

# Developing the Web 2.0 tools awareness scale and determining the Web 2.0 awareness levels of the pre-service teacher

Özge Başpınar<sup>1</sup>, Çiğdem Alev Özel<sup>1</sup>

<sup>1</sup>Department of Science and Mathematics Education, Gazi University, Teknikokullar, Ankara, Türkiye

## Article Info

### Article history:

Received March 3, 2023

Revised May 14, 2023

Accepted May 18, 2023

### Keywords:

Web 2.0 tools, scale development, awareness, pre-service teachers

## ABSTRACT

This research aimed to develop a scale to measure pre-service teachers' awareness of web 2.0 tools and examine it based on department and grade level. The study included pre-service teachers from a state university across different grades. A scale was developed with 431 participants from the mathematics and science education department, and 125 participants were then assessed using the scale. Data analysis was performed using exploratory factor analysis with IBM SPSS 26. The resulting 'pre-service teacher awareness scale for web 2.0 tools' consisted of 18 items and two factors on a 3-point Likert scale, showing good internal consistency (Cronbach's alpha = 0.86). The scale was administered to pre-service teachers in various teaching departments. The study revealed that pre-service physics teachers had the highest average awareness ( $M = 25.96$ ) among the departments, and 1st-grade pre-service teachers had significantly higher awareness ( $M = 24.31$ ) compared to other grade levels. This research provides a reliable scale to assess pre-service teachers' awareness of web 2.0 tools and highlights the need for tailored interventions and support in different educational contexts.

*This is an open access article under the CC BY-NC license.*



## Corresponding Author:

Çiğdem Alev Özel

Department of Science and Mathematics Education

Gazi University, Teknikokullar, Ankara, Türkiye.

Email: [cigdemozel@gazi.edu.tr](mailto:cigdemozel@gazi.edu.tr)

ORCID: 0000-0002-5952-1412

## I. INTRODUCTION

The ubiquitous adoption of technology across all societal domains can be attributed to its rapid advancement and development in recent years. The swift integration of technology into daily life has resulted in significant alterations to various domains, including healthcare and the economy. However, one of the most noteworthy transformations has occurred in the realm of global educational practises. The integration of technology in education has become an essential requirement due to the swift advancement of technology and its compatibility with daily life. The significance of accessing information at the desired time and location has escalated due to the abundance of pre-existing information and the challenges associated with comprehensively acquiring all available knowledge (Bulun, Gulnar & Guran, 2004; Korucu & Sezer, 2016).

In today's world, it is aimed at raising educated individuals who have the ability to use the desired technology effectively. Expectations from educational institutions in order to achieve these goals are also changing. Today, computer technologies are used at all education levels, from primary education to higher education. When

the curricula and textbooks published by the Ministry of National Education are examined, it is observed that there is at least one activity related to each learning goal (outcome), and technology support suggestions are made for almost every activity (MEB, 2018). Therefore, it is thought that the use of computer technologies is an extremely important element in the effective implementation of the curriculum. For this reason, the effective integration of information technologies into the learning and teaching process and the efficient management of technological resources gain importance (Cakiroglu, Gokoglu & Cebi, 2015). The teacher, who is the keystone for the use of technology in education, is of great importance in this regard. In order to lead changes and advance societies, it is of great importance to raise technology awareness among teachers, who are the transmitters of the teaching process. The 21st century teacher is expected to have the qualities that lead the digital age, enable the effective use of digital resources, and improve digital resources (ISTE, 2021). Having these qualities in teachers increases student success and greatly affects their attitudes towards the lesson (Gunes & Buluc, 2017). For this reason, the necessity of educating teachers who play a key role in ensuring the harmony of education and technology emerges in accordance with the age (Goktas, Yildirim & Yildirim, 2009; Ilgaz & Usluel, 2011; Parlak Yilmaz, 2011).

The provision and development of teacher qualifications can only be realised in institutions where teacher candidates are trained. In order to reach the expected qualifications in Turkey, the Higher Education Institution has taken a step to provide pre-service teachers with technology skills by adding the 'Information Technologies' and 'Instructional Technologies' courses to the teacher education programme with its latest updated education programme (YÖK, 2018). For this reason, it is important to determine the awareness of pre-service teachers towards web 2.0 tools in order to make teaching more efficient. Bayraktar (2015) and Jung (2005) emphasised in their studies that for the efficient use of technology in education, teachers should have opinions about technology and have the opportunity to apply this technology.

As a result of the digitalization of education and training, it has been observed that course materials have been enriched with web tools and the diversity of course environments has increased. Web 2.0 technologies, which are widely used today, make a significant contribution to the digitalization of education (Çekinmez, 2009). When Web 2.0 technologies are examined, it is known that their use in education contributes to the teacher, student, and classroom environment (Elmas & Geban, 2012).

In addition, the contribution of Web 2.0 applications to education is listed as the habit of group work, effective learning, high-level thinking skills, information literacy, constructivist problem solving, suitability for students (attracting attention), individual development, and taking responsibility (Karaman, Yildirim, & Kaban, 2008; Aytan & Basal, 2015). For all these reasons, it is possible to say that web 2.0 tools are a technology with a very high rate of use in the education environment today (Aytan & Basal, 2015).

When the literature is examined, a limited number of studies on the subject have been found. The Web 2.0 Tools Awareness Scale developed by Arslan and Gorgulu Arı (2021) was administered to secondary school students, and the Web 2.0 Tools Usage Competence Scale developed by Celik (2021) was administered to teachers and prospective teachers in different departments. Birisci et al. (2018)'s 'Web 2.0 Rapid Content Development Scale for Determining Self-Efficacy Belief' was applied to teacher candidates studying in different departments. In their study, Top, Yukselturk and Cakir (2011) examined the web 2.0 technology awareness of information technology teachers based on gender.

Again, based on the literature, it has been determined that many researchers focus on library staff as a working group while looking at their web 2.0 awareness. Hussain and Jan (2018) looked at 100 library staff in Pakistan to determine their awareness of web 2.0 technologies. Eze (2016) and Baro, Idioidi and Godfrey (2013) looked at the use and awareness of web 2.0 tools for librarians working in university libraries in Nigeria. Similarly, Baro, Edwor and Sunday (2014) investigated the awareness of librarians working in university libraries in Africa towards the use of web 2.0. Garoufallou and Charitopoulou (2011) looked at library science information system students' awareness of their use of web 2.0 tools in Greece and the extent to which these students associate web 2.0 tools with their daily lives. Few studies in the literature are about the web 2.0 awareness of teachers and students. Chan She Ping and Issa (2011) studied the knowledge and awareness levels of undergraduate business graduates about web 2.0 technologies in education in Australia. Bhatt, Chandra, and Denick (2008) investigated web 2.0 usage and awareness of students in science and engineering faculties. As a result of the research, no measurement tool was found to measure the web 2.0 awareness of pre-service teachers studying in the mathematics and science education department. Therefore, in this research, it was aimed to develop a web 2.0 tool awareness scale for pre-service teachers' awareness and examine pre-service teachers' awareness levels in terms of various variables.

