Participatory Educational Research (PER)
Vol. 7(3), pp. 124-138, December 2020
Available online at http://www.perjournal.com
ISSN: 2148-6123
http://dx.doi.org/10.17275/per.20.38.7.3

Developing a Scale to Assess Teachers' Perceptions towards Using Web 2.0 Tools in Lectures (TPUWL Scale)

Bekir Yıldırım*
Faculty of Education, Muş Alparslan University, Muş, Turkey,
ORCID: 0000-0002-5374-4025

Adem Akkuş
Faculty of Education, Muş Alparslan University, Muş, Turkey,
ORCID: 0000-0001-9570-3582

Article history

Received:
05.04.2020

Received in revised form:
29.05.2020

Accepted:
23.06.2020

Key words:
Web 2.0 tools;
teacher;
scale;
perception

Web 2.0 tools are the tools helping individuals share information online. Although there are scales which determine the opinions of teachers on using web 2.0 tools there is no scale developed to determine the perceptions of teachers towards using Web 2.0 tools. Thus, aim of this research was to develop a scale to assess the teachers' perceptions related to using Web 2.0 tools at lectures (TPUWL) and determine the factors affecting the perception of teachers. For scale development purpose data was gathered from 240 teachers. Exploratory factor analyses were carried out to find out the structure of the TPUWL. Analyses revealed that TPUWL's structure had two factors. First factor had 12 items and was entitled "Perception towards Using" while second factor had 10 items and was called "Professional Competence Perception". For confirmatory factor analyses data was gathered from 220 teachers. Thereupon, total sample of the study consisted of 460 teachers. Data analyses revealed that TPUWL scale is a reliable and valid assessment tool. Scale's Cronbach's alpha reliability coefficient was found as .95. After confirming the validity and reliability of the scale, analyses were carried out to determine the factors which might affect the teachers' perceptions on using Web 2.0 tools with respect to age, education level, experience and gender factors. Analyses revealed that age, education level and experience factors had no statistically significant effect on teachers' perception toward using Web 2.0 tools. On the other hand, it was revealed by the study that gender factor had a statistically significant effect on the perception. As a consequence, it was determined by the researchers that TPUWL is a useful scale to determine the teachers' perception towards using Web 2.0 tools in lectures.

Introduction

Rapid changes in technology have caused dramatic changes on informatics sciences. As a result, different tools have been developed for users to access data and to use the data interactively. Web 2.0 is one of the tools developed for that purpose. The term was first

* Correspondency: bekir58bekir@gmail.com

defined by Tim O'Reilly in 2004 (O'Reilly, 2005). Web 2.0 tools are the new generation of the web tools helping individuals to participate in the process of sharing information, commenting on information and interacting with other individuals (Ajjan & Hartshorne, 2008; Horzum, 2010; O'reilly, 2005; Korucu & Çakır, 2015). Web 2.0 tools include blogging, poster and concept map creations, assessment and evaluation tools, interaction on social networks, creating and editing videos (Aybat & Doğan, 2017). Web 2.0 tools are also used in education due to their interactive features. Those features help students to acquire positive skills that enable meaningful learning, permanent learning, problem solving skills, critical thinking and working cooperatively (Korucu & Yücel, 2015).

Studies indicate that the increasing trend of using web 2.0 tools creates a harmony between the individuals and assist them in sharing knowledge among themselves (Yan, Zha & Yan, 2014). Even local governments use web 2.0 to share information and in return citizens shape the politicians' ideas (Rodriguez Bolivar, 2017). Such dramatic effects of web 2.0 tools naturally paved the way for their being situated in educational settings and hence researchers tried to determine the attitudes of teacher candidates towards using web 2.0 tools (Eyyam, Meneviş & Doğruer, 2011). Other researchers tried to study the perceptions of students on the effectiveness of web 2.0 tools in higher education (Venkatesh, Croteau & Rabah, 2014) while some of the researchers tried to determine the effect of gender on using web 2.0 tools in higher education (Huang, Hood & Yoo, 2013).

Upon the integration of Web 2.0 tools into educational settings and with the integration of technology, teachers have become responsible agents of using those technologies (Akpınar, 2003). Due to those responsibilities teachers should have the necessary qualifications to use Web 2.0 tools. On the other hand, studies show that teachers lack enough efficiency in using Web 2.0 tools. (Blannin, 2015). For more efficient teaching, training on Web 2.0 tools should be given to teachers. But prior to the planning of such training sessions, having knowledge upon the perception of teachers on using Web 2.0 tools is important. That said, perceptions might be a subjective case. Thence, ideas pertaining to the notions of "right" and "wrong" might differ for each individual (Friman, 1999). Thusly researchers have to determine the different factors affecting the individuals' perceptions and assess these accordingly. In light of these, since perceptions might change through experiences, it is crucial to give training on web 2.0 tools and train teachers to use the tools efficiently. Here again, so as to be able to create experiences the need of knowing an individual's perception is essential. Literature already outputs that different measurement tools, such as scales, are being continuously used to determine the attitudes of individuals. In fact, different scales are being used to assess the attitudes of teachers (Birişçi et.al., 2018; Horzum & Aydemir, 2014; Madden, Ellen & Ajzen, 1992) in this regard. Several researchers tried to reveal in particular teachers' opinions related to using Web 2.0 tools. On the other hand, within our knowledge, there is not a scale developed to determine the perceptions of teachers' towards using Web 2.0 tools, (Anyanwu, 2012; Faize, Chiheb, & Ee Afia, 2015; Yuen, Yaoyuneyong, &Yuen, 2011; Zelick, 2013). Since no scale has been developed for assessing teachers' perceptions towards usage of web 2.0 tools, purpose of this study is to develop a scale to assess teachers' perception towards usage of web 2.0 tools and developing a scale to determine the effect of age, education level, experience and gender factors on perception of the teachers.

