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Water awareness scale for pre-service science teachers: Validity and reliability study

Cansu FILIK ISCEN

Department of Elementary Education, Faculty of Education, Eskisehir Osmangazi University, 26480, Eskisehir, TURKEY.

The role of teachers in the formation of environmentally sensitive behaviors in students is quite high. Thus, the water awareness of teachers, who represent role models for students, is rather important. The main purpose of this study is to identify the reliability and validity study outcomes of the Water Awareness Scale, which was developed to determine the water awareness of pre-service science teachers. The study sample consists of 246 undergraduate senior class pre-service science teachers, who are educated as science teachers in different universities. Expert opinions were obtained for the content validity of the scale. Exploratory and confirmatory factor analyses were conducted to ensure the construct validity. As a result of the factor analysis, it has been demonstrated that the scale is centered around 11 items and 3 factors. The variance explained by the total scale is 59.023%, and Cronbach's alpha is .81. As a result, the scale has a valid and reliable structure.

Key words: Water awareness, scale, validity, reliability, pre-service science teachers.

INTRODUCTION

The total water amount on earth is 1.4 billion km^3 which covers three-fourths of the sphere. However, achieving access to and using this entire amount is not possible because of technical and economic aspects. Because, 97.5% of this water exists as salty water in seas and oceans, only 2.5% of it is fresh water (Shiklomanov and Rodda, 2003). Today, water enhances its importance as an indispensable part of our lives and ecosystem. In addition to meeting the basic needs of humans, water is the source of sustainable agriculture, energy production, industry, transportation and tourism, as well as development. An increasing demand, pollution and bad management of water resources make water an

increasingly scarcer resource. The uneven distribution of water on the sphere also adds to these characteristics; thus, water management has been transformed into one of the most important problematic areas of our era. Approximately 1.3 billion individuals, which corresponds to nearly 20% of the world population, lack adequate amounts of drinking water; 2.3 billion individuals long for healthy water. Some forecasts indicate that more than 3 billion individuals will face water scarcity by 2025 (Cosgrove and Rijsberman, 2000). For this reason, raising water awareness in individuals is an important element. As the population and life quality increase on earth and in Turkey environmental pollution increases

E-mail: cfilik@ogu.edu.tr

and the water quantity decreases each day. Among most solutions suggested for water shortage, which we sense its effect minimally closer day by day, one critical solution is to create "water awareness" among individuals (Ergin et al., 2009). The concept of "awareness" is defined as the promotion of awareness and susceptibility to social communities, individuals and the environment (Braus, 1995; Keles, 2007). Because water and the problems associated with water are predominately examined in Science courses, the development of awareness of candidate science teachers regarding the sustainability of water utilization is critical. Thus, teachers who have an increased awareness will be effective in the development of the susceptibility of the next generation to water.

When we examine the literature, we identified studies regarding water awareness at different educational levels. In his research, Pinaroglu (2009) discussed the attitudes and behaviors of families regarding water consumption and the facts that affect them. The evidence indicates that the behaviors of families on water consumption that are affirmative also affect their attitudes. When education, level of income, age and sex are considered the criteria, they fail to create a meaningful difference level in water consumption attitude. Furthermore, the attitudes of women are more positive than the attitudes of men, and an increase in educational level and revenue attenuates attitudes related to water consumption.

In a study designed to determine the environmental awareness of primary school students, Sharmin (2003) also examined water awareness. He evaluated the awareness levels regarding subjects such as the definition of fresh water, the causes of water pollution, the problems induced by water pollution, how drinking water is obtained and ways to prevent water pollution according to the school types and sex of the students. In total, 52% of the students defined fresh water correctly, and there was no considerable difference between the schools. Among male and female students, a considerable difference is present in favor of male students. 59% of the students correctly answered the causes of water pollution, no considerable difference is present between the schools or sex of the students. A considerable difference is present between the state and private schools in favor of the state schools regarding this matter, 90% of the students provided the answer "They cause diseases." to problems of water pollution. 50% of the students provided a correct answer regarding how to supply the drinking water and a considerable difference is present between male and female students in favor of the male students. Finally, while 75% of the students provided the expected answer to the question "how shall water pollution be prevented?, no considerable difference is present between the school types or sex of the students".