## 2. METHOD

### 2.1. Research model

In this study, which was carried out in order to develop an awareness scale for valid and reliable Web 2.0 tools and to determine the awareness levels of pre-service teachers about Web 2.0 tools, a descriptive survey model was used. The survey method is a research approach that aims to describe a past or present situation as it exists (Karasar, 2016). Survey method is the studies carried out to determine the desired characteristics of a group (Buyukozturk, Cakmak, Akgun, Karadeniz, & Demirel, 2019; Toyon, 2023). In this method, the main purpose is to clearly reveal the existing situation without changing it (Karasar, 2016). The general survey model is a research conducted on the entire universe or a sample that can represent the universe, in order to make a general judgment about the universe (Karasar, 2016).

### 2.2. Working group and sample

The study group of the research was selected by convenient sampling from non-random sampling methods. Easily accessible or convenient sampling method is to collect data from the group that the researcher can easily reach and practice due to limitations such as time, money and labor (Buyukozturk et al., 2019). The scale development process of the study and the re-application stages of the final scale were carried out with different participants.

In the scale development process, which is the first stage of the research, the study group of the research consists of a total of 431 teacher candidates studying at a state university in the fall semester of the 2021-2022 academic year in the mathematics and science education department. Pre-service teachers studying in the department of mathematics and science education; consists of students from biology teaching, science teaching, chemistry teaching, physics teaching mathematics teaching departments.

The second stage of the study, the application of the final version of the scale, was attended by a total of 125 pre-service teacher studying at department of mathematics and science education in the fall semester of the 2021-2022 academic year. When the distribution of the study group participating in the scale development process is examined according to the grade level, it is seen that 34.80% of the pre-service teachers consist of first classes, 27.85% from second classes, 22.73% from third classes and 14.62% from fourth classes. When the data are examined, the distribution of pre-service teachers according to their departments is 9.51% for biology teaching, 37.35% for science teaching, 6.72% for chemistry teaching, 7.19% for physics teaching and 39.21% for mathematics teaching.

### 2.3. Instrument design and data collection process

#### 2.3.1. Web 2.0 tools awareness scale

Web 2.0 Tools Awareness Scale, which was developed by the researcher, was used as a data collection tool in the study. In the scale development process, firstly, the literature was scanned and the scales, which were thought to be suitable for the purpose of determining the awareness of pre-service teachers towards web 2.0 tools, were examined in detail. As a result of this examination, a scale that serves the desired purpose could not be found. For this reason, a 3-point Likert-type scale was developed to determine the awareness of pre-service teachers about Web 2.0 tools, which is thought to be suitable for the desired purpose and contribute to the literature.

In order to write awareness items for Web 2.0 tools, interviews were conducted with 5 pre-service teachers who were not included in the study group. Interview data were analyzed and a literature search was conducted using concepts such as 'web 2.0, web 2.0 tools, web 2.0 tools awareness' from Scopus, EBSCO (Complementary Index), DergiPark, ProQuest, YÖK Thesis Center, ERIC and ULAKBİM databases. After the literature review, a draft form consisting of 40 items was first prepared. 5 expert opinions were received for the draft form. Each item was evaluated by the experts as 'Appropriate', 'Appropriate, but should be corrected' and 'Not applicable'.

In order to investigate the content of the draft form and to examine its suitability to the scale, the scale was examined by an information technology teacher working at the Ministry of National Education and a faculty member working in the Computer and Instructional Technologies Education department at a state university. In line with the feedback received from the experts, 3 items from the scale pool consisting of 40 items were excluded from the scale as they did not find it appropriate. Again, with the suggestions of the experts, 10 items were written and added to the scale. In the last case, the total number of items of the scale was 47.

The draft scale, consisting of 47 items, was examined in terms of compliance with the assessment and evaluation principles by two experts working as a faculty member in the Department of Mathematics and Science Education at a state university, who had previously worked on scale development.

The scale was examined by an expert who works as a lecturer in Turkish Language and Literature Education at a state university in terms of compliance with grammar rules and intelligibility, and necessary corrections were made by taking into account the expert's opinion. Before the scale was applied to the determined groups, a pilot application was made to 10 pre-service teachers who were not included in the study group to determine the response time of the scale and whether there were any items that were not understood by the pre-service teachers. After the application, it was observed that there were no items that were not understood and the response time of the scale was 15 minutes on average.

The data collection process was carried out by applying the prepared scale to 431 teacher candidates. The data obtained from the application were entered into the IBM-SPSS 26 program. Pre-service teachers were given 3 points for 'yes' answers for positive items, 2 points for 'I have no idea' and 1 point for 'no' answers. For negative items, 1 point was given for 'yes' answers, 2 points for 'I have no idea', and 3 points for 'no' answers.

Factor analysis was performed to test the construct validity of the scale and to determine the factors measured by the items. It states that the number of participants participating in the scale development process should be over 200 in order for the researchers to carry out factor analysis (Tabachnick & Fidell, 1989). For this reason, it is thought that the number of 431 teacher candidates participating in the scale development process is sufficient.

Another prerequisite for factor analysis is the Kaiser-Meyer-Olkin (KMO) test. A KMO value greater than .70 indicates that the data are suitable for factor analysis (Leech, Barrett & Morgan, 2005; Tavsancil, 2010). The KMO value of the scale developed by the researcher was found to be .91. Researchers state that it is 'excellent' for a KMO value above .90 (Leech, Barrett & Morgan, 2005; Sencan, 2005). If the Bartlett Sphericity test result has a value of  $p \leq .05$ , it is known that the scale has the feature of measuring tool. The Bartlett Sphericity test result of the awareness scale for web 2.0 tools used in the research was found as  $p < .01$ . These results show us that the data are suitable for factor analysis (Leech, Barrett & Morgan, 2005; Tavsancil, 2010).

After it was decided that the scale provided the prerequisite analyzes for factor analysis, factor analysis was performed. During the factor analysis, attention was paid to ensure that the factor load difference between them was at least .10 and that the value given to a single factor should be .30 or higher for items with loads on more than one factor (Buyukozturk, 2020). 25 items that did not comply with these values were removed from the scale and the analyzes were repeated. As a result of the analysis, it was seen that the factor loads of the remaining 18 items in the scale varied between .46 and .74. The number of factors related to the scale and the load values of the factors are shown in Table 1. When Table 1 is examined, it is seen that 10 of the items in the scale are collected in the 1st factor and 8 of them in the 2nd factor.

Table 1. Factor loading values of the items in the scale

Item number	Factor 1	Item number	Factor 2
13	.63	12	.55
18	.57	14	.66
113	.56	118	.60
116	.61	120	.61
125	.68	129	.72
128	.54	135	.64
134	.59	143	.46
136	.70	147	.74
138	.68		
140	.57		

After determining the factor load values of the scale, the phase of determining the factor number was started. As a result of the inclusion of items with a factor load of .30 and above, 2 factors with eigenvalues of 1.00 and

above emerged (Buyukozturk, 2020). At this point, in order to determine the factor number of the scale, Cattell's scree test was performed (Kline, 1994) and a graph as below was obtained (Figure 1).