Method

Methodological research design is applied for the study to develop TPUWL scale since it is useful in sustaining data quality and also it is an appropriate approach in survey

development or scale adaptation studies (Madans, 2001).

Participants

Study was carried out with two different groups and finalized within two months. The first study group consisted of 240 teachers, and the second group consisted of 220 teachers. The exploratory factor analysis (EFA) of the adapted scale was conducted via the data obtained from the first group. The confirmatory factor analysis (CFA) was implemented from the data of the second study group. The current study used differences of the two samples since repeating the study or re-doing the exploratory factor analysis or conducting a confirmatory factor analysis, or conducting two successive confirmatory factor analyses only with a sample may not validate the proposed structure (Yıldırım, 2018). To validate the proposed structure demographics of the two samples are selected as closely as possible to each other. Table 1 shows the demographic characteristics of the two study groups (samples).

Table 1. Demographic Characteristics of Science Teachers for Two Analyses

		First Study Group		Second Study Group	
		N	%	N	%
Gender	Male	59	24.58	55	25
	Female	181	75.42	165	75
Age	20-30 years	91	37.92	82	37.27
	31-40 years	109	45.42	101	45.91
	41- or more years	40	16.66	37	16.82
Experience	0-10 years	135	56.25	124	56.36
	11-20 years	86	35.83	79	35.91
	21-or more years	19	7.92	17	7.73
Educational Level	Bachelor	176	73.33	163	74.09
	Postgraduate	54	22.50	49	22.27
	Doctorate	10	4.17	8	3.64

It is clear from Table 1 that teachers who are the sample of the study are mostly women, aged between 31-40, with experiences of 0-10 years and nearly a quarter of them have masters and few of them have PhD degrees.

Development of the TPUWL Scale

Taking a glance at the relevant literature five steps are followed to develop TPUWL scale to assess teachers' perceptions towards using web 2.0 tools in the lectures (Anyanwu, 2012; Horzum & Aydemir, 2014; Yuen, Yaoyuneyong, &Yuen, 2011; Zelick, 2013). Those steps are indicated in the Table 2.

Table 2. TPUWL Scale Development Steps

Step	Procedure
Step 1	Extensive literature review on web 2.0 tools was conducted
Step 2	Interviews conducted with 12 teachers whose opinions were asked through open ended questions on web 2.0 tools
Step 3	TPUWL scale was developed with 30 items having two themes; Perception towards Using (PU) and Professional Competence Perception (PCP)
Step 4	TPUWL scale was shared with three experts with a view to obtaining their opinions and taking these into consideration
Step 5	Draft TPUWL was administrated to 10 teachers. Finalized version consisted of 22 items which are rated on a 5-point scale and administered to 460 teachers.

Data analysis

EFA and CFA were performed for data analyses of the TPUWL scale. 240 teachers were selected for exploratory factor analysis. Their responses to the TPUWL Scale were analyzed via SPSS 22TM software and the results of factor analysis and reliability were obtained. CFA was performed after the item and factor structure of the TPUWL scale was determined. Data from a second sample group (220 teachers) was obtained for confirmatory factor analysis. Both EFA and CFA were applied for the data obtained from study group for the TPUWL scale. Rating of the scale was determined as "good" since the total number of sample group is consisted of 460 teachers (Comrey & Lee, 1992, p. 217). Additionally, literature suggests that sample size should be five to ten times larger than the number of items (Tavşancil, 2002), and since the present study's sample size was ten times larger than the number of items, it is thought that sampling is good enough to carry out factor analysis. Employing an orthogonal rotation strategy with varimax rotation technique helps researchers to interpret the results easily. To that end, using a varimax rotation for factor analysis considered logical for the current study and hence varimax rotation was used for factor analysis (Kieffer, 1998). For the confirmatory factor analysis, GFI, AGFI, RMSEA, CFI, SRMR, IFI and NFI were calculated.

Findings

Final version of TPUWL scale was applied to 240 teachers for EFA. For CFA data were collected from 220 teachers. Both EFA and CFA results are indicated in the next section.

Findings on Scale's Validity

Exploratory factor analysis

Kaiser-Meyer-Olkin (KMO) and Barlett tests were utilized to determine whether the data fit for EFA or not. The KMO value of 22 items was calculated as .94 and the Bartlett test result was found to be significant ($\chi 2 = 3431.326$, df=231, $p < .05$). The results indicated that the data were appropriate for factor analysis since KMO coefficient was greater than 0.60 and the Bartlett test was significant (Büyüköztürk, 2006). Therefore, it is concluded that the data from Turkish science teachers were appropriate to run an EFA. EFA and the factor loadings of the items were conducted with the first study group to determine the factorial status of the scale.

Varimax analysis was performed for the TPUWL scale. Kaiser (1960) recommends considering the eigenvalues which are equal or greater than one (1) in choosing the factors. The results of the varimax analysis revealed that two factors have an eigenvalue greater than 1 for the TPUWL scale. This meant that the TPUWL scale had a two-factor structure. Scree plot results for the TPUWL scale are given in Figure 1.

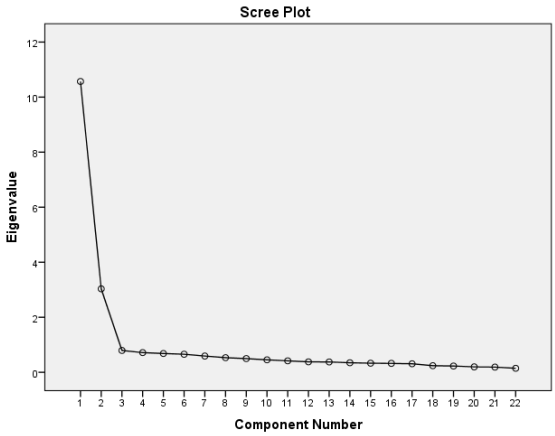

Figure 1. Scatter Graph

The results of the Exploratory Factor Analyis of the TPUWL scale are presented in Table 3.