Forsyth et al. (2004) conducted awareness evaluation studies regarding the development of positive attitudes and behaviors in individuals regarding water sources and

water pollution. In a study conducted with individuals, -who live in two different cities-, the evidence suggests that knowledge regarding water sources is determined; the quality of water sources is evaluated; a value is given to preserve the water sources, and relevant behaviors are determined and evaluated; and individuals, -who have an awareness on water sources and water pollution-, exhibit behaviors to preserve water and are willing to become more effective.

When the existing scales in the literature regarding the water issue are analyzed, quite a few studies were identified (Gürbüz et al., 2009; Ergin et al., 2009). However, in the formation of these scales, the factor analysis was not beneficial from or only an exploratory factor analysis was conducted. Simsek (2007) notes that a scale that does not have strong theoretical foundations may provide very good results in the exploratory factor analysis; however, the same result cannot be obtained in a confirmatory factor analysis. Departing from the fact that the role of teachers is critical for the new genera-tion's susceptibility to the environment, in this study, the aim was to develop a valid and reliable criterion to determine the awareness of candidate teachers regard-ing water. Because of this reason, the water awareness scale is assumed to close a gap in the literature.

METHODS

Study group

The study comprised senior class pre-service teachers who continue their education in science undergraduate programs in different universities. The research data includes 277 senior class pre-service teachers randomly selected who studied in the 2011 to 2012 academic year in universities. The universities that partici-pated in the research and the numbers of participants are provided in Table 1.

Thirty-one of the 277 forms completed by the student participant have not been included in the evaluation because of reasons such as incomplete forms and the selection of more than one option. The answers of 246 students have been included in the evaluation, via the removal of the students who have not been included in the evaluation from the scope of the research.

Scale development process

A water awareness scale was developed to determine the water awareness levels of the students who participated in the research, before and after the application. In the development of the water awareness scale, the following phases were included: (a) the formation of scale items, (b) the content validity study, (c) the item total correlation calculation, (d) the construct validity study, (e) the Cronbach's alpha internal consistency reliability, and (f) the analysis of the correlations between the sub-scales.

Formation of scale item phase

Water awareness is the increase in the water knowledge levels of individuals, and the gain in consciousness and sensitivity in the use and protection of water. In this context, existing scales have been examined through literature reviews regarding the gain in
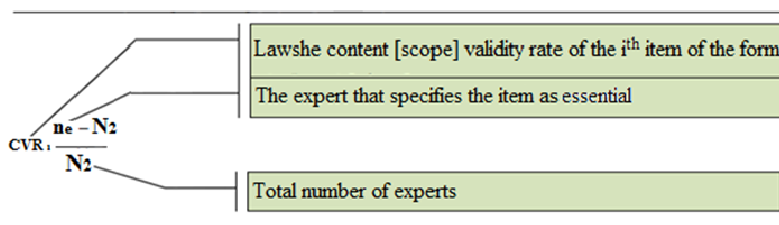
Table 1. Distribution of participant students according to universities.

	Number of participants	Percent
Pamukkale University (Denizli)	125	0.45
Mugla University (Mugla)	100	0.36
Eskisehir Osmangazi University (Eskisehir)	52	0.19
Total	277	1.00

Table 2. Content validity compliance level form: sample of water awareness scale.

