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Examination of Information and Communication Technologies Competencies of Teacher Candidates Studying at the Faculty of Sport Sciences

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Abstract

The aim of this study is to examine, in terms of some variables, the "Information and Communication Technology Competencies" regarding physical education teacher candidates studying in the Faculties of Sport Sciences, and to identify the problems for adapting themselves to the developing technologies and to present solutions in this age where information and communication technologies are changing rapidly, epigenetics, robots, cyborgs, nano technologies, metaverse, and virtual reality platforms are mentioned. A total of 432 male (n=206) and female (n=226) teacher candidates aged 12-18 participated in the research voluntarily. To collect data in the research, the "Information and Communication Technology Competencies Scale" which is adapted into Turkish by Gökçearslan et al. (2019) was used. Descriptive statistics were made for demographic variables in the analysis of the research data. The data acquired from the scale were analyzed using the IBM SPSS Statistics 26 program. When the scale scores were examined, there was no significant difference between male and female students in the dimension of using information and communication technologies for instructional design ($p>0.05$) in accordance with the gender variable of physical education teachers, whereas a difference was found in favor of girls ($X=3.34$) in the dimension of information and communication technology competency ($p<0.05$). Significant differences were detected between the sub-dimensions of the scale according to the teacher candidates' grades and the departments they studied ($p<0.05$). A difference in the information and communication technologies competency dimension was found in favor of the senior year Physical Education Teaching candidates. A significant difference was found in favor of those who have a personal computer ($x=3.41$) in accordance with the variable of owning a personal computer in the dimension of self-efficacy to use communication technologies for instructional design ($x=3.46$) and Information and Communication competencies. In line with that, it can be said that the variables of having a personal computer and gender of sports teacher candidates' are factors that affect ICT competencies, and the variable of having a personal computer is a factor that affects the self-efficacy of using Information technologies for instructional design.

Keywords: Teacher Candidate, Information and Communication Technology, Competence, Technology, Artificial Intelligence, Humanoid

1. Introduction

1.1 Introduce the Problem

Technologies that have an active role in accessing information are also used for communication purposes between individuals. Therefore, information technology and communication technology have been started to be used together and the concept of information and communication technologies, in short, the ICT has emerged. ICT can be defined as electronic resources and services such as computers, telecommunications, the internet, etc., used to transmit, process, create, disseminate, share, store and manage information (Jankowska, 2004).

Information technology, which is seen as a set of tools that enable the creation and dissemination of information, is increasing its effectiveness gradually and the use of these systems in different fields is becoming widespread. Computers and similar technologies that enable individuals to communicate with each other and enable both individual and mass communication, have, at every stage of social life, become the key elements of communication, especially for educators and students (Sime & Priestley, 2005; Erbas & Gumus, 2020). The reflections of these important developments and changes in the use of technology have been very effective in the field of education (Haznedar, 2012).

It is observed that, in today's age of technology, computers have important effects on people's learning and behavior (Martinovic & Zhang, 2012). Technical developments are progressing rapidly every day in our age, where computers and many other innovations and technologies will begin to take place in our daily lives, and technologies such as epigenetics, robots, artificial intelligence, android cyborg, humanoid, are being talked about. These rapid developments in our age affect all social structures including the education system (Usun, 2000).

Communication and communication tools between people have begun to show a wide variety with the development of humanity and technology (Gonen, 2015). Today, when teachers are seen as the primary change representatives in the education system, it can be said that tablets, computers, or at least mobile phones are among the most commonly owned technological devices. (Cakir Z. et al., 2021; Usluel et al., 2007). Among the main communication tools are computers, the internet, smartphones, and television (Eyidogan, 2009). As a result of the drastic change experienced with the introduction of computers into our lives, the Human-Computer interaction dimension has been added besides the Human-Human interaction. Human-Human interaction in education processes stops being a face-to-face interaction day by day and communication has started to take place effectively with computer platforms and internet technologies. (Cagiltay, 2016). Today, computer technologies and communication are intertwined with each other and have become a whole. Through ICT, by reaching common information in the fastest way, individuals have increased their ability to evaluate, review and correct this information in a short time, to consolidate new information with previous information, to interpret, brainstorm, and solve problems (Akkoyunlu & Kurbanoglu, 2004; Certel et al., 2011; Probert, 2009; Taylor, 2006).