Table 3. Results of the EFA of the TPUWL scale

Items No	Items	M	SD	Factor Load.	Com. (h2)	Var.
	Perception towards Using (PU) (12 items)					
26	Web 2.0 tools increase technology literacy	4.41	.715	.819	.723	
24	Web 2.0 tools help courses to be fun	4.48	.696	.815	.724	
33	Usage of Web 2.0 tools in an education environment is important	4.38	.712	.712	.687	
32	Web 2.0 tools offer an interactive learning environment	4.44	.660	.793	.664	
22	Web 2.0 tools appeal more than one sense	4.35	.713	.787	.669	
23	Web 2.0 tools provide permanent learning	4.17	.716	.756	.612	
13	Web 2.0 tools provide rich learning environments for the students	4.31	.739	.743	.587	
27	Web 2.0 tools allow the teachers and students to share music, pictures and videos.	4.33	.696	.727	.570	
10	Web 2.0 tools increase creativity of students	4.28	.692	.721	.602	
25	Web 2.0 tools provide concrete learning	4.16	.760	.705	.532	
15	Web 2.0 tools increase attention of students towards courses	4.26	.712	.702	.555	
8	Web 2.0 tools are effective on gaining skills required for professional life	4.18	.748	.569	.425	
	Professional Competence Perception (PCP) (10 items)					
12	I can prepare educational materials related to Web 2.0 tools	3.59	.873	.824	.706	
1	I can use Web 2.0 tools effectively	3.85	.879	.815	.698	
5	I have enough information on Web 2.0 tools	3.28	.936	.805	.661	
3	I can integrate Web 2.0 tools into my lesson plans	3.57	.817	.761	.594	
20	I know how to use Web 2.0 tools at lectures	3.75	.864	.757	.653	
2	I can assess and evaluate student learning via Web 2.0 tools	3.85	.806	.740	.640	
4	I can guess which one of the Web 2.0 tools is appropriate to students' level	3.81	.783	.731	.600	
17	I can answer students' questions related to Web 2.0 tools	3.59	.874	.717	.585	
11	I can integrate Web 2.0 tools into learning and instruction process.	3.92	.791	.684	.635	
37	I follow the developments on Web 2.0 tools	3.78	.943	.635	.477	

The percentages of the ranked variance quantities for PU, and Professional Competence Perception (PCP) were 48.035 and 13.783 respectively. These two factors share 61.818% of the total variance of the TPUWL scale. 12 items emerged under PU (factor loads of each item are between .569 and .819) and 10 items emerged under PCP (factor loads of each item are

between .635 and .824).

Confirmatory factor analysis

CFA results of the TPUWL scale are shown in Figure 2.

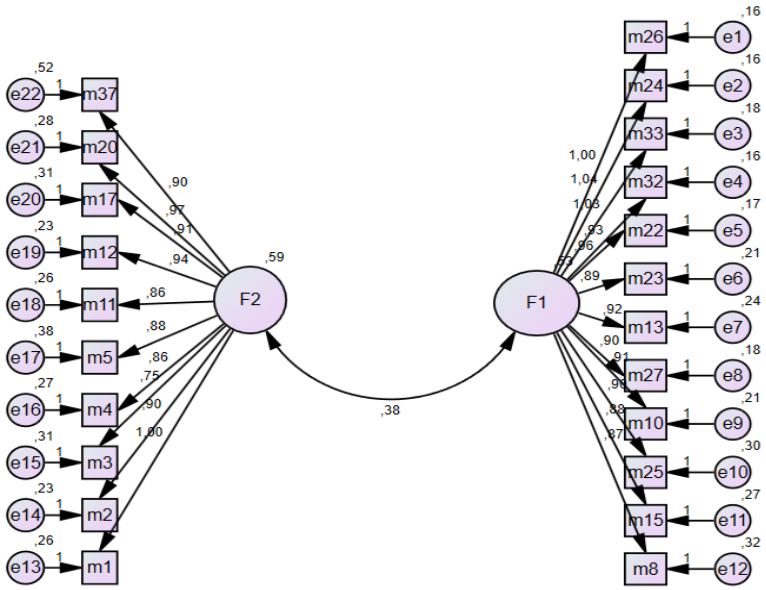

Figure 2. CFA results of the TPUWL scale

The model conformity of the TPUWL Scale were tested by criteria such as GFI, AGFI, RMSEA, CFI, SRMR, and NFI (Kılıç & Şen, 2014). Chi-square (χ2), χ2/SD, RMSEA, GFI and AGFI are commonly used in confirmatory factor analysis. In large samples, calculated χ2/df ratio can also be used as a criterion for conformity adequacy. If calculated Chi-square (χ2)/degree of freedom (df) ratio is smaller than 3, it can be regarded as good fit; and if χ2/df ratio is smaller than 5, it can be regarded as sufficient (Yıldırım & Selvi, 2015).

The findings showed that model data had a good fit since AGFI and GFI values were greater than 0.90 (Hooper, Coughlan, & Mullen, 2008), IFI value was greater than 0.95 (Baumgartner & Homburg, 1996; Bentler, 1980), RMSEA value was smaller than 0.05 (Jöreskog & Sörbom, 1993). Model data fit is acceptable since AGFI > 0.80; GFI > 0.85 and both the RMSEA and RMR values > 0.080 (Anderson & Gerbing, 1984; Hu & Bentler, 1999). The confirmatory factor analysis results of the TPUWL scale are shown in Table 4.

