A STUDY ON DEVELOPING A BEHAVIOUR SCALE TOWARDS SUSTAINABLE ENVIRONMENTAL EDUCATION

Abstract. *Sustainability is a term that presented itself especially in the late 1970s, when there was a considerable increase in environmental problems. In general, it can be defined as satisfying the present requirements with a consideration into future needs without using up natural resources. It is clear that education is part of the process of achieving it. Accordingly, sustainable environmental education includes enabling individuals to gain an awareness of environmental issues, to attain certain values and attitudes, and to adopt positive behaviours. The purpose of this study is to develop a valid and reliable scale regarding sustainable environmental education. The study was implemented on a total of 409 prospective teachers at Ahi Evran University. It was based on the 5-point Likert scale and consisted of 29 items. The data were transferred to the SPSS 15.0. Afterwards, an exploratory factor analysis was conducted on the data. The analysis yielded that the scale had three dimensions. In addition, Cronbach's alpha coefficient for the scale was found to be 0.944.*

Key words: *behaviour scale, sustainable environmental education, scale development.*

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Introduction

Technological and scientific advances, increased mechanization and population, and higher standards of living have resulted in a considerable need for food, energy and employment, which has influences, whether direct or indirect, on the environment. As a result of natural circulation, environmental problems are felt globally, not locally, in our globalizing world. In particular, such environmental problems as acid rains caused by heavy industrial waste, increasing holes in the ozone layer or water pollution have direct or indirect influences on the ecological balance not only in industrial areas but also in other areas where no industry is located.

Ecological problems are principally as a result of advancement and increasing requirements. The advancement is mostly observed in the fields of industry, population and energy and has effects on the environment. One of the most significant factors in environmental pollution is using solid, liquid and gas particles- inevitable inputs of the process of industrialization- and turning them into the waste. Gas waste (carbon dioxide (CO_2), methane, (CH_4) chlorofluorohydrocarbons, CFC, nitrogen oxide NO_x) leads to greenhouse effects and acid rains, which, in turn, results directly in increases in temperature and indirectly in global warming, reduced bio-diversity, and water and soil pollution (Durning,1998, p.78). Liquid waste, on the other hand, presents problems caused by petro-chemistry products and waste (Uslu, 1997,p.47).

Population increase, another factor in environmental pollution, causes an increased demand for employment and consumption, and brings about industrialization, heavy traffic, noise,

air pollution, water pollution and soil pollution. Unconscious irrigation and disinfection, and the use of artificial fertilizers make soil less productive, which, in turn, accelerates the migration from rural to urban areas. Similarly, other known environmental problems include unconscious urbanization, activities for opening new living areas, unnecessary obsession with consumption, wasting thousands of land on searching for gold and diamond mostly through such substances as cyanide and polluted drinking water caused by these substances combining with water over time (Yucel, 2003).

Packaging materials are another environmental problem that results from consumption. Although some of them can be recycled, an immense amount of technological and plastic rubbish is produced. The reason for this is that popular marketing techniques cause these materials to be changed frequently; in addition, not only products but also clothes are often replaced by others and thrown away (Yucel, 2003).

In such a setting surrounded with all these problems, the first attempts to conduct international studies on the environment started in the 1970s. These studies gained momentum with the Declaration of the United Nations Conference on the Human Environment. It was in the Bruntland Report, from the United Nations World Commission on Environment and Development, that the term of sustainable development was mentioned for the first time (Agca, 2002, p.30). In general, sustainability can be defined as efficient use of social, economic and environmental resources worldwide (Calder & Clugston, 2003) in a way that will enable the present resources to be transferred to future generations without being polluted or used up (Anonymous, 1987).

It was in the 1972 Stockholm Conference when the correlation between sustainable development and education was presented (Ouablan, 2009). It was argued in the conference that education was a process of enabling individuals and societies to realize their own potentials, and that the environment and development were parts of the process (Quablan, 2009, cited from UNCED, 1992). In order to emphasize the severity of the situation, the United Nations declared the years from 2005 to 2014 as "The Decade of Education for Sustainable Development", and defined the situation as "an emergency throughout the universe" (Conde & Sanchez, 2010).