During the covid 19 pandemic, which has been announced on a global scale and has both economic and deadly effects all over the world (Cakir, 2020), all educational institutions have switched to online education. During the online education period, all educators and students had to actively use the internet and information technologies. Besides critical thinking, which is one of the high-level thinking skills that should be found in today's information age people, the use of Internet information technologies and Information and communication technologies competency is important (Certel et al., 2011).

Systems containing education-specific large-scale software have brought radical changes for students and educators. Meanwhile, the related systems are used by people who will fulfill the functions requested from them, they have caused some educators to experience difficulties. Even though the students with smart phones and computers spend most of their time on the internet and social media, they have encountered many problems, especially from the internet while using online education software systems (Ceyhan & Cakir, 2021).

Individuals raised today should be equipped with the skills of reaching information, organizing information, assessing information, presenting information, and communicating, and likewise, the teachers who will educate them should be enabled to gain these skills as well (Akkoyunlu, 1995). Likewise, in order to become an

information society so that they do not fall behind the times, teacher candidates should be able to use information technologies effectively (Eyidoğan, 2009). Besides having a number of competencies like self-confidence, activeness, creative thinking, leadership, courage, and problem-solving skills, teacher candidates should be at the highest level of using information and communication technologies of the age and have the relevant competence (Sahin et al., 2011).

From this point forth on these thoughts and information, determining physical education teacher candidates' ICT competencies and comparing them in terms of branch and gender, daily internet usage time, grade and department variables constitute the aim of this study.

2. Method

2.1 The Aim of The Study

The aim of this study is to examine, in terms of some variables, the "Information and Communication Technology Competencies" for physical education and sports teacher candidates studying in Sports Sciences to detect the problems in adapting themselves to the developing technologies and to present solutions to the problems. On the other side, it is aimed to determine the effects of demographic characteristics like age, gender, grade, and department of teacher candidates on their information and communication technologies competencies.

2.2 Population and Sample of the Research

This study that was carried out for determining the information and communication technology competencies of teacher candidates studying at the undergraduate level in the field of Sports Sciences in the fall semester of the 2021-2022 academic year is in the descriptive research model. The descriptive research model aims to investigate the current situation on a particular subject and set it forth as to how it is. In this framework, the current situation is studied under its own conditions and as to how it is. It requires collecting data for testing the hypotheses about the current state of the studied subject or to find answers to questions. (Yildirim & Simsek, 1999). The sample of the research consists of female and male teacher candidates who are studying in the Faculties of Sport Sciences and voluntarily fill in the online or hardcopy scales according to their accessibility.

2.3 Data Collection Tool

As a data collection tool in the study, the "Information and Communication Technology Competencies Scale" developed for teacher candidates by Tondeur et al. (2017) and "Teacher Candidate Information and Communication Technology Competencies Scale," which is a 5-point Likert type (1: Strongly Disagree-5: Strongly Agree) adapted into Turkish by Gokcearslan et al. (2019) were used (Gokcearslan et al., 2019; Tondeur et al., 2017). The scale used was used in this study without changing any of the items with the permission of the relevant authors.

The scale consists of a total of 19 items under two factors, with 11 items measuring the "Perception of teacher candidates' self-efficacy to support students' use of information technologies" (BITY-OK), and 8 items measuring the "Perception of self-efficacy in using information technologies in instructional design" (BITY-ÖT).