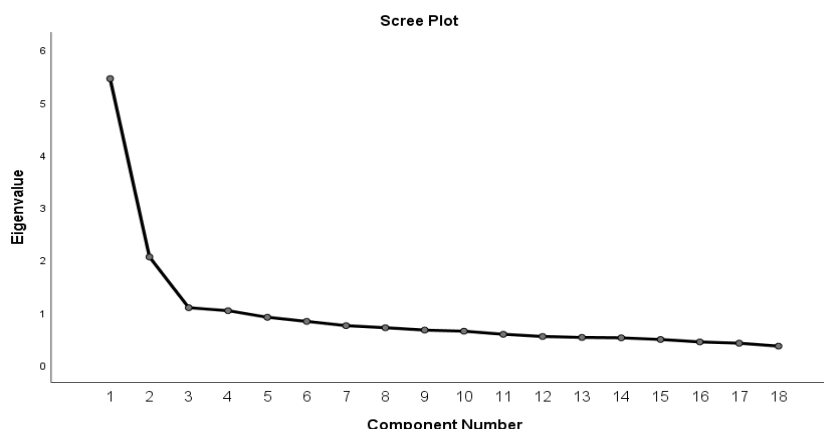


Figure 1. Scree plot chart of awareness scale for Web 2.0 tools

According to the graph, the points where the graph curve shows a rapid decline are determined (Buyukozturk, 2020). The number of factors in the scale was determined as 2 and the findings related to these 2 factors are given in Table 2.

Table 2. Findings related to a factor as a result of factor analysis

Factor	Eigenvalue	Percentage of variance	Percentage of total variance
1	4.05	22.48	22.48
2	3.46	19.21	41.70

As seen in Table 2, the eigenvalue of the first factor in the scale is 4.05 and the eigenvalue of the second factor is 3.46. It is seen that the percentage of variance of the factors is 22.5 and 19.2, respectively. The two factors together explain 41.7% of the total variance (Kline, 1994, p.37). It states that scales with an accepted percentage of variance of 41% and above can be used. It is possible to say that it is appropriate to use this scale, which consists of a total of 18 items and two factors, with a total variance percentage of 41.7% obtained as a result of the analysis. The factor names and sample items of the scale are given in Table 3.

Table 3. Distribution of items by factors and item examples

Factors	Item number	Sample items from the scale
Awareness of usage areas of Web 2.0 tools	13, 18, 113, 116, 125, 128, 134, 136, 138, 140	28. Web 2.0 tools can be used to create virtual classrooms. 36. Web 2.0 tools can be used to create and edit videos. 38. Web 2.0 tools can be used to create puzzles. 40. Web 2.0 tools can be used to create augmented reality materials.
Awareness of the effects of using Web 2.0 tools	12, 14, 118, 120, 129, 135, 143, 147	4. The use of Web 2.0 tools distracts students in the lessons. 20. The use of Web 2.0 tools causes a waste of time in the lesson. 35. The use of Web 2.0 tools in the classroom positively affects communication. 43. Web 2.0 tools can be used to ensure collaboration among students.

In the last step, the Cronbach alpha internal consistency value for the whole scale and its sub-dimensions was calculated to determine the reliability of the scale. As a result of the analysis, the Cronbach alpha value of 10 items in Factor 1 was found .83 and the Cronbach alpha value of 8 items in Factor 2 was found .80. The Cronbach alpha reliability coefficient obtained for the entire scale is .86. It is sufficient for the Cronbach alpha coefficient to be greater than .70 (Kilic, 2016), and considering this value, the scale has been found to be highly reliable. After the validity and reliability analyzes of the scale were completed, an 18-item scale was reached. The highest score that can be obtained from the scale is 54 and the lowest score that can be obtained from the scale is 18. The appropriate time for answering the final version of the scale was determined as 10 minutes.

The scale, which was developed to determine the awareness levels of pre-service teachers towards Web 2.0 tools, was applied to 125 pre-service science teachers studying at a state university in the fall semester of the 2021-2022 academic year. The actual application process was completed by analyzing the data obtained from the teacher candidates.

#### 2.4. Data Analysis

In the research, Microsoft Excel 2016 spreadsheet program and IBM-SPSS 26 statistical analysis program were used to analyze the data obtained with the awareness scale developed during the study in order to determine the awareness levels of pre-service science teachers towards web 2.0 tools. Descriptive statistics techniques (mode, median, arithmetic mean, standard deviation) were used to determine the general distribution of the answers given by the students to the developed scale and to investigate whether the data showed a normal distribution. The central tendency (mean, mode and median) and central distribution (standard deviation, variance, skewness and kurtosis) values of the scale scores are reported. In addition, 'One-Way Analysis of Variance-ANOVA' and Post-Hoc Multiple Comparisons tests were applied to test the significance of pre-service teachers' total scores from the Web 2.0 Tools Awareness Scale according to the variables of department and grade level. The significance level was accepted as .05 in all analyzes.

### 3. FINDINGS

In the study, it was primarily aimed to determine the awareness levels of pre-service teachers towards web 2.0 tools according to the department variable. Before examining the awareness levels of pre-service teachers for web 2.0 tools according to the department variable, the statistical method to analyze the data collected with the awareness scale for web 2.0 tools was examined. In order to use the parametric analysis method on the quantitative data obtained from the application, a normal distribution of the data is a prerequisite (Sim & Wright, 2002; Cepni, 2007). In the study, descriptive statistics techniques (mode, median, arithmetic mean, variance, standard deviation) were used to examine whether the data showed a normal distribution. The central tendency (mean, mode and median) and central distribution (standard deviation, variance, skewness and kurtosis) values of the scale scores are given. Table 4 shows the descriptive analyzes of the scores obtained from the awareness scale for Web 2.0 tools according to the variable of the department in which the pre-service teachers studied.

Table 4. Descriptive data of pre-service teachers' departments

Department	N	M	SD	Med.	Mod	Kurtosis	Skewness	Var.
Biology Teaching	25	23.00	2.90	23	25	-.98	-.43	8.42
Science Teaching	25	21.20	2.97	20	18	-1.1	.56	8.83
Chemistry Teaching	25	21.36	2.67	21	21	-.90	.47	7.16
Physics Teaching	25	25.96	5.01	26	25	-.83	.90	25.12
Mathematics Teaching	25	22.64	3.09	22	21	-.72	.27	9.57

When the mean scores of the awareness levels for Web 2.0 tools are examined, it is seen that the average of the biology teacher candidates' M = 23.00, the average of the science teacher candidates' M = 21.20, the average of the physics teacher candidates' M = 25.96, the average of the chemistry teacher candidates' M =

21, It is seen that the average of 36 and mathematics teacher candidates is  $M = 22.64$ . It is seen that the group with the highest average ( $M = 25.96$ ) among the groups belongs to the physics teacher candidates. It is seen that the mean of the group with the lowest average ( $M = 21.20$ ) belongs to the pre-service science teachers. In general, it is possible to state that the group averages are close.

