Perceptions of Prospective Teachers on Digital Literacy

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ABSTRACT

The aim of the quantitative study is to identify the digital literacy levels of prospective teachers in terms of several variables. The sample consisted of 354 prospective teachers studying in different departments of Sakarya University College of Education. The 30-item instrument used to gather the data was the "Digital Literacy Scale" developed and used by the researchers. The scale was composed of 5 different factors namely information literacy, visual literacy, software literacy, technology literacy and computer literacy. Exploratory Factor Analysis, Cronbach alpha, t-test and Anova were used for data analysis. Results showed that in terms of gender variable digital literacy levels of male prospective teachers and in terms of department variable digital literacy levels of computer education and instructional technology teaching department were found high. Besides, the digital literacy levels of prospective teachers having continuous Internet connection or a computer that they can continuously use were found high. In addition, the research found that prospective teachers' personal income levels had no effect on their digital literacy levels.

Keywords: *Digital literacy; technology; visual; software; computer; information*

INTRODUCTION

Technological changes and the information explosion have altered the dimensions of learning. While shaping their futures, societies give priority to various goals such as being an information society, dealing with science and producing technology. To realize those goals demands improved skills, especially literacy. Indeed literacy has played a significant role in the educational systems of many countries through the formation of curriculums, goals and objectives. Namibia, South Africa, Australia, Canada, Denmark, Iceland, Finland, Belgium, Germany, Switzerland, Russia, Ireland and Turkey education systems attach great importance to literacy (Apak & Tanrıverdi, 2010; Bianco & Freebody, 2001; Bruce, Candy, & Klaus, 2000; Dillon, 2016; Eisenberg, Lowe & Spitzer, 2004; Fraillon et al., 2014; Street, 2014). The term literacy can be defined as one's ability to lead one's life, ability of reading and writing good enough for communicating with society and carrying out basic arithmetical operations (Karunaratne, 2000; as cited in Kiyici, 2008). UNESCO (2004, p. 13) defines literacy as:

"the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning is enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in community and wider society."

Fryer (2003) argue that literacy is a wide term reflecting a society's need for information and also suggests that the definition of a literate individual changes as information use within society increases. Jones and Flannigan (2006) state that the new generation and rapid technology development have changed society and given new definitions to the term literacy. They also claim that the new generation needs to grow up with digital abilities to be able to manage productively in such a rapidly changing and multi-dimensional digital world.

In general terms, literacy means one's ability to read and write in a language shared within a culture. Digital literacy consists of sourcing information using the digital technologies, organizing information, analyzing, interpreting, evaluating, transferring and also reading and writing digital texts through the information production process (Akkoyunlu & Soylu, 2010). Eshet (2002) defines digital literacy as individuals' having complex, cognitive, psycho-motor, and affective skills in order to work efficiently in digital contexts, rather than as using a software or a digital device. Blackall (2005) states that today literacy skills include the ability to understand the power of visuals and sounds, ability to use and define this power, ability to carry visuals and sounds into the digital contexts, ability to convert visuals and sounds into new formats and also the ability to publish visuals and sounds. For instance, abilities to share photos, write something and read on social network sites can be given as examples of digital literacy. The Digital Literacy High-Level Expert Group (2008) defines the concept of digital literacy, which is the skill acquisition process, as:

"Digital literacy is essential for achieving digital competence, the confident and critical use of information and communication technology for work, leisure, learning and communication."

The term 'digital literacy' today can be defined as the technological knowledge and skills necessary for the individuals who want to lead a productive life, to continue their personal development with lifelong learning activities and to contribute positively to society. With this definition, the literacies incorporated in digital literacy can be listed as Information Literacy, Visual Literacy, Software Literacy, Technology Literacy and Computer Literacy.

According to UNESCO's definition, information literacy is defined as being aware of the personal information needs, identifying and evaluating the quality of the information acquired, accessing and storing information, using information effectively and ethically and finally as the capacity of customizing information for new situations (Hennessey, 2009). Some scientists argue that for individuals to get information easily in such a context as busy as the Internet requires information literacy. Altun (2005) defines information literacy as identifying both textual and different media (Internet, visual, auditory etc.) and the ability of finding, evaluating, selecting the information needed with the goal of using it efficiently. According to Akkoyunlu (2008), information literacy is feeling when information is needed and reaching, evaluating and using the information needed efficiently. Information literacy aims at critical thinking, interpreting and taking active roles for one's responsibilities. Information literacy also includes using and shaping the information as intended, which is presented in different formats (Argon, Öztürk, & Kılıçaslan, 2008).

