

The Study on the Validity and Reliability of the Sustainable Development Awareness Scale

Cagri Ozturk Demirbas

Social Studies Education Department, Faculty of Education, Ahi Evran University, Kirsehir, Turkey

Abstract: This study aims to develop a scale in order to determine the awareness level of individuals within the framework of the sustainable development. The study group is formed by 504 students. For the validity of scope of the scale, experts were consulted. In order to determine the validity of the scale; exploratory factor analysis was conducted; total substance correlations and substance distinctiveness capacities were calculated. On the other hand, in order to determine the reliability of the scale; the level of internal consistency and the level of stability were calculated. As a consequence, the sustainable development awareness scale, being developed, may be regarded as a valid and reliable instrument while determining the sustainable development awareness levels of individuals.

Key words: Sustainable Development • Scale Development • Awareness • Validity • Reliability

INTRODUCTION

The sustainable development is regarded as meeting today's needs without depriving next generations of meeting their own needs [1]. In order to enable next generations to meet their needs in the future, the individual of the current time should re-interpret the concept "need" and shape their lives in this regard. This necessity can only be met by creating sustainable development awareness and then adopting it in individual's life under operational level.

The necessity to consider the relationship between the natural environment and the economy while planning development policies was first indicated in the report called "The Limits of Development" issued by Rome Club in 1972 [2]. The expression of "Protection of the resources of next generations" came up in at United Nations Environment Conference [3]. However, it made its real impact at United Nations Environment and Development Conference held in 1992. At the end of the ongoing process, sustainable development was stressed during the 2002 World Sustainable Development Summit in a broader sense [4]. Following, the period between 1st January 2005 and 31st December 2014 was declared as "The Ten-Year Education for United Nations Sustainable Development" [5]. Within this context, the aim is to create awareness on global scale by combining and integrating the theme of sustainable development *at all* educational

levels. Therefore, while the individual identifies/defines himself and the environment essentially, he/she will mainly grab the chance to define/identify the other individuals around the world. It is considered that the world citizenship identifying/defining other individuals around the world is regarded as the first step while solving the problems on the global scale.

Individuals certainly wish to increase their life quality. However, while achieving this, our participation to individual or mutual decisions without damaging the planet we live will come into question. Within the framework of sustainable development education enables the development of the values, manners and skills influencing our decisions in such situations [6]. As long as the human-beings acquire such values, manners and skills, they will maintain their existences in the world compatibly and steadily by increasing their life quality.

When studies carried out on sustainable development education are taken into consideration [7-16], it is stressed that students still have deficiencies in developing their manners, even though they maintain positive attitudes towards sustainable development. For instance, as a result of their studies called "Environmental Literacy; Are future teachers ready for a sustainable future?" held on 2311 teacher candidates, [9] indicate that teacher candidates maintain positive attitudes towards the environment, but don't have adequate environmental knowledge and attach priority to some of the environmental problems.

It is of great importance to find solutions to environmental problems for a livable world and future. Only technological developments, policies being made, the legal system being improved and economic precautions are not adequate for the solutions of environmental problems. The solution lies in raising individuals with a high level of sensitivity and awareness and enabling them to adapt this sensitivity and awareness in their life styles. This can be achieved only through education from preschool period to lifelong learning. [17] divides the environmental awareness into three steps: nominal, functional and operational. He also stresses that individuals must overstep from the nominal and functional steps to the operational step. Only an individual with an environmental sight at operational level can practice these manners and values as a life style.

In the literature, studies on the determination of the attitudes of teacher candidates or teachers toward sustainable development can be observed; these determinations were gathered together by using meetings, half-structured interview formulas or attitude scales. A validity and reliability study on determining sustainable development awareness levels was carried out in the literature, but no scale development study was performed. Hence, development of a scale with the aim of serving for such purposes will be of great importance within the context of its contribution to the literature. It is considered that this research is of importance, for it aims to develop such a scale and therefore make up the deficiency in the literature.