Table 4. Fit Indices of TPUWL scale

Chi Square	p-value	CFI	NFI	GFI	AGFI	IFI	SRMR	RMSEA
2.025	.00	.94	.90	.85	.81	.94	.040	.072

CFA results highly confirmed the structural equation and scale model. Chi-square value is highly affected by sample size and when sample size is good enough, probability of getting significant results increases. Chi-square value of the CFA was found significant which also indicated that sample size is good enough. Since χ2 and df ratio is lower than 3, it might be said that model data fit is high. Additionally, IFI, CFI and NFI indicated that model-data fit is high since their values exceeds 0.90 and, RMSEA value was found as 0.0072 where AGFI and GFI also exceeded 0.80 and 0.85 in respective order. Results of CFA of TPUWL scale confirmed that scale has two sub-dimensions along with high model-data fit.

Item Factor Correlations

Table 5. Item Factor Correlations

Factor 1: PU (12 items)		Factor 2: PCP (10 items)	
Items	Item-total correlation	Items	Item-total correlation
I26	.713	I12	.656
I24	.721	I1	.662
I33	.663	I5	.605
I32	.659	I3	.575
I22	.684	I20	.695
I23	.647	I2	.699
I13	.623	I4	.655
I27	.624	I17	.655
I10	.681	I11	.738
I25	.596	I37	.598
I15	.639		
I8	.592		

**= p< .001

The results indicated that the TPUWL scale's item-total correlation values range between .575 and .738. These values indicate that each item is appropriate to be used in the TPUWL scale (Field, 2009; Büyüköztürk, 2006).

Item Discrimination

Table 6. Item Discrimination

Factor 1: PU (12 items)		Factor 2: PCP (10 items)	
Items	t-value (bottom 27%, top 27%)	Items	t-value (bottom 27%, top 27%)
I26	11.380**	I12	11.648**
I24	9.880**	I1	11.544**
I33	8.849**	I5	10.534**
I32	8.555**	I3	8.995**
I22	10.573**	I20	11.900**
I23	10.846**	I2	10.883**
I13	8.750**	I4	9.966**
I27	8.562**	I17	11.005**
I10	9.802**	I11	12.636**
I25	9.111**	I37	9.768**
I15	9.955**		
I8	9.476**		

** The results of the t-value comparing the 27% bottom-top of the students show that there is a significant difference in scores for all items (Wiersma & Jurs, 1990).

Independent group samples t-test was applied to compare the total scores of bottom (27%) and top (27%) groups on each item and evaluate the significant differences for all items between the groups. Also, correlation between TPUWL scale and its subscales was examined to determine their relationship(s) with each other.

Table 7. Correlation of TPUWL Scale with subscales

	TPUWL Scale	PU	PCP
TPUWL Scale	-		
PU	.90	-	
PCP	.86	.56	-

* P<.01

Correlation between TPUWL and its subscales are shown in Table 7. It is revealed by the data that scale has significant positive relation with its subscales.

Findings on Scale's Reliability

Every analysis case was examined to determine the reliability of the scale. To develop TPUWL scale data were gathered from 240 teachers and an internal reliability analysis was carried out. Results of analyses for each factor are indicated in Table 8.

Table 8. Internal consistency values of the TPUWL scale

Construct	Cronbach's α
TPUWL Scale	.95
Perception towards Using (PU)	.93
Professional Competence Perception (PCP)	.94

The Cronbach's Alpha values for the entire TPUWL scale, PU, and PCP were found to be .95, .93, and .94 respectively. To confirm the reliability of TPUWL scale a second set of data were gathered from 220 teachers and an internal reliability analysis was carried out. Results of analyses for each factor are indicated in Table 9.

Table 9. Internal consistency values of the TPUWL scale

Construct	Cronbach's α
TPUWL Scale	.96
Perception towards Using (PU)	.94
Professional Competence Perception (PCP)	.96

As shown in Table 8 and Table 9, Cronbach Alpha values of the TPUWL scale and its subscales were greater than 0.70 (Tavşancıl, 2002), meaning that both overall scale and factor structures of scale have good reliability coefficients.

Findings on Scale's Stability

Stability of the scale was analysed through the data obtained during two different time intervals. Stability of the scale was shown in Table 10 with respect to Cronbach's Alpha (α), Correlation Between Forms (CBF), Spearman-Brown Coefficient (SBC), Guttman Split-Half Coefficient (GSHC) values for factors and overall scale.

Table 10. Stability of Scale

	Interval I				Interval II			
	α	CBF	SBC	GSHC	α	CBF	SBC	GSHC
PCP	,960	,894	,944	,944	,940	,863	,926	,926
PU	,940	,865	,928	,927	,960	,897	,945	,945
Overall	,961	,663	,797	,797	,962	,676	,807	,807

Data in Table 10 reveals that overall scale which consists of 22 items and two factors has

stability values for Interval I; .961 for Cronbach's Alpha; .663 for Correlation Between Forms; .797 for Spearman-Brown Coefficient and .797for Guttman Split-Half Coefficient. Stability values for the "Perception towards Using" factor are .940 for Cronbach's Alpha; .865 for Correlation Between Forms; .928 for Spearman-Brown Coefficient and .927 Guttman Split-Half Coefficient. Stability values for the "Professional Competence Perception" factor are .960 for Cronbach's Alpha; .894 for Correlation Between Forms; .944 for Spearman-Brown Coefficient and .944 Guttman Split-Half Coefficient.