Visual Literacy, for the first time was defined by Debes as a group of ability of sight that one can improve by integrating their abilities of sight and other perceptive experiences. Visual Literacy can also be explained as the formation, adaptation, usage and interpretation of pictures and videos using the new and the traditional media to improve thinking, deciding, communicating and learning processes. As a result of the changes nowadays, in broader terms, Visual Literacy can be defined as: producing visual messages, and a different language bearing the ability of reading and interpretation (Bamford, 2003; Kaya, 2011; Tüzel, 2010). A comprehensive definition of Visual Literacy was made by the Association of College and Research Libraries (ACRL). According to the ACRL (2011, p.)

"Visual literacy is a set of abilities that enables an individual to effectively find, interpret, evaluate, use, and create images and visual media. Visual literacy skills equip a learner to understand and analyze the contextual, cultural, ethical, aesthetic, intellectual, and technical components involved in the production and use of visual materials. A visually literate individual is both a critical consumer of visual media and a competent contributor to a body of shared knowledge and culture."

Persons with a highly advanced sense of visual literacy, which is defined as comprehending visual messages and forming their own visual messages, can interpret and make sense of everything around them, all visible actions, objects, symbols, natural or artificial (Alpan, 2008). Elkins (2003) states that visual literacy is perceived as "the ambiguous cousin of the ordinary literacy which is based on the idea that pictures also have a grammatical structure or syntax as writing has".

Software literacy is a new concept in digital literacy literature. Therefore, Software Literacy can be

defined as understanding and resolving of the information formed by machine commands used for developing tasks and their usability by enabling the electronic devices communication and compatibility, and the ability of defining this electronic information, access and usage. According to Khoo and Craig (2017), the "notion of software literacy is emerging as one way to conceptualise the repertoires of skills and understandings needed for people to be critical and creative users of software packages and systems in a software saturated culture."

Rapid changes in science have transformed technology production. According to Bessac (2002), Technological Literacy is defined as one's understanding the nature of the technological devices, predicting the technological potential, and the potential dangers and also as predicting the technologies to be produced and the roles of these technologies in society. Individuals who can make conscious decisions about technology can be called technology literate. Technological Literacy can be defined as the information, skills and approaches necessary for using, applying, designing and changing technology (Wang, 2003). In addition, the International Technology Education Association (ITEA) definition clearly explains the concept of technology literacy. ITEA (2007) defines technological literacy as, "*the ability to use, manage, assess, and understand technology.*"

Holland (2004) states that the concept of technological literacy includes the ability to use technology, to understand the complex problems arising as a result of technology use and ability to appreciate the role of technology in society. Shackelford, Brown, and Warner (2004) meanwhile note that a technologically literate individual can understand, manage and use technological concepts and systems.

The definition of Computer Literacy varies from person to person and so it has been debated in the literature. Kellner (2004) states that Computer Literacy involves learning how to use a computer in order to do research and gather information. Gezer and Dağ (2010) define it as individuals who can use computer programs, reach the information needed through a computer and the Internet and also can solve the problems encountered on their own. Lawton (2005) explains Computer Literacy as the file management, use of word processor programs, calculation table programs, presentation programs, database programs, communication programs, algorithmic design, research techniques, and skills of accessing information.

Digital Literacy has been appearing in almost every aspect of our daily lives. Integrating digital literacy into education has several advantages. According to Erstad, Gilje, and de Lange (2007), the digitalization of many media, increased capacity of computers, Internet connection via high speed broadband have enabled learners to collaborate. Those having the most efficient roles in teaching these literacy skills are doubtless the teachers. Hence teachers need to acquire digital literacy skills while they are still candidates. The changes in society will affect teacher behaviors correspondingly and the new digital technologies offer an increasing use in their daily lives.

The main goal of this research is to identify the teacher candidates' digital literacy levels. By primarily depending on this basic goal, digital literacy levels of the teacher candidates have been studied according to their genders, their having a computer or not where they live, internet availability where they live, to the department in which they study, and to their personal incomes.

RESEARCH METHOD

This research, aimed at identifying the digital literacy levels of teacher candidates, has been carried out by correlational survey methods. One of the quantitative methods, this method is used to determine if there is any relation between one or more variables (Karasar, 2013). According to Best (1970) the description of relations, applications, perspectives, beliefs or approaches that are handled as they are in nature and society, the researches related with identifying a situation which can be linked to a former case and the researches on predicting the possibility of how such a case might affect the existing circumstances are all accepted as the correlational survey methods (as cited in Cohen, Manion, & Morrison, 2013).

Research Group/Sample

The sample of the study consists of a total of 354 people (244 females and 110 males) from the departments of Computer Education and Instructional Technology, Primary Teaching, Social Sciences, Psychological Counseling, Science and Technology, Pre-Schooling, Elementary Mathematics, Teaching of Mentally Disabled, Turkish and English Teaching at Sakarya University College of Education. The sample consists of fourth grade prospective teachers whose voluntarily take part in the research.