Table 5. ANOVA results of Web 0.2 tools awareness scale scores according to department

Variable		Sum of Sq	df	Mean Sq	F	p
Department	Between groups	366.99	4	91.75	7.76	.00*
	Within groups	1418.48	120	11.82		
	Total	1785.47	124			

\* $p < .05$

Table 6. Multiple comparison results according to department variable

Department		Mean difference	Std. error	p
Biology Teaching	Science Teaching	1.80	.83	.30
	Chemistry Teaching	1.64	.78	.36
	Physics Teaching	-2.96	1.16	.14
	Mathematics Teaching	.36	.84	1.00
Science Teaching	Biology Teaching	-1.80	.83	.30
	Chemistry Teaching	-.16	.80	1.000
	Physics Teaching	-4.76*	1.16	.00*
	Mathematics Teaching	-1.44	.85	.65
Chemistry Teaching	Biology Teaching	-1.64	.78	.36
	Science Teaching	.16	.80	1.00
	Physics Teaching	-4.60*	1.13	.00*
	Mathematics Teaching	-1.28	.81	.73
Physics Teaching	Biology Teaching	2.96	1.15	.14
	Science Teaching	4.76*	1.16	.00*
	Chemistry Teaching	4.60*	1.13	.00*
	Mathematics Teaching	3.32	1.17	.07
Mathematics Teaching	Biology Teaching	-.36	.84	1.00
	Science Teaching	1.44	.85	.65
	Chemistry Teaching	1.28	.81	.73
	Physics Teaching	-3.32	1.17	.07

\* $p < .05$

When the mean, mode and median values of the data obtained from the awareness scale for Web 2.0 tools are examined, it is seen that these values are very close to each other. The fact that the mean, mode and median values are close to each other allows us to comment that they are normally distributed (Buyukozturk, Cokluk & Koklu, 2020). When the kurtosis and skewness values in Table 4 are examined, it is seen that the values vary between -1.5 and +1.5 values. The values of kurtosis and skewness between -2 and +2 indicate that the data are suitable for normal distribution (George & Mallery, 2003).

As a result of descriptive statistics and considering the case of group sizes over 20, it was decided that the data showed normal distribution according to the central limit theorem (Buyukozturk, 2020). As a result of the normal distribution of the data, one-way analysis of variance-ANOVA was performed to determine whether there was a statistically significant difference between prospective teachers studying in different departments (Table 5).

ANOVA was preferred because the number of independent variables in the examined sub-problem consisted of 5 different groups. Because ANOVA is a statistical technique that allows comparison of the mean scores of more than two independent variable groups. If the ANOVA test is found to be significant, comparisons should be made using Post-Hoc Multiple Comparisons tests to determine which groups the difference is significant (Tan, 2016).

Since the significance (p) value is  $p < .05$  according to Table 5, a statistically significant difference was found between pre-service teachers' awareness of web 2.0 tools according to their departments [ $F_{(4, 120)} = 7,76$ ;  $p < .05$ ]. In order to determine between which groups this difference is, the distribution of variances should be examined first. The Levene test result shows that the variances are not homogeneously distributed since  $p < .05$ . In cases where the variances are not homogeneous, post-hoc tests such as Tamhane's T2, Dunnett's T3, Games-Howell and Dunnett's C, which do not require this assumption, should be used. Because the assumption could not be met, Tamhane's T2 test was applied and the results are given in Table 6.

According to Table 6, it is seen that there is a statistically significant difference between pre-service physics teachers and science teacher candidates in favor of physics teacher candidates. Similarly, it was determined that there was a statistically significant difference between the physics teacher candidates and the chemistry teacher candidates in favor of the physics teacher candidates.

In the next stage of the research, the process of determining whether the awareness levels of pre-service teachers towards web 2.0 tools differ significantly according to the grade level variable. In order to determine which analysis method will be used on the data obtained as a result of the application, the normality of the data should be examined (Sim & Wright, 2002; Çepni, 2007). The descriptive data related to the analyzes made for this purpose are given in Table 7.

Table 7. Descriptive data of pre-service teachers' grade level

Grade Level	N	M	SD	Med.	Mod	Kurtosis	Skewness	Var.
1st Class	25	24,31	4,22	24	26	,69	,86	17,81
2nd Class	25	23,16	3,33	23	25	-,63	,07	11,07
3rd Class	25	22,64	3,60	22	18	,74	,44	12,98
4th Class	25	21,00	3,23	20	18	1,15	,68	10,40

According to Table 7, when the mean scores of the awareness levels for web 2.0 tools are examined, the mean of the pre-service teachers in the 1st grade is  $M = 24.31$ , the mean of the pre-service teachers in the 2nd grade is  $M = 23.16$ , the mean of the pre-service teachers in the 3rd grade is  $M = 22.64$ , and the average of the 4th grade teacher candidates is  $M = 21.00$ . When the average of all groups is compared in general, it is seen that the average scores of the groups are very close to each other. While the class level with the highest average is the pre-service teachers in the 1st grade with an average of  $M = 24.31$ , the group with the lowest average is the pre-service teachers in the 4th grade with an average of  $M = 21.00$ . When the mean, mode and median values of the data taken from the awareness scale for Web 2.0 tools are examined, it is seen that these values are close to each other. The median, mode and mean values of the 1st grade teacher candidates are very close to each other. Likewise, it is seen that the mode, median and mean values of the pre-service teachers at the 2nd grade level has close values. Although the median and mean values of the pre-service teachers in the 3rd grade are equal to each other, it is possible to say that the mode value is close to this value. The median and mean values of pre-service teachers at the 4th grade level are almost equal to each other and the mode value is very close to this value. The fact that the mode and median values have close values allows us to comment on the normal distribution given (Buyukozturk, Cokluk & Koklu, 2020). It is seen that the kurtosis and skewness values specified in Table 7 are in the range of -1.5 and +1.5. Although it is considered perfect that the kurtosis and skewness values are between -1 and +1, it is stated that the +2 and -2 value ranges are also acceptable (George & Mallery, 2003).



It was decided that the data showed a normal distribution due to the results of the descriptive statistics and the group sizes being over 20 (Buyukozturk, 2020). A one-way analysis of variance-ANOVA was conducted on the data in order to determine whether there is a significant difference between pre-service teachers' awareness levels for web 2.0 tools according to their grade levels.

If the ANOVA test is found to be significant, comparisons should be made using Post-Hoc Multiple Comparisons tests to determine which groups the difference is significant (Tan, 2016).

Table 8. ANOVA results of Web 0.2 tools awareness scale scores according to grade level

Variable		Sum of Sq	Df	Mean Sq	F	p
Grade level	Between groups	185.30	3	61.77	4.67	.00*
	Within groups	1600.16	121	13.23		
	Total	1785.47	124			

\*p<.05

Since  $p < .05$  according to Table 8, it was found that there was a statistically significant difference between pre-service teachers' awareness of web 2.0 tools and their grade levels [ $F(3, 121) = 4.67$ ;  $p = 0.00$ ]. In order to determine between which groups the difference is, homogeneity of variances should be tested before using multiple comparison tests. The assumption of homogeneity of variances was examined with the Levene Test. Levene test results show that the  $p = .62$  ( $p > .05$ ) value provides the assumption of homogeneity of variances. In this situation where the assumption was met, it was decided to compare the groups with the Bonferroni test, one of the Post-Hoc Multiple Comparisons, in order to determine between which class levels the difference was. The reason for choosing this test is that it is a frequently used multiple comparison test and does not require equal sample numbers (Miller, 1969). The results from the Bonferroni test are given in Table 9.

