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THE MEDIATING ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES USE AND ATTITUDE BETWEEN PERCEIVED LEVEL OF KNOWLEDGE, SOCIAL NEEDS AND SELF-CONFIDENCE

Bilgi ve İletişim Teknolojileri Kullanımı ve Tutumun, Algılanan Bilgi Düzeyi, Sosyal Gereksinim ve Kendine Güven Arasındaki Aracı Rolü

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ABSTRACT

The aim of this study is to model the relationships between information and communication technologies use, attitude levels, perceived knowledge levels, social needs and self-confidence of fifteen-year-old students taking the pisa exam. The universe of the research consists of fifteen-year-old students studying in 79 countries participating in the PISA 2018 exam. The sample consisted of the students (n = 519,334) who took the PISA exam in 2018. ICT susceptibility questionnaire was used as data collection tool. SmartPLS 3 program was used to analyze the data. As a result of the research, it was seen that social needs and self-confidence have a direct effect on attitudes towards ICT use. Again, it was determined that the attitude towards ICT use has a direct effect on the ICT usage level and the ICT usage level on the perceived level of knowledge. When the indirect effects were examined, it was seen that all mediator variables were accepted.

Key Words: Information and communication technologies, self-confidence, attitude, perceived knowledge level.

ÖZET

Bu araştırmanın amacı pisa sınavına katılan onbeş yaş grubu öğrencilerinin bilgi ve iletişim teknolojileri kullanımları, tutum düzeyleri, algılanan bilgi düzeyleri, sosyal gereksinimleri ve kendine güvenleri arasındaki ilişkilerin modellenmesidir. Araştırmanın evrenini PISA 2018 sınavına katılan 79 ülkede öğrenim gören onbeş yaş grubu öğrenciler oluşturmaktadır. Örneklemi ise 2018 yılında PISA sınavına katılan (n=519.334) öğrenci oluşturmuştur. Veri toplama aracı olarak ICT yatınlık anketi kullanılmıştır. Verilerin analizinde SmartPLS 3 programı kullanılmıştır. Araştırma sonucunda sosyal gereksinimler ve kendine güvenin ICT kullanımına yönelik tutum üzerinde doğrudan etkisinin olduğu görülmüştür. Yine ICT kullanımına yönelik tutumun ICT kullanım düzeyi üzerinde ve ICT kullanım düzeyinin de algılanan bilgi düzeyi üzerinde doğrudan bir etkisinin olduğu saptanmıştır. Dolaylı etkiler incelendiğinde ise tüm aracı değişkenlerin kabul edildiği görülmüştür.

Anahtar Kelimeler: Bilgi ve iletişim teknolojileri, kendine güven, tutum, algılanan bilgi düzeyi.

1. INTRODUCTION

The OECD Program for International Student Assessment (PISA) is an exam that examines what students know and can do with what they know in reading, mathematics and science. As a result of this exam, a comprehensive international assessment of students' learning results is made (Schleicher, 2019). PISA 2018 was held for the first time in 2000. PISA 2018 evaluates representing around 32 million 15-year-old students selected from different region of schools in the countries. In 2018, 79 countries (36 OECD countries and 43 partner countries) and about 600,000 students took this exam (Thomson et al., 2019). PISA 2018 results show that there are significant differences between schools located in advantageous and disadvantaged areas regarding the lack of resources, including educational staff and digital resources. These results provide important data to ensure that all schools have sufficient material and appropriate support, and to provide equal opportunities for students to be successful (OECD, 2020).

Nowadays, it is more important than ever before for young people to master a wide variety of skills and have the capacity to constantly update them. These skills are an indispensable part of a successful career and active participation in society in the 21st century. Knowledge-based economies need employees with a high level of digital competence, able to perform non-routine tasks and understand new concepts and ideas to keep up with technological changes (Binkley et al.2012; OECD, 2019). For this reason, the knowledge and skills that students acquire throughout their education life have an important place. Among these skills, information and communication technologies have started to take place in education systems from an early age. Lennon et al. (2003), ICT literacy is defined as "the interest, ability and attitude of individuals to use ICT tools appropriately to manage, access, evaluate and integrate information". Using the ICT susceptibility questionnaire included in the PISA 2018 exam, the relationships between information and communication technology use, attitude levels, perceived knowledge levels, social needs and self-confidence of students in the age group of fifteen were modeled