Items	0	1	2	3	4	5	6	7	8	9	10
Water saving is unnecessary because 2/3 of the World is covered by water.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
The insertion of filters in factory chimneys has no effect on water protection.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
There is sufficient water for everyone in the World.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Please specify your thoughts with an (x) mark regarding how much the items satisfy the grammar and understandability requirements; (0) indicates it does not satisfy the requirements at all, and (10) indicates it completely satisfies the requirements.

$$CVR_i = \frac{n_e - N_2}{N_2}$$

- Lawshe content [scope] validity rate of the ith item of the form
- The expert that specifies the item as essential
- Total number of experts

Figure 1. Lawshe content (scope) validity rate formula.

awareness (Erten, 2004; Ergin et al. 2009; Gürbüz et al., 2009). Twenty-six positive and negative behavior items, which are accepted as directly or indirectly related and can measure the water awareness levels of individuals, have been compiled via the examined scales.

Content validity phase

The scale items were first analyzed by a language expert in terms of grammar rules and understandability. The developed draft scale was subsequently examined by nine voluntary experts, who study science as a specialty and primary education in general. A 10-grade scale was used to indicate the Content Validity Compliance Level (Table 2).

Regarding the content validity, the experts were asked to read each item in the water awareness scale and assess the ability of each item to measure the water awareness level of the pre-service science teachers.

The experts were asked to assess the items between 10 if the item perfectly measures the teacher competency feeling and 0 (zero) if it does not measure the item at all. The Lawshe Content Validity Rates (CVR) have been calculated, to determine the content validity of the scale. How the experts evaluated each item is taken into consideration in the Lawshe content [scope] validity rates. How high or low the Lawshe coefficient is calculated according to the coefficients of compliance the experts have assigned to each item. Lawshe content [scope] validity rate formula used in the research is presented in Figure 1 (Lawshe, 1975; Yurdugül, 2005).

A percent value was obtained for each item; from the results of Lawshe content [scope] validity rate formula. This coefficient varies between -1 and +1. The minimum Lawshe content [scope] validity rates, which have been provided by Lawshe (1975) for the sizes of different numbers of experts with p=.05 confidence interval, have been presented in Table 3 (Lawshe 1975; Yurdugül, 2005).

As shown in Table 3, if the items of a study in which 10 experts participate have a Lawshe content [scope] validity rate lower than .62, the item must be removed from the data collection tool.

Item total correlation calculation phase

A Pearson product moment correlation analysis was performed, with the goal to determine the item total coefficients for the item discrimination of the scale items.

Construct validity study (Exploratory and Confirmatory Factor Analyses)

The construct validity of the scale was tested in 2 different ways. First, an exploratory factor analysis was conducted, to determine the structure of the scale. This approach was followed by a confirmatory factor analysis study.

Table 3. Lawshe minimum content validity rates.

Number of experts	Minimum value	Number of experts	Minimum value
5	0.99	13	0.54
6	0.99	14	0.51
7	0.99	15	0.49
8	0.78	20	0.42
9	0.75	25	0.37
10	0.62	30	0.33
11	0.59	35	0.31
12	0.56	40+	0.29

Cronbach's alpha internal consistency

The Cronbach's alpha internal consistency coefficient was used to determine the internal consistency level of the scale and the heterogeneity of the items.

Analysis of correlations between Sub-Scales

A Pearson product moment correlation analysis was used in the determination of the average and standard deviation values of the scale sub-scales, and the correlations between the sub-scales.

FINDINGS

Findings regarding the water awareness scale validity study

Both the content and construct validities were examined for the validity study.