In course of time the concept of sustainability took place in literature including environmental education as sustainable environmental education. In this purpose studies including attitude, behaviour, value were conducted (Benedict,1999; Fien, Tilbury,1996; Gallagher, Wheeler, McDonough, Namfa, 2000; Pearson, Honeywood, O'Toole, 2005).

The purpose of sustainable environmental education is not to explain cognitive and scientific concepts to individuals but to enable them to react to environmental problems in a sensitive way (Hansman, 2009), to train them in a way that will make them imagine different dimensions of development, and to enable them to remain within these dimensions (Jensen & Schnack, 2006). In this sense, sustainability requires considerable changes in one's behaviours (Cunningham et al., 2010). As is known, education is a prerequisite for changes in behaviours and equipping individuals through certain necessary activities (Hungerford & Volk, 1990); however, it is not enough on its own. Behavioural changes are based on sensitivity and knowledge (Jeronen et al. 2009). The level of knowledge about the environment forms the basis of behaviours towards the environment, which is important in that it enables individuals to be aware of the causes for and consequences of their behaviours (Uusitalo, 1993, cited in Jeronen et al., 2009). The literature includes studies reporting that people worldwide have started to be sensitive not only to environmental problems but also to protecting natural resources and the environment in recent years. Such studies suggest that attitudes, behaviours and intentions of individuals are mostly intertwined with financial reasons, their values and beliefs (Halpenny, 2010).

Attitudes and social norms have a profound effect on behaviours (Biel, Eek & Gärling, 1999). Even so, individuals noted that they would rather not experience a change in their behaviours on the grounds that "nothing will probably change" (Kerr & Kaufman-Gilliland, 1997). Another factor in behavioural changes is awareness, although it is not enough for behaviours to turn into a personal pattern (Schwartz & Howard, 1982/1984). An actual and tangible connection exists between attitudes to the environment and behaviours. Nevertheless, it is sometimes necessary to know the attitude underlying a particular behaviour. An example would be someone who rides a bicycle. It is important to know whether he/she rides it to stay healthy, to save money or to move. To save energy in order to get hot water, to insulate

a house, to walk or ride a bicycle instead of driving are all behaviours that suggest a certain amount of sensitivity to the environment. Even so, it is important to determine whether the underlying cause is a positive attitude to the environment or not (Kaiser, 1997).

As can be seen, behaviours towards a particular situation, incident or phenomenon are actually expressed products of cognitive and affective patterns. When behavior is considered as an output, the inputs are knowledge, attitudes, values, the place and century one is in, lifestyle, religious values and financial situation.

Both environmental problems and behaviours consist of a number of correlated factors. Just as it is impossible to get rid of all environment problems by coping with only a few, it is not possible to enable individuals to acquire or change behaviours that include a number of patterns. Although it seems unlikely that current environment problems will be overcome, some of them could be prevented through certain behaviours.

Most of the studies in this extent are aimed at attitudes. Attitude is a factor which directs an individual to behaviour. So, when certain cases were given and their behaviours against these cases were asked, individuals awarenesses towards sustainable environment existed (Tuncer, Ertepinar, Tekkaya, Sungur,2005; Bogner; Wiseman, 2006; Kaiser, Wölfing, Fujrer, 1999).

For that reason, the present study is different from others that concludes only behavior items of prospective teachers, who are expected to teach the next generations, towards the environment.

Methodology of Research

The present study is based on the survey model. The survey approach refers to a group of methods which emphasize quantitative analysis, where data for a large number of organizations are collected and these data are analyzed using statistical techniques. By studying a representative sample of organizations, the survey model seeks to discover relationships that are common across organizations and hence to provide generalizable statements about the object of study (Gable, 1994).