“The Sustainable Development Awareness Scale (SDAS)” aimed to be developed in this research aims to measure the sustainable development awareness levels of teachers or teacher candidates. The awareness is defined as the capability to distinguish something. As a result, the study is considered as important within the framework of

its aim to develop a measurement instrument that can determine the sustainable development awareness levels of teachers or teacher candidates. Within the scope of the data to be held by means of using the scale, it will be possible to design what kind of development activities should be carried out within education faculties and educational activities with a view to determining sustainable development awareness levels of teachers or teacher candidates and making up the deficiencies.

Method

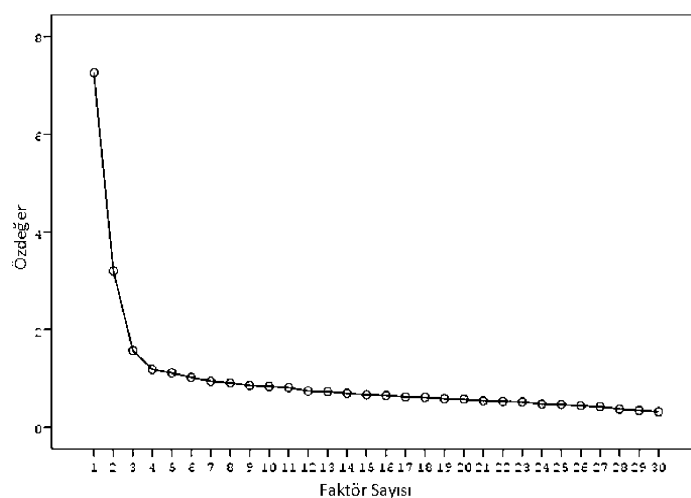
The Study Group: The study group of this research consists of 504 3rd Grade students at different departments at Ahi Evran University Education Faculty. The range of the study group according to the department and gender are summarized in Table 1.

The Scale Development Process: The literature scanning [1, 4-5, 7, 9, 10, 12, 18-31] was first carried out during the scale development process. In this regard, the main guidelines of the sustainable development were attempted to be listed in terms of principles and benchmarks related from past to present. This list was examined by three geography experts for enabling the scale to be at reasonable length and some articles were combined appropriately. Articles regarding the communal-social, economic and environmental aspects of sustainable development were especially chosen.

By means of the contributions of information acquired from the literature and of field experts, a 63 article pool was formed. In order to determine the awareness levels of students shown in the articles, five graded options were placed across the articles designed. These are organized and graded as follows: “(1) I disagree *at all*”, (2) “I disagree”, (3) I’m undecided, “(4) I agree” and “(5) I’m totally agree.”

Table 1: The range of the study group according to the department and gender

Departments of Teacher Candidate	M	F	Total
Computer Education and Instructional Technologies	18	18	36
Science Education	27	41	68
Elementary Mathematics Education	7	22	29
Pre-School Teaching	10	28	38
Psychological Counseling and Guidance	15	27	42
Classroom Teacher Education	27	60	87
Social Studies Education	63	49	112
Turkish Language Teacher Education	44	48	92
Total	211	293	504



Graphic 1

The articles formed as a draft were examined by a linguist, four geography experts, two assessment and evaluation experts in terms of context, expressions and narration, pronunciation and punctuation errors. In accordance with the reviews, a 53-article draft scale was formed after the necessary corrections were made.

The draft scale was applied to the study group with the help lectures during a course within the framework of the faculty course program. The data collected was loaded to the SPSS 15.00 Program in order to carry out the validity and reliability analyzes of the scale statistically.

In order to determine the validity of the scale, KMO and Bartlett Test Analyzes were carried out on the data collected as a result of the statistical analyzes and the necessity to carry out a factor analysis was specified. In accordance with the values acquired, exploratory factor analyzes were carried out; the capability of the scale to divide into factors was determined via principle component analysis and the factor loads were examined by using the Varimax vertical rotation technique. Items with a factor load less than 30 were eliminated and analyzes were carried out again. The item- total correlations of the remaining 30 items after the elimination were subjected to Pearson's R Test. Afterwards, the item distinctiveness powers were tested via Independent Groups T Test and the validity of the scale was determined. On the other hand, in order to determine the reliability of the scale, Cronbach Alpha Reliability Coefficient, the Chance-Half correlation value, Sperman-Brown formula and Guttman Split- Half Reliability Formula were used. The stability level of the scale was calculated by determining the correlation among the results of the two applications carried out in every five weeks.