Indicated values for Interval II are; 962 for Cronbach's Alpha; .676 for Correlation Between Forms; .807 for Spearman-Brown Coefficient and .807 for Guttman Split-Half Coefficient. Stability values for the "Perception towards Using" factor are .960 for Cronbach's Alpha; .897 for Correlation Between Forms; .945 for Spearman-Brown Coefficient and .945 Guttman Split-Half Coefficient. Stability values for the "Professional Competence Perception" factor are .940 for Cronbach's Alpha; .863 for Correlation Between Forms; .926 for Spearman-Brown Coefficient and .926 Guttman Split-Half Coefficient.

Findings on Scale's Correlation Values

Table 11. Pearson correlation between scale and factors

	TPUWL Scale	PU	PCP
TPUWL Scale	1	.917*	.899*
PU	.917*	1	.633*
PCP	.899*	.633*	1

Pearson product moment correlation analysis was applied to examine the relationship between the scale and the factors. Analysis has revealed that there is a positive and significant relationship between the scale and factors. Significance level of TUPWL and sub-scales is determined by .01 and correlation degrees are taken into account when determining the correlation of the scale with its subscales. A 1.00-0.70 value indicates high correlation; .070-0.30 indicates medium correlation; 0.30-.0.00 value indicates low correlation (Büyüköztürk, 2005). These results suggest that there is a high probability of an individual who gets a high score from a subscale will also get a high score from overall scale or vice versa. On this aspect, comparative analyses were carried out with respect to total scores obtained from the scale.

ANOVA and t-test results for the sample group with respect to age, education level, experience and gender are given in the tables shown below for TPUWL scale scores.

Table 12. ANOVA Results of TPUWL Scale with respect to age

	Sum of Squares	df	Mean square	f	p
Between groups	185.967	2	92.984	.481	.619
Within groups	41959.669	217	193.363		
Total	42145.636	219			

Data in Table 12 reveals that there is no significant relationship ($F(2, 217)= .481$, $p>.05$) between age and perception of teachers towards usage of Web 2.0 tools. This result draws the conclusion that teachers' perceptions towards using Web 2.0 tools are not affected by age factor.

Table 13. ANOVA results of TPUWL Scale with respect to Education Level

	Sum of Squares	df	Mean square	f	p
Between groups	35.433	2	17.716	.091	.913
Within groups	42110.204	217	194.056		
Total	42145.636	219			

Data in Table 13 reveals that there is no significant relationship (F(2, 217)= .091, p>.05) between education level and perception of teachers towards usage of Web 2.0 tools. This result draws the conclusion that teachers' perceptions towards using Web 2.0 tools are not affected by education level factor.

Table 14. ANOVA results of TPUWL Scale with respect to Experience

	Sum of Squares	df	Mean square	f	p
Between groups	90.239	2	45.120	.233	.793
Within groups	42055.397	217	193.804		
Total	42145.636	219			

Data in Table 14 reveals that there is no significant relationship (F(2, 217)= .233, p>.05) between experience and perception of teachers towards usage of Web 2.0 tools. This result draws the conclusion that teachers' perception towards using Web 2.0 tools are not affected by experience factor.

Table 15. T-test results of TPUWL Scale with respect to Gender

Gender	n	x	s	sd	t	p
Male	55	83.96	17.11	218	2.347	.020
Female	165	88.98	12.41			

Data in Table 15 reveals that there is a significant relationship (t(218)= 2.347, p<..05) between gender and perception of teachers towards usage of Web 2.0 tools. This result, in light of descriptive statistics shown in Table 9, points to the fact that teachers' perceptions towards using Web 2.0 tools are affected by gender factor and female teachers have more positive perceptions than male teachers.

Discussion and Conclusion

The aim of this study is to develop "a scale to determine teachers' perceptions towards usage of web 2.0 tools" and to reveal the factors which affect these perceptions towards using Web 2.0 tools. First aim of the study is fulfilled since "determining teachers' perceptions on using Web 2.0 tools" scale is developed. Validity and reliability analyses of the TPUWL scale were carried out through two different samples which consisted of 460 teachers in total. Varimax results analyses indicated that two factors emerged for the TPUWL scale. Briggs & Cheek (1986) point out that similarity of items which present themselves under a structure could be named through the factor name. Similarly, Williams, Onsman & Brown (2010) argue that a meaningful induction of items under a factor structure could be named by the studies. Through the analyses it was understood that the items represent the image of teachers related to the process of Web 2.0 tools and their meaning in educational settings assembly under a structure. Whence, researchers of this study determined that the items under this factor structure could be named as Perception towards Using (PU) for the first factor since items under this factor mostly present perceptions of teachers towards using the Web 2.0 tools. However, items under the second factor mostly present the job related attributes and

competence related to profession. Hence, the second factor was named as Professional Competence Perception (PCP).

Those factors are named as PU and PCP. Shared variance by the factors was 61.818% and scale's internal consistency Cronbach's Alpha value was .95. Internal consistency Cronbach's Alpha value for PU determined as .93 for PU and .94 for PCP. Since reliable scales has internal consistency Cronach's Alpha value above the 0.80 then TPUWL scale is also confirmed as a reliable one (Field, 2009; Kline, 1999).

In Addition, CFA, CFI, IFI, and NFI had the values above 0.90, and indicated a high model–data fit (Hooper et al., 2008; Sümer, 2000). Likewise, the SRMR value (0.040) was above 0.05 and indicated a high model–data fit (Anderson & Gerbing, 1984; Sümer, 2000; Hu & Bentler, 1999). RMSEA value (0.072) was less than 0.08, indicating that model–data fit was acceptable (Anderson & Gerbing, 1984; Hooper et al., 2008; Jöreskog&Sörbom, 1993; Sümer, 2000; Hu & Bentler, 1999). In summary, the results of confirmatory factor analyses showed that TPUWL scale has two-factor structure and high model-data compatibility (Anderson & Gerbing, 1984). All these results indicated a valid and reliable TPUWL scale.