Studies regarding the content validity

Expert opinions were obtained regarding the content validity, depending on whether the items in the measurement tool are appropriate for the measurement tool, and whether they represent the area aimed to be measured. The content validity of the Water Awareness Scale was evaluated by the educational science experts with the help of the form, whose details have been provided in the methodology section; the evaluation scores varied between 6.49 and 9.00. In the grading that belongs to the experts who participated in the content validity study; if an expert scored an item less than 5, the item was considered not suitable, and the CVR was calculated for each item. In the Lawshe content validity rate, how experts evaluate each item is taken into consideration, as well as, how high or low the Lawshe coefficient is calculated according to the compliance coefficients that the experts provided to each item. A percent value is obtained for each item, from the result of the Lawshe content validity rate. This coefficient varies between -1 and +1. The minimum Lawshe content validity rate, which has been provided by Lawshe (1975) for

sizes of different numbers of experts in p=.05 confidence interval, is .62 for 10 participant experts. According to this criterion, the CVRs of the 26 item scale vary between .40 and 1.00, and items 1., 9., 11., 13., 14., 15., 19. and 21 were removed from the scale because they could not satisfy the content validity, whereas item 16 was removed based on expert opinions. The content validity coefficients of all items are presented in Table 4.

Determining the Item total correlations

The item total correlations were calculated regarding the data collected from 246 students, with the aim to specify the adequacy of item criteria, which occurs in the scale that completed its content validity, in the differentiation of individuals in terms of characteristics. The correlation coefficients obtained in the item-total correlations are between -.019 and .680. Because the item total correlation of item 8 was not significant, it was removed from the scale. The item-total correlation coefficients of all items have been provided in Table 5.

Studies regarding the construct validity

Exploratory factor analysis

The suitability of the data for the factor analysis was examined via a Kaiser-Meyer Olkin (KMO) coefficient and Barlett Sphericity test. The KMO coefficient is a statistical method used to identify the suitability and adequacy and sample size for the selected analysis. A KMO larger than .60 and a significant Barlett test indicate that the data are appropriate for the factor analysis. As the KMO coefficient approaches 1, the data are accepted to be suitable for the analysis: when the value equals 1, a perfect compliance exists (Sharma, 1996, p.116). As a result of the analysis performed, the KMO value was 0.826. The Barlett Sphericity test is a statistical technique that can be used to control whether the data originate from a multivariate normal distribution. Chi-square test statistic obtained as a result of this test to determine significance is an indicator that the data originate from a

Table 4. Water awareness scale content validity rate values.

Item No	X	SD	CVR	Item No	X	SD	CVR
Item 1	7.87	2.87	0.6	Item 14	6.49	4.26	0.4
Item 2	8.61	3.15	0.8	Item 15	7.32	3.79	0.6
Item 3	8.61	2.85	0.8	Item 16	8.25	2.81	0.8
Item 4	8.70	3.02	0.8	Item 17	8.07	2.85	0.8
Item 5	8.43	2.82	0.8	Item 18	8.25	3.11	0.8
Item 6	8.72	2.72	1	Item 19	7.96	2.99	0.6
Item 7	8.25	3.08	0.8	Item 20	8.45	2.65	1
Item 8	8.72	2.76	1	Item 21	8.23	3.10	0.6
Item 9	8.23	3.16	0.6	Item 22	8.63	2.69	1
Item 10	7.98	3.07	0.8	Item 23	8.25	3.05	0.8
Item 11	7.87	3.07	0.6	Item 24	8.54	2.76	1
Item 12	7.70	2.87	0.8	Item 25	7.89	2.85	0.8
Item 13	7.14	3.67	0.6	Item 26	9.00	2.68	1

CVR (Lawshe Content Validity Rate).

Table 5. Results of the pearson product moments correlation analysis, performed to determine the item total correlations of the awareness scale.

Item no	Item-total r	Item no	Item-total r
Item 1	0.318**	Item 10	0.632**
Item 2	0.532**	Item 11	0.607**
Item 3	0.276**	Item 12	0.541**
Item 4	0.542**	Item 13	0.505**
Item 5	0.464**	Item 14	0.612**
Item 6	0.666**	Item 15	0.485**
Item 7	0.680**	Item 16	0.454**
Item 8	-0.019**	Item 17	0.493**
Item 9	0.529**		

**Correlation is significant at the 0.01 level (2-tailed).

multivariate normal distribution. As a result of the analysis conducted within the study, the Barlett test was significant (χ^2 =755.754; p<0.05). These results have proven that the data are suitable for the factor analysis.

