

ICT Usage of Pre-service Teachers: Cultural Comparison for Turkey and Bosnia and Herzegovina

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Abstract

The importance of ICTs has become the undisputed in the present century. Studies have been conducted to investigate the use of ICTs with the goal of increase in quality of teacher education for a long time. This study is a cross-cultural comparison in terms of pre-service teachers' level of ICT usage, ICT knowledge and attitudes. The study was conducted in three different universities, two in Turkey and one in Bosnia and Herzegovina. A total of 709 pre-service teacher participated in the study, 385 from Turkey and from 324 Bosnia and Herzegovina. To this end, three different questionnaires were used: the ICT usage for educational purposes scale (ICT-U), the ICT knowledge scale (ICT-K), and the Internet attitude scale (IAS). According to the results significant differences were found between two countries in terms of ICT usage. ICT knowledge was determined as the most explaining variable for the level of ICT use. Culture is also found to be predictive. The study results revealed the need to take into consideration cultural differences in ensuring the integration of ICTs.

Key Words

ICT Usage, ICT Integration, Pre-service Teachers, Cultural Comparison, Teacher Education.

Information and Communication Technologies (ICTs), which constantly revolutionize with innovations, affects a nation's institutions, economies and processes of political determination. Hence, all of the countries around the world are socially and economically under the influence of ICT developments according to the United Nations Development Program's Report (United Nations [UN], 2000). Most of the countries are aware that one of the keys to becoming a sophisticated society is to carry out investments in ICTs (Rice, 2003). In this context, ICTs have become an inseparable actor in current educational systems. Particularly in Turkey, the Information Society Strategy of the Ministry of Development stated ICTs as one of the main tools of the educational process and set targets to ensure the effective use of these technologies by students and teachers (Devlet Planlama Teşkilatı [DPT], 2006). The high-budget Fatih Project, launched by the Republic of Turkey's Ministry of National Education (Milli Eğitim Bakanlığı [MEB], 2012) is considered

to be a reflection of this. On the other hand, Bosnia and Herzegovina's Council of Ministers (CMBH) approved the Action Plan for the Development of the Information Society (CMBH, 2012) containing the decisions regarding the necessary capacity and scope of the policy decisions. Parallel to this, in order to overcome the shortcomings of issues, such as equipment, the SCORE project carried out studies under five separate main headings (eBusiness, eGovernment, eLearning, eHealth, and Environment-Energy) in the field of ICTs (Community Research and Development Information Service, 2012). However, even if ICTs move in to the classroom as hardware, actualization of teacher's ICT integration in their classroom seems to be insufficient (Yıldırım, 2007). This situation requires a transformation of understanding to exploit ICTs in the field of education. This transformation should be carried out to provide education with technology. In other words, the design of educational environments to provide learning through ICTs is important.

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Studies that take into account the universal dimension and different components of the issue have a particular significance in terms of decision-makers and process designers. Studies completed with the individuals who have critical roles in education offer important information for decisions to ensure the integration of ICTs. Considering teachers have one of the critical roles, significant differences in teacher education should not be underestimated. This is because the approaches toward multi-dimensional contributions to the teaching-learning process (Zarotsky & Jaresko, 2000) and the effects of integration (Zhao, Hueyshan, & Mishra, 2001) are not an immediately realized situation for individuals. While forming the approach, to ensure individuals' ICT integration, their ICT usage, ICT knowledge, and ICT attitudes are important. On the other hand, due to the universal dimensions of ICTs, trends and conditions across cultures are useful to know during research.

In this context, this study aimed to investigate whether there are differences regarding the use of ICTs by pre-service teachers from Turkey and Bosnia and Herzegovina as two different cultures. Based on the literature review, I found that there were no comparisons between two countries in terms of cultural differences of ICT use. In this research, Turkey and Bosnia and Herzegovina were selected for the comparison as two countries which are classified as two developing countries in Europe based on World Bank report (World Bank, 2007). This is due to the fact that it is possible to direct the development of national and international programs and policies for teacher education by comparison studies of ICTs usage. Particularly, studies for the development of associate teacher education programs can be a significant contribution to the determination of approaches regarding ICTs. The results of the study may provide important results to policy-makers and decision-makers in regard to the identification of ICT approaches towards pre-service teachers in different cultures during the execution of the training program and the identification of common training programs. Furthermore, it can shed light on the required activities for efficient ICT integration in educational institutions. Although ICT as an international concept is regarded to have an effect on educational settings, I aimed to unveil whether the effects of ICT can vary based on the cultural differences

Method

Participants

This study was conducted in three different faculties of education, two in Turkey and one in Bosnia and

Herzegovina. Research data was collected from senior pre-service teachers from different departments (Science, Mathematics, Social Studies, Homeroom, Pre-school, and Turkish language education) in various state universities. Overall, a total of 709 pre-service teachers participated in the study, 385 pre-service teachers from Turkey of which 123 were women and 201 were men; and from Bosnia and Herzegovina a total of 324 pre-service teachers participated, of which 234 were women and 151 were men.