Findings: The procedures performed and findings acquired as a result of the scale validity and reliability analyzes are presented below.

Findings Regarding the Validity of the Scale: Within the framework of the validity analyzes of the Sustainable Development Awareness Scale (SDAS), the major structure validity and item-total correlations were calculated. The findings are presented below:

The Structure Validity: Findings regarding the Exploratory Factor Analysis: In order to test the structure validity of the SDAS, Kaiser-Meyer-Oklin (KMO) and Barlett Test Analyzes were first carried out. As a result, KMO is calculated as 0,898 (KMO=0,898); Barlett test value as $\chi^2 = 8318,709$; and $sd = 1378$ ($p = 0,000$). In this regard, it occurs that factor analysis can be carried out on the 53-item scale.

The factor analysis is applied to highlight whether items on a scale is divided into less factors retaining each other off (Balci, 2009). On the other hand, as a result of the Principle Component Analysis used in the factor analysis and Varimax Vertical Rotation technique carried out in this regard, it is necessary to extract items with factor loads less than 0,30 and items with factor loads less than 0,100 between two factors, i.e. the load of which separated in two factors [32].

Within this context, the Principle Component Analysis was first carried out in order to determine whether the scale is one-dimensional or not, for the Principle Component Analysis is a technique used often as a factorization technique [32]. In order to observe whether the scale is disintegrated into irrelevant factors or not, Varimax Vertical Rotation Technique was applied and

Table 2: The Results of the Factor Analysis carried out according to the Factors of the Scale

	Item	F1	F2	F3
Environmental- Moral	i11 In order to re-form and protect the integrity of the system on earth, activities, harmful to the environment, should be taken under control.	.707		
	i3 Natural resources should be used sustainably and without violating the rights of next generations.	.685		
	i18 Every country should establish an administrative system that ensures the active participation of its citizens in sustainable development.	.654		
	i20 In order to achieve sustainable development, countries should have an administration system, flexible and capable of self-correcting.	.598		
	i17 The environment should be livable for the present and future generations and be benefited equally.	.596		
	i22 I have responsibility for protecting the natural heritage against next generations.	.570		
	i13 Technologies protecting new resources should be developed.	.561		
	i21 Today's needs should be met without depriving next generations of meeting their needs.	.559		
	i4 There isn't only a single pattern for sustainability, for every country has different economic and ecological conditions.	.548		
	i6 The protection of plant and animal species on earth is an international responsibility.	.545		
	i10 Development strategies should aim to ensure the adaptation between human-beings and the nature.	.544		
	i5 People in the developed countries should adapt the limitations outlined in international directives regarding the use of the natural resources.	.533		
	i19 There should be obligatory rules for the solutions of international environmental problems.	.523		
	i2 In order to achieve sustainable development on a global scale, every country should have universal mutual targets in education programs.	.511		
Communal- Social	i35 There should be obligations regarding the protection of genetic diversity/richness.		.599	
	i41 The pressure of civil environmental organizations will influence the international coordination for sustainable development.		.593	
	i34 In order to keep emission at a certain level, there should be international obligatory rules.		.577	
	i51 Support to the sustainable development around the world depends on the manner and sensitiveness of policy-makers.		.554	
	i52 Environment-friendly economic growths should be preferred.		.551	
	i36 Countries should establish a production system respecting the obligation of protecting the necessary ecological ground for the development.		.542	
	i40 An environment-development cooperation that will protect everyone's interest should be developed for the globe, the home of all human-beings.		.539	
	i37 Activities within the framework of protecting the environment should be carried out at international level.		.537	
Environmental- Economic	i39 Forests belong to all human-beings. Therefore, they should be protected by rules at a global scale.		.504	
	i31 Forests belong to the country where they are situated. Therefore, the country should have all relevant usage rights.			.730
	i28 In order to increase life standards, natural resources may be highly consumed.			.709
	i47 Countries should use their water resources for their intentions.			.687
	i24 Forests belong to countries where they are situated. Therefore, their re-production should be managed by only the relevant country.			.676
	i16 When the country's interests are in question, the necessity to keep the emission, leading to the global climate changes, at a certain level can be ignored.			.585
	i43 Environmental problems can be solved at local level.			.568
	i50 As the usage of natural resources is not stable among countries, the feasibility of sustainable development seems impossible.			.464
Eigenvalue		7.263	3.202	1.572
Total Variance		17.937	11.561	10.626

the factor loads were examined. In this regard, the same procedure was carried out again after 22 items with factor loads less than 0.30 and 1 item the load of which dispersed on different factors had been extracted from the scale.