The second purpose of the study was to determine factors which affect teachers' perceptions. Thus, teachers' perceptions towards using Web 2.0 tools are analysed with respect to age, education level, experience and gender factors. Data analyses revealed that teachers' perceptions are not affected significantly by the factors of age, education level and experience. Almekhlafi and Abulibdeh (2018) also revealed that K-12 teachers' perceptions towards using Web 2.0 tools are not affected by the experience of teachers. Thus, results of this study, on this perspective, are consisted with these results. There are similar results shared in the literature (Lekan Kamil, 2014). On the other hand, literature also reveals opposing results with respect to age, experience and education level towards using Web 2.0 tools. For example, Horzum (2010) analysed the effect of experience with as to factors such as having knowledge upon the Web 2.0 tools, usage frequency, and purpose of usage. The results announced that usage of Web 2.0 tools and experience factors are related which contradict with the results of this study. In a similar vein, Soomro, Zai and Jafri (2015) pronounced that perceptions towards using Web 2.0 tools are affected by age. Another study by Batsila, Tsihouridis, Vavougios and Ioannidis (2015) showed perceptions towards usage of Web 2.0 tools are impacted by experience. These results contradict with our results.

The findings pertinent to the second purpose of the study revealed that perceptions towards using Web 2.0 tools are affected by gender factor. Similar results are also indicated in the literature. For example, Horzum (2010) declares knowledge upon usage of Web 2.0 tools, usage frequency and usage purpose are affected by gender factor which complies with the results of our study. Soomro, Zai and Jafri (2015) used a different approach and questioned usage and competency on Web 2.0 tools in the faculties. The related results indicated gender has influence on the usage. Batsila, Tsihouridis, Vavougios and Ioannidis (2015) also stated gender is effective on the usage of Web 2.0 tools. Zelick (2013) analysed academicians' perceptions on usage of Web 2.0 tools and pinpointed that these are affected by gender factor. Although studies mentioned above show similar results to those of our study, literature also indicates contradicting study results about gender factor. For example, Özerbaş and Mart (2017) studied English teacher candidates' perceptions towards usage of Web 2.0 tools and they did not detect any significant effect of gender on perceptions related to the usage of Web 2.0 tools. In a similar fashion, Almekhlafi and Abulibdeh (2018)'s study found out no effect of gender on K-12 teachers' perceptions towards using Web 2.0 tools.

Due to Covid-19 an emergency lockdown has been put in effect around the world almost by all of the countries (Dunford, Dale, Stylianou, Lowther, Ahmed & Torre Arenas, 2020). A similar approach adopted by Turkey and hence immediate precautions were taken account. For instance, on 12 March 2020 minister of Ministry of National Education has announced both on Periscope TV and Twitter that all the schools in the country will continue their education through distance education (MEB, 2020a), and Council of Higher Education stopped face to face course instruction on 13 March 2020 for universities (CHE, 2020). Even recently, President of the Republic of Turkey had a live meeting on 26 June 2020 with high school students on YouTube channel (TCBB, 2020). Such cases indicate that Web 2.0 tools used effectively by the states and officials, and as a consequence Web 2.0 tools have become an important subject for education settings and the states.

Taking a glance upon the Ministry of National Education's (MNE) distance education system will also enhance the comprehension of the importance of Web 2.0 tools within the education settings. MNE has announced that interactive courses will be taken through EBA TV (an online and interactive television-like software) which was developed by MNE for primary, elementary and high school levels. Lesson schedules were announced through EBA TV which has different portals for teachers, students, and parents (IETGD, 2020). Teachers were required to complete the missing lessons via EBA TV. Being unprepared to Covid-19 precautions and not having knowledge upon the Web 2.0 tools, some teachers used other platforms which in turn caused an official warning to the teachers by the MNE to use EBA TV. Consequently, school principals are required to establish and control EBA TV classrooms. That case naturally indicated that not only teachers need to have knowledge upon the Web 2.0 tools but also principals should (MEB, 2020b).

As a conclusion, it is believed that the importance of Web 2.0 tools for the states, teachers, principals and parents is critical. Thus, it is hoped that this study will enhance the contribution of the usage of Web 2.0 tools and related studies.

Limitations of the Study and Suggestions

This study aimed to develop a TPUWL scale to assess teachers' perceptions towards using Web 2.0 tools. Thus, the very study examined teachers' perceptions of using Web 2.0 tools based on factors of age, gender, education level and experience. A further study might be done to investigate whether branches (teaching areas) are influential in the development of perceptions or not. Reliability and validity of TPUWL might be assessed through different samples as well.

References

Ajjan, H., &Hartshorne, R. (2008). Investigating faculty decisions to adopt Web 2.0 technologies: Theory and empirical tests. *The Internet and Higher Education, 11* (2), 71-80. https://doi.org/10.1016/j.iheduc.2008.05.002

Akpınar, Y. (2003). Öğretmenlerin yeni bilgi teknolojileri kullanımında yükseköğretimin etkisi: İstanbul okulları örneği [The effects of higher education on teachers' use of new technologies: The Case of Schools in Istanbul]. *The Turkish Online Journal of Educational Technology, 2* (2), 79-96. http://www.tojet.net/articles/v2i2/2211.pdf

Almekhlafi, A.G., & Abulibdeh, E.S.A. (2018). K-12 teachers' perceptions of Web 2.0 applications in the United Arab Emirates. *Interactive Technology and Smart Education, 15* (3), 238-261. https://doi.org/10.1108/ITSE-11-2017-0060

Anderson, J. C., &Gerbing, D. W. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika, 49* (2), 155–173. DOI: https://doi.org/10.1007/BF02294170

Anyanwu, K. (2012). *Teachers' perception concerning use of web 2.0 applications following professional development*. (Unpublished Doctoral Dissertation). University of Houston. Texas.