Instruments

Four research instruments were used in the current study to address the research questions. The instruments were: (i) The Personal Inquiry Form, (ii) The ICT Usage for Educational Purposes Scale (ICT-U), (iii) The ICT Knowledge scale (ICT-K), and (iv) The Internet Attitude Scale (IAS). The ICT Usage for Educational Purposes Scale was designed to examine the pre-service teachers' usage level of 15 different ICT applications. The personal inquiry form included demographic data (gender, computer ownership, weekly computer usage) about the pre-service teachers. The ICT-K scale was designed to examine the pre-service teachers' level of knowledge of 15 different software programs. The IAS aimed at investigating the pre-service teachers' attitudes towards the Internet. The home internet attitude measurement tools ICT-U, ICT-K used in the research to collect data were developed by Tezci (2009; 2011a; 2011b) by creating a factor analysis for the data collection in this research. As the measures were developed in Turkish, the forms used in Bosnia and Herzegovina were adopted to Bosnian and Croatian to ensure linguistic equivalence. First, linguistic appropriateness of the translated scales were presented for expert opinion in the fields of linguistics, pedagogy, and measurement and evaluation. Prior to pilot implementation, pre-service teachers who know Turkish-Croatian, and Turkish-Bosnian were asked to describe in Turkish what they understand from the expressions in the Bosnian and Croatian forms. Thus, equivalence between the Turkish, Bosnian, and Croatian forms were provided. Later, pilot implementation to the 40 pre-service teachers who know both Turkish and Bosnian and both Turkish and Croatian was completed by presenting the original form as well as the Bosnian and Croatian forms at one day intervals. Consistencies between the pre-service teacher's answers on each presented form were examined. A .97 correlation between the scores of Turkish and Croatian forms, and a .98 correlation between the scores of Turkish and Bosnian forms were deter-

mined. In addition, the Cronbach's alpha reliability coefficients for the measures used in this study were determined as .85 for the ICT-U measurement, .88 for the ICT-K measurement, and .84 for the Home Internet Attitude measurement.

Participants indicated their level of agreement with each item on a five-point scale, ranging from 5 (totally agree) to 1 (do not agree at all). Some items were negatively worded and reverse scored at the data entry stage. The scores for the items were added up and divided by the number of questions in each scale. Thus, the scores in each scale ranged from 1 to 5.

Data Analysis

Descriptive statistics were analyzed to identify the participants' level of ICT knowledge, usage, and Internet attitudes. A t-test was conducted to examine differences between countries. A Pearson's correlation analysis was carried out to examine the relationships among the variables of interest. Finally, a stepwise regression analysis was conducted to examine the relative contribution of factors (ICT-K, IA, weekly computer use, gender) that predicted the level of ICT usage.

Results

ICT Usage

As stated above, the participants indicated their level of usage of 15 ICT applications for educational pur-

poses on a five-point scale, ranging from 1 (never) to 5 (almost every day). The results of analysis involving ICT-U are presented in table 1. The overall ICT usage for educational purposes was found to be low (Mean (M) = 2.30, Standard Deviation (SD) = 0.94).

According to the data from the two cultures, accessing the Internet (M = 4.43), communication (M = 3.98), and word processing (M = 3.20) were determined to be the most commonly used technologies, while complex systems (M = 1.31), authoring microworlds / simulations (M = 1.52), and computer programming (M = 1.61) were determined to be the least used technologies. Internet (M = 4.23), communication (M = 3.78) and word processing (M = 3.18) were determined to be the most used technologies, and modeling complex systems (M = 1.20), authoring microworlds / simulations (M = 1.35), and concept mapping (M = 1.46) were determined to be the least used technologies by Bosnian and Herzegovinian pre-service teachers. Usage of educational-level ICT by Turkish pre-service teachers was found to be low (M = 2.39). The most commonly used technologies were determined to be accessing the Internet (M=1.41), communication (M=4.15), and word processing (M=3.22), respectively, while the least commonly used ones were modeling complex systems (M=1.41), concept mapping (M=1.62), and authoring microworld/simulations (M=1.66), respectively, among Turkish pre-service teachers. The level difference between two cultures was determined in terms of usage of software that requires the Internet and a high lev-