Sample of Research

The universe of the study was comprised of prospective teachers from different departments in Ahi Evran University. The sample was comprised of a total of 409 prospective teachers who studied Social Sciences Teaching, Science Teaching and Classroom Teaching in Ahi Evran University. Purposive sampling method was used in selection of sample. By choosing information-rich cases, purposive sampling gives the opportunity to make a deep research according to the aim of the study (Patton, 1990).

Instrument and Procedures

The stages of the scale development were based on the required stages for developing attitude scales. They are generally as follows (Cited in Afacan and Aydogdu, 2006, p. 191):

1. The Stage of Designing Behaviour Items
2. The Stage of Receiving Learned Opinion
3. The Stage of Pretesting
4. The Stage of Validity
5. The Stage of Factor Analysis and Reliability

1. The Stage of Designing Behaviour Items

A review of literature, especially foreign literature, was conducted in order to develop the behaviour scale (Feng, Reisner, 2011; Kaiser, Oerke, Bogner, 2007; Kaiser, Wolfing, Fuhrer, 1999).

While the behaviour items were being designed,

1. Great care was taken to design them in a way that would express desired and undesired conditions instead of simple facts.
2. Great care was taken to make them include clear and explicit statements regarding the issue.
3. Negative items were also included.
4. The scale was based on the 5-point Likert scale and included the following ratings: "strongly agree", "agree" "neither agree nor disagree", "disagree", and "strongly disagree" (Tavsancil, 2002, p. 143-144).

Afterwards, an item pool was constructed. The pool consisted of behaviours concerning sustainable environmental education and contained 69 items.

2. The Stage of Receiving Learned Opinion

The study of content validity is necessary to test the appropriateness of the scale measure and to see if it represents the aim to be measured (Fraenkel, Wallen, 1996). In order to get the content validity of the scale interviews were conducted with four experts who specialized in science education on the scale items and its appropriateness over what it measures. The scale has been lasted as a draft scale by excluding some of the items and making corrections according to the proposals. Three language experts concerned with the clear behaviour items whether they were poor or good in the way they were expressed in language.

Interviews were conducted with four experts who specialized in environmental education in order to determine whether the scale measured behaviours concerning sustainable environmental education. Furthermore, three language experts were asked for their opinion about whether the items were good or poor in the way they were expressed.

3. The Stage of Pretesting

During the stage, three 4th grade prospective teachers from the departments of Social Sciences Teaching, Science Teaching and Classroom Teaching, Ahi Evran University, were asked to read the scale and to comment on the items. Afterwards, the time required for filling in the scale was calculated to be 25 minutes with a consideration into how long it took these three students to fill in the scale.

4. The Stage of Validity

An attempt was made to determine the content validity and construct validity of "The Behaviour Scale for Sustainable Environmental Education", which was based on the 5-point Likert type.

After the scale had been finalized, a pilot scheme was carried out for reliability purposes. The preliminary scale was conducted on a total of 409 prospective teachers who studied Social Sciences Teaching (102), Science Teaching (104) and Classroom Teaching (113) at Ahi Evran University.

Then, the answers provided by the prospective teachers to the positive statements were rated as "strongly agree" (5), "agree" (4), "neither agree nor disagree" (3), "disagree" (2), and "strongly disagree" (1). On the other hand, their answers to the negative statements were graded as follows: "strongly agree" (1), "agree" (2), "neither agree nor disagree" (3), "disagree" (4), and "strongly disagree" (5). Next, the data were transferred to the SPSS 15.

Finally, an analysis was conducted into the item-total correlation values of each item included in the scale. It was found that they varied from 0.003 and 0.758 (Table 1). Twenty-four behaviour items with an item-correlation value of lower than 0.35 were excluded from the scale. A total of 45 items remained.

Table 1.   Item-Total Correlation Values.