The benchmark used in assessing the results of the factor load analysis is the factor loads included in the benchmark and to be interpreted as the correlation between variables and factors [33, 34]. The high factor loads are regarded as a signal for the fact that the variable can rank under the relevant factor [32].

The 30 items remaining as a result of the procedures were collected under three factors. the final figure of the scale is as follows: the KMO value is calculated as 0.899; Barlett test values as $\chi^2 = 4364.858$ and $p < 0.001$. It was also observed that the unrotated factor loads of the remaining 30 items ranged between 0.307 and 0.541 while the rotated factors ranged between 0.452 and 0.712 after the Varimax Vertical Rotation Technique. On the other hand, it was determined that items and factors included in the scale indicated 40.124% of the total variance. It is also observed that the factor loads are more than 0.30 and the 40%-amount of variance clarified in terms of the behavioral sciences is adequate [32, 33]. On the other hand, 30 items were collected under three factors. Items collected under these factors were named having been examined their contents. 14 items were collected under the factor called “environmental-moral sustainability; 9 items under the factor called “communal-social” sustainability and 7 items under the factor called “environmental-economic” sustainability.

Graphic 1 indicates the factors drawn in accordance with the proper values. Graphic 1 determines that the first three factors come through high accelerated falls, therefore these factors highly contribute to the variance, on the contrary, the fall in other factors become horizontal-in other words, their contribution to the variance is similar [32, 33].

As a result of these procedures, the findings regarding the item loads of total 30 items remaining on the scale in comparison with the factor loads, the proper values of the factors and their amounts in forming the variance are presented in the Table 2.

As indicated in Table 2, the “environmental-moral” factor of the scale is composed of 14 items and the factor loads range between 0.511 and 0.707. The proper value of this factor within the total scale is 7.263 and the amount of its contribution to the total variance is 17.937%. “The communal-social” factor is composed of 9 items. The

factor loads range between 0.504 and 0.599. The proper value of this factor within the total scale is 3.202 and the amount of its supplement for the total variance is 11.561%. The “environmental-economic” factor is composed of 7 items. The factor loads of items range between 0.464 and 0.730. The proper value of the designation factor within the total scale is 1.572 and the amount of its supplement for the total variance is 10.626%.

Item Distinctiveness: In this part of the study, the level of item distinctiveness was tested, calculating the correlations between the scores acquired from each item in the factors and the scores acquired from factors according to the item-total correlation method. The capability of each item to serve the total target was also tested. Table 3 indicates the item-factor correlation values acquired for each item.

As indicated in Table 3, the item test correlation coefficients range between 0.514 and 0.713 for the first item; between 0.545 and 0.646 for the second factor and between 0.498 and 0.717 for the third factor. Each item is related to the total scale significantly and positively ($p < 0.000$). The coefficients indicate the validity coefficient of each item, the consistency of the each item with the total scale; i.e. the capability level of the scale to serve for the total target [35].

In line with this, the corrected correlations within the total factor score calculated by extracting the scores of each item and the score of the relevant item score were also calculated and indicated in Table 4.

As indicated in Table 4, the corrected correlations coefficients within each item’s factor in the scale range between 0.651 and 0.342. If the corrected correlation coefficients of an item is more than 0.20, then it means, it can serve for the target of the relevant factor [36].