Batsila, M., Tsihouridis, C., Vavougios, D., & Ioannidis, G. (2015). Factors that influence the application of web 2.0 based techniques for instructional purposes: A case study. *International Journal of Emerging Technologies in Learning, 10* (4), 15-21.http://dx.doi.org/10.3991/ijet.v10i4.4529

Baumgartner, H., & Homburg, C. (1996). Applications of structural equation modeling in marketing and consumer research: A review. *International Journal of Research in Marketing, 13* (2), 139-161.

Bentler, P.M. (1980). Multivariate analysis with latent variables: Causal modeling. *Annual Review of Psychology, 31*, 419-456.

Birişçi, S., Kul, Ü., Aksu, Z., Akaslan, D., & Çelik, S. (2018). Web 2.0 hızlı içerik geliştirme öz-yeterlik inancı belirlemeye yönelik ölçek (w2öyiö) geliştirme çalışması [A scale development study to determine web 2.0 practical content development self-efficacy belief (w2sebs)]. *Educational Technology Theory and Practice, 8* (1), 187-208. DOI: https://doi.org/10.17943/etku.335164

Blannin, J. (2015). The role of the teacher in primary school Web 2.0 use. *Contemporary Educational Technology*, *6* (3), 188–205. https://files.eric.ed.gov/fulltext/EJ1105760.pdf

Briggs, S.R. & Cheek, J.M. (1986). The role of factor analysis in the development and evaluation of personality scales. *Journal of Personality, 54* (1), 106-148. DOI: https://doi.org/10.1111/j.1467-6494.1986.tb00391.x

Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd Ed.). New York, NY: Guildford Press.

Büyüköztürk, Ş. (2006). *Sosyal bilimler için veri analizi el kitabı: İstatistik, araştırma deseni SPSS uygulamaları ve yorum* [Data analysis handbook for social sciences statistics: Research design SPSS practices and interpretation] (6th ed.). Ankara, Turkey: Pegem.

Council of Higher Education (CHE). *Koronavirüs (Covid-19) bilgilendirme notu: 1[Corona virus (Covid-19) information note: 1]*. Retrieved from: https://www.yok.gov.tr/Sayfalar/Haberler/2020/coronavirus_bilgilendirme_1.aspx

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis (2nd ed.).* Hillsdale, NJ: Erlbaum.

Dunford, D., Dale, B., Stylianou, N., Lowther, E., Ahmed, M. & Torre Arenas, I. (2020). *Coronavirus: The world in lockdown in maps and charts*. Retrieved from: https://www.bbc.com/news/world-52103747 28 June 2020

Eyyam, R., Meneviş, İ., Doğruer, N. (2011). Perceptions of teacher candidates towards web 2.0 technologies. *Procedia Social and Behavioral Sciences, 15*, 2663-2666. DOI: https://doi.org/10.1016/j.sbspro.2011.04.166

Faize, R., Chiheb, R., & Ee Afia, A. (2015). Students' perceptions towards using web 2.0 technologies in education. *International Journal of Emerging Technologies in Learning (IJET), 10* (6), 32-36. DOI: http://dx.doi.org/10.3991/ijet.v10i6.4858

Field, A. (2009). *Discovering statistics using SPSS (3nd ed.).* California: SAGE

Friman, H., (1999). Perception warfare: a perspective for the future. Retrieved from http://media.leeds.ac.uk/papers/pmt/exhibits/746/Friman(1999)PW.pdf

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modeling: Guidelines for determining model fit. *Journal of Business Research Methods, 6* (1), 53–60. Retrieved from http://www.ejbrm.com/issue/download.html?idArticle=183

Horzum, M. B. (2010). Investigating teachers' Web 2.0 tools awareness, frequency and purposes of usage in terms of different variables. *International Journal of Human Sciences (JHS), 7* (1), 603-634.

Horzum, M. B., & Aydemir, Z. (2014). Web 2.0 tools and educational usage self-efficacy: A scale development study. *Procedia-Social and Behavioral Sciences, 116*, 453-458.

Hu, L.-T., & Bentler, P. M. (1999). Cut off criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6* (1), 1–55. DOI: https://dx.doi.org/10.1080/10705519909540118

Huang, W-H. D., Hood, D.W., & Yoo, S.J. (2013). Gender divide and acceptance of collaborative web 2.0 applications for learning in higher education. *The Internet and Higher Education, 16*, 57-65. DOI:10.1016/j.iheduc.2012.02.001

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the simplis command language*. Lincolnwood, IL: Scientific Software International.

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20*, 141-151.

Kılıç, H. E., & Şen, A. İ. (2014). UF/EMI eleştirel düşünme eğilimi ölçeğinin Türkçeye uyarlama çalışması [Turkish adaptation study of UF/EMI critical thinking disposition instrument]. *Eğitim ve Bilim [Education and Science], 39* (176), 1–12. DOI: https://dx.doi.org/10.15390/EB.2014.3632

Kieffer, K. M. (1998). Orthogonal versus Oblique Factor Rotation: A Review of the Literature regarding the Pros and Cons. *Paper presented at the annual meeting of the American Educational Research Association*, New Orleans, LA.

Kline, P. (1994). *An easy guide to factor analysis. London.* England: Routledge.