Table 1.
The Results of ICT-U Analysis

	Turkey N= 385		Bosnia and Herzegovina N=324		Total N=709		t
	Mean	SD	Mean	SD	Mean	SD	
Playing games	2.60	1.30	2.88	1.27	2.73	1.30	-2.809**
Making presentations	2.46	1.05	2.45	.86	2.45	.97	.113*
Word processing	3.22	1.19	3.18	1.15	3.20	1.17	.441*
Publishing materials	1.76	1.01	1.47	.81	1.63	.94	4.134**
Preparing spreadsheets	1.69	.89	1.61	.92	1.65	.90	1.114*
Creating graphics	2.27	1.17	2.24	1.09	2.25	1.14	.376*
Communication	4.15	1.05	3.78	1.19	3.98	1.13	4.460**
Accessing the Internet	4.59	.77	4.23	.91	4.43	.85	5.712**
Developing web pages	2.16	1.22	1.70	1.05	1.95	1.17	5.315**
Developing multimedia	1.82	1.01	1.60	1.02	1.72	1.02	2.864**
Authoring microworlds /Simulations	1.66	.87	1.35	.70	1.52	.81	5.198**
Concept mapping	1.63	.89	1.46	.89	1.55	.90	2.526**
Modeling complex systems	1.41	.72	1.20	.58	1.31	.67	4.152**
Computer programming	1.68	.90	1.53	.85	1.61	.88	2.363**
Using educational CD	2.74	1.19	2.29	1.09	2.53	1.17	5.103**
Overall ICT-U	2.39	.95	2.20	.94	2.30	.54	4.682**

*p>.05; **p<.05 sd: 706

el of knowledge. Average scores in terms of the overall levels of use varied between pre-service teachers from the two cultures ($t = 4682, p < .05$). The level of Bosnian and Herzegovinian pre-service teachers in regard to performing determined tasks ($M=2.20$) were lower than that of the Turkish pre-service teachers ($M=2.39$). In the comparison between cultures regarding usage levels of word processing, presentations, graphics, and spreadsheet preparation no difference was identified ($p > .05$). A significant difference was determined in terms of game playing related software use between Turkish pre-service teachers ($M=2.60$) and Bosnian and Herzegovinian pre-service teachers ($M=2.88$) in favor of the latter ($t = -2809, p < .05$). A significant difference was determined in terms of other education- oriented ICT software usage in favor of Turkish pre-service teachers.

ICT Knowledge

As stated above, the participants indicated their knowledge level of 15 types of ICTs on a five-point scale, from 1 (do not know how to use at all) to 5 (know very well). The results of the analysis involving ICT-K are presented in table 2. The participants' overall knowledge level of ICT was found to be low ($M = 2.59, SD = 0.83$).

ICT knowledge levels of both pre-service teachers in Turkey ($M = 2.72$) and pre-service teachers in Bosnia and Herzegovina ($M = 2.45$) were low. Bosnian and Herzegovinian pre-service teachers stated

the Internet ($M = 4.12$), email ($M = 3.82$), word processing ($M = 3.41$) as their best known ICTs. Their least known ICTs were stated as modeling software ($M = 1.65$), microworlds / simulations ($M = 1.64$), and programming languages ($M = 1.98$). Pre-service teachers in Turkey stated the Internet ($M = 4.44$), email ($M = 4.10$), and word processing ($M = 3.42$) as their best known ICTs, while modeling software ($M=4.44$), microworlds / simulations ($M = 1.86$), and animation ($M = 2.04$) were determined to have lowest means. For pre-service teachers from the two countries, differences were determined between knowledge levels of ICT software except in terms of spreadsheets, word processing, and animations. Knowledge of graphics and presentation software was found to be lower for pre-service teachers in Turkey then pre-service teachers in Bosnia and Herzegovina. Knowledge levels of other software among pre-service teachers in Bosnia and Herzegovina was found to be low. The average level of knowledge for all software was found to be lower for pre-service teachers in Bosnia and Herzegovina ($M=2.45$) than pre-service teachers in Turkey ($M=2.72$) ($t = 5399, p < .05$).

ICT Attitude

Average weekly internet usage time was determined as 13.64 hours for all pre-service teachers. According to the data obtained, while pre-service teachers in Turkey use the Internet 11 hours per week on average, pre-service teachers in Bosnia and Herzegov-

Table 2.
The Results of ICT-K Analysis

	Turkey N= 385		Bosnia and Herzegovina N=324		Total N=709		
	Mean	SD	Mean	SD	Mean	SD	t
Word Processing	3.42	.98	3.41	1.14	3.41	1.06	.080*
Database	2.70	1.09	2.11	1.15	2.43	1.16	7.008**
Spreadsheets	2.89	1.11	3.02	1.15	2.95	1.13	-1.609*
Graphics	2.87	1.22	3.09	1.31	2.97	1.27	-2.335**
Multimedia authoring software	2.31	1.19	1.93	1.16	2.13	1.19	4.283**
Presentation software	3.05	1.26	3.37	1.28	3.19	1.28	-3.427**
Concept mapping	2.29	1.20	1.90	1.17	2.11	1.20	4.383**
Internet	4.44	.81	4.12	.92	4.29	.88	4.944**
Email	4.10	1.10	3.82	1.19	3.98	1.15	3.267**
Publishing software	2.47	1.18	1.75	1.11	2.14	1.20	8.234**
Webpage authoring software	2.33	1.26	1.74	1.11	2.06	1.23	6.529**
Programming languages	2.14	1.15	1.68	1.00	1.93	1.11	5.581**
Modeling software	1.85	.99	1.39	.83	1.64	.95	6.700**
Microworlds/Simulations	1.86	.94	1.40	.83	1.65	.92	6.730**
Animation	2.04	1.18	2.01	1.20	2.03	1.19	.291*
Overall ICT-K	2.72	.60	2.45	.71	2.59	.83	5.399**

* $p > .05$; $p < .05$; $sd = 706$

ina use the Internet 15 hours per week on average. Forty-six percent of pre-service teachers in Turkey use ICTs 4-10 hours per week, while approximately 2.2% claimed to not use ICTs at all. Thirty-eight percent of pre-service teachers in Bosnia and Herzegovina use ICTs for 4-10 hours per week, while approximately 1% claimed not to use ICTs at all. In both cultures, the second most common rate of internet use ranged between 1-3 hours.