Table 9. Multiple comparison test results according to grade level variable

(I) group	(J) group	Mean difference (I-J)	Std. error	p
1st grade	2nd grade	1.15	.89	1.00
	3rd grade	1.67	.92	.43
	4th grade	3.31*	.89	.00*
2nd grade	1st grade	-1.15	.89	1.00
	3rd grade	.52	.94	1.00
	4th grade	2.16	.92	.12
3rd grade	1st grade	-1.67	.92	.43
	2nd grade	-.52	.94	1.00
	4th grade	1.64	.94	.51
4th grade	1st grade	-3.31*	.89	.00*
	2nd grade	-2.16	.92	.12
	3rd grade	-1.64	.94	.51

\*p<.05

According to the results of multiple comparisons for the grade levels of the scores obtained from the awareness scale for Web 2.0 tools; It has been determined that there is a statistically significant difference between the 1st grade teacher candidates and the 4th grade teacher candidates in favor of the 1st grade teacher candidates.

#### 4. DISCUSSION AND CONCLUSION

In this study, it was primarily aimed to develop a valid and reliable Web 2.0 Tools Awareness Scale in order to determine the awareness of pre-service teachers towards Web 2.0 Tools. Within the scope of the study, a 3-point Likert-type scale consisting of 18 items and two factors was developed. It was observed that the factor loads of the items varied between .46 and .74. The contents of the scale items were examined and grouped under two factors, and each factor was named with an appropriate title. These factors are awareness of the usage areas of Web 2.0 tools and awareness of the effects of using Web 2.0 tools. While the reliability value of the first factor was .83, the reliability value of the second factor was found to be .80. The total reliability of the scale was found to be .86. Ozdamar (2017) states that the alpha value in the range of  $.75 \leq \alpha < .85$ , the scale is highly reliable.

The findings obtained through the scale developed in the second stage of the study were evaluated according to the department and grade level variables of the pre-service teachers. When the findings obtained according to the department variable are examined; It was found that there is a statistically significant difference between pre-service physics teachers and science teacher candidates in favor of physics teacher candidates. In the study, it was also determined that there was a statistically significant difference between prospective physics teachers and chemistry teacher candidates in favor of physics teacher candidates ( $p < .05$ ). This result also coincides with the descriptive data of the pre-service teachers' departments. When Table 4 is examined, it is seen that the group with the highest average ( $M = 25.96$ ) among the groups is physics teacher candidates. However, no significant difference was found between pre-service biology and mathematics teachers and pre-service teachers studying in other departments ( $p > .05$ ).

When the studies in the literature are examined, it is seen that the average scores of teacher candidates vary according to their departments in similar subjects such as technology use, technological competence, technological attitudes, information and communication technologies, and digital literacy. The results of these studies are consistent with the results obtained from this study. Korucu and Bicer (2017) found that pre-service teachers' use of technology in education differs significantly according to their departments. Researchers stated that the reason for this difference may be the increase in the need to use technology in lessons. Similarly, Timur (2020) determined that science teachers' awareness of Web 2.0 tools and the frequency of use of these tools are at a high level. Ozerbas and Kuralbayeva (2018) stated in their study with pre-service teachers in Turkey and Kazakhstan that digital literacy levels are significant in favor of mathematics and classroom teacher candidates. Akdogan and Cam (2022) revealed that science teachers have a higher level of using technology in education than social science teachers. Aksogan and Ozek (2020) stated in their study that among the Turkish, social studies, mathematics, science and classroom teaching departments, the department with the highest technology use skills is the teacher candidates studying in the Turkish department.

Another variable examined in this study is the grade levels of teacher candidates. It was determined that there was a statistically significant difference between the 1st grade and 4th grade teacher candidates in favor of the 1st grades, parallel to the result obtained from this study. This difference is also consistent with the descriptive data of the pre-service teachers' grade levels, and the first grade teacher candidates ( $M = 24.31$ ) have the highest average. There was no significant difference between the other grade levels.

In this study, it was revealed that the web 0.2 awareness levels of the pre-service teachers differ according to the grade level. This result is in line with the results of many studies. However, the subjects of these studies (technological competence, technological attitude, ICT, digital literacy...) differ with our study subject. Sahin and Namli (2019) emphasized that the attitudes of teacher candidates regarding the use of technology in education show a significant difference according to the grade level variable. This significance was found to be in favor of the 3rd grade between the 1st and 3rd grades, and in favor of the 4th grade between the 1st and 4th grades. Aksogan and Ozek (2020) aimed to examine the relationship between pre-service teachers' technology competencies and their perspective on technology. As a result of the study, it was found that the 4th grade teacher candidates had a more positive perspective on technology than the 1st and 3rd grade teacher candidates. In another study, Boyaci (2019) revealed that 1st grade pre-service teachers have a lower level of digital literacy than pre-service teachers studying in upper grades. Demirtas (2020), Aydogmus and Karadag (2020) concluded that 4th grade teacher candidates are more competent in ICT than 1st and 2nd grade teacher candidates.

As seen in the given literature, the technological competence, technological attitude, ICT and digital literacy levels of teacher candidates studying at education faculties vary according to the grade level variable. Contrary

to the results obtained from this study, the results of some studies show that upper classes have higher average scores than lower classes (Ozsevgec, Batman, Yazar & Yigit, 2014; Cetin, Caliskan & Menzi, 2012; Demirtas, 2020; Aydogmus & Karadag, 2020; Boyaci, 2019; Sahin & Namli, 2019; Aksogan & Ozek, 2020). In this study, mean scores of 1st grade teacher candidates were found to be higher than all other grade levels. In this study, it is thought that the reason for the high web 2.0 awareness of the lower classes is especially the covid 19 pandemic process. Due to the pandemic, distance education was started in our country (Turkey) in March of the 2019-2020 academic year. It is known that in the 2021-2022 fall semester, when the application was made, the pre-service teachers studying in the 1st year of our faculty were studying in high school at that time and continued their third year of high school and the last year of high school with distance education. In addition, since these students were in the process of preparing for the university entrance exam, they actively studied using online education technologies. At this point, they actively used web 2.0 tools. While using Web 2.0 tools, it is thought that they benefit from these tools in line with the aims and scopes of the FATİH Project. It is known that two of the main objectives of the FATİH Project, an initiative of the Ministry of National Education, are the effective use of information technology and the provision of educational e-content in curricula (MEB, 2023). In this context, the fact that pre-service teachers received intensive training in a program compatible with educational technologies may have increased their awareness of web 2.0.

This scale study, which was developed to determine the awareness of pre-service teachers towards Web 2.0 tools, provides important contributions to the field. When the literature on the subject was scanned, a few more studies were found in which the opinions of pre-service teachers towards Web 2.0 tools. However, these studies are mostly aimed at the use of web 2.0 tools. The teachers' point of view towards technology and their use of technology affect the attitudes of students towards the use of technology in education (Ertmer, 2005). For this reason, it is thought that it is important to determine the awareness of pre-service teachers about Web 2.0 tools for a more efficient teaching. Therefore, a reliable and valid awareness scale was developed in order to determine the awareness levels of pre-service teachers towards Web 2.0 tools. It is thought that this developed scale will fill this deficiency in the field of education and contribute to future studies.