2. LITERATURE AND HYPOTHESIS DEVELOPMENT

2.1.Use of Information and Communication Technologies

With the age of technology, the use of ICT has become an important factor for students to fulfill their school duties. In this process, it was observed that the ICT usage levels of the students were high (Aypay, 2010). However, Gumus (2013) states that there are great differences between schools in terms of in-school and out-of-school tasks related to the use of ICT by students. These differences are mostly explained by family-related factors and participation in ICT-related tasks at school. Sengul & Demir (2018) were compared the information and communication technologies familiarity of 15-year-old students with different mathematics proficiency levels who participated in the PISA 2012 application in Turkey, Greece, Portugal and Shanghai. It was determined that the ICT familiarity level is highest in Portugal, and Shanghai is the last. Yildiz-Durak & Seferoglu (2016) compared the Finland, Korea and Turkey PISA 2009 results) according to the digital device usage gauge. It was determined that ICT was used at least in mathematics and mostly in language lessons in these countries, and that the reading comprehension and remembering strategies of students in the studied countries differ significantly according to their internet access status at home. Similarly, Askar & Olkun (2005), based on PISA 2003 data, found that students with computer access at home and at school had higher math and problem solving scores than those who did not. He also found that the scores of long-term computer users are higher than those who use computers for a short time, and that the scores of students who use computers and the Internet at schools are higher than others. Erdogdu & Erdogdu (2015) states that the presence of internet connection at home or at school and having their own room in the student's home have positive effects on academic achievement; however, the finding that the use of the school internet outside of school-related activities can distract students from school homework is another remarkable result. The use of ICT can have some positive or negative effects on the social needs of individuals.

2.2.Social Requirements and ICT

The concept of socialization was first introduced by Preece (2000) to express social and technical infrastructures that support social interaction and common goals as a dimension of online learning environments. Social networks allow individuals to communicate regardless of time and place; It provides the opportunity to come together in virtual environments (Karagulle & Cayci, 2014). Kreijns et al. (2007), states that no matter how strong the technical infrastructure, policies and principles regarding socialization are, the main determinant of the socialization process in the community is the participant perceptions of these structures due to the degree of awareness of the participants about these structures. Sutluoglu (2015) states that today, young people are in a process of socialization and identity building in which the identities built in virtual reality are not limited to the time spent in front of the screen, as in the periods when access to the internet only through desktop computers, identity construction is re-established and made permanent through the transitions between online and offline worlds. states. According to İscibasi (2011), discussions on the effects of the rapidly evolving imaginary environments on children with computers are getting intense in our country. Educators, on the other hand, point to the gains that will be provided to children by using the programs to be prepared in cooperation with the creators of this communication and interaction world in schools. It is also important for children to use this digital communication medium to meet their social needs. Suter (2011) states that he should benefit from instructional designs in which socialization

will be achieved and increased. The rate of meeting the social needs of individuals with the help of ICT will greatly affect their attitudes towards ICT.

2.3. Attitude Towards Information and Communication Technologies

The attitude towards objects has a positive effect on the attitude towards behavior. Attitudes towards a previous version of the software can have significant effects on individuals' current attitudes (Zhang & Aikman, 2007). Researches show that students' attitudes towards information and communication technologies are generally positive (Casillas Martín et al., 2020; Gundogdu et al., 2018; Ngo & Eichelberger, 2019). Similarly, Hu et al., (2018) found that students' interest, autonomy and competence in using ICT have positive correlations on their academic achievement. In addition to these findings Hong (2014) reached the conclusion that the general computer attitudes is similar of the students in Turkey and Korea. But it was found that Turkey is in a better situation from Korea about the use of computers in schools. This situation can be explained by the fact that students' ICT attitudes are affected by different variables. For example; digital literacy, tablet and smartphone use, previous education in computer use and frequency of computer use significantly affect students' attitudes towards ICT use (Jan, 2018). According to Guzeller (2011), students' computer attitudes are influenced by variables such as gender, computer self-efficacy beliefs, school type, and education region. The positive attitude of students towards the use of ICT will positively affect their level of self-confidence regarding the subject.

2.4. Self-confidence and ICT

Self-confidence in using information and communication technologies positively affect computer use. Supporting this situation, Duru et al., (2010) stated that the confidence of students with computers in using computers differed statistically positively compared to others, and students with more computer experience had higher computer confidence than others. Cretchley (2007) states that despite the positive support given to students for using different types of software, students with low computer confidence level feel themselves disadvantaged in computer skills. Vekiri and Chronaki (2008) state that female students who are less self-confident in their abilities and less interested in computers avoid experiences where they can improve their computer competence. Bozdogan & Ozen (2014) states that perceived computer use, experience and trust play an important role in the perception of ICT self-efficacy. According to Birol et al. (2009), female students need more motivation and self-confidence to use computers; otherwise men will continue to pursue careers in information technology more than women. Students' confidence in using computers depends in part on the comfort teachers feel about using computers in the classroom, their ability to integrate computers into lessons and programs, and the degree to which students get opportunities to use them. According to Martinovic and Zhang (2012), increased use of ICT by students will have a positive effect on their self-confidence.