Data Collection Tools

In order to collect data for research we developed the "Digital Literacy Scale." The scale consists of two parts. In the first part five questions were asked to the participants in order to identify the genders of prospective teachers whether they have a computer that they can use continuously, whether they have Internet connection, the department in which they study and their personal income levels. Activities and goals that can be achieved by the prospective teachers were introduced in the second part. Some 41 Likert type questions were prepared for the second part of the survey. The survey items are answered by means of a Likert-type Scale with five response choices, including "Never", "Rarely", "Sometimes", "Often" and "Always".

In order to identify content appropriateness of the survey questions and response format of the trial form of the "Digital Literacy Scale" and to see if the survey instructions are easy to understand, for content validity, opinions of 6 different academicians (2 Associate Professors, 3 Lecturers and 1 Research Assistant) were analyzed. Pre-application was done in a sample of 47 people. In the pre-application, the items have been rearranged which are not understood according to the prospective teachers' feedback. For construct validity and internal consistency reliability studies, data of 354 university students were used. As a result of the feedback necessary corrections were made. At the end of the study, the scale consisted of a 5-factor pattern. By looking at the items below each factor, the factors were named and the final state of the scale was analyzed with same 354 prospective teachers.

As part of the validity study of the "Digital Literacy Scale" construct validity of the survey was analyzed by applying confirmatory factor analysis. The reliability of the digital literacy scale was analyzed by Cronbach alpha method. For the validity and reliability analysis, the SPSS 21.0 software was used.

Exploratory Factor Analysis

First of all, exploratory factor analysis (EFA) was carried out for determining construct validity of the scale. As a result of the EFA, for the identification of the items to go in for the test, it was paid attention for the eigenvalues of the factors formed by the items to be at the level of 1, and the items at factors to have at least .30 of load values, and also the items to appear in a single factor and to be at least .10 points of difference between two factors (Büyüköztürk, 2011). It was decided that the items falling outside these criteria be excluded from the scale. Factor common variance and factor load values obtained from the EFA were reported. After the factor analysis, the internal consistency coefficient of the scale was checked. Throughout the research, all the analyses were carried out by SPSS package program and level of significance in the analyses was accepted as .05.

Validity and reliability studies of the survey were conducted with 354 (68.9% Female, 31.1% Male) prospective teachers. Exploratory factor analysis (EFA) was used for determining validity of the 41 items. The Kaiser-Meyer-Olkin (KMA) measure of sampling adequacy and Bartlett's Test of Sphericity (BTS) were applied to the data prior to factor extraction to ensure the data set characteristics are suitable for EFA. Since the KMO and BTS results indicate the data satisfy the psychometric criteria for factor analysis, the EFA was performed. Furthermore, Cronbach's alpha internal consistency coefficient was calculated.

According to findings of exploratory factor analysis, similar to original scale, adapting scale was resulted in five dimension with 61.30% explained variance. Besides, Kaiser-Meyer-Olkin (KMO) and Bartlett test confirm the appropriateness of the sample size with .95 value (χ^2= 8860.99, p = .000). Although the original scale had 41 items, after the exploratory factor analysis, 30 item were obtained. The scale reliability

was calculated with Cronbach's alpha and it was found to be .93.

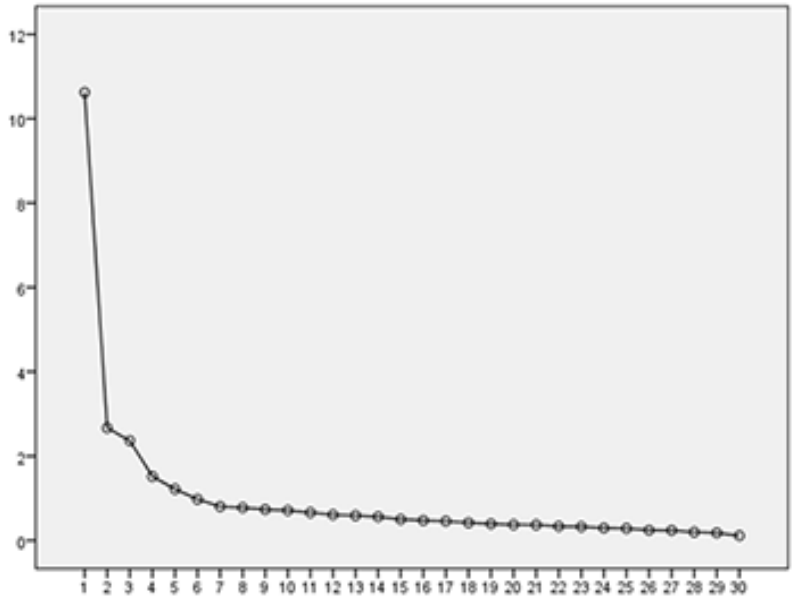

Figure 1. Scree Plot Chart

Thirty (30) items were analyzed with factor analysis and all items were grouped under five factors. The findings are given in Table 1.