2.4 Analysis of Data

The data used in this study were collected using the questionnaire method and convenience sampling method. Participants included in the study were informed about the purpose, importance, and method of the research. Volunteer participants were informed that the data acquired would only be used for research purposes. Depending on their availability, the scale was applied to the participants online or in hardcopy. Since it is mandatory to fill in all the items, missing data was not encountered in the data set. All the data obtained were coded in a computer environment into the IBM SPSS 26 program. The scores obtained were scored separately with their sub-dimensions. For determining the assumption of normal distribution of the data, the Kolmogorov-Smirnov test was

used for the analysis of independent variables. The Cronbach Alpha reliability coefficient of the scale is .898 (Büyükoztürk et al., 2011). In case the coefficient is 0.7 or higher, the reliability of the scale is considered good. As a consequence of the results obtained, kurtosis and skewness values were also examined (Kiliç, 2016; Ozdamar, 2010; Buyukozturk, 2011; George & Mallery, 2010). As a result of the analysis, these values were found to be between -1.5 and +1.5. Therefore, it was determined that the assumption of normality was met (Tabachnick & Fidell, 2013). Parametric tests were used for the analysis and interpretation of the data. For this study, official approval was obtained from the Bayburt University Ethics Committee with the letter numbered 28.02.2022-E-51694156-050.99-58956/ 2022/36.

3. Findings

In this part of the study, the results of the analysis of the data obtained from the total scores of the "Teacher Candidate Information and Communication Technology Competence Scale (BITY-OK)" applied to the participants were interpreted in terms of some variables by putting them into tables.

3.1. Definitive Characteristics

Table 1: Frequency and Percentage Distributions of the Descriptive Characteristics of the Research Group

Değişkenler	F	%	
Gender	Male	206	47,7
	Female	226	52,3
Departments	Physical Education Teaching	164	38,0
	Sport Management	142	32,9
	Coaching Education	79	18,3
	Recreation	47	10,9
Grades	1 st Grade	64	14,8
	2nd Grade	119	27,5
	3rd Grade	150	34,7
	4th Grade	99	22,9
Do you have computer?	Yes	279	64,6
	No	153	35,4
Daily Internet Usage time?	Less Than 1 Hour	10	2,3
	Between 1-3 Hours	131	30,3
	4-6 Hour	200	46,3
	7 Hours and Above	91	21,1
Total	432		

According to Table 1, 47.7% of the participants are male (n:206) and 52.3% are female (n:226). Participants are teacher candidates with 38.0% (n:164) of them being in the Physical Education Teaching department, 32.6% (n:142) of them being in the Sports Management department, 18.3% (n:79) of them being in the Coaching Education department, 10.9% (n:47) of them being in the Recreation Department. 14.8% of the participants (n:64) are 1st year, 27.5% (n:119) are 2nd year, 34.7% (n:150) are 3rd year, 22.9% (n:99) are 4th year students. 64.6% of the teacher candidates own a computer (n:279) and 35.4% do not (n:153). The daily internet usage frequency of teacher candidates is as follows: 2.3% (n:10) less than 1 hour, 30.3% (n:131) 1-3 hours, 46.3% (n:200) 4-6 hours, 21.1% (n:91) 7 hours or more.

The results of the t-test analysis performed for determining the statistical differences between the demographic characteristics of the sub-dimensions of the Information and Communication Technologies Competence Scale of the Physical Education and Sports Teacher Candidates are given in Table 2.

Table 2: Independent samples t-test results of physical education teacher candidates according to demographic

Variables	Groups	N	X	ss	T-test			
					t	sd	p	
Teacher Candidate ICT competencies	Gender	Male	206	3,20	.706	-3.192	430	.002
		Female	226	3,34	.555			
*** (BİT-ÖT)	Do you have computer?	Yes	262	3,41	.605	4.456	430	.000*
		No	170	3,14	.604			
*** (BİT-ÖT)	Sex	Male	206	3,24	.706	-3.085	430	.626
		Female	226	3,43	.583			
*** (BİT-ÖT)	Do you have computer?	Yes	262	3,46	.582	4.771	430	.000*
		No	172	3,16	.709			

* Significant difference at $p < 0.05$ level

** Teacher Candidate ICT competencies

*** Using Information and Communication Technologies for Instructional Design

When it is examined whether there is a statistical difference between the sub-dimensions of the information and communication technologies competency scale of physical education and sports teacher candidates according to the gender variable, statistically significant differences were found in favor of women in sub-dimensions of ICT competencies ($p < 0.05$). It can be said that, according to the results of the analysis, the ICT competency scores of women in ICT competency sub-dimension scores ($x = 3.34$) and accordingly the gender variable is a factor affecting the ICT competency of teacher candidates studying in sports sciences. There was no statistically significant difference according to gender in the sub-dimension of using information and communication technologies for instructional design. ($p > 0.05$). (Table 2)