2.5. Knowledge Level of Information and Communication Technologies

Perceived level of knowledge about information and communication technologies influences students' thoughts and beliefs. In this process, digital information, digital education opportunities and digital education contents play an important role (Rajabion, 2019). Bhuasiri et al. (2012) made suggestions such as developing basic technology skills, giving importance to computer education, motivating users to benefit from distance education and getting support from universities in order to increase technology awareness and attitude towards e-learning in developing countries. Judi et al. (2011) stated that students in rural areas have limited knowledge of internet technologies. When gender roles were examined in terms of perception level, Vonkova et al., (2021) stated that male students were more prone to ICT concepts. Finally, Porat, et al., (2018) stated that there is a difference between students' perceived skill levels regarding ICT use and their actual performance. In general, students are highly confident in their digital literacy and significantly exaggerate their actual competence.

2.6. Purpose

Students' ICT usage skills emerge as a necessary competence both in their school life and in their later life. In this process, students' self-confidence and technology attitudes positively affect the use of ICT. In addition, the importance of bit technology in meeting the social needs of students is increasing today. During the process, students' level of knowledge about the subject can be affected positively or negatively by the above factors. The aim of the study is to model the relationships between ICT usage, attitude levels,

perceived knowledge levels, social needs and self-confidence of fifteen-year-old students participating in the pisa exam. Hypotheses belonging to the model are expressed as follows:

H 1: There is a significant relationship between social needs and attitudes towards ICT use.

H2: There is a significant relationship between self-confidence and attitude towards ICT use.

H 3: There is a significant relationship between the attitude towards ICT use and the use of ICT.

H 4: There is a significant relationship between ICT use and perceived knowledge level.

3. METHOD

3.1. Research Model

While creating the research model, the relationships between various variables were taken into account. It was observed in the literature that the social needs and attitudes of students affect each other (Cure & Ozdener, 2008; Tunceli, 2013). Again, computer attitude and computer confidence both affect perceived computer knowledge positively. (Levine & Donitsa-Schmidt, 1998). In addition, it is known that ICT use of students is effective in increasing their self-confidence level (Martinovic & Zhang, 2012) (Figure 1).

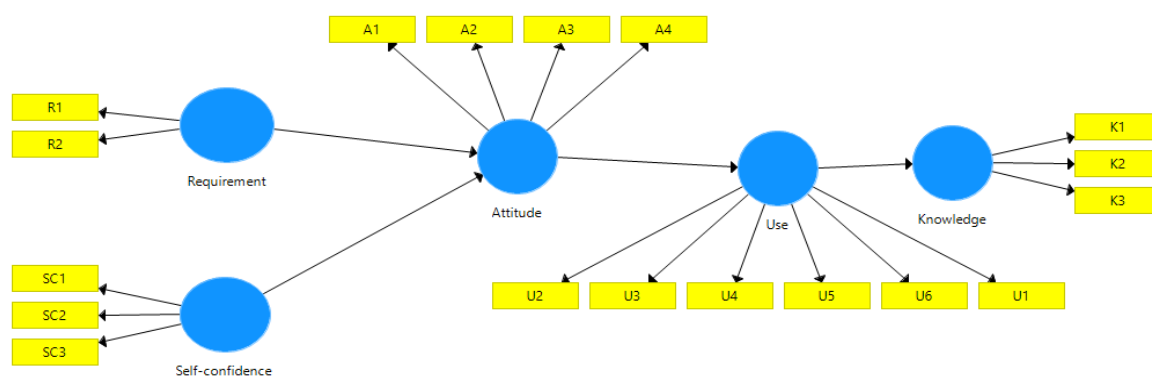


Figure 1. Research model created using PLS Smart 3 program

3.2. Population and Sample

The universe of the research consists of students who studying in 79 countries that have taken the PISA 2018 exam. The sample consisted of the students ($n = 519,334$) who took the PISA exam in 2018. Students' ages range from 15.17 to 16.42. 50.1% of them are female ($n = 260,245$) and 49.9% are male ($n = 259,089$) students. 82.7% of the students receive general education and 17.3% vocational education.