Behaviour Item	Item-Total Correlation Value	Behaviour Item	Item-Total Correlation Value	Behaviour Item	Item-Total Correlation Value
1	0.261	24	0.487	47	-0.260
2	0.545	25	0.538	48	0.751
3	0.411	26	0.544	49	-0.331
4	0.444	27	0.269	50	0.576
5	0.375	28	0.597	51	0.667
6	0.005	29	-0.317	52	-0.158
7	-0.127	30	0.634	53	0.494
8	0.428	31	0.648	54	0.663
9	0.608	32	-0.137	55	0.621
10	0.368	33	0.477	56	-0.081
11	0.502	34	0.684	57	0.700
12	0.066	35	-0.051	58	0.595
13	-0.006	36	0.533	59	0.284
14	0.527	37	0.624	60	0.714
15	0.215	38	0.347	61	0.707
16	0.477	39	0.645	62	0.687
17	-0.245	40	0.609	63	0.677
18	-0.299	41	0.511	64	0.674
19	0.284	42	0.685	65	-0.188
20	0.576	43	0.647	66	0.598
21	0.106	44	0.758	67	0.607
22	0.592	45	0.701	68	-0.058
23	0.546	46	0.003	69	-0.157

5.   The Stage of Factor Analysis and Reliability
5.1   Factor Analysis

Factor analysis can be defined as a multiple-variable statistic that makes an attempt to gather a number of correlated variables and to find a small number of conceptually significant new variables (factors, dimensions) (Buyukozturk, 2002, p. 472). The data obtained from a study may not be suitable for factor analysis The Kaiser- Mayer- Olkin (KMO) coefficient can be considered or the Barlett's test can be conducted in order to determine whether the data are suitable for factor analysis. The data are regarded suitable for factor analysis on the condition that the KMO value is higher than 0.60 and the Barlett's test yields a significant result (Cited in Buyukozturk, 2003, p. 120). In this study, the KMO value for the scale was found to be 0.960. A value of 0.960 is considered perfect (Cited in Afacan and Aydogdu, 2006, p. 193). Accordingly, the scale can be regarded perfect. Furthermore, the Barlett's test yielded a significant result (χ^2=10472.162; df=990; p=0.000<0.05) (Table 2).

Table 2.   The KMO value and Results of the Bartlett's Test

|	
Kaiser-Meyer-Olkin (KMO)	0.960
Bartlett's Test	10472.162
df	990
Sig	0.000

p<0.05

An item analysis was conducted on the behaviour items included in the scale. Afterwards, an exploratory factor analysis was carried out in order to determine the factor structure of the scale.

5.1.1.   Exploratory Factor Analysis

The exploratory factor analysis on the scale included a varimax rotation. The rotation suggested that the scale had 6 factors. The behaviour items 36 and 55 were excluded, for they had fallen into two factors. In addition, the behaviour items 3, 4, 5, 16, 40, 41 and 53 were excluded from the scale, for it was observed that they did not comply with the names specified during the process of naming the factors. Furthermore, the behaviour items 37, 45, 50, 51, 57, 60 and 66 were excluded from the scale, for they had fallen into different factors. Finally, another varimax rotation was carried out on the remaining 29 behaviour items. Table 3 presents the results of the rotated principal components analysis.

The eigenvalues relating three factors are shown in diagram 1 Scree Plot Graphic below.