Findings Regarding the Reliability of the Scale: In order to calculate the reliability of the scale, internal consistency and stability analyzes were carried out on the data. The procedures performed and findings acquired are presented below:

Internal Consistency Level: The reliability analysis of the scale including 30 items and 3 factors for factors and as a whole was calculated, using Cronbach Alpha Reliability Coefficient, Chance- Half Correlation Value, Sperman-Brown Formula and Guttman Split-Half Reliability Formula. Values of the reliability analysis regarding each factor and the total scale are summarized in Table 5:

Table 3: The Correlation Analysis of Item- Factor Scores

F1 (Environmental- Moral)		F2 (Communal- Social)		F3 (Environmental- Economic)	
I. No	r	I. No	r	I. No	r
11	.713(**)	35	.611(**)	31	.717(**)
3	.702(**)	41	.579(**)	28	.713(**)
18	.654(**)	34	.597(**)	47	.700(**)
20	.595(**)	51	.545(**)	24	.673(**)
17	.608(**)	52	.593(**)	16	.607(**)
22	.604(**)	36	.633(**)	43	.581(**)
13	.613(**)	40	.646(**)	50	.498(**)
21	.590(**)	37	.652(**)		
4	.514(**)	39	.623(**)		
6	.588(**)				
10	.602(**)				
5	.617(**)				
19	.598(**)				
2	.559(**)				

N=504; **= $p < .001$

Table 4: The Corrected Correlation Analysis of Item-Factor Scores

F1 (Environmental- Moral)		F2 (Communal- Social)		F3 (Environmental- Economic)	
I. No	r	I. No	r	I. No	r
11	.651	35	.481	31	.571
3	.628	41	.433	28	.562
18	.583	34	.461	47	.541
20	.514	51	.383	24	.511
17	.503	52	.450	16	.432
22	.506	36	.497	43	.418
13	.529	40	.523	50	.342
21	.506	37	.517		
4	.410	39	.476		
6	.503				
10	.524				
5	.535				
19	.509				
2	.469				

N=504

Table 5: Results of the Reliability Analysis Regarding the Total Scale and Factors

Factors	Item of Number	Chance-Half Correlation	Sperman Brown	Guttman Split-Half	Cronbach Alpha
F1 (Environmental- Moral)	14	.759	.863	.861	.869
F2 (Communal- Social)	9	.561	.719	.717	.784
F3(Environmental- Economic)	7	.537	.698	.642	.766
Total	30	.513	.678	.678	.849

As indicated in Table 5, the Chance-Half Correlation value of the scale, being composed of 3 sub-factors and 30 items in total was calculated as 0.531; its Sperman Brown Reliability Coefficient as 0.678; its Guttman Split Half value as 0.678 and its Cronbach Alpha Reliability Coefficient as 0.849. On the other hand, the Chance-half Correlation of factors were determined to range between 0.537; Sperman Brown values between 0.698 and 863; Guttman Split- Half values between 0.642 and 0.831 and Cronbach Alpha values between 0.766 and 0.869.

The Stability Level: The stability level of the scale was determined via Test-again-test method. A reliable measurement instrument should make stable measurements [37]. The last form of the scale, consisting of 30 items was applied on the relevant 76 students again after five weeks. The relationship among scores acquired at the end of both applications was considered in terms of each item and the total scale. Therefore, the capability of teach item on the scale and the total scale to make stable measurements was tested. The findings are summarized in Table 6.

Table 6: The Test-again- Test Results of the Scale Items

F1 (Environmental- Moral)		F2 (Communal- Social)		F3 (Environmental- Economic)	
I. No	r	I. No	r	I. No	r
11	.511(**)	35	.649(**)	31	.553(**)
3	.574(**)	41	.515(**)	28	.755(**)
18	.664(**)	34	.618(**)	47	.821(**)
20	.440(**)	51	.808(**)	24	.799(**)
17	.648(**)	52	.698(**)	16	.834(**)
22	.546(**)	36	.889(**)	43	.853(**)
13	.425(**)	40	.680(**)	50	.799(**)
21	.516(**)	37	.813(**)		
4	.648(**)	39	.644(**)		
6	.678(**)				
10	.266(*)				
5	.596(**)				
19	.747(**)				
2	.693(**)				

N: 76; *= $p < 0.005$; **= $p < 0.001$

Table 7: The Test-again-Test Results of the Scale Factors

First Application		Second Application			
		F1	F2	F3	Total
Environmental- Moral	F1	.860(**)			
Communal- Social	F2		.873(**)		
Environmental- Economic	F3			.655(**)	
Total					.904(**)

N: 76; *= $p < 0.005$; **= $p < 0.001$

Table 6 indicates that the correlation coefficients of each scale item acquired via Test-again-Test method range between 0.266 and 0.889 and each relationship is significant and positive ($p < 0.001$). Reliability is associated with the stability, consistency and sensitiveness of the scale. Therefore, the values determined as stability coefficient are regarded as the evidence for the reliability of the scale [38]. In this regard, it is understood that the scale can make stable measurements.