3.3. Data Collection Tools

The data of this study were collected using the ICT Familiarity Questionnaire. The questionnaire consists of 18 items and 5 subscales. It consists of questions asked about ICT in the PISA 2018 exam. The scales in the questionnaire are named as information and communication technologies use, attitude, perceived knowledge level and social needs. The use of information and communication technologies subscale is composed of 6 items. In the scale, there are expressions such as I use the computer for homework at school, I use the computer for group work at school and communicating with other friends. The information and communication technologies attitude subscale consists of 4 items and includes items such as I like digital devices and I feel bad if there is no internet connection. Perceived level of knowledge about information and communication technologies consists of 3 items and includes items such as if I need a new software, I can install it myself, I can follow information about digital devices. The social needs subscale consists of 2 items, such as I like to communicate with my friends to learn new information about digital devices, I learn a lot about social media by discussing with my friends.

3.4. Data Collection and Analysis

The data were collected using the data obtained as a result of the 2018 PISA exam. The data were analyzed by using structural equation modeling (SEM) through the Smart PLS 3 program in order to find an answer to the research question. The PLS simultaneously evaluates the reliability and validity of the scale used in

the measurement of each variable in the measured model, and the degree and significance level of the relationship between the variables in the model. Although the PLS method does not make any assumptions about the data distribution, it uses nonparametric methods such as bootstrapping and jackknifing in determining the statistical significance levels of the estimates (Chin, 1998). In addition, good results are obtained in cases where there is missing data even though the sample is large enough (Hair et al., 2013).

4.RESULTS

4.1.Validity and Reliability Analysis of the Model

Table 1. Factor Load Values, Cronbach Alpha Values, Composite Reliability And AVE Values

Factor	Items	Load values	Cronbach's alpha	Composite reliability	AVE
Attitude	A1	0.961	0.98	0.98	0.93
	A2	0.964			
	A3	0.963			
	A4	0.971			
Received Knowledge	K1	0.976	0.97	0.98	0.95
	K2	0.975			
	K3	0.974			
Requirement	R1	0.983	0.96	0.98	0.96
	R2	0.982			
Self-Confidence	SC1	0.975	0.98	0.98	0.96
	SC2	0.980			
	SC3	0.976			
Use	U2	0.988	0.99	0.99	0.97
	U3	0.983			
	U4	0.987			
	U5	0.988			
	U6	0.987			
	U1	0.980			

First, the reliability and validity analysis of the model was made. In these analyzes, complaint validity, discrimination validity and internal consistency reliability were evaluated. Hair et al., (2014) it is suggested that the factor loads of the items in the model should be 0.70. Accordingly, it is seen that all factor loads in the model are above the expected value (Table 1). Hair et al. (2017), it is considered sufficient for the AVE values of the measurement model to be 0.40 and above. Composite reliability value should be 0.70 and above according to Hair & Lukas (2014). Combined reliability coefficients in the model are between 0.98 and 0.99; Since the Cronbach Alpha coefficients are between 0.96 and 0.99, it can be said that internal consistency reliability is ensured. When the values are examined in the table, it can be said that the convergence validity of the model is ensured. Because the AVE values are between 0.93 and 0.97 and the factor loads are between 0.96 and 0.99. In addition, the SRMR (Standardized Root Mean Square Error) value and NFI (Normized Fit Index) values were also examined whether the model had a good fit. It was determined that the NFI value was 0.953 and above the threshold value 0.80, and when the SRMR value was considered, it was found to be between 0.05 and 0.10, which is the threshold value accepted with 0.069