Korucu, A. T., & Yücel, A. (2015). Information technologies teachers' ideas about dynamic web technologies use in education. *Educational Technology Theory and Practice, 5* (2), 126-152. DOI: https://dx.doi.org/10.17943/etku.78815

Lekan Kamil, Q. (2014). *Teachers' perceptions and attitudes toward the implementation of web 2.0 tools in secondary education*. (Unpublished Doctorate Thesis). Walden University, Minnesota.

Madans, J. H. (2001). Health Surveys. *International Encyclopedia of the Social & Behavioral Sciences*, 6619–6627. DOI:10.1016/b0-08-043076-7/03903-6

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A Comparison of the Theory of Planned Behavior and the Theory of Reasoned Action. *Personality and Social Psychology Bulletin, 18*(1), 3–9. DOI: https://dx.doi.org/10.1177/0146167292181001

MEB. (2020a). *Bakanımız Sayın Ziya Selçuk, küresel ölçekte etkili olan "yeni tip korona virüs"e karşı eğitim alanındaki tedbirler ve uzaktan eğitim sürecine ilişkin detayları açıklıyor [Minister Mr. Ziya Selçuk explains the details about the precautions related to education and distance education processes against the "new type of corona virus" which is effective on global scale]*. Retrieved from https://twitter.com/tcmeb/status/1238163265462710272

MEB. (2020b). EBA'DA canli sinifla eğitim başliyor [Education start with live classrooms on EBA]. Retrieved from *http://www.meb.gov.tr/ebada-canli-sinifla-egitim-basliyor/haber/20602/tr*

O'Reilly, T. (2005). *What is web 2.0: Design patterns and business models for the next generation of software*. Retrieved from: http://oreilly.com/web2/archive/what-is-web-20.html

Özerbaş, M. A., & Mart, Ö. A. (2017). Pre-service English teachers' opinions and utilization levels on the use of web 2.0. *Ahi Evran University Kırşehir Education Faculty Journal, 18* (3), 1152-1167.

Rodríguez Bolívar, M.P. Policy makers' perceptions on the transformational effect of Web 2.0 technologies on public services delivery. *Electron Commer Res 17*, 227–254 (2017). DOI: https://doi.org/10.1007/s10660-015-9196-1

SPSS Statistics (Version 21) [Computer software]. Chicago, IL: SPSS.

Soomro, K.A., Zai, S.Y., & Jafri, I. H. (2015). Competence and usage of Web 2.0 technologies by higher education faculty. *Journal Educational Media International, 52* (4), 284-295. https://doi.org/10.1080/09523987.2015.1095522

Sümer, N. (2000). Yapısal eşitlik modelleri: Temel kavramlar ve örnek uygulamalar [Structural equation models: Basic concepts and sample applications]. *Türk Psikoloji Yazıları [Turkish Psychological Articles], 3* (6), 49–74. Retrieved from https://www.researchgate.net/publication/281981476_Yapidotlesssal_esitlik_modelleri_Temel_kavramlar_ve_ornek_uygulamalar

Tavşancıl, E. (2002). *Tutumların ölçülmesi ve spss ile veri analizi* [Attitude measurement and data analysis with SPSS]. Ankara, Turkey: Nobel.

TCBB. (2020). *Cumhurbaşkanı Erdoğan'ın, YKS'ye girecek öğrencilerle video konferans aracılığıyla yaptığı görüşme [President Erdoğan's video conference meeting with students who will take the YKS]*. Retrieved from https://www.youtube.com/watch?v=nhXz8783eOU

Venkatesh, V., Croteau, A-M., Rabah, J. (2014). Perceptions of effectiveness of instructional uses of technology in higher education in an Era of web 2.0. *47th Hawaii International Conference on System Sciences*, Waikoloa, HI, USA. DOI: https://doi.org/10.1109/HICSS.2014.22

Williams, A., Onsman, A. & Brown, T. (2010). Exploratory factor analysis: a five-step guide for novices. *Journal of Emergency Primary Health Care (JEPHC), 8* (3), 1-13.

Yan, Y., Zha, X. and Yan, M. (2014). Exploring employee perceptions of Web 2.0 virtual communities from the perspective of knowledge sharing. *Aslib Journal of Information Management, 66* (4), 381-400. https://doi.org/10.1108/AJIM-08-2013-0070

Innovation and Educational Technologies General Directorate, (IETGD) (2020). EBA TV *ders yayını [EBA TV lesson broadcast]*. Retrieved from: http://www.eba.gov.tr/

Yıldırım, B. (2018). Adapting the teachers' efficacy and attitudes towards STEM scale into Turkish. *Journal of Turkish Science Education, 15* (2), 54-6. DOI: https://dx.doi.org/10.12973/tused.10230a

Yıldırım, B., & Selvi, M. (2015). Adaptation of STEM attitude scale to Turkish. *Turkish Studies: International Periodical for the Languages, Literature and History of Turkish or Turkic, 10* (3), 1117–1130. DOI: https://dx.doi.org/10.7827/TurkishStudies.7974

Yuen, S. C., & Yuen, P.K. (2010). Web 2.0 in education: Teachers' perceptions and perspectives. Creating Futures Through Technology Conferenc, Biloxi: Missisippi. Retrieved from https://www.slideshare.net/scyuen/web-20-in-education-teachers-perceptions-and-perspectivres

Yuen, S. C. Y., Yaoyuneyong, G., & Yuen, P. K. (2011). Perceptions, interest, and use: Teachers and web 2.0 tools in education. *International Journal of Technology in Teaching& Learning, 7* (2), 109-123.

Zelick, S. A. (2013). The Perception of web 2.0 technologies on teaching and learning in higher education: a case study. *Creative Education, 4* (7), 53-93. DOI: http://dx.doi.org/10.4236/ce.2013.47A2010