Statistically significant differences were found in favor of the candidates who own a computer in the sub-dimensions of ICT competence and using information and communication technologies for instructional design ($p < 0.05$). According to the results of the analysis, the scores of the candidates who own a computer in the ICT competency sub-dimension scores ($x = 3.41$) have higher arithmetic averages when compared to the candidates who do not own a computer in the ICT-ÖT sub-dimension ($x = 3.46$). In line with that, it can be said that the variable of having a computer of sports teacher candidates' is a factor that affects ICT competencies and the self-efficacy of using Information technologies for instructional design (Table 2).

The results of the one-way analysis of variance (ANOVA) carried out to determine whether there is a relationship between Information and Communication Technologies Competencies and the participants' department they study are given in Table 3.

Tablo 3: ANOVA results of Information and Communication Technologies Competencies Scale Scores by Department of Physical Education Teacher Candidates

Departments	N	X	Ss	Varian ce Source	KT	sd	KO	F	p	Significanc e	
Teacher Candidate ICT competencies	Physical Education -1	164	3,54	,480	Between Groups	22,267	3	7,422	20.677	.000*	1-2,3,4; 2-4; 3-4
	Sport Management-2	142	3,24	,720	Within Groups	153,640	428	,359			
	Coaching Education -3	79	3,25	,671	Total	175,907	431				

	Recreation -4	47	2,79	,404							
	Total	432	3,31	638							
*** BIT-ÖT	Physical Education -1	164	3,72	,365	Between	55,239	3	18.413			
	Sport Management-2	142	3,19	,657	Within	127,639	428	.293	61.742	.000*	1-2,3,4; 2-4; 3-4
	Coaching Education -3	79	3,28	,670	Groups						
	Recreation -4	47	2,57	,462	Total	182,878	431				
	Total	432	3,34	,651							

* Significant difference at $p < 0.05$ level

** Teacher Candidate ICT competencies

*** Using Information and Communication Technologies for Instructional Design

When Table 3 is examined, in the sub-dimension of Information and Communication Technologies Competencies ($F=20.677$; $p < 0.05$) and self-efficacy of using information and communication technologies for instructional design of teacher candidates studying in Sports Sciences, it is observed that there is a significant difference according to the departments of the candidates ($F=61,742$; $p < 0.05$).

According to the results of the Games-Howel test conducted to determine that the ICT Competencies Sub-dimension of the participant individuals differ according to the departments they are studying, it was detected that the scores of the candidates studying in the Department of Physical Education Teaching ($X=3.54$) were higher than the scores of the candidates in the departments of Sports Management ($X=3.24$), Coaching Education ($X=3.25$) and Recreation ($X=2.79$). The scores of the candidates in the Sports Management department ($X=3.24$) and the candidates studying in the coaching department ($X=3.24$) were determined to be higher than the scores of the candidates in the recreation department ($X=3.79$) and that the department variable has a positive effect on the ICT competency level.

According to the results of the Games-Howel test conducted to determine that the Self-Efficacy to Use Information and Communication Technologies for Instructional Design Sub-dimension of the participant individuals differ according to the departments they are studying, it was detected that the scores of the candidates studying in the Department of Physical Education Teaching ($X=3.72$) were higher than the scores of the candidates in the departments of Sports Management ($X=3.19$), Coaching Education ($X=3.28$) and Recreation ($X=2.57$). The scores of the candidates in the Sports Management department ($X=3.19$) and the candidates studying in the coaching department ($X=3.28$) were determined to be higher than the scores of the candidates in the recreation department ($X=2.57$) and that the variable of the department has a positive effect on the Self-Efficacy of Using Information Technologies for Instructional Design.

The results of the one-way analysis of variance (ANOVA) carried out to determine whether there is a relationship between Information and Communication Technologies Competencies and the participants' grade they study are given in Table 4.

