandura (1986) defines self-efficacy perception as individual's belief for his own capacity to be able to achieve a target. Self-efficacy is not a general pattern, but it is related to certain situations, topics and duties. Thus, self-efficacy is measured as a relation to a specific field and performance (Bandura, 2001). Compeau and Higgins (1995) define the computer self-efficacy as a person's belief about his own capacity to use computer.

Self-efficacy perception affects the effort that individuals make to achieve something, the intensity and continuity of this effort and their individual performance. Studies have shown that individuals with high self-efficacy make more effort to achieve a target and, are more determined, persistent and patient when they encounter challenging and negative situations (Pajares, 1996). If we look from this aspect, self- efficacy perception comes out as one of the significant variables that must be emphasized when students' usage of ICT is considered (Aşkay and Umay 2001; Kurbanoğlu, 2003).

Studies report that self-efficacy perceptions of students about using computer can be affected by variety of factors. The experience of using computer (Torkzadeh and Kaufteros, 1994; Aşkay and Umay, 2001; Özçelik and Kurt, 2007), the period of the experience (Brinkerhoff, 2006, Milbrath and Kinzie, 2000) and the type of training (Torkzadeh & Koufteros, 1994) are the variables which have been reported to have had positive relation with computer self-efficacy.

In brief, education institutions have the responsibility in enabling students to develop positive attitudes towards computer and increase their computer self-efficacy beliefs. Being able to discharge this responsibility primarily requires knowing the variables that affect students' attitude and self-efficacy. Studies that have been carried out so far have given clues about the effects of various variables. However, the majority of these studies have been performed with limited sample, but this study has been performed being based on the data that has been collected from an international and larger sample. In this study, as well as gender factor, the fact that whether there is the possibility of access to ICT at home and school affect students' attitude towards computer and their computer self-efficacy have been tested.

2. Method

This research has been planned and carried out according to relational survey model. Besides gender factor, whether students' attitude towards computer and their self-efficacy perceptions vary according to the availability to access to ICT at home and school has been tested.

2.1. Participants

The research has been performed according to the data which have been obtained from 287503 15 year-old and over secondary school students from 44 countries. 145726 (50.7%) of these students are female and 141777 (49.3%) of them are male. 213335 (74.2%) of the students who participated in the research live in OECD Countries and 74168 (25.8%) of them live in non-OECD Countries.

Among the participants, the number of the ones who have the availability of a desktop or a laptop at home and are able to use it is 262855 (91.4%); the number of the ones who do not have an access despite having a computer at

home is 7309 (2.5%) and finally the number of the participants who do not have a computer in their homes is 17339 (6.0%).

The number of the students who have the facilities of a desktop or a laptop in their schools and have an access to be able to use them is 204709 (71.2%); the number of the ones who cannot use them in spite of having computer facilities in their schools is 61185 (21.3%) and lastly the number of the students who do not have computer facilities in their schools is 21609 (7.5%).

2.2. Instrument & Data Collection

All data that has been used in this study has been included in the database of the Programme for International Student Assessment (PISA) and it has been collected by means of Information and Communication Technology Survey (2009). The options of (a) and (b) of the questions number 1 and 2 are related to the fact that whether students have the possibility of having computers at home and at school. There are three standard options for both questions that measure whether they have the possibility of computer at home and at school. For this question, students choose one out of the three options, which are "yes, I use it.", "Yes, but I can't use it." and "No, I don't use it." to indicate their conditions at home and at school. Profiles of participants have been described by analyzing the given answers to these questions. The first dependent variable of computer self-efficacy has been measured through 5 different options under the question number 8. Each of these items includes a terms of reference which is related to computer and students respond to each item according to Likert Scale type of measurements that equal to 1 to 4 points.

Student attitudes towards computer as a second dependent variable have been measured through 4 different options under the question number 10. Each of these options includes an attitude statement towards computer and students respond to them according to Likert Scale type of measurement that express their level of agreement and disagreement and equal to 1 to 4 points.

2.3. Data Analysis

PISA database has been built with the data that has been formed with the responses given by 470000 students, but it consists data loss related to many questions. The responses of the participants who caused data loss during data analysis period have not been included in the analysis. 287503 participants answered all the questions which were examined in the research without making any mistake. A complete data file has been created excluding the answers of the participants who can not complete the questionnaire fully. The data related to participant profile has been analyzed with the f and percentage (%) statistics through the data in this file.

Computer self-efficacy and attitudes towards computer have been analyzed over the total points of the following subscale items. T test has been used for the independent samples in the analyses based on gender factor and one-way ANOVA test has been used in the analyses to determine the effects of whether there are computer facilities at home and school. Significant level in all comparisons has been based as .05.

3. Findings

3.1. Gender Factor

Average attitude points towards computer are 12.30 for females and 12.61 for males. The levels of female and male attitude points towards computer are very close to each other. However, the difference between their points is significant [$t_{(284603.98)}$=-32.01, $p<.05$]. In other words, students' attitudes towards computer show differences in terms of gender.