Table 1. Exploratory Factor Analysis Results

Item No.	Common Factor Variance	Factor Load Values	Information	Visual	Software	Technology	Computer
20	0.67	0.64	0.77				
22	0.65	0.56	0.76				
21	0.65	0.62	0.74				
17	0.61	0.62	0.72				
19	0.63	0.64	0.70				
23	0.49	0.54	0.66				
18	0.61	0.65	0.66				
15	0.49	0.61	0.61				
14	0.45	0.57	0.60				
37	0.65	0.62		0.73			
41	0.70	0.69		0,71			
40	0.68	0.68		0.70			
36	0.61	0.68		0.64			
39	0.56	0.64		0.64			
38	0.62	0.69		0.62			
35	0.46	0.59		0.54			
4	0.84	0.54			0.88		
3	0.84	0.58			0.87		
5	0.80	0.58			0.85		
2	0.52	0.50			0.58		
8	0.48	0.54			0.56		
30	0.65	0.59				0.73	
32	0.66	0.66				0.70	
33	0.51	0.51				0.66	
31	0.52	0.56				0.64	

28	0.54	0.64	0.60	
11	0.73	0.45		0.82
13	0.64	0.50		0.75
1	0.67	0.55		0.73
10	0.47	0.54		0.53

Variance % Total = 61.30
Information: 16.72%
Visual: 12.86%
Software: 11.99%
Technology: 10.41%
Computer: 9.32%

From Table 1, it can be seen that the Digital literacy scale consisted of a 5 factor construct. When all the items seen below each factor are checked, it was found that the first factor could be termed as Information Literacy, the second as Visual Literacy, the third as Software Literacy, the fourth as Technology Literacy and the fifth as Computer Literacy. The load values of the 30 items in the test vary between 0.45 and 0.69. Factors seen in the test explain 61.30 % of the total variance. These values show that the scale explains well the Digital Literacy of the prospective teachers.

FINDINGS

In this part, evaluating the responses of the prospective teachers related to the Digital Literacy Scale, it was searched on a factorial basis if there was any meaningful difference in terms of such variables as gender, whether they have a computer that they can use continuously or not, whether they have access to a continuous Internet connection or not, their departments of study and personal income levels. For the variables of gender, whether they have a computer that they can use continuously or not and whether they have access to a continuous internet connection or not, significance test (*t*-test) of the two mean difference values shown in tables, and for the variables of their departments of study and personal income levels, one way analysis of variance (One Way ANOVA) values were shown in tables. For the findings, $p < .05$ were regarded as 95% reliable, ignoring a level of 5% margin of error (Büyüköztürk, 2011).

Digital Literacy Levels of the Prospective Teachers in Terms of the Gender Variable

According to the Digital Literacy Scale with five factors, the *t*-test was applied to the basis of the factors. This part aimed at investigating the difference between digital literacy according to gender. The gender differences are given Table 2.

Table 2. *t*-Test for Differences between Genders

Factor	Gender	N	$\bar{x}$	S	*SD*	*t*	*p*
Information Literacy	Female	244	35.95	6.24	352	1.154	.249
	Male	110	35.11	6.48			
Visual Literacy	Female	244	24.21	5.42	352	-2.406	.017
	Male	110	25.76	6,02			
Software Literacy	Female	244	21.71	3.50	352	.595	.552
	Male	110	21.47	3.56			
Technological Literacy	Female	244	18.74	3.88	352	-1.799	.073
	Male	110	19.55	3.91			
Computer Literacy	Female	244	11.05	4.04	352	-6.072	.000
	Male	110	13.92	4.27			

Result of the *t*-test applied showed there was a significant difference between "Digital Literacy" related to the answers given. The result showed that male prospective teachers significantly (t = -2.406, p < .05) have more visual literacy than female prospective teachers. Besides that, male prospective teachers significantly (t = -6,072, p < .05) have more computer literacy than female prospective teachers.

The Digital Literacy Levels of the Prospective Teachers Related to Continuous Computer Use

According to the Digital Literacy Scale with five factors, the *t*-test was applied to the basis of the factors. This part aimed at investigating the difference between digital literacy according to whether prospective teachers have a computer that they can use continuously. The differences are given Table 3.