In this study, pre-service teachers' Web 0.2 awareness levels were examined only according to the variables of department and grade level. In future studies, it is thought that examining the level of awareness towards Web 2.0 tools in terms of different variables such as gender, academic grade average and taking courses related to web 2.0 tools will also contribute to the field. In order to interpret the relationships between the variables obtained in the study in depth, it is recommended to obtain more comprehensive data supported by qualitative research methods. In addition, the 'web 2.0 awareness scale' developed in this study can be applied to different working groups. As a result of these practices, it is thought that it would be beneficial to provide trainings to increase awareness to groups with low awareness

## REFERENCES

- Akdogan, C., & Cam, A. (2022). Öğretmenlerin teknoloji kullanabilme düzeylerine etki eden faktörlerin incelenmesi [Investigation of teachers' technology use levels in terms of different demographic variables]. *Araştırma ve Deneyim Dergisi* [Research and Experience Journal], 7(2), 1-14. <https://doi.org/10.47214/adeder.1175266>
- Aksogan, M., & Ozek, M. B. (2020). Öğretmen adaylarının teknoloji yeterlilikleri ile teknolojiye bakış açısı arasındaki ilişki [The relationship between pre-service teachers' technology competencies and technology perspectives]. *Gümüşhane Üniversitesi Sosyal Bilimler Dergisi* [Gümüşhane University Journal of Social Sciences Institute], 11(2), 301-311. Retrieved March 05, 2023, from <https://dergipark.org.tr/en/pub/gumus/issue/55299/661961>
- Arslan, K., & Arı Gorgulu, A. (2021). Web 2.0 Araçlarına Yönelik Farkındalık Ölçeği Geliştirme Çalışması [Web 2.0 Tools Awareness Scale Development Study]. *Ulakbilge Sosyal Bilimler Dergisi* [Ulakbilge Journal of Social Sciences], 687-703.
- Aydogmus, M., & Karadag, Y. (2020). Öğretmen adaylarının bilgi ve iletişim teknolojileri (BİT) yeterlilikleri: Ondokuz Mayıs Üniversitesi Örneği [Preservice teachers' competence of information and communication technologies: Sample of Ondokuz Mayıs University]. *Mersin Üniversitesi Eğitim Fakültesi Dergisi* [Mersin University Journal of the Faculty of Education], 16(3), 686-705. <https://doi.org/10.17860/mersinefd.715457>

- Aytan, T., & Basal, A. (2015). Türkçe öğretmen adaylarının web 2. 0 araçlarına yönelik algılarının incelenmesi [Investigation of the perceptions of pre-service turkish teachers towards web 2.0 tools], *Turkish Studies - International Periodical For The Languages, Literature and History of Turkish or Turkic* 10(7), 149-166, <http://dx.doi.org/10.7827/TurkishStudies.8388>
- Baro, E. E., Edewor, N., & Sunday, G. (2014). Web 2.0 tools: A survey of awareness and use by librarians in university libraries in Africa. *The Electronic Library*. <https://doi.org/10.1108/EL-11-2012-0151>
- Baro, E. E., Idiodi, E. O., & Godfrey, V. Z. (2013). Awareness and use of web 2.0 tools by librarians in university libraries in Nigeria. *OCLC Systems & Services: International Digital Library Perspectives*, 29(3), 170-188. <https://doi.org/10.1108/OCLC-12-2012-0042>
- Bayraktar, R. (2015). Öğretmenlerin eğitim teknolojileri kullanım düzeylerinin belirlenmesi: Ölçek geliştirme çalışması [Determination of level of teachers' educational technology usage: A study of a scale development]. Master Thesis. Karadeniz Teknik Üniversitesi Eğitim Bilimleri Enstitüsü, Trabzon. Retrieved March 07, 2023, from <https://Tez.Yok.Gov.Tr>
- Bhatt, J., Chandra, S., & Denick, D. (2008). Using web 2.0 applications as information awareness tools for science and engineering faculty and students in academic institutions. In *Proceedings of International Conference of Asian Special Libraries on Shaping the Future of Special Libraries: Beyond Boundaries*.
- Birisci, S., Kul, U., Aksu Z., Akaslan, D., & Celik, S. (2018). Web 2.0 hızlı içerik geliştirme öz-yeterlik algısını belirlemeye yönelik ölçek (W2öyaö) geliştirme çalışması [A scale development study to determine web 2.0 practical content development self-efficacy belief (W2sebs). *Eğitim Teknolojisi Kuram ve Uygulama [Educational Technology Theory and Practice]*, 8(1), 187-208. <https://doi.org/10.17943/etku.335164>
- Boyacı, Z. (2019). Öğretmen Adaylarının Yaşam boyu öğrenme eğilimleri ile dijital okuryazarlık düzeyleri arasındaki ilişki: düzce üniversitesi örneği [The relationship between lifelong learning tendencies and digital literacy levels of pre-service teachers (A Düzce University sample)]. Master Thesis. Sakarya Üniversitesi, Eğitim Bilimleri Enstitüsü, Sakarya. Retrieved February 28, 2023, from <https://tez.yok.gov.tr>
- Bulun, M., Gulnar, B., & Guran, S. (2004). Eğitimde mobil teknolojiler [Mobile technologies in education]. *Tojet: The Turkish Online Journal of Educational Technology*, 3(2)165-169.
- Buyukozturk, S. (2020). Sosyal bilimler için veri analizi el kitabı [Data analysis handbook for social sciences]. Ankara: Pegem Akademi [Pegem Academy].
- Buyukozturk, S., Cokluk, O., & Koklu, N. (2020). Sosyal bilimler için istatistik (Statistics for social sciences). Ankara: Pegem Akademi [Pegem Academy].
- Buyukozturk, S., Kılıc-Cakmak, E., Akgun, O., Karadeniz, S., & Demirel, F. (2019). Bilimsel araştırma yöntemleri [Scientific research methods]. Ankara: Pegem Akademi [Pegem Academy].
- Chan She Ping, C., & Issa, T. (2011). The Awareness and knowledge of web 2.0 technologies in education: an Australian perspective. *The International Journal of Learning*, 18(2), 121-132. <http://hdl.handle.net/20.500.11937/47570>
- Cakiroglu, U., Cebi, A., & Gokoglu, S. (2015). Öğretmenlerin teknoloji entegrasyonlarına yönelik temel göstergeler: Bir ölçek geliştirme çalışması [Basic indicators for teachers' technology integration: A scale development study]. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi [Journal of Gazi University Gazi Education Faculty]*, 35(3), 507-508.
- Çekinmez, M. (2009). Web 2.0 teknolojileri ve açık kaynak kodlu öğretim yönetim kullanılarak uzaktan eğitim sistemi uygulaması. [An e-learning application using web 2.0 technologies and open source learning management systems]. Master Thesis. Sakarya Üniversitesi, Fen Bilimleri Enstitüsü, Sakarya Retrieved May 16, 2023, from <https://Tez.Yok.Gov.Tr>
- Celik, T. (2021). Web 2.0 araçları kullanımı yetkinliği ölçeği geliştirme çalışması [Developing a scale of competency in using web 2.0 tools]. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi [Pamukkale University Journal of Education]*, 51, 449-478. <https://doi.org/10.9779.pauefd.700181>
- Cepni, S. (2007). Araştırma ve proje çalışmalarına giriş [Introduction to research and project studies]. (3. Basım). Trabzon: Celepler Matbaacılık.