Table 4: ANOVA results of Information and Communication Technologies Competencies Scale Scores by Grade variable of Physical Education Teacher Candidates

	Variables	N	X	Ss	Variance Source	KT	sd	KO	F	P	Significance
Teacher Candidate	1 st Grade	64	3,22	.729	Between	5,332	3	1,777			
	2 nd Grade	119	3,21	.831	Within	170,575	428	.399	4,46	.004	
	3 rd Grade	150	3,28	.459	Total	175,907	431			*	4-2,3

	4th Grade	99	3,50	.496							
**	Total	432	3,31	.638							
BIT-ÖT***	1 st Grade	64	3,25	.866	Between Groups	7,103	3	2,368			
	2 st Grade	119	3,21	.835	Within Groups	175,775	428	.411	5,765	.001*	4-2,3
	3 rd Grade	150	3,34	.480	Total	182,878	431				
	4 st Grade	99	3,56	.342							
	Total	432	3,34	.651							

* Significant difference at $p < 0.05$ level

** Teacher Candidate ICT competencies

*** Using Information and Communication Technologies for Instructional Design

When Table 4 is examined, in the sub-dimension of Information and Communication Technologies Competencies ($F=4.46$; $p < 0.05$) and self-efficacy of using information and communication technologies for instructional design of teacher candidates studying in Sports Sciences, it is observed that there is a significant difference according to the grade variable of the candidates ($F=5.765$; $p < 0.05$).

According to the results of the Games-Howel test conducted to determine that the ICT Competencies Sub-dimension of the participant individuals differ according to the departments they are studying, it was determined that the scores of the 4th year teacher candidates ($X=3.50$) were higher than the scores of the 2nd year ($X=3.21$) and 3rd year ($X=3.28$) candidates and that the grade variable had a positive effect on the ICT competency level. According to the results of the Games-Howel test conducted to determine that the Self-Efficacy to Use Information and Communication Technologies for Instructional Design Sub-dimension of the participant individuals differ according to the grades they are studying, it was determined that the scores of the 4th year teacher candidates ($X=3.56$) were higher than the scores of the 2nd year ($X=3.21$) and 3rd year ($X=3.34$) candidates and that the grade variable had a positive effect on the self-efficacy to use information technologies for instructional design.

The results of the one-way analysis of variance (ANOVA) carried out to determine whether there is a relationship between Information and Communication Technologies Competencies and the participants' daily internet usage times are given in Table 5.

Table 5: ANOVA results of Information and Communication Technologies Competencies Scale Scores according to Daily Internet Usage time variable of teacher candidates studying in Sports Sciences

	Department	N	X	Ss	Variance Source	KT	sd	KO	F	p	Significance
Teacher Candidate ICT Competencies	Less Than 1 Hour (1)	10	3,16	.583	Between Groups	31,303	3	10,434			
	Between 1-3 Hours (2)	131	3,05	.661	Within Groups	144,605	428	.338			
	Between 4-6 Hours (3)	200	3,40	.401	Total	175,907	431		30.883	.000*	3-2; 4-2,3;
	7 Hours and Above (4)	91	3,74	.608							
	Total	432	3,31	.638							
BIT-ÖT***	Less Than 1 Hour (1)	10	3,23	.611	Between Groups	47,537	3	15,846			
	Between 1-3 Hours (2)	131	3,06	.661	Within Groups	135,341	428	.316	50.110	.000*	3-2; 4-1,2,3;
	Between 4-6 Hours (3)	200	3,37	.425	Total	182,878	431				
	7 Hours and	91	3,93	.486							
	Total										

Above (4)

Total	432	3,34	.651
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* Significant difference at $p < 0.05$ level

** Teacher Candidate ICT competencies

*** Using Information and Communication Technologies for Instructional Design

When Table 5 is examined, in the sub-dimension of Information and Communication Technologies Competencies ($F=30.883$; $p < 0.05$) and self-efficacy of using information and communication technologies for instructional design of teacher candidates studying in Sports Sciences, it is observed that there is a significant difference according to the daily internet usage of the candidates ($F=50,110$; $p < 0.05$).