Table 3. *t*-Test for Differences between Groups

Factor	Group	N	$\bar{x}$	S	*SD*	*t*	*p*
Information Literacy	Yes	331	35.86 ,,28	6.28	352	1.980	.049
	No	23	33.17	6.49			
Visual Literacy	Yes	331	24.86 1	5.53	352	2.031	.043
	No	23	22.39	6.88			
Software Literacy	Yes	331	21.75	3.47	352	2.263	.024
	No	23	20.04	3.88			
Technological Literacy	Yes	331	19.14	3.87	352	2.722	.007
	No	23	16.87	3.78			
Computer Literacy	Yes	331	12.09	4.31	352	2.548	.011
	No	23	9.74	3.83			

As a result of the *t*-test applied, there is a significant difference in"Digital Literacy" related to the answers given. The result showed that information (t = 1,980, p < .05), visual (t = 2,031, p < .05), software (t = 2,263, p < .05), technological (t = 2,722, p < .05) and computer (t = 2,548, p < .05) literate users have a computer that they can use continuously.

The Digital Literacy Levels of the Prospective Teachers Related to Internet Connectivity

According to the Digital Literacy Scale with five factors, the *t*-test was applied to the basis of the factors. This part was aimed at investigating the difference between digital literacy according to whether prospective teachers have an internet connection that they can use continuously. The differences are given in the following Table 4.

Table 4. Variation table of Digital Literacy levels of Prospective Teachers in terms of internet connectivity

Factor	Group	N	$\bar{x}$	S	sd	t	p
Information Literacy	Yes	278	36.34	5.96	352	3.779	.000
	No	76	33.30	7.04			
Visual Literacy	Yes	278	25.29	5.43	352	3.849	.000
	No	76	22.53	5.93			
Software Literacy	Yes	278	21.90	3.30	352	2.693	.007
	No	76	20.68	4.08			
Technological Literacy	Yes	278	19.36	3.79	352	3.483	.001
	No	76	17.63	4.02			
Computer Literacy	Yes	278	12.20	4.36	352	2.154	.032
	No	76	11.00	405			

As a result of the *t*-test applied, there is a significant difference between "Digital Literacy" related to the answers given. The result showed that information ($t = 3.779$, $p < .05$), visual ($t = 3.849$, $p < .05$), software ($t = 2.693$, $p < .05$), technological ($t = 3,483$, $p < .05$) and computer ($t = 2,154$, $p < .05$) literate users have an Internet connection that they can use continuously.

Digital Literacy Levels of the Prospective Teachers Related to Their Departments of Study

ANOVA was applied to see whether there was a significant difference in digital literacy among prospective teachers according to department.

Table 5. ANOVA for Differences between Departments on Information Literacy Factor

Factor	Department	N	$\bar{x}$	SS	Source of Variance	Sum of Squares	Df	F	p
Information Literacy	Psychological Counseling	48	35.10	6.41	Between Groups	1951.57	9	11.21	.000
	Computer Education and Instructional Technology	56	40.64	4.63	Within Groups	12152.63	344		
	Primary Teaching	55	34.29	6.64	Total	14104.20			
	Social Sciences Teaching	28	35.79	5.96					
	Science and Technology Teaching	41	36.15	5.33					
	English Teaching	11	34.64	5,82					
	Pre-Schooling Teaching	21	36.33	6.19					
	Turkish Teaching	36	33.64	6.72					
	Teaching of Mentally Disabled	19	34.21	5.94					
	Elementary Mathematics Teaching	39	33.26	5.74					
	Total	354	35.68	6.32					

When the digital literacy of the prospective teachers participating in the survey was analyzed according to the variance of the departments ($F_{(9, 344)} = 6.14$), related with their levels of information literacy factor, information literacy factor shows statistically significant difference in terms of department variable ($p < .05$).

Bonferroni multi comparison test was used to identify which departments had differences according to the department variable in terms of information literacy which is one of the factors bearing significant differences. As a result of the test, it was seen that prospective teachers studying in the department of Computer Education and Instructional Technology ($\bar{x} = 40,64$) have a higher level of information literacy than

those from the departments of Psychological Counseling ($\bar{x}$ = 35,10), Primary Teaching ($\bar{x}$ = 34.29), Social Sciences ($\bar{x}$ = 35.79), Science and Technology ($\bar{x}$ = 36.15), Turkish ($\bar{x}$ =33.64), Teaching of Mentally Disabled ($\bar{x}$ = 34.21) and Elementary Mathematics ($\bar{x}$ = 33.26).