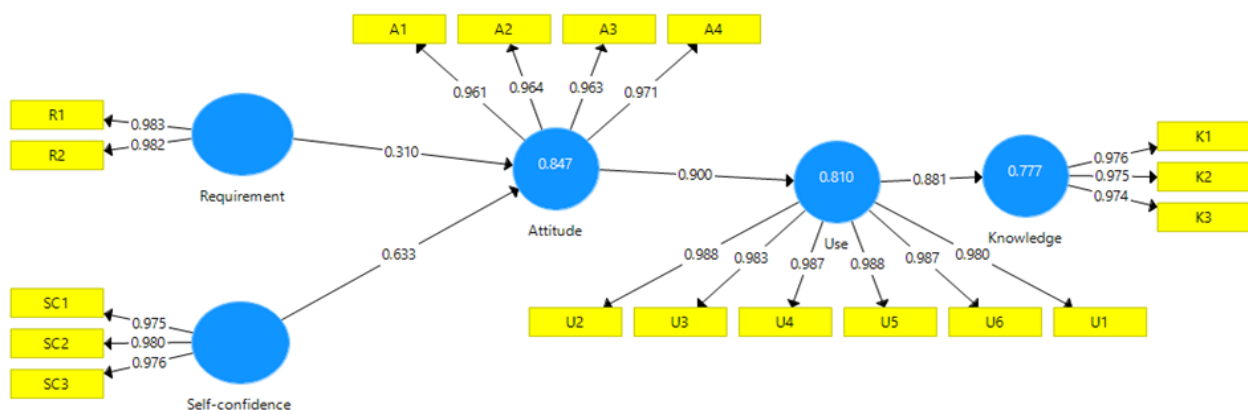


Figure 2: Evaluation of the Measurement Model

The model tested with the Smart PLS 3.0 program was found to be a valid and reliable model. All the hypotheses put forward by the tested model were accepted. Self-confidence and social needs variables affect the ICT attitude variable at a level of 85% ($R^2 = 0.847$). The attitude variable shown towards ICT has an effect of 81% ($R^2 = 0.810$) on ICT usage behavior. Finally, ICT usage behavior affects the perceived knowledge variable at the level of 78% ($R^2 = 0.777$) (Figure 2).

Table 2. Discriminant Validity

	A	K	R	SC	U
A	0.965				
K	0.891	0.975			
R	0.876	0.903	0.983		
SC	0.910	0.916	0.894	0.977	
U	0.900	0.881	0.868	0.888	0.985

It was seen that the measurement model has discriminant validity (Table 2). According to Wong (2013), Fornell-Larcker values are expected to be higher than the correlation values of latent variables. It is understood in the table that these values meet the specified criteria.

4.2.Evaluation of the Structural Model

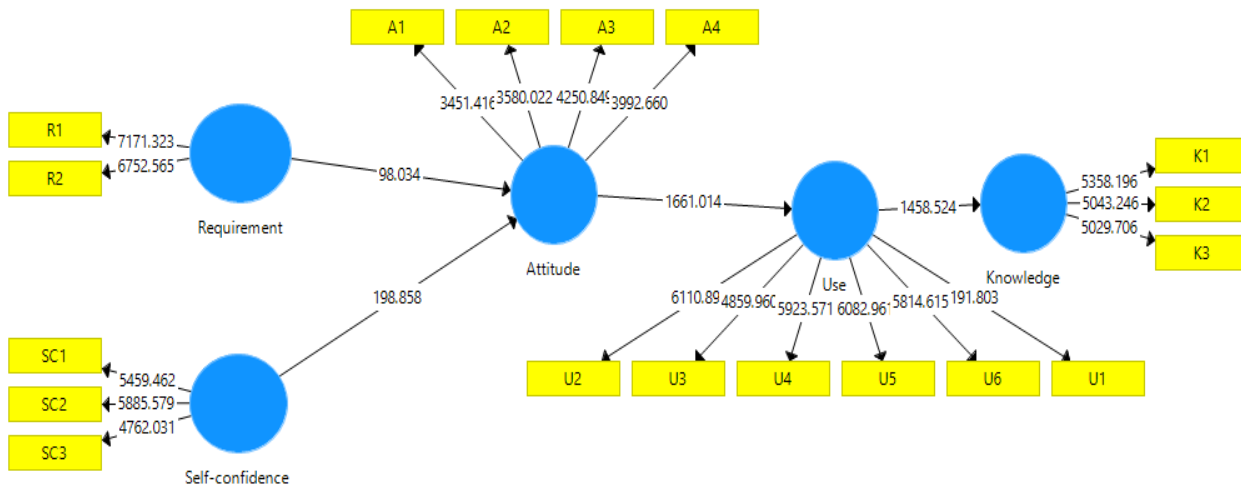


Figure 3. Evaluation of the Structural Model

Hypotheses determined in the study were tested by considering the coefficient path and t values. The direct and indirect effects of the designed measurement model have been examined. When the direct effects were examined, it was seen that all hypotheses were accepted because the p-value (<.05) and t-value > 1.96 (Figure 3 and Table 3).