The Water Awareness Scale factor analysis study was conducted via the application of the Principal Component Analysis technique. With the aim to support this study and correctly determine the factor number, the Scree test chart which depends on the eigenvalues of the factors was also examined (Büyüköztürk, 2002). The scale structure was collected in three factors, considering the discontinuities identified in the graphic in this examination. In the subsequent step, a varimax rotation technique, was used to collect items that exhibit a high correlation with each other in a factor together, which has been deemed suitable (Büyüköztürk, 2002; Kalaycı, 2005). In the identification of the items that measure the

same structure, an item that has at least .35 load value in the factor it occurs, and the difference between a factor load value of an item that has a load value of .35 or greater in a factor and other load values in other factors that are at least .10 have been identified. Figure 2 shows the maximum significant factor number, as a result of the Cattel's "scree" test (Kline, 1994).

The Water awareness scale item analysis, and the results of the rotation process obtained by the Varimax Rotation technique also support the findings regarding the three dimensional feature of the scale. The factor analysis results related to the scale are shown in Table 6. The loads of items in one factor prior to rotation are between 0.49 - 0.74. After rotation, it has been determined that the items in the scale scatter to three factors, and the factor loads are between 0.54 - 0.85.

Three factors explain 59.023% of the total variance. The loads that items take in factors other than the ones that they occur in are visibly low. The basic components value of the first factor is 4.198, the basic components value of the second factor is 1.366 and the basic components value of the third factor is 0.929. Thus, the basic components values are over 1, with the exception of the third factor. These results indicate that the scale, which consists of eleven items, has construct validity. These factors have been named in consideration of the literature (Gürbüz et al., 2009; Ergin et al., 2009). Factor 1 has been referred to as water protection, factor 2 has been referred to as water scarcity, and factor 3 has been referred to as water pollution and water education.

1. Factor: Water protection: After the elimination of items via factor analysis, the items that compose this factor in the scale were 5, 7 and 15.
2. Factor: Water scarcity: After the elimination of items via factor analysis, the items that compose this factor in the scale were 2, 9, 11 and 17.
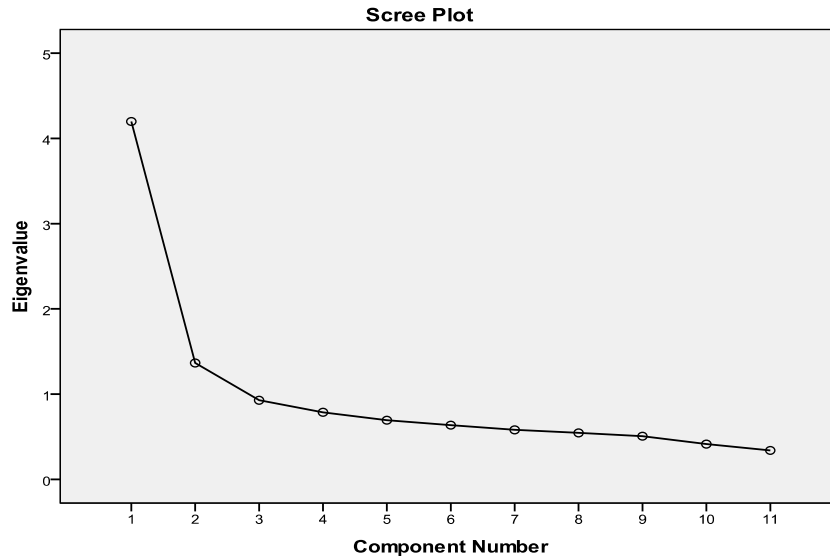
Figure 2. Scree plot test.

Table 6. Factor analysis results.