Table. 6. ANOVA for Differences between Departments on Visual Literacy Factor

Factor	Department	N	$\bar{x}$	SS	Source of	Sum of	Df	*F*	*p*
Visual Literacy	Psychological Counseling	48	23.60	4.99	Between Groups	4080.08	9	21.69	.000
	Computer Education and Instructional Technology	56	32.38	3.24	Within Groups	7188.98	344		
	Primary Teaching	55	23.22	4.81	Total	11269.05			
	Social Sciences Teaching	28	23.39	5.45					
	Science and Technology Teaching	41	24.07	4.56					
	English Teaching	11	22.36	4.76					
	Pre-Schooling Teaching	21	22.81	4.55					
	Turkish Teaching	36	21.72	5.15					
	Teaching of Mentally Disabled	19	22.84	4.40					
	Elementary Mathematics Teaching	39	24.00	4.11					
	Total	354	24.69	5.65					

When the digital literacy of the prospective teachers in the survey was analyzed according to the variance of the departments ($F_{(9, 344)}$= 21.69), visual literacy factor shows statistically significant difference in terms of department variable (p < .05).

Bonferroni multi comparison test was used to identify which departments had differences according to the department variable in terms of visual literacy which is one of the factors bearing significant differences. The test results showed that prospective teachers from the department of Computer Education and Instructional Technology ($\bar{x}$ = 32,38) have a higher level of visual literacy than those studying in the departments of Psychological Counseling ($\bar{x}$ = 23.60), Primary Teaching ($\bar{x}$ = 23.22), Social Sciences ($\bar{x}$ = 23.39), Science and Technology ($\bar{x}$ = 24.07), English ($\bar{x}$ = 22.36), Pre-Schooling ($\bar{x}$ = 22.81), Turkish ($\bar{x}$ = 21.72), Teaching of Mentally Disabled ($\bar{x}$ = 22.84) and Elementary Mathematics ($\bar{x}$ = 24.00).

Table 7. ANOVA for Differences between Departments on Software Literacy Factor

Factor	Department	N	$\bar{x}$	SS	Source of	Sum of	Df	*F*	*p*
Software Literacy	Psychological Counseling	48	21.06	2.93	Between Groups	720.91	9	7.56	.000
	Computer Education and Instructional Technology	56	24.23	1.60	Within Groups	3642.81	344		
	Primary Teaching	55	22.00	3.29	Total	4363.72			
	Social Sciences Teaching	28	21.89	3.40					
	Science and Technology	41	21.68	3.13					
	English Teaching	11	19.09	4.04					
	Pre-Schooling Teaching	21	22.29	4.08					
	Turkish Teaching	36	19.27	4.22					
	Teaching of Mentally Disabled	19	20.73	3.36					
	Elementary Mathematics	39	20.87	3.58					
	Total	35	21.64	3.52					

When the digital literacy of the prospective teachers participating in the survey was analyzed according to the variance of the departments ($F_{(9, 344)}$= 7.56), Software Literacy factor shows statistically significant difference in terms of department variable (p < .05).

Bonferroni multi comparison test was used to identify which departments had differences according to the department variable in terms of software literacy which is one of the factors bearing significant differences. The test results suggested that prospective teachers studying in the department of Computer Education and Instructional Technology ($\bar{x}$ = 24.23) have a higher level of software literacy than the ones from the departments of Psychological Counseling ($\bar{x}$ = 21.06), Primary Teaching ($\bar{x}$ =22.00), Science and Technology ($\bar{x}$ = 21.68), English ($\bar{x}$ = 19.09), Turkish ($\bar{x}$ = 19.27), Teaching of Mentally Disabled ($\bar{x}$ = 20.73) and Elementary Mathematics ($\bar{x}$ = 20.87). Besides that, prospective teachers studying in the department of Primary Teaching ($\bar{x}$ = 24.23) and Pre-Schooling ($\bar{x}$ = 22.29) have a higher level of software literacy than the ones studying in the department of Turkish ($\bar{x}$ = 19.27).

Table 8. ANOVA for Differences between Departments on Technological Literacy Factor

Factor	Department	N	$\bar{x}$	SS	Source	Sum of	Df	F	p
Technological Literacy	Psychological Counseling	48	18.23	4.18	Between Groups	886.23	9	7.55	.000
	Computer Education and Instructional Technology	56	22.38	3.02					
	Primary Teaching	55	18.16	4.08					
	Social Sciences Teaching	28	18.82	2.98					
	Science and Technology Teaching	41	19.05	3.85	Within Groups	4486.75	344		
	English Teaching	11	17.73	3.82					
	Pre-Schooling Teaching	21	19.24	3.85	Total	5372.98			
	Turkish Teaching	36	17.00	3.66					
	Teaching of Mentally Disabled	19	19.05	2.82					
	Elementary Mathematics Teaching	39	18.33	3.15					
	Total	354	18.99	3.90					

When the digital literacy of the prospective teachers participating in the survey was analyzed according to the variance of the departments ($F_{(9, 344)}$= 7.55), related with their levels of Technological Literacy factor, Technological Literacy factor shows statistically significant difference in terms of department variable (p < .05).