Findings regarding the Test-again-Test results of the scale factors are summarized in Table 7:

Table 7 indicates that the correlation coefficients of scale factors acquired via test-again-Test method range between 0.655 and 0.904 and each relationship is significant and positive ($p < 0.001$). Therefore, it is understood that factors shown in the scale can also make stable measurements.

According to the values acquired in line with the reliability analyzes, SDAS can be regarded as a reliable scale, for it makes consistent and stable measurements.

RESULTS

In this study, a scale was developed in order to determine the sustainable development awareness of teacher candidates. The SDAS is a five point likert scale and consists of 30 items under three factors. Each item in the factors is scaled as follows: “(1) I disagree *at all*”, (2) “I disagree”, (3) I’m undecided, “(4) I agree” and “(5) I’m totally agree. The scores acquired for the responses of the students to the five point likert scale don’t have standard features due to the differences in item numbers of the factors. Therefore, it is appropriate to convert the raw scores into standard scores in such a way that the lowest will be 20 and the highest 100. While converting the raw scores into standard scores, the following formula can be used:

$$X_{\text{standard score}} = \frac{X_{\text{raw score}}}{\text{Item number in the scale}}$$

The Levels Corresponding to the Scores Acquired from Factors Can Be Summarized as Follows:

- 20-35 : Very low level of awareness
- 36-51 : Low level of awareness
- 52-67 : Intermediary level of awareness
- 68-83 : High level of awareness
- 84-100 : Very high level of awareness

The validity of the scale was examined via two different methods, which are (1) factor analysis and (2) testing of the validity through distinctiveness.

According to the results of the factor analysis, the scale consists of three factors. Taking into account the factor loads of scale items, proper values of factors and the variance rates shown, it can be understood that the scale has the structure validity. As a matter of fact, it is adequate in terms of behavioral sciences that the factor loads in the scale items are more than 0.30 and the total variance is clarified as at least 40% [39].

In order to determine to what extent each scale item can measure the features attempted to be measured by the relevant factor, item factor correlations were calculated. The fact that the score acquired from each item is correlated with the score acquired from the relevant item factor is used as a benchmark in terms of comprehending the serving level of the total factor target of each item [37, 40]. In this regard, the correlation values between each item of the scale and the scores acquired from the relevant factor range between 0.498 and 0.717. In accordance with this, it is understood that each scale item and factor serves for the target to measure the desired level with the total scale significantly and each item is distinctive at a desired level.

The internal consistency coefficients of the scale were calculated via Cronbach Alpha, Sperman-Brown formula and Guttman Split-Half Reliability Formula. The Chain-half correlations with regard to scale factors were calculated as 0.513; Sperman Reliability coefficient as 0.678; Guttman Split-Half value as 0.678; Cronbach Alpha Reliability Coefficient as 0.849. On the other hand, the Chain-Half correlations for factors range between 0.537 and 0.759; Sperman Brown values between 0.698 and 0.863; Guttman Split-Half values between 0.642 and 0.831; Cronbach Alpha values between 0.766 and 0.869. Within the framework of these values, it can be stated that the scale can make reliable measurements for factors and as a whole. However, the fact that the reliability coefficient is 0.70 and above is regarded as an indicator of the scale reliability [32, 34].

In order to determine the invariance level of the sustainable development awareness scale in respect to the time, Test-again-Test method was applied, using the data collected from applications performed each five weeks. Test-again-test method was applied within the framework of each item and sub-factors of the scale. The test-again-test correlation coefficients for each scale item range between 0.266 and 0.889. Test-again-test correlation coefficients calculated with respect to factors range between 0.655 and 0.904. These relationships are all positive and significant at $p < 0.001$ level. The reliability coefficient representing the consistency level increases as it reaches to 100 and falls as it drops to 0.00 [34]. As known, the 0.00-0.30 level represents the low correlation in terms of correlation coefficients; 0.30-0.70 level the intermediate and 0.70-1.00 level high correlation [32]. In accordance with this, 1 of the scale items is at low correlation level, 20 of them are at intermediate and 9 at high correlation level. 3 of the factors are at high correlation level. Therefore, stable measurements can be made in terms of invariance aspect of each scale item and factor.