The analysis of descriptive statistics revealed that the participants' overall attitudes towards the Internet ($M = 3.55$, $SD = 0.42$) were, in general, positive. Attitude levels of pre-service teachers in Turkey ($M=3.60$, $SD=.41$) as well as in Bosnia and Herzegovina ($M=3.50$, $SD=.45$) were found positive (table 3).

Correlation and Regression Analysis

Results presented in table 4 revealed that all of the variables are correlated to each other. ICT knowledge (Pearson's Correlation Value (r) = 0.69, $p < 0.01$) had the highest correlation of ICT usage. ICT usage has a moderate correlation with Internet attitude ($r = 0.37$, $p < 0.01$).

A stepwise regression analysis was performed to determine to what extent each variable explains ICT for educational purposes. Errors (error terms) were tested for eligibility of regression analysis numerals. Results showed that errors (residual) were normally distributed (Skewness = $-.11$; Kurtosis = $.17$). There was no multiple correlation between independent variables, and the highest VIF value was determined to be 1297. Background variables were included in the equation primarily for control of the independent hierarchical regression analy-

sis. Since attitude stems from knowledge, the order of inclusion to the equation is as follows: gender, weekly internet usage time, knowledge and lastly, attitude. The results of the analysis on the predictive power of the variables are given in table 5.

According to the results of the regression analysis, 30% of the educational use of ICT levels were explained by gender and contributed to the model significantly ($R^2 = .30$, $F(1/707) = 306.638$). Country was the other indicator variable, which entered the model in the second step, and contributed to the model by 40%. Country variable's peculiar contribution was found to be significant within the model ($R^2 = .40$, $F(2/706) = 236.359$). Weekly internet usage entered in to the model at the third step, ICT-K at the fourth step, and ICT-A at the fifth step. Weekly internet usage ($R^2 = .44$, $F(2/706) = 182.747$), ICT-N ($R^2 = .64$, $F(3/705) = 312.883$), and ICT-A ($R^2 = .66$, $F(4/704) = 268.811$) were significant contributions to the model.

However, in order to determine the effect of the country variable, variables were placed in the equation in diverse order. According to this, in the hierarchical regression analysis, predictor variables were entered into the regression equation in the following order: ICT-K, ICT-A, gender (dummy variables), and country (dummy variables). The dependent variable was ICT-U. Results presented in table 6 revealed that all variables contributed to the use of ICT for educational purposes. In the fourth step explanation of the variance by all variables, the ratio was 64%.

Usage time ($\beta = .30$), ICT-K (ICT knowledge level) ($\beta = .66$), the level of knowledge on the contribution of attitude ($\beta = .19$), the contribution of these variables by gender ($\beta = .35$), and country variable

Table 3.
The Analysis of the Participants' Overall Attitudes towards the Internet

	Bosnia and Herzegovina			Turkey			General			
	N	M	SD	N	M	SD	N	M	SD	t
Weekly use of Internet	324	11.49	13.26	385	15.43	15.41	709	13.64	14.59	3.589*
I-A	324	3.50	.45	385	3.60	.41	709	3.55	.42	3.285*

* $p < .05$

Table 4.
Correlations among the Variables of Interest

	ICT-K	ICT-U	I-A	Gender	Country
ICT-U	.688**				
I-A	.290**	.366**			
Gender	.316**	.542**	.190**		
Country	.201**	.175**	.124**	-.227**	
Weekly internet usage	.221**	.292**	.117**	.111**	.135**

All of the correlation is significant .01

Table 5.

The Results of the Analysis on the Predictive Power of the Variables

	Variables	B	SE B	β	t	R	R ²	R ² change	F for Change in R ²
Step 1	Gender	.081	.005	.551	17.511**	.550	.303	.303	306.638**
Step 2	Gender	.092	.004	.624	20.851**	.634	.401	.099	116.092**
	Country	.048	.004	.323	10.775**				
Step 3	Gender	.063	.004	.595	20.277**	.662	.438	.036	45.611**
	Country	.026	.004	.290	9.839**				
Step 4	Usage hour	.001	.000	.195	6.754**				
	Gender	.061	.004	.415	16.486**	.800	.640	.203	395.821**
	Country	.023	.004	.158	6.464**				
	Usage hour	.001	.000	.121	5.192**				
Step 5	ICT-K	.037	.002	.502	19.895**				
	Gender	.058	.004	.395	15.919**	.810	.657	.017	33.919**
	Country	.021	.004	.143	5.953**				
	Usage hour	.001	.004	.116	5.074**				
	ICT-K	.036	.002	.473	18.783**				
	ICT-A	.010	.002	.136	5.824**				

** $p < .01$

contribution as a last entry to the model ($\beta = .14$) were found significant according to the analysis results. On the level of use of ICT for educational purposes, the only significant predictor was level of knowledge of ICT. ICT knowledge level describes the ICT usage levels nearly by 41% when the weekly usage hour is held constant. The explanation of the variance by the country variable is 1.7% when all other variables held constant.