Table 1. *Attitudes and Self-Efficacy Towards Computer – t-Test Results According to Gender*

Dep. Variable	Gender	N	Mean	Std. Deviation	df	t	Sig.
Attitude	Female	145726	12.30	2.47	284603.98	-32.01	0.00
	Male	141777	12.61	2.66			
Self-efficacy	Female	145726	16.25	3.00	282292.56	-16.24	0.00
	Male	141777	16.44	3.35			

N=287503

Analysis results related to computer self-efficacy and attitude resemble each other. Male self-efficacy points (X=16.44) are a little higher than female self efficacy points (X=16.25) and the difference between two groups is significant [$t_{(282292)}$ =-16.24, p<.05].

3.2. Availability of computer at home

An average attitude point towards computer is 12.57 for students who indicate that they have computer and use it; and the average is 10.99 for those whose responses is "yes, but I can't use it "and finally, the average is 11.38 for those who indicated that they do not have a computer. ANOVA results have shown that there are significant differences [$F_{(2\text{-}287500)}$ =3020.69, p<.05]. According to Scheffe test, the availability of computer at home is an effective factor over students' attitudes towards the computer. It is indicated that the situation of whether they are able or not able to use the computer at home is not effective on attitude points.

Computer self-efficacy points are 16.54 for those who have computer at home and are able to use it and 14.36 for those whose response is " yes but I can't use it" and finally 14.27 for those who indicated that they do not have a computer at home. According to ANOVA analysis, there are significant differences among the groups [$F_{(2\text{-}287500)}$ =5857.07, p<.05]. According to Scheffe test results, differences among all of the groups are significant. According to these findings, not only the availability of computer at home but also being able to use it is an important factor over the students' computer self-efficacy.

Table 2. Attitude and Self-Efficacy towards Computer – ANOVA Results about the Availability of Computer at Home

Dep. Variable	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.	Differences
Attitude	Between Groups	39362.18	2	19681.09	3020.69	0.00	1-3, 2-3
	Within Groups	1873183.68	287500	6.51			
	Total	1912545.86	287502				
Self-efficacy	Between Groups	114030.93	2	57015.47	5857.07	0.00	1-2, 1-3, 2-3
	Within Groups	2798659.62	287500	9.73			
	Total	2912690.55	287502				

3.3. Availability of computer at school

Average attitude point towards computer is 12.51 for the students who indicated that they have computer at their schools and are able to use it and the average is 12.37 for the ones whose response is " yes but I can't use it " and finally the average is 12.26 for those who do not have a computer at school. ANOVA results have shown that there are significant differences among the points of the groups. [$F_{(2\text{–}287500)}$=141,98, p<.05]. According to Scheffe test results which have been performed to determine among which groups there are significant differences, the average point of each group has shown significant diversity from each other.

Table 3. Attitude and Self-Efficacy towards Computer – Availability of Computer at School ANOVA Results

Dep. Variable	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.	Differences
Attitude	Between Groups	1887.17	2	943.58	141.98	0.00	1-2, 1-3, 2-3
	Within Groups	1910658.69	287500	6.64			
	Total	1912545.86	287502				

Self-efficacy	Between Groups	14621.52	2	7310.76	725.25	0.00	1-2, 1-3, 2-3
	Within Groups	2898069.03	287500	10.08			
	Total	2912690.55	287502				

Average computer self-efficacy point is 16.48 for the students who have a computer at school and are able to use it and the average is 16.16 for those whose response is " yes but I can't use it" and finally, the average is 15.70 for those who do not have a computer at their school. There are meaningful differences among the points of the groups. [$F_{(2-287500)}$=725,25, p<.01]. According to Scheffe test, all the difference among the averages of all groups is significant.

4. Results and Discussion

Within its own limits, this study has suggested that gender of students is effective on their attitude and self-efficacy points towards computer. This finding requires taking variables which have been reported to be effective over attitude and self-efficacy in a variety of studies into consideration. Especially, when it is agreed that experience (Comber, Colley, Hargreaves & Dorn,1997; Deniz,2000) and level of knowledge related to computer (Koseoglu et.al., 2007) are effective on attitudes and that male students have far more experience about computer (Durndell, Macleod, & Siann, 1987; Comber, Colley, Hargreaves & Dorn, 1997), the effect of gender over attitude and self-efficacy appears to be understandable.

The fact that the attitude of the students who have computer both at school and home are more positive than those who do not have computer at home and school is an expected situation because various studies have reported that awareness causes positive attitudes (Roussos, 2007). From this aspect, it is expected that students who have computer both at home and school have higher computer awareness and because of that their attitude points are expected to be high as well

The fact that there are not any differences between the attitude points of the students who have computer and are able to use it and students who have computer but are not able to use it can be explained with a computer awareness of both groups although they have different levels of awareness. On the other hand, the fact that there are differences between their self-efficacy points of these same two groups make us think that self-efficacy is far more relative with practice experience than awareness. The fact that the effect of the availability of computer at school is different from the availability of computer at home has indicated that school or home environment can have different effects over students' attitude.

Although generally there is a small difference among the average points of different groups related to their attitude and self-efficacy, significant differences are pointed out in most cases. This situation may have been occurred because the results which will be obtained through statistical techniques depend on the size of the samples. t and ANOVA tests may give different results on far smaller samples. Therefore, research findings must be approached cautiously and possible effects of variables must be emphasized more than the precise effects of them. These findings should be perceived as clues but not conclusive evidence.

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