Bonferroni multi comparison test was used to identify which departments had differences according to the department variable in terms of Technological Literacy which is one of the factors bearing significant differences. The test results showed that prospective teachers studying in the department of Computer Education and Instructional Technology ($\bar{x}$ =22.38) have a higher level of Technological Literacy than the ones studying in the departments of Psychological Counseling ($\bar{x}$ = 18.23), Primary Teaching ($\bar{x}$ = 18.16), Social Sciences ($\bar{x}$ = 18.82), Science and Technology ($\bar{x}$ = 19.05), English ($\bar{x}$ = 17.73), Pre-Schooling ($\bar{x}$ = 19.24), Turkish ($\bar{x}$ = 17.00), Teaching of Mentally Disabled ($\bar{x}$ = 19.05) and Elementary Mathematics ($\bar{x}$ = 18.33).

Table 9. ANOVA for Differences between Departments on Computer Literacy Factor

Factor	Department	N	$\bar{x}$	SS	Source	Sum of	Df	F	p
Computer Literacy	Psychological Counseling	48	10.6	3.45	Between Groups	3066.52	9	33.34	.000
	Computer Education and Instructional Technology	56	18.57	1,52	Within Groups	3515.23	344		
	Primary Teaching	55	10.7	3.25	Total	6581.75			
	Social Sciences Teaching	28	11.2	3,56					
	Science and Technology Teaching	41	11.2	4.07					
	English Teaching	11	11.1	3.03					
	Pre-Schooling Teaching	21	10.5	3.12					
	Turkish Teaching	36	9.06	3.27					
	Teaching of Mentally Disabled	19	11.7	3.49					
	Elementary Mathematics Teaching	39	10.7	3.11					
	Total	354	11.9	4.32					

When the digital literacy of the prospective teachers participating in the survey was analyzed according to the variance of the departments ($F_{(9, 344)}$= 33.34), related with their levels of Computer Literacy factor and this shows statistically significant difference in terms of department variable (p < .05).

Bonferroni multi comparison test was used to identify which departments had differences according to the department variable in terms of Computer Literacy which is one of the factors bearing significant differences. As a result of the test, it was seen that prospective teachers studying in the department of Computer Education and Instructional Technology ($\bar{x}$ = 18.57) have a higher level of Computer Literacy than the ones studying in the departments of Psychological Counseling ($\bar{x}$ =10,67), Primary Teaching ($\bar{x}$ = 10.71), Social Sciences ($\bar{x}$ = 11.25), Science and Technology ($\bar{x}$ = 11.20), English ($\bar{x}$ = 11.18), Pre-Schooling ($\bar{x}$ = 10.67), Turkish ($\bar{x}$ = 9.06), Teaching of Mentally Disabled ($\bar{x}$ = 11.79) and Elementary Mathematics ($\bar{x}$ = 10.72).

Digital Literacy Levels of the Prospective Teachers Related to Their Personal Income Levels

ANOVA was applied to see whether there is a significant difference in digital literacy among prospective teachers according to their personal income levels related to the answers given to the Digital Literacy Scale.

Table 10. ANOVA for Differences between Personal Income Levels on Information Literacy Factor

Factor	Income	N	$\bar{x}$	SS	Source of	Sum of	Df	F	p
Information Literacy	TL	8	32.88	8.24	Between Groups	101.75	4	0.63	.639
	151-300 TL	92	36.29	6.10					
	301-450 TL	131	35.53	6.01	Within Groups	1400 2.45	349		
	451-600 TL	66	35.58	6.65					
	601 TL	57	35.60	6.77	Total	1410 4.20			
	Total	354	35.69	6.32					

As shown in Table 10, significant differences Information Literacy ($F_{(4, 349)}$ = .63; p > .05)were not found between type of personal income levels.

Table 11. ANOVA for Differences between Personal Income Levels on Visual Literacy Factor

Factor	Income	N	$\bar{x}$	SS	Source of	Sum of	Df	F	p
Visual Literacy	TL	8	24.13	7.43	Between Groups	295.61	4	2.35	.054
	151-300 TL	92	25.60	5.99					
	301-450 TL	131	25.15	5.01					
	451-600 TL	66	23.08	5.81	Within Groups	10973.44	349		
	601 TL	57	24.14	5.77					
	Total	354	24.69	5.65	Total	11269.05			

As shown in Table 11, significant differences were not found between type of personal income levels in their Visual Literacy ($F_{(4, 349)}$= 2,35; p >.05).