Results and Discussion

In this study, the effects of knowledge, attitude, gender, and culture variables on the educational purposes of ICTs were investigated. This study was executed on pre-service teachers studying in the faculties of education in Turkey and Bosnia and Herzegovina. According to the results, ICT knowledge and usage levels of pre-service teachers who are studying pre-service education were found to be low. Especially knowledge levels for more complex software (such as complex systems modeling and computer programming) and programs that require a more advanced level of experience (such as software, modeling, and simulations) were found to be low. Nevertheless, software knowledge for internet, e-mail, word processing software, and levels of usage of these programs were found to be high. A great amount of similar research on ICT (Garland & Noyes, 2004; Lim, 2007; OECD, 2004; Sam, Othman, & Nordin, 2005; Yalın, Karadeniz, & Şahin, 2007; Yıldırım, 2007), as in this study, showed

that the level of knowledge and usage is sufficient enough to accomplish simple tasks, but it is far from effective integration.

Results showed that information, weekly hours of internet usage, attitudes, gender, and country variables are associated with usage levels. When knowledge, attitudes, and hours of internet use increased, the level of ICT usage for learning and teaching purposes increased as well. This result is consistent with several studies' reports. Butler and Sellbom (2002), Garland and Noyes (2004), Kirkwood, Van Der Kuyl, Parton, and Grant (2000), Straub, Keil, and Brenner (1997) and Tezci (2011a) concluded in their research that a lack of experience, knowledge and/or education affects the levels of usage and identified them as major barriers for effective integration. Pelgrum (2001) also stated that a lack of information was identified as the major barrier for ICT integration in 26 different countries by practitioners in training. Usage levels of pre-service teachers in Turkey are higher than the usage levels of pre-service teachers in Bosnia and Herzegovina.

Attitudes towards ICT were found to be highly positive in pre-service teachers from both cultures. Overall, studies in different cultures (Garland & Noyes, 2004; Tezci, 2009, 2011a) observed that pre-service teachers' attitudes towards ICT were high as well. Nevertheless, while this positive attitude has a significant impact on the level of usage according to the regression analysis, it is not sufficient on its own. On the other hand, these results were parallel to other studies (Boveè, Voogt,

Table 6.
Summary of the Hierarchical Regression Analysis for Variables Predicting ICT-U

	Variables	B	SE B	β	t	R	R ²	R ² change	F for Change in R ²
Step 1	Usage hour	.002	.000	.300	8.344**	.300	.090	.090	69.622**
Step 2	Usage hour	.001	.000	.154	5.655**	.707	.500	.411	
	ICT-K	.048	.002	.657	24.075**	.717	.512	.035	50.845**
Step 3	Usage hour	.001	.000	.144	5.437**	.730	.531	.032	579.629**
	ICT-K	.044	.002	.605	22.022**				
	ICT-A	.014	.002	.188	6.978**				
Step 4	Usage hour	.001	.000	.131	5.626**	.800	.638	.107	208.320**
	ICT-K	.037	.002	.509	20.348**				
	ICT-A	.011	.002	.151	6.344**				
	Gender	.051	.004	.347	14.433**				
Step 5	Usage hour	.001	.000	.116	5.074**	.810	.654	.017	35.438**
	ICT-K	.035	.002	.473	18.783**				
	ICT-A	.010	.002	.136	5.824**				
	Gender	.058	.004	.395	15.919**				
	Country	.021	.004	.143	5.953**				

** $p < .01$

& Meelissen, 2007; Khine, 2001; Roussos, 2007; Torkzadeh, Chang, & Demirhan, 2006) regarding attitudes towards educational purposes of ICT and its integration into the programs has an important impact. However, some research results (Garland & Noyes, 2004; Li & Kirkup, 2007) found a low correlation between the attitude levels and ICT experience. Despite the different results, it can be said that attitudes during pre-service teacher training should be taken into account in terms of effective technology integration. Naturally, the attitude variable towards ICT usage has a cultural dimension. In fact, a similar study carried out by Li and Kirkup (2007) on Chinese and British students showed that there is a relationship between ICT attitudes and experience and this is effective culturally. This circumstance is not effective by itself in ensuring the integration of attitude, but it should not be ignored because of its importance in the process.