According to the results of the Games-Howel test, which was conducted to determine that the ICT Competencies Sub-dimension of the participant individuals differ according to the daily internet usage variable of the physical education teacher candidates, it was determined that the scores of the candidates who use the internet for 7 hours or more ($X=3.74$) are higher than the scores of the candidates who use the internet for 1-3 Hours ($X=3.05$) and 4-6 Hours ($X=3.40$) and that daily internet usage variable has a positive effect on the level of ICT competency.

According to the results of the Games-Howel test, which was conducted to determine that the Self-Efficacy to Use Information and Communication Technologies for Instructional Design Sub-dimension of the participant individuals differ according to the daily internet usage variable of the physical education teacher candidates, it was determined that the scores of the candidates who use the internet for 7 hours or more ($X=3.93$) are higher than the scores of the candidates who use the internet for 1-3 Hours ($X=3.06$) and 4-6 Hours ($X=3.37$) and that daily internet usage variable has a positive effect on the level of Self-Efficacy to Use Information and Communication Technologies for Instructional Design.

4. Discussion and Result

In the research, there was no significant difference between male and female students in the dimension of using information and communication technologies for instructional design in accordance with the gender variable of candidate physical education teachers, whereas a difference was found in favor of girls in the dimension of information and communication technology competency.

Significant differences were detected between the sub-dimensions of the scale according to the Physical Education teacher candidates' grades and the departments they studied. A difference in the information and communication technologies competency dimension was found in favor of the senior year Physical Education Teaching candidates. In order to design a good and quality educational environment, a comprehensive student analysis should be done first (Khan & Joshi, 2006).

A significant difference was found in favor of those who have a computer in accordance with the variable of owning a personal computer in the dimension of self-efficacy to use communication technologies for instructional design and Information and Communication competencies. The ICT competency of the candidates who do not own a computer was not found to be as high as those who own one. This shows that they are not sufficient in this regard. Here, it becomes more meaningful for the candidates who have a computer to have the skills to repeat and use the information they have learned in technology-supported courses. For instance, just as it is important for a surgeon to be familiar with the technological tools used while operating, a computer engineer to use software or an architect to use the software or technological equipment used in drawings, a physical education teacher candidate should be able to prepare technology-containing materials and be able to use technological tools. A well-equipped physical education teacher should also be able to use physical performance measurement devices, sports software, and technological tools effectively.

In the research, it was detected that the candidates' having a daily computer and the excess of internet usage time contributes to the experience of using the computer. The teacher candidate, who has comprehended the instructional methods suitable for the subject content with the support of computers and the internet, and uses these methods together with technology, offers their students a very rich and interactive learning environment. For

developing the computer and information technology skills of teacher candidates, active teachers should have a high level of information communication skills. Teacher candidates who learn to use technological applications and strategies related to sports have the opportunity to increase their knowledge and develop their skills.

When examined in the literature, information and communication technologies have been an important subject that is widely studied by researchers. On the basis of the research, it is observed that both students' and teachers' information and communication technologies self-efficacy and attitudes and computer literacy skills are examined in relation to information and communication technologies. The level of using information technology of teacher candidates and their competency in benefiting from developing technologies have been examined by current research. Information and Communication Technology skills of teacher candidates are one of the factors that affect their students' desire to learn (Bursal & Yigit, 2012; Dincer & Sahinkayasi, 2011; Fatma & Ozdener, 2008; Papastergiou et al., 2011; Tor & Erden, 2004).

As a result, the effective use of technology affects the learning method positively. One of the factors affecting candidate teachers' ICT skills is the experience of computer usage. It appears that they improve their ICT skills by using computers and the internet with the frequency of internet use.

ICT courses should be mandatory in all departments and necessary studies can be carried out to help other courses and ensure their integration in this age where information and communication technologies change rapidly, epigenetics, robots, cyborgs, nano technologies, metaverse, virtual reality exercises are spoken. It is important to measure and assess the ICT skill levels of students, teachers, and prospective teachers from time to time about ICT. Nevertheless, in order for these suggestions to be an important step for successful and effective teachers of the future, it is of great importance that they are converted into practice. ICT competence level can be acquired by applying studies similar to this study to large sample groups in different branches in different universities.

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