Scree Plot
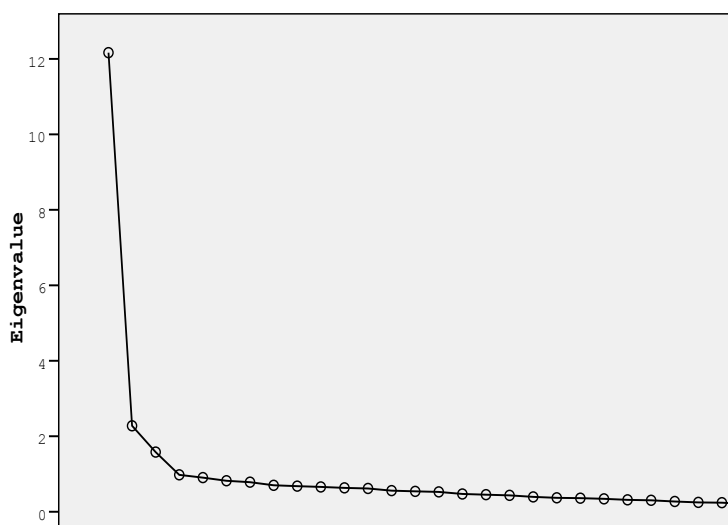
Graphic 1.   Scree Plot

The vertical line represents the eigen value number and horizontal line represents the factors in this graphic. The graphic is brought out by matching the factors and eigenvalues. The factor which has high accelerations and fast decreases give the number of important factors. As seen in the developed graphic there are three fast accelerated decreases (Büyüköztürk, 2003: 120).

The results of rotated principal components analysis are shown on Table 3.

Table 3. Rotated Principal Components Analysis.

Behaviour Items	Factors And Factor Loadings		
	F1	F2	F3
i9	0.792		
i31	0.789		
i30	0.762		
i28	0.761		
i34	0.731		
i48	0.619		
i20	0.617		
i11	0.601		
i54	0.583		
i39	0.567		
i44	0.553		
i14	0.536		
i10	0.529		
i22	0.528		
i8	0.474		
i63		0.782	
i62		0.729	
i61		0.708	
i43		0.695	
i64		0.691	
i58		0.688	
i42		0.677	
i67		0.627	
i26			0.724
i23			0.702
i24			0.695
i25			0.562
i33			0.479
i2			0.436

The items fell into three factors whose eigenvalues were higher than 1 (12.164, 2.278, 1.581). The factors are presented in Table 4.

Table 4. The Factors of The Three-Factor Scale, Their Eigenvalues, The Number of Items in The Factors, Their Factor Variances, and Increasing Variance Values with Each Added Factor.

The factors of the Behaviour Scale towards Sustainable Environmental Education	Eigenvalues	The number of items in the factors	Factor Variances	Increasing variance values with each added factor
I	12.164	15	24.336	24.336
II	2.278	8	19.263	43.599
III	1.581	6	11.651	55.251

The eigenvalues of the first, second and third factors and the percentage of the variance they accounted for were 12.164, % 24.336; 2.278, %19.263; and 1.581, % 11.651 respectively (Table 4).

Eigen value is a considerable coefficient in the account of variance explained by the factors also deciding on the number of important factor. At the beginning, generally the factors of which eigenvalues are 1 or more than 1 are named as important factors in factor analyze (Büyüköztürk, 2003, p. 119). In multi-factored scales the high variance is the indicator which shows that the related concept or structure was measured very well. As shown in Table 4, total variance percentage accounted by the scale is %55. 251 and this is a very high value (Büyüköztürk, 2003, p. 119).

The First Factor of Scale

The first factor accounted for 12.164% of the total variance. It consisted of 15 behaviour items and the factor loadings varied between 0.474 and 0. 792. The data for the first factor are presented in Table 5.

Table 5.   The Behaviour Items of the First Factor and Their Factor Loadings.

1st Factor Cronbach's Alpha: 0.919	Variables	Behaviour Items	Factor Loadings
	i9	I prefer walking very short distances to driving.	0.792
	i31	I turn off the computer if I do not intend to use it for a few hours.	0.789
	i30	I use energy-efficient lambs at home.	0.762
	i28	I use both sides of paper for copying and photocopying.	0.761
	i34	I use goal-oriented detergents to clean my home.	0.731
	i48	I give away any products like furniture and clothes that I do not want to use anymore to someone who might need them.	0.619
	i20	I buy battery devices that can be recharged instead of those that run on cell battery.	0.617
	i11	I do not put electrical appliances (TV, printer, etc.) on stand-by.	0.601
	i54	I do not leave the tap on while brushing my teeth or washing my hands.	0.583
	i39	I use permanently-used glasses, plates, forks and knives rather than disposable ones.	0.567
	i44	I buy electrical appliances (phone, laptop, white goods) that use less electricity.	0.553
	i14	I make an effort to put what I buy during shopping into as few bags as possible.	0.536
	i10	I turn off the lights if I am the last one to leave a room.	0.529
	i22	I keep used pieces of paper as scrap paper.	0.528
	i8	I wash my clothes in the washing machine without prewashing unless they are too dirty.	0.474

As can be concluded, the items were intended to test the behaviour of energy-saving. Accordingly, the factor was named "Behaving in an Energy-Saving Way". Cronbach's Alpha coefficient for the factor was 0.919.