In this study, the predictor value of the culture variable on the level of usage was determined. When all other variables are held constant, cultural differences can be said to be an important factor. However, it should not be ignored that this study was carried out with students from two different developing countries. Indeed, the country (culture) variable emerged as an important factor for educational purposes of ICT. In order to reach a common and widespread conclusion about the effect of this variable, the same differences should be examined in developed countries or cultures who integrated ICT into their programs. This is based on a study published by European Schoolnet (2006) that stated that in developing countries, ICT usage

levels are low and its integration is still in the first stage. In fact, Kaynak and Özer (2009) stated that independent success levels of ICT performances are not satisfactory in Turkey and Bosnia and Herzegovina. On the other hand, the study of Li and Kirkup (2007) stated the cultural differences between dimensions of self-esteem and attitude when studying computer and internet usage in China and England. Lim (2002) determined the level of usage in terms of cultural differences. Torkzadeh et al. (2006) discussed their research regarding cultural perspectives, and stated that teachers perceived computers as a tool specific to their own culture, and cultural differences have a significant impact on the level of usage. Considering knowledge level is the most important indicator, and the knowledge levels of students (pre-service teachers) are low, it would be useful for faculty members to become role models by using these technologies effectively in the classroom, and to do model implementations to demonstrate how to use them for educational purposes. In fact, this is not surprising. Indeed, it was observed that the level of use increases when the level of students' knowledge increases. In this context, the level of information for software that requires a high level of knowledge is low and, in parallel, the level of use is lower.

Transmission-based activities, rather than integration based on the constructivist approach, in other words, computer activities based TYPE I (Maddux & Johnson, 2006) usage can be said to be weighted. However, effective integration requires TYPE II, in other words, learning through technology (Jonassen, 2000). Perkmén and Tezci (2011) explained

TYPE II as “technology in the classroom should be used in such a way that without the technology there is no way to teach in that manner.” It can be said that it is possible to increase the use of technology in the process of effective learning, and teaching can be accomplished by deviating from traditional ways. For this, role modeling and designing activities for direct experiences by faculty members would be helpful. According to a research report published by the European Commission (2001), traditional ICT use (TYPE I) has a negative impact on effective ICT integration in the classroom. Hence, to increase knowledge levels and to gain first-hand experiences, practices provided to the students in the process of teaching and learning can be said to be beneficial. Although there are several factors that affect the use of ICT in the teaching-learning process, it would be useful to consider factors such as: a wide variety of applications, concrete experiences, first-hand experiences, and motivation (Anderson, 1990; Brown, Collins, & Duguid, 1989; Hong, 2002; Sam et al., 2005) in the process of teaching and learning. Organizing events such as special activities, courses, seminars, and workshops and learning by technology in the classes will contribute to increasing the level of knowledge. In this regard, faculty members will contribute to the increase of ICT knowledge levels and the effective use of ICT by giving examples of TYPE II usage, and becoming role models in the classroom (Baek, Jung, & Kim, 2008; Gosmire & Grady, 2007; Neufeld, Dong, & Higgins, 2007).

In addition to knowledge, gender was determined to be the second most important factor to effect students' usage levels. In fact, while some studies revealed decreasing effects of gender, findings of this study showed that gender is still an important factor on usage levels. Usage levels of female students were determined to be lower than male students. Even though this research was conducted in two different countries, both of them are classified as developing countries (World Bank, 2007). On the other hand, the use of computer and internet technologies based on the cultural perceptions should not be ignored. To better analyze the gender variable effect, a qualitative analysis would contribute better in countries with different cultures and levels of development. In the study of Volman, van Eck, Heemskerk, and Kuiper (2005), they reported gender as an important factor in developing countries. Several studies (Janssen Reinen, & Plomp, 1997; Paraskeva, Bouta, & Papagianni, 2008; Volman et al., 2005) determined gender as an important factor in terms of ICT usage, and female students had a

lower level of use. However, other results are also available revealing the effect of gender as an unimportant factor (Murphy, 2000). All of these showed that every country is required to develop policies for the effective integration of ICT into their educational programs in relation to their cultural conditions.

Despite the high level of investment in ICT, the effective utilization level can be said to be quite low. Indeed, the results of this study support the perspective that: “The presence of technology in the classroom does not guarantee its use.” (Bullock, 2004; Niederhauser & Perkmen, 2010; Tezci, 2011a, 2011b). It is important to consider “technological-pedagogical content knowledge” for effective technology integration in teacher education. Still, for effective use, it would be beneficial that faculty members become role models for pre-service teachers in terms of integration to programs and areas.

Considering teachers have a dominant role for integrating ICTs into programs, development of original national and school level policies would be useful. British Educational Communications and Technology Agency (2004) stated that problems directed at ICTs learning and teaching adaptation is not just technical, and there is not a universal solution. The findings of this study also support this view. In this case, problems should be addressed locally. Indeed, Straub et al. (1997) stated that their research on different cultures demonstrated that the Technology Acceptance Model (TAM) is suitable for the solution of problems in the United States of America, while it is not valid for Japan.

It can be said that, while by its nature ICTs have a universal character; programs for teacher education differ among countries, and ICT usage and training on it was affected by cultural dimensions. However, the findings of this research revealed that it is not possible to state that the levels of providing effective ICT integration in developing countries are yet sufficient.