Item	The only factor	Factor 1	Factor 2	Factor 3
I5	.645	.802		
I7	.634	.704		
I15	.504	.667		
I2	.662		.804	
I17	.521		.694	
I9	.491		.561	
I11	.542		.544	
I12	.740			.857
I14	.579			**.700**
I10	.580			**.632**
I6	.594			**.615**
Value of Principal Components		4.198	1.366	.929
% of variance		**38.163**	**12.418**	**8.442**
Cumulative %		**38.163**	**50.582**	**59.023**
Alpha Consistency	.81	.61	.70	.78

3. Factor: water pollution and water education: As a result of the factor analysis, the items that form this factor in the scale continued to be 6, 10, 12 and 14.

Confirmatory factor analysis

A Confirmatory factor analysis (CFA) was applied to determine the factor structures of the Water Awareness Scale. The analysis was initiated with 11 items. No items were removed from the scale, as a result of the CFA performed with the purpose to assess how much the three factor structure was established via the exploratory factor analysis and the data obtained in this study comply with each other. The path diagram regarding the factor loads of the items is presented in Figure 3. The factor loads of the scale items vary between 0.80-1.11. While the first factor is composed of three items, the second and third factors are composed of four items.

The results of the confirmatory factor analysis are shown in Table 7. According to these results, the chi-square was determined as χ^2= 70.88; (sd=41, p<.01); (χ^2/sd)= 1.72. Additionally, the following results were obtained; Root Mean Square Error of Approximation (RMSEA)=0.053; Root Mean Square Residual (RMR) and Standardized RMR (SRMR) =0.046; The Goodness-of Fit Index (GFI)=
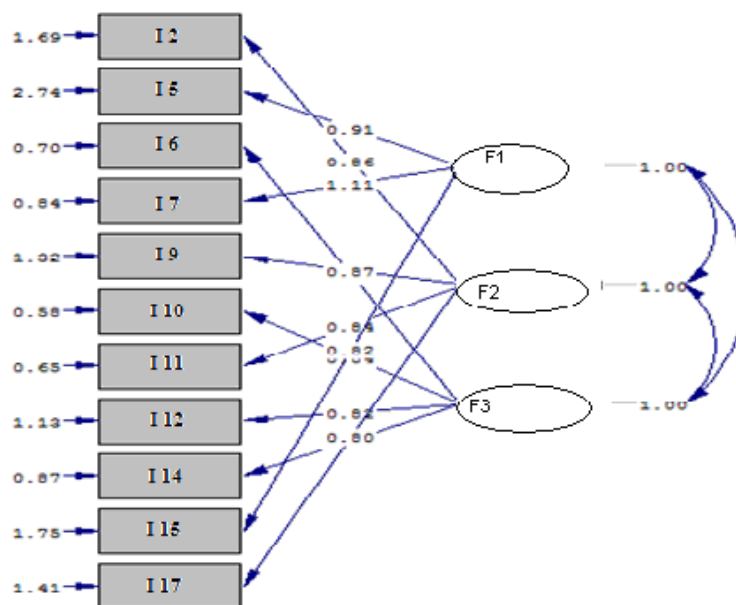
Figure 3. Path diagram reveals the relationships between factor loads and factors.

Table 7. Comparison of the standard goodness of fit criteria and research results.

Convergence measures	Good convergence	Acceptable convergence	Convergence values obtained in the research
χ^2	$0 \leq \chi^2 \leq 2df$	$2df \leq \chi^2 \leq 3df$	70.88
P value	$0.05 \leq p \leq 1$	$0.01 \leq p \leq 0.05$	0.00
χ^2/df	$0 \leq \chi^2/df \leq 2$	$2 \leq \chi^2/df \leq 3$	1.72
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$	0.053
RMR			0.10
SRMR	$0 \leq SRMR \leq 0.05$	$0.05 \leq SRMR \leq 0.10$	0.046
NFI	$0.95 \leq NFI \leq 1.00$	$0.90 \leq NFI \leq 0.95$	0.95
NNFI	$0.97 \leq NNFI \leq 1.00$	$0.95 \leq NNFI \leq 0.97$	0.97
CFI	$0.97 \leq CFI \leq 1.00$	$0.95 \leq CFI \leq 0.97$	0.98
GFI	$0.95 \leq GFI \leq 1.00$	$0.90 \leq GFI \leq 0.95$	0.95
AGFI	$0.90 \leq AGFI \leq 1.00$	$0.85 \leq AGFI \leq 0.90$	0.92
RFI	$0.90 < RFI < 1.00$	$0.85 < RFI < 0.90$	0.93