The Second Factor of Scale

The second factor accounted for 19.263% of the total variance. It consisted of 8 behaviour items and the factor loadings varied between 0.627 and 0. 782. The data for the second factor are presented in Table 6.

Table 6.   The Behaviour Items of the Second Factor and Their Factor Loadings.

2nd Factor Cronbach's Alpha: 0.898	Variables	Behaviour Items	Factor Loadings
	i63	I talk with my friends about environmental issues.	0.782
	i62	I do not hesitate to warn anyone who damages the environment.	0.729
	i61	I watch and listen to environmental programs on TV and radio.	0.708
	i43	I forward any message or e-mail about environmental issues to my friends.	0.695
	i64	I remember warning people about their damaging behaviours towards the environment.	0.691
	i58	I follow magazines and newspapers on environmental and natural issues.	0.688
	i42	Before I vote for any politician, I take his/her attitudes towards the environment into account.	0.677
	i67	I share messages and videos about the environment on social networking sites (Facebook, Twitter)	0.627

In conclusion, all the items are about following environmental publications or broadcasts and reacting to people who damage the environment. Accordingly, the factor was named "Following Environmental Publications or Broadcasts and Reacting to People Who Damage the Environment". Cronbach's Alpha coefficient for the factor was 0.898.

The Third Factor of Scale

The third factor accounted for 11.651% of the total variance. It consisted of 6 behaviour items and the factor loadings varied between 0.436 and 0. 724. The data for the third factor are presented in Table 7.

Table 7.   The behaviour Items of the Third Factor and their Factor Loadings.

3rd Factor Cronbach's Alpha: 0.793	Variables	Behaviour Items	Factor Loadings
	i26	Before I buy a product, I take into account whether its waste is recyclable or not.	0.724
	i23	I put empty glass bottles into recycling bins.	0.702
	i24	I divide waste into certain categories, such as paper, glass, plastic, etc.	0.695
	i25	I keep wrapping paper used for presents for prospective users.	0.562
	i33	I prefer to buy environmentally-friendly products even if they might be more expensive.	0.479
	i2	I buy environmentally-friendly personal care products	0.436

As can be concluded, the items in this factor are all about using sustainable, environmentally-friendly and recyclable products. Accordingly, the factor was named "Using Environmentally-Friendly and Recyclable Products". Cronbach's Alpha coefficient for the factor was 0.793.

5.2. The Stage of Reliability

Following the factor analysis, the scale was analyzed for reliability purposes. It was found that Cronbach's alpha coefficient for the scale was 0.944.

Discussion

Behaviours are displayed and negative behaviours are prevented through considerably complex processes. In particular, environmental problems and behaviours towards the environment are composed of a number of elements. It is human beings that are the largest factor in environmental problems. The nature is equipped in a way that will absorb the damages. In general, air and soil, acting as recipients, absorbs the waste left by living things on the environment. Nevertheless, their capability to do so is diminished as they are burdened with increasing waste. As a result of the damage to the nature and its ability to absorb waste, we are faced with a number of large-scale environmental problems such as global warming, greenhouse effect, light pollution, deforestation, desertification, reduced biodiversity and diseases (World Health Organization, 1998, cited in Uzun, 2007, p.2).

It is important to know how environmental problems present themselves and how strong the consciousness, attitudes, behaviours and values of individuals are in implementing potential solutions to these problems. Therefore, individuals can be enabled to behave towards the use of