Table 3. Evaluation of the Structural Model (Direct Effect Results)

Hypothesis	β	t	p	Decision
R->A	0.31	98.03	0.000	Acceptance
SC->A	0.63	198.86	0.000	Acceptance
A->U	0.90	1661.01	0.000	Acceptance
U->K	0.88	1458.52	0.000	Acceptance

Cohen (1988) suggested 0.10 weak, 0.30 medium and 0.40 strong effects to describe the relationships between variables. According to Table 3, it is seen that the path coefficient ($\beta = 0.31$, $p < 0.05$) between social needs and attitude variable is positive and moderately significant. It was also found that the path coefficient ($= 0.63$, $p < 0.05$) between self-confidence and attitude was positively and highly significant, and the path coefficient between attitude and ICT use behavior ($= 0.90$, $p < 0.05$) was found to be positively and highly significant. Finally, it was found that the path coefficient ($\beta = 0.88$, $p < 0.05$) between ICT usage behavior and perceived information was positively and highly significant (Table 3).

Table 4. Evaluation Results of the Structural Model (Indirect Effects)

Hypothesis	Ort	SS	t	p	Decision
SC -> A -> U-> K	0,507	0,003	192,513	0,00	mediator variable
R -> A -> U-> K	0,246	0,003	96,950	0,000	mediator variable
A -> U ->K	0,793	0,001	848,522	0,000	mediator variable
R -> A -> U	0,279	0,003	97,949	0,000	mediator variable
SC-> A -> U	0,570	0,003	195,534	0,000	mediator variable

The bootstrapping tab has been run to see indirect effects. The indirect effects of the structural model are presented in Table 4. All hypotheses regarding the mediator variables in the study were accepted. Indirect effects appear to be significant for these hypotheses. In other words, it is seen that ICT attitude and level of use mediate the relationship between perceived knowledge and self-confidence. Similarly, it can be said that ICT attitude and level of use mediate the relationship between perceived knowledge and social needs. Again, it is seen that the level of ICT use mediates between the variables of attitude towards ICT use and perceived knowledge level. Finally, it was determined that attitude towards ICT use mediated between social needs, self-confidence variables and ICT usage level.

5. DISCUSSION

The aim of this study is to model the relationships between ICT use, attitude levels, perceived knowledge levels, social needs and self-confidence of fifteen-year-old students taking the pisa exam. As a result of the research, it was seen that social needs and self-confidence have a direct effect on attitudes towards ICT use. Again, it was determined that the attitude towards ICT use has a direct effect on the ICT usage level and the ICT usage level on the perceived level of knowledge. When the indirect effects were examined, it was seen that all mediator variables were accepted. It was determined that ICT attitude and level of use mediated the relationship between perceived knowledge and self-confidence. Similarly, ICT attitude and level of use mediated the relationship between perceived knowledge and social needs; It was also found that the level of ICT use mediated between the variables of attitude towards ICT use and perceived knowledge level. Finally, it was determined that attitude towards ICT use mediated between social needs, self-confidence variables and ICT usage level.

It was observed that there are research findings similar to the findings obtained in this study in the literature. Levine & Donitsa-Schmidt (1998) determined that students' computer attitudes and computer confidence affect each other and both positively affect the perceived computer knowledge variable. Tezci (2011) investigated the role of variables such as computer and internet attitudes, self-confidence and knowledge and perceived support that affect the level of ICT usage. These factors were found to be correlated with each other and the level of ICT usage. It has been found that internal and external factors are related to each other and to the level of ICT usage. Again, Lee & Wu (2012) states that students' reading skills are positively affected by the factors such as positive attitude towards computers, self-confidence and ICT at home. González, Ramírez & Viadel (2012) also stated that the participation of the elderly in activities, more contact with information and communication technologies develop more positive attitudes towards learning and benefit, and they have more self-confidence. Papastergiou (2010), on the other hand, stated that the computer course attended by students significantly affected students' computer and internet self-efficacy and attitudes; However, it was found that it significantly reduced computer anxiety. Beas & Salanova (2006) states that it is important to consider some characteristics of individuals in order to provide a better quality technology education. Wilkowska & Ziefle (2009) states that individual factors determine people's technology acceptance to a large extent and this acceptance is influenced by people's experience in technology. In the light of these findings, the following recommendations can be made for researchers and practitioners:

It would be appropriate to increase the duration of use of students in order to increase their self-confidence level in information and communication technologies. Since students' technology acceptance is influenced by their individual experiences, increasing the level of use by taking the past experiences of individuals into consideration will increase their knowledge level. Meeting the social needs of individuals will have an effect on their computer attitude levels and indirectly their usage levels. For the researchers, it may be suggested to retest the model using different samples and age-level students. In addition, models that

examine the effects of different needs of individuals on computer attitude and usage levels can be proposed.

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