Schermelleh-Engel-Moosbrugger (2003).

0.95; The Adjusted Goodness-of-Fit Index (AGFI) =0.92; Normed Fit Index (NFI)= 0.95; The Comparative Fit Index (CFI)=0.98; Relative Fit Index (RFI)= 0.93. The closer the RMSEA value is to zero, the fitter the model is (Fidell and Tabacnichnick, 2001). For a good model, the CFI and GFI values need to come close to 1 (Akbaba, 2015). The RMSEA, CFI and GFI values obtained in the study were at good levels.

In conclusion, the Water Awareness Scale is composed of 11 items, and three factors have also been determined via the alignment markers of the confirmatory factor analysis, thus this model has been theoretically and statistically approved.

Findings regarding the reliability study of the water awareness scale

Studies intended to determine the internal consistency (Cronbach's Alpha Coefficient)

The Cronbach's alpha coefficient, which was determined for the scale that was reduced to 11 items as a result of the reliability study, was α=0.81. This reliability coefficient

Table 8. Correlation coefficients between the factors that compose the scale.

			Water protection	Water scarcity	Water pollution and water education
		R	1.000	.277[**]	.408[**]
	Factor 1	P	.	.000	,000
		N	244	244	244
Spearman's rho	Factor 2	R	.277[**]	1.000	.555[**]
		P	,000	.	,000
		N	244	244	244
		R	.408[**]	.555[**]	1.000
	Factor 3	P	.000	.000	.
		N	244	244	244

is evaluated as a measure that has high reliability in educational and social sciences.

Findings regarding the correlation study between the factors that compose the water awareness scale

The correlation coefficients between the factors that form the scale are shown in Table 8. The correlation coefficients between the sub-factors obtained from the attitude scale vary between 0.277 and 0.555. These coefficients have been accepted as significant at the .01 significance level.

A significant relationship between water protection and water scarcity is present (r=.277 p<.001). Moreover, a significant relationship between water protection, and water pollution and water education is demonstrated (r=.408 p<.001). A significant relationship between the water scarcity factor and the water pollution and water education factors exists (r=.555 p<.001). Based on these findings, the factors that compose the scale measure structures related to each other, and they will be valid in the measurement of behaviors oriented to water.

DISCUSSION AND CONCLUSION

The sustainability of water for a sustainable environment has great importance. Water, which is essential to life, is a strategically and limited natural resource. As it is known that an artificial substance that can replace water in the future does not exist; thus, the importance of water will increase daily. Global climate changes and improvements in technology parallel to an increasing population have negative effects on water resources. These negative effects intensify the problem of water not being homogenously distributed on the sphere. Because of this reason, there is a need to pay attention more than ever to balances in the usage and distribution of water, and to use resources for new strategies wisely (Pamuk Mengü and Akkuzu, 2008).