Öğretmen Adaylarının Bilişim Teknolojileri Kullanımı: Türkiye ve Bosna Hersek için Kültürel Karşılaştırma

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Öz

İçinde bulunduğumuz çağda bilgi ve iletişim teknolojilerinin (BT/ICT) önemi tartışmasız bir hal almıştır. Özellikle öğretmen eğitiminde kalitenin artırılması için ICT kullanımı ile ilgili araştırmalar uzun yıllardan beri devam etmektedir. Bu araştırmada öğretmen adaylarının; ICT kullanma düzeyinin, ICT bilme düzeyinin ve tutumlarının kültürler arası karşılaştırma yapılarak belirlenmesi amaçlanmıştır. Araştırma, Türkiye'den iki ve Bosna Hersek'ten bir olmak üzere üç farklı eğitim fakültesinde yürütülmüştür. Araştırmaya 385'i Türkiye'den ve 324'ü Bosna Hersek'ten olmak üzere toplam 709 son sınıf öğrencisi öğretmen adayı katılmıştır. Araştırmada likert tipi sorular içeren üç farklı (ICT-U, ICT-K ve IAS) ölçek kullanılmıştır. Yapılan analizlerde iki kültür arasında ICT kullanımı bakımından istatistiksel olarak farklar bulunmuştur. ICT Bilme düzeyinin ICT kullanım düzeyini en çok açıklayan değişken olduğu belirlenmiştir. Ayrıca kültürün az da olsa yordayıcı olduğu belirlenmiştir. Araştırma sonuçları ICT entegrasyonunun sağlanmasında kültürel farkların dikkate alınması gerekliliğini ortaya koymuştur.

Anahtar Kelimeler

ICT Kullanımı, ICT Entegrasyonu, Öğretmen Adayı, Kültürel Karşılaştırma, Öğretmen Eğitimi.