As a consequence, SDAS can be regarded as a valid and reliable scale in measuring the sustainable development awareness levels of the students at Education Faculty (teacher candidates).

REFERENCES

1. WCED, 1987. World Commission on Environment and Development, Our Common Future. Oxford: OUP.
2. Meadows, H.D. *et al.* 1990. Ekonomik Büyümenin Sınırları. Ceviri: Kemal Tosun ve diğerleri. İstanbul: İşletme İktisadi Enstitüsü Yayını. pp: 112.
3. Alagöz, M., 2007. Sürdürülebilir kalkınmada çevre faktörü. Uluslararası Hakemli Sosyal Bilimler E-Dergisi, Sayı., pp: 11.
4. Lucerne Declaration, 2007. Lucerne declaration on geographical education for sustainable development (Editors: H. Haubrich, S. Reinfried and Y. Schleicher,). Geographical Views on Education for Sustainable Development. Proceedings of the Lucerne-Symposium, Switzerland, July 29-31, 2007. Geographiedidaktische Forschungen, 42: 243-250.
5. Unesco, 2007, <http://www.unesco.org/education/tlsf/> (Accessed: Eylül-2010).
6. Summers, M., C. Kruger, A. Childs and J. Mant, 2000. Primary school teachers' understanding of environmental issues: An Interview Study, Environmental Education Res., 6(4): 163-182.