In the classification of countries according to presence of water and in the determination of the current situations regarding water, countries that have an average amount of usable water per individual per year between 1700 - 5000 m^3 are categorized as *"countries with water shortages"*. Turkey is in the *"countries with water shortages"* category, with 1735 m^3 water per individual per year (Türkyılmaz, 2010). According to the data of Turkish Statistical Institute, the amount of usable water per individual as of 2030 will decrease to 1120 m^3/year. Moreover, this prediction is valid in the case of transferring current water resources without subversion until 2030. Therefore, to leave clean and healthy water to future generations, resources must be well protected and used rationally. Because of this reason, one of the most important things that can be done is to provide water education to individuals (SHW, 2011). According to Nasr (1998), the purpose of water education is to make the individual responsible for water, sensitive to water problems, and change his/her gestures and behaviors in the direction of water protection. In the delivery of an effective environment education to individuals and making them gain environmental consciousness; knowledge regarding the specific types of prior knowledge, awareness and attitudes they have towards the environment is very important (Ilgar, 2009). In this research, the reliability and validity studies of the Water Awareness Scale, which was developed to determine the awareness of pre-service teachers regarding water, have been investigated.

Validity and reliability studies regarding the scale have been performed with the participation of 246 pre-service teachers. The sample size can be evaluated as at a "good" level (Şencan, 2005). The correlation coefficients obtained from the item total correlations of the scale are above 0.28, and all items with the exception of item 8 have been identified as significant. The KMO value of 0.826 as a result of the exploratory factor analysis applied to the scale indicates the sample size is adequate; and the Bartlett's Test of Dimensionality was identified as significant and has been evaluated as an

indicator of the dimension existence in the scale (Büyüköztürk, 2007, p. 172; Şencan, 2005, p. 364). As the factor loads of the sub-dimensions that compose the scale are analyzed, the fact that the values identified for each sub-scale are not below 0.30 indicates that the factor analysis validity is high. Additionally, the explained variance percent of the scale is 59.023. A rate of explained variance greater than 30% is an indicator of the assurance for the construct validity of scales (Tosun and Karadağ, 2008). The identification of a Cronbach's Alpha coefficient of 0.81 in the reliability analysis is perceived as a proof of scale reliability (Büyüköztürk, 2007). In the literature review regarding the confirmatory factor analysis, it has been identified that the goodness of fit range may exhibit changes (Okur and Yalçın- Özdilek, 2012; Ingles et al., 2005). In the evaluation performed within this framework, it has been determined that the scale has also demonstrated appropriate values in the confirmatory factor analysis (RMSEA: 0.053, SRMR: 0.046, NFI: 0.95, CFI: 0.98, GFI: 0.98, AGFI: 0.92, RFI: 0.93), and an opinion has been formed that the scale has strong theoretical foundation (Şimşek, 2007). The item factor loads obtained in the exploratory and confirmatory factor analyses to have close values to each other point to the strength of the construct validity of the scale (Baloğlu et al., 2008). The final version of the scale is predicted as "valid, reliable and has a strong theoretical foundation", by the experts.

In conclusion, because a water awareness scale that has been used with both exploratory and confirmatory factor analyses has not been identified in the literature, this research may be helpful for researchers to attain their goals and gain time. Testing the scale on different samples (for example teachers) will enable the identification of stronger indicators. The scale may represent a beneficial tool that can be used, especially in studies conducted with pre-service teachers. Moreover, conducting studies that use this scale will provide important contributions to the measurement power of this scale.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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Appendix 1. Final version of the scale.

Water awareness scale	Strongly disagree			Totally agree			
	1	2	3	4	5	6	7
1 There may be wars in the future because of water scarcity.							
2 Individual behaviors will not be useful for resolving the water shortage on Earth.							
3 Water saving habits should be acquired at young ages.							
4 Water saving is unnecessary, because 2/3 of the World is covered by water.							
5 Leakages may cause serious water losses.							
6 Whether factories give their waste waters to receiver environments by refining them should be controlled.							
7 An increased urbanization rate increases water pollution.							
8 If human feces are removed in a healthy way, water-borne diseases will decrease.							
9 More time should be allocated to water protection in education and training programs.							
10 The inserting of filters in factory chimneys has no effect on water protection.							
11 If we cannot protect it, drinking water will run out in the near future.							