- Cetin, O., Caliskan, E., & Menzi, N. (2012). Öğretmen adaylarının teknoloji yeterlilikleri ile teknolojiye yönelik tutumları arasındaki ilişki [The relationship between technological competencies and attitudes of pre-service teachers towards technology]. *İlköğretim Online [Elementary Education Online]*, 11(2), 273-291. <http://ilkogretim-online.org.tr>
- Demirtas, B. (2020). Uzaktan eğitim yöntemiyle verilen bilişim teknolojileri dersinin öğretmen adaylarının bit yeterliliklerine ve teknolojik pedagojik içerik bilgilerine etkisi The effect of ICT course given by distance education method on the preservice teachers' ICT competencies and technological pedagogical content knowledge]. Master Thesis. Manisa Celal Bayar Üniversitesi, Sosyal Bilimler Enstitüsü, Manisa. Retrieved March 07, 2023, from [Https://Tez.Yok.Gov.Tr](https://Tez.Yok.Gov.Tr).
- Elmas, R. & Geban, Ö. (2012). 21. yüzyıl öğretmenleri için Web 2.0 araçları. *International Online Journal of Educational Sciences*, 4(1), 243-254.
- Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development*, 53(4) 25-39.
- Eze, E. M. (2016). Awareness and use of web 2.0 tools by lis students at University of Nigeria, Nsukka, Enugu State, Nigeria. *Library Philosophy & Practice*. <http://digitalcommons.unl.edu/libphilprac/1355>.
- Garoufallou, E., & Charitopoulou, V. (2011). The use and awareness of web 2.0 tools by greek lis students. *New Library World*, 112(11/12), 490-498. <https://doi.org/10.1108/03074801111190383>
- George, D., & Mallery, P. (2003). *Spss for windows step by step: A simple guide and reference*. (4th Edition). Boston: Allyn & Bacon.
- Goktas, Y., Yildirim, S., & Yildirim, Z. (2009). Main barriers and possible enablers of lcts integration into pre-service teacher education programs. *Journal of Educational Technology & Society*, 12(1), 193-204. <https://www.jstor.org/stable/10.2307/jeductechsoci.12.1.193>
- Gunes, A. M., & Buluc, B. (2017). Sınıf öğretmenlerinin teknoloji kullanımları ve öz yeterlilik inançları arasındaki ilişki [The relationship between classroom teachers' technology use and their self efficacy beliefs]. *Tübav Bilim Dergisi [Tübav Journal Science]*, 10(1), 94-113. Retrieved March 03, 2023, from <https://dergipark.org.tr/en/pub/tubav/issue/27928/296808>
- Hussain, A., & Jan, S. U. (2018). Awareness of web 2.0 technology in the academic libraries: an Islamabad perspective. *Library Philosophy And Practice*, 1-13.
- Ilgaz, H., & Usluel, Y. (2011). Öğretim sürecine Bit entegrasyonu açısından öğretmen yeterlikleri ve mesleki gelişim [Teacher competencies according to lct integration into the teaching processes and professional development]. *Journal of Educational Sciences & Practices*, 10(19).
- International Society for Technology in Education (2021). *ISTE standards teachers*. Retrieved March 07, 2023, from [Https://Www.Iste.Org/Standards/Iste-Standards-For-Teachers](https://www.iste.org/standards/iste-standards-for-teachers)
- Jung, I. (2005). Ict-Pedagogy integration in teacher training: Application cases worldwide. *Educational Technology & Society*, 8(2), 94-101. Retrieved March 03,2023 from [Https://Www.Jstor.Org/Stable/E26558822](https://www.jstor.org/stable/E26558822)
- Karaman S., Yıldırım S., & Kaban A. (2008). Öğrenme 2.0 yaygınlaşıyor: Web 2.0 uygulamalarının eğitimde kullanımına ilişkin araştırmalar ve sonuçları [Learning 2.0 spreads: Web 2.0 applications research and results related to its use in education]. *İnet-Tr'08 - XIII. Türkiye'de İnternet Konferansı Bildirileri*, 22-23 December 2008 Orta Doğu Teknik University, Ankara.
- Karasar, N. (2014). *Bilimsel araştırma yöntemi: Kavramlar, teknikler, ilkeler*. [Scientific research method: Concepts, techniques, principles]. Ankara: Nobel Yayın Dağıtım.
- Kılıç, S. (2016). Cronbachs alpha reliability coefficient. *Journal of Mood Disorders* 6(1),1. <https://doi.org/10.5455/jmood.20160307122823>.
- Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge
- Korucu, A. T. & Sezer, C. (2016). Web 2.0 teknolojilerini kullanma sıklığının ders başarısı üzerindeki etkisine yönelik öğretmen görüşleri [Teacher opinions regarding the effects of usage frequencies of web 2.0 technologies on academic success]. *Eğitim ve Öğretim Araştırmaları Dergisi [Journal of Research in Education and Teaching]*, 35(2) 379-394.
- Korucu, A. T., & Bicer, H. (2017). Öğretmen adaylarının mesleki kaygı durumları ile teknolojiyi kabul ve kullanma durumlarının incelenmesi [Investigation of teacher candidates' occupational anxiety status

- and technology acceptance and condition of use]. *Öğretim Teknolojileri ve Öğretmen Eğitimi Dergisi* [Journal of Instructional Technologies & Teacher Education], 6(3), 111-124.
- Leech, N. L., Barrett, K. C., & Morgan, G. A. (2005). *SPSS for intermediate statistics: Use and interpretation*. NJ: Lawrence Erlbaum Associates, Inc.
- MEB. (2018). T.C. Millî Eğitim Bakanlığı öğretim programı. Ankara-2018. Retrieved March 10, 2023, from <Http://Mufredat.Meb.Gov.Tr/Programlar.AspX>
- MEB. (2023). Fatih projesi. Retrieved March 05, 2023, from <Http://Fatihprojesi.Meb.Gov.Tr/>
- Miller, R. G. (1969). *Simultaneous statistical inference*. New York: Mcgraw-Hill.
- Ozdamar, K. (2017). Eğitim, sağlık ve davranış bilimlerinde ölçek ve test geliştirme yapısal eşitlik modellemesi- Ibm Spss, Ibm Spss Amos ve Minitab uygulamalı. [Development Structural Equation Modeling in Education, Health and Behavioral Sciences- Ibm Spss, Ibm Spss Amos and Minitab Applied] Eskişehir: Nisan.
- Ozerbas, M. A., & Kuralbayeva, A. (2018). Türkiye ve Kazakistan öğretmen adaylarının dijital okuryazarlık düzeylerinin değerlendirilmesi [A review of digital literacy levels of future primary-school and secondary-school teachers in Turkey and Kazakhstan]. *Muğla Sıtkı Koçman Üniversitesi Eğitim Fakültesi Dergisi* [MSKU Journal of Education] 5(1), 16-25. <https://doi.org/10.21666/muefd.314761>
- Ozsevgec, T., Batman, D., Yazar, E., & Yigit, N. (2014). Öğretmen adaylarının teknolojik terim farkındalıklarının belirlenmesi [Determining the technological terms awareness of pre-service teachers]. *Eğitim ve Bilim* [Education and Science], 39(173), 234-248.
- Parlak Yılmaz, N. (2011). Evaluation of the technology integration process in the Turkish education system. *Contemporary Educational Technology*, 2(1), 37-54.
- Sim, J., & Wright, C. (2002). *Research in health care: Concepts, designs and methods*. United Kingdom, Cheltenham: Nelson Thornes Ltd.
- Sahin, M. C., & Namli, N. A. (2019). Öğretmen adaylarının eğitimde teknoloji kullanma tutumlarının incelenmesi [Attitudes of pre-service teachers' on technology use in education: Çukurova University sample]. *Türkiye Sosyal Araştırmalar Dergisi* [The Journal of Turkish Social Research], 23(1), 95-112.
- Sencan, H. (2005). Sosyal ve davranışsal ölçümlerde güvenilirlik ve geçerlilik [Reliability and validity in social and behavioral measurements]. Ankara: Seckin Yayıncılık. [Seckin Publisher].
- Tabachnick, B. G., & Fidell, L. S. (1989). *Using multivariate statistics*. (2nd Edition). Cambridge: Harper And Row.
- Tan, S. (2016). *Spss ve Excel uygulamalı temel istatistik I*. [Spss and Excel applied basic statistics] Ankara: Pegem Akademi [Pegem Academy].
- Tavsancil, E. (2010). Tutumların ölçülmesi ve spss ile veri analizi [Measuring attitudes and data analysis with spss]. Ankara: Nobel Yayın Dağıtım [Nobel Publisher].
- Timur, S., Timur, B., Arcagok, S., & Ozturk, G. (2020). Fen bilimleri öğretmenlerinin web 2.0 araçlarına yönelik görüşleri [Views of science teachers on web 2.0 tools]. *Journal of Kirsehir Education Faculty*, 21(1), 63-108. <https://doi.org/10.29299/kefad.2020.21.01.003>
- Top, E., Yukselturk, E., & Cakir, R. (2011). Gender and web 2.0 technology awareness among ict teachers. *British Journal of Educational Technology*, 42(5), E106-E109 <https://doi.org/10.1111/j.1467-8535.2011.01208.x>
- Toyon, M. (2023). Introduction to research: Mastering the basics. *Scholars Journal of Research in Social Science*, 3(1), 1-24. <https://doi.org/10.5281/zenodo.772471>
- YÖK. (2018). Yükseköğretim kurumu yeni öğretmen yetiştirme lisans programları. Retrieved March 10, 2023, from <https://www.Yok.Gov.Tr/Kurumsal/Idari-Birimler/Egitim-Ogretim-Dairesi/Yeni-Ogretmen-Yetistirme-Lisans-Programlari>.