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References

- Anderson, J. R. (1990). *Cognitive psychology and its implications*. New York: Freeman.
- Baek, Y., Jung, J., & Kim, B. (2008). What makes teachers use technology in the classroom? Exploring the factors affecting facilitation of technology with a Korean sample. *Computers & Education*, 50(1), 224-234.
- Bove'e, C., Voogt, J., & Meelissen, M. (2007). Computer attitudes of primary and secondary students in South Africa. *Computers in Human Behavior*, 23, 1762-1776.
- British Educational Communications and Technology Agency. (2004). *A review of the research literature on barriers to the uptake of ICT by teachers*. Retrieved from <http://www.becta.org.uk>.
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32-41.
- Bullock, D. (2004). Moving from theory to practice: An examination of the factors that pre-service teachers encounter as they attempt to gain experience teaching with technology during field placement experiences. *Journal of Technology and Teacher Education*, 12(2), 211-237.
- Butler, D. L., & Sellbom, M. (2002). Barriers to adopting technology for teaching and learning. *Educause Quarterly*, 8(2), 22-28.
- Community Research and Development Information Service. (2012). *SCORE deliverable D6 - Final strategic ICT research agendas for the Western Balkan region*. Retrieved from <http://cordis.europa.eu>.
- Council of Ministers of Bosnia and Herzegovina. (2012). *United Nations Development Programme. Council of Ministers of Bosnia and Herzegovina Action Plan of Information Society Development in Bosnia and Herzegovina*. Retrieved from <http://www.undp.ba>.
- Devlet Planlama Teşkilatı. (2006). *Devlet Planlama Teşkilatı bilgi toplumu stratejisi 2006-2010 raporu*. Ankara: Yazar.
- European Commission. (2001). *Survey report: Students' perceptions of the use of ICT in university learning and teaching*. Retrieved from <http://www.spotplus.odl.org>.
- European Schoolnet. (2006). *European Schoolnet. The ICT impact report: A review of studies of ICT impact on schools in Europe*. Retrieved from <http://ec.europa.eu>.
- Garland, K. J., & Noyes, J. M. (2004). Computer experience: A poor predictor of computer attitudes. *Computers in Human Behavior*, 20, 23-40.
- Gosmire, D., & Grady, M. (2007). A bumpy road: Principal as technology leader. *Principal Leadership*, 7(6), 17-21.
- Hong, K. S. (2002). Relationships between students' and instructional variables with satisfaction and learning from a Web-based course. *The Internet & Higher Education*, 5(3), 267-281.
- Janssen Reinen, I., & Plomp, T. (1997). Information technology and gender equality: A contradiction in terminis. *Computers in Education*, 28(2), 65-78.
- Jonassen, D. (2000). *Computers as mindtools for schools: Engaging critical thinking*. Prentice Hall: Columbus, OH, Merrill.
- Kaynak, S., & Özer, H. (2009). Comparative analysis of ICT performances of Turkey and Bosnia and Herzegovina by Custom Scorecard Model. In *1st International Symposium on Sustainable Development* (pp. 266-272). Sarajevo.
- Khine, M. (2001). Attitudes toward computers among teacher education students in Brunei Darussalam. *International Journal of Instructional Media*, 28(2), 147-153.
- Kirkwood, M., Van Der Kuyl, T., Parton, N., & Grant, R. (2000). *The new opportunities fund (NOF) ICT training for teachers program: Designing a powerful online learning environment*. The European Conference on Educational Research.
- Li, N., & Kirkup, G. (2007). Gender and cultural differences in Internet use: A study of China and the UK. *Computers & Education*, 48(2), 301-317.
- Lim, C. P. (2002). A theoretical framework for the study of ICT in schools: A proposal. *British Journal of Educational Technology*, 33(4), 411-421.
- Lim, C. P. (2007). Effective integration of ICT in Singapore schools: Pedagogical and policy implications. *Educational Technology Research and Development*, 55(1), 83-116.
- Maddux, C. D., & Johnson, D. L. (2006). Type II applications of information technology in education: The next revolution. *Computers in the Schools*, 23(1/2), 1-5.
- Milli Eğitim Bakanlığı. (2012). *Milli Eğitim Bakanlığı Fatih Projesi*. Retrieved from <http://fatihprojesi.meb.gov.tr>.
- Murphy, C. (2000). Effective use of ICT by student teachers—is it improving? In *SITE 2000* (pp. 1656-1661). Charlottesville, VA.: AACE Publications.
- Neufeld, D. J., Dong, L., & Higgins, C. (2007). Charismatic leadership and user acceptance of information technology. *European Journal of Information Systems*, 16(4), 494-510.
- Niederhauser, D. S., & Perkmen, S. (2010). Beyond self-efficacy: Measuring pre-service teachers' instructional technology outcome expectations. *Computers in Human Behavior*, 26(3), 436-442.
- Organisation for Economic Co-operation and Development. (2004). *Completing the foundation for lifelong learning: An OECD survey of upper secondary schools*. Retrieved from <http://browse.oecdbookshop.org/oecd/>
- Paraskeva, F., Bouta, H., & Papagianni, A. (2008). Individual characteristics and computer self-efficacy in secondary education teachers to integrate technology in educational practice. *Computers & Education*, 50, 1084-1091.
- Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: Results from a worldwide educational assessment. *Computers & Education*, 37, 163-178.
- Perkmen, S., & Tezci, E. (2011). *Eğitimde teknoloji entegrasyonu: Materyal geliştirme ve çokluortam tasarımı*. Ankara: Pegem Akademi.
- Rice, M. F. (2003). Information and communication technologies and the global digital divide technology transfer, development, and least developing countries. *Comparative Technology Transfer and Society*, 1(1), 72-88.
- Roussos, P. (2007). The Greek computer attitudes scale: Construction and assessment of psychometric properties. *Computers in Human Behavior*, 23(1), 578-590.
- Sam, H. K., Othman, A. E. A., & Nordin, Z. S. (2005). Computer self-efficacy, computer anxiety, and attitudes toward the internet: A study among undergraduates in unimas. *Educational Technology & Society*, 8(4), 205-219.
- Straub, D., Keil, M., & Brenner, W. (1997). Testing the technology acceptance model across cultures: A three country study. *Information & Management*, 33, 1-11.
- Tezci, E. (2009). Teachers' effect on ICT use in education: The Turkey sample. *Procedia Social and Behavioral Sciences*, 1(12), 85-94.
- Tezci, E. (2011a). Factors that influence pre-service teachers' ICT usage in education. *European Journal of Teacher Education*, 34(4), 483-499.

- Tezci, E. (2011b). Turkish primary school teachers' perceptions of school culture regarding ICT integration. *Educational Technology Research and Development*, 59, 429-443.
- Torkzadeh, G., Chang, J. C., & Demirhan, D. (2006). A contingency model of computer and Internet selfefficacy. *Information and Management*, 43, 541-550.
- United Nations. (2000). *Driving information and communications technology for development: A UNDP agenda for action 2000-2001*. New York: United Nation Development Programme.
- Volman, M. van Eck, E., Heemskerk, I., & Kuiper, E. (2005). New technologies, new differences. Gender and ethnic differences in pupils' use of ICT in primary and secondary education. *Computers & Education*, 45, 35-55.
- World Bank. (2007). *2007 world development indicator*. Washington, DC.: Author.
- Yalın, H. İ., Karadeniz, Ş., & Şahin, Ş. (2007). Barriers to information and communication technologies integration into elementary schools in Turkey. *Journal of Applied Sciences*, 7, 4036-4039.
- Yıldırım, S. (2007). Current utilization of ICT in Turkish basic education schools: A review of teacher's ICT use and barriers to integration. *International Journal of Instructional Media*, 34(2), 171-186.
- Zarotsky, V., & Jaresko, G. S. (2000). Technology in education-Where do we go from here? *Journal of Pharmacy Practice*, 13, 373-381.
- Zhao, Y., Hueyshan, T., & Mishra, P. (2001). Technology, teaching and learning: Whose computer is it? *Journal of Adolescent and Adult Literacy*, 44(4), 348-355.