7. Reid, A. and P. Petocz, 2006. University lecturers' understanding of sustainability. Higher Education, 51: 105-123.
8. Gürbüz, H., M. Kisoglu and M. Erkol, 2007. Biyoloji öğretmenleri adaylarının çevreye yönelik tutumlarının informal ve formal eğitim ortamları açısından değerlendirilmesi. Atatürk Üniversitesi Bayburt Eğitim Fakültesi Dergisi, 2(3): 74-84.
9. Tuncer, G., G. Tekkaya, S. Sungur, J. Cakiroglu and E. Sahin, 2008a. Environmental literacy of future teachers as a key for sustainable future. XIII. IOSTE Symposium, Izmir, Turkey. pp: 21-26.
10. Tuncer, G., H. Ertepinar and E. Şahin, 2008b. Çevre okuryazarlığı: Geleceğin öğretmenleri sürdürülebilir bir gelecek için hazır mı? 8. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi, 2008, Ağustos. Bolu, Türkiye. pp: 27-29.
11. Erdoğan, M. and A. Ok, 2008. Environmental literacy assessment of turkish children: The effects of background variables. The WCCI 13th World Conference in Education, Antalya, Turkey. pp: 02-06.
12. Şahin, E., H. Ertepinar and G. Teksöz, 2009. Sürdürülebilir kalkınmaya yönelik yeşil bir müfredat uygulaması için göstergeler. Ankara: Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 37: 123-135.
13. Kisoglu, M., *et al.* 2010. Environmental literacy and evaluation of studies conducted on environmental literacy in Turkey. International Online J. Educational. Sci., 2(3): 772-791.
14. Aydın, F., 2010. Geography teacher candidates' views about environment problems and environment education (Gazi University Case). International Online J. Educational Sci., 2(3): 818-839.
15. Aydın, F. and H. Kaya, 2011. Secondary Education Students' Thoughts and Behaviours towards Environment (Karabuk Sample-Turkey). American-Eurasian J. Agricultural and Environ., 10(2): 248-256.
16. Aydın, F., M. Kaya and M. Coşkun, 2011. The Role of Geography Course in Building Environmental Conscious. World Applied Sci. J., 12(6): 822-829.
17. Roth, C.E., 1992. Environmental Literacy: Its Roots, Evolution And Directions in The 1990s. http://www.eric.ed.gov/ERICDocs/data/ericdocs2s ql/content_storage_01/0000019b/80/24/44/47.pdf (Accessed: Eylül-2009)
18. Stockholm Conference. 1972. <http://www.unep.org/documents/default.asp?documentid=97>. (Accessed: Ekim 2010).
19. Ortak Geleceğimiz, 1989. Ortak Geleceğimiz Raporu, Dünya Çevre ve Kalkınma Komisyonu, Ankara: Türkiye Çevre Sorunları Vakfı.,
20. Rio Declaration. 1992. <http://www.un.org/documents/ga/conf151/aconf15126-1.htm> (Accessed: Aralık 2010).
21. Dulupcu, M., 2001. Sürdürülebilir kalkınma politikasına yönelik gelişmeler. Dis Ticaret Dergisi, Sayı., 20: 42-60.
22. Wood, W.B., 2004. American Geography and International Research: A Sustainable-Development Agenda. The Professional Geographer, 56(1): 53-61.
23. Moore, J., 2005. Barriers and pathways to creating sustainability education programs: policy, rhetoric and reality. Environmental Education Res., 11(5): 537-555.
24. Bin Yıl Kalkınma Hedefleri. 2005. <http://www.undp.org.tr/Gozlem3.aspx?WebSayfaNo=248>. (Accessed: Kasım 2010).
25. Higgins, P. and G. Kırk, 2006. Sustainability Education in Scotland: The Impact of National and International Initiatives on Teacher Education and Outdoor Education. J. Geography in Higher Education, 30(2): 313-326.
26. Demirci, A., 2006. Developing international geography standards for a more sustainable future and its underlying reasons. Proceedings of the Second International Conference of the Asian Philosophical Association, Daedong Philosophical Association, South Korea, pp: 413-426.
27. Firth, R. and C. Winter, 2007. Constructing education for sustainable development: the secondary school geography curriculum and initial teacher training. Environmental Education Res., 13(5): 599-619.
28. NSW Department of Education and Training. 2007. Skills for Sustainability. http://www.bvet.nsw.gov.au/pdf/Skills_for_Sustainability_2007.pdf.
29. NSW Department of Education and Training. 2009. Skills for Sustainability. http://www.bvet.nsw.gov.au/pdf/Skills_for_Sustainability_2009.pdf.
30. Alkis, S., 2009. Sürdürülebilir bir dünya için coğrafya eğitimi. İstanbul: Aktif Yayınevi.,
31. Meydan, A., S. Doğu and M. Dinc, 2009. Öğretmen adaylarının çevre sorunları konusundaki farkındalık ve duyarlılıkları. Selçuk Üniversitesi Ahmet Keleşoğlu Eğitim Fakültesi Dergisi Sayı. 28, Sayfa. pp: 153 -168.
32. Büyüköztürk, S., 2002. Sosyal bilimler için veri analizi el kitabı. Ankara: Pegem Akademi Yayıncılık.
33. Eroglu, A., 2008. Faktör analizi. S. Kalaycı (Ed.), SPSS Uygulamalı Çok Değişkenli İstatistik Teknikleri (ss. 321-331). Ankara: Asil Yayın Dağıtım.
34. Gorsuch, R.L., 1983. Factor analysis. Hillsdale: Lawrence Erlbaum Associates.

35. Carmines, E.G. and R.A. Zeller, 1982. Reliability and validity assessment. 5th ed. Beverly Hills: Sage Publications Inc.
36. Tavsancıl, E., 2010. Tutumların ölçülmesi ve SPSS ile veri analizi. Ankara: Nobel Yayıncılık.
37. Balci, A., 2009. Sosyal bilimlerde araştırma: Yöntem, teknik ve ilkeler. Ankara: Pegem Akademi Yayınevi.
38. Hovardaoglu, S., 2000. Davranış bilimleri için araştırma teknikleri. Ankara: Ve-Ga Yayıncılık.
39. Kline, P., 1994. An easy guide to factor analysis. London and New York: Routledge.
40. Karadağ, E., 2007. Yapılandırmacı öğrenme ile ilgili öğretmen yeterliliği ölçeğinin geliştirilmesi: geçerlik ve güvenirlik analizleri. Kuram ve Uygulamada Eğitim Bilimleri, 7: 153-175.