## Notes

### *Disclosure of conflicts of interest*

The author declares that no perceived, potential, or actual conflict of interest exists.

*Funding/Sponsorship*

The authors confirm that no financial support was received and that the author is not affiliated or associated with any organization or entity with a financial or non-financial interest in the subject matter or materials discussed in this manuscript.

*Scientific ethics declaration*

The purposes and procedures of the current study were granted approval from the ethical committee of the Gazi University (19.10.2021 / E-77082166-302.08.01- 253769).

**Appendix**

Web 2.0 tools awareness scale in English and Turkish version

<b>WEB 2.0 TOOLS AWARENESS SCALE</b>			
Dear pre-service teachers; Please tick the blank (yes-no idea-no) that represents your opinion after reading each statement on the scale. Please do not hesitate to ask if there is an item that is not understood. You can leave work whenever you want. In order for the research to yield valid and reliable results, it is important that you give sincere answers to the statements. Thank you for your contribution.	Yes	No idea	No
1. Learning does not occur in courses where Web 2.0 tools are used.			
2. Web 2.0 tools can be used for video conference calls.			
3. The use of Web 2.0 tools distracts students in the lessons.			
4. Web 2.0 tools can be used to create animations.			
5. Web 2.0 tools can be used to create concept maps.			
6. Web 2.0 tools can be used to create posters.			
7. Web 2.0 tools reduce the student's motivation for the lesson.			
8. The use of Web 2.0 tools causes a waste of time in the lesson.			
9. Web 2.0 tools can be used to prepare presentations.			
10. Web 2.0 tools can be used to create virtual classrooms.			
11. The use of Web 2.0 tools in the classroom causes communication problems.			
12. Web 2.0 tools should be chosen according to their intended use.			
13. The use of Web 2.0 tools in the classroom positively affects communication.			
14. Web 2.0 tools can be used to create and edit videos.			
15. Web 2.0 tools can be used to create puzzles.			
16. Web 2.0 tools can be used to create augmented reality materials.			
17. Web 2.0 tools can be used to ensure cooperation among students.			
18. The use of Web 2.0 tools negatively affects classroom dominance during the lesson.			

<b>WEB 2.0 ARAÇLARI FARKINDALIK ÖLÇEĞİ</b>			
Değerli öğretmen adayları; Lütfen ölçekte bulunan her ifadeyi okuduktan sonra fikrinizi temsil eden boşluğu (evet-fikrim yok - hayır ) işaretleyiniz. Anlaşılmayan bir madde olduğunda lütfen sormaktan çekinmeyiniz. İstedığınız zaman çalışmadan ayrılabilirsiniz. Araştırmanın geçerli ve güvenilir sonuçlar verebilmesi için ifadelere samimi yanıtlar vermeniz önem taşımaktadır. Katkılarınızdan dolayı teşekkür ederiz.	EYET	FIKRİM YOK	HAYIR
1. Web 2.0 araçlarının kullanıldığı derslerde öğrenme gerçekleşmez.			
2. Web 2.0 araçları, video konferans görüşmeleri için kullanılabilir.			
3. Web 2.0 araçlarının kullanımı derslerde öğrenci dikkatini dağıtır.			
4. Animasyon oluşturmak için Web 2.0 araçları kullanılabilir.			
5. Web 2.0 araçları, kavram haritası hazırlamak için kullanılabilir.			
6. Web 2.0 araçları, poster hazırlamak için kullanılabilir.			

7. Web 2.0 araçları, öğrencinin derse yönelik motivasyonunu azaltır.			
8. Web 2.0 araçlarının kullanılması derste zaman kaybına yol açar.			
9. Web 2.0 araçları, sunum hazırlamak için kullanılabilir.			
10. Web 2.0 araçları, sanal sınıf oluşturmak için kullanılabilir.			
11. Web 2.0 araçlarının sınıf içi kullanımı, iletişim problemi yaşanmasına sebep olur.			
12. Web 2.0 araçları, kullanım amacına uygun olarak seçilmelidir.			
13. Web 2.0 araçlarının sınıf içi kullanımı iletişimi olumlu etkiler.			
14. Video oluşturma ve düzenlemek için Web 2.0 araçları kullanılabilir.			
15. Web 2.0 araçları, bulmaca hazırlamak için kullanılabilir.			
16. Web 2.0 araçları, artırılmış gerçeklik materyalleri oluşturmak için kullanılabilir.			
17. Öğrenciler arasındaki işbirliğini sağlamak amacıyla Web 2.0 araçları kullanılabilir.			
18. Web 2.0 araçlarının kullanılması ders esnasında sınıf hâkimiyetini olumsuz etkiler.			

### Publishers Note

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>) with the journal retaining first publication rights. Publisher stays neutral with regard to jurisdictional claims in published maps and institutional affiliation. The publisher makes every effort to guarantee that all information (the 'Content') contained in the publications is accurately represented. This implies that the Publisher and all of its representatives — including the editor and other editorial board members — make no claims or guarantees about the Content's accuracy, completeness, or appropriateness for any purpose. It should be noted that the authors' views and opinions expressed in this publication are their own and not those of the Publisher. As a result, the content should be checked against main sources of information. The publisher disclaims all responsibility for any losses or damages resulting from the use of the content, whether direct or indirect.