Table 12. ANOVA for Differences between Personal Income Levels on Software Literacy Factor

Factor	Income	N	$\bar{x}$	SS	Source of	Sum of	Df	*F*	*p*
Software Literacy	TL	8	20.75	4.65	Between Groups	42.13	4	0.85	.494
	151-300 TL	92	21.99	3.49					
	301-450 TL	131	21.79	3.21					
	451-600 TL	66	21.09	3.59					
	601 TL	57	21.47	3.98	Within Groups	4321.59	349		
	Total	354	21.64	3.52	Total	4363.72			

As shown in Table 12, significant differences were not found between type of personal income levels in the prospective teachers' Software Literacy ($F_{(4, 349)}$= 0.85; p >.05).

Table 13. ANOVA for Differences between Personal Income Levels on Technological Literacy Factor

Factor	Income	N	$\bar{x}$	SS	Source of	Sum of	Df	*F*	*p*
Technological Literacy	TL	8	18.88	3.83	Between Groups	26.18	4	0.43	.789
	151-300 TL	92	19.12	4.00					
	301-450 TL	131	19.24	3.82					
	451-600 TL	66	18.58	4.41	Within Groups	5346.79	349		
	601 TL	57	18.70	3.34					
	Total	354	18.99	3.90	Total	5372.98			

As shown in Table 13, significant differences were not found between type of personal income levels in their Technological Literacy ($F_{(4, 349)}$= 0,43; p > .05).

Table 14. ANOVA for Differences between Personal Income Levels on Computer Literacy Factor

Factor	Income	N	$\bar{x}$	SS	Source of	Sum of	Df	*F*	*p*
Computer Literacy	TL	8	14.13	5.00	Between Groups	174.60	4	2,38	,052
	151-300 TL	92	12.35	4.49					
	301-450 TL	131	11.80	4.27	Within Groups	6407.16	349		
	451-600 TL	66	10.77	4.25					
	601 TL	57	12.65	3.90	Total	6581.75			
	Total	354	11.94	4.32					

As shown in Table 14, significant differences were not found between type of personal income levels in their Computer Literacy ($F_{(4, 349)}$= 2,38; p > .05).

CONCLUSION

Individuals today interact with technology much more day by day and carry out their routine operations with the help of digital technologies such as computers, Internet, mobile phones and tablets. Colleges of education which train teachers play an important role in improving society; they train teachers as individuals who have mastered current and future technologies and also can use and direct these technologies effectively. Within the scope of the research the digital literacy level of the prospective teachers was identified. The research analyzed the digital literacy level of the prospective teachers in terms of several variables.

Digital literacy level of the prospective teachers was analyzed in terms of gender. Visual and computer literacy level of male prospective teachers were higher than that of female prospective teachers. This research finding supports the findings of Hardy (2005), Markauskaite (2005) and Zogheib (2006). Besides, digital literacy levels of prospective teachers were analyzed in terms of whether they had a computer that they could use continuously or not. Accordingly, students who had opportunity to use a computer continuously had higher information, visual, software, technology and computer literacy levels than those without such chance. This finding supports that of Clark (2007). Digital literacy level of the prospective teachers was analyzed in terms of their having a continuous Internet connection or not; digital literacy level of prospective teachers having a continuous Internet connection was found to be higher than those who had none. This finding is similar to that of Stern (2003).

In addition, digital literacy level of prospective teachers was analyzed in terms of their college department attended. Information literacy, software literacy, technology literacy and computer literacy of prospective teachers studying in the department of computer education and instructional technology teaching were found higher than the digital literacy level of prospective teachers studying in other departments. Besides, software literacy levels of prospective teachers studying in the departments of primary school teaching and pre-school teaching were higher than that of the prospective teachers in the department of Turkish Teaching. These findings of the research support the Kiyici (2008) findings.

Finally, the digital literacy levels of prospective teachers were analyzed in terms of their personal income levels. In the study, personal income levels have no effect on the digital literacy levels of prospective teachers. In contrast, Tally (2006) found that the information and computer literacy levels of students with low family income were found to be low compared to the information and computer literacy levels of students with moderate and high family income.

In line with the research results, prospective teachers' use of technological devices such as computers, mobile phones, tablets, Internet and social networks with activities inside or outside the classroom may be beneficial in terms of digital literacy levels. These technological instruments can be effective to a great extent in their understanding of subjects they have difficulty in or their observing several experiments that they

cannot practice. Moreover, the literacies stated within the research are the processes that have necessary characteristics to meet the daily needs of individuals in today's society in their academic, business and daily life. Realization of these processes effectively in the teaching and learning environments has a great deal of significance in terms of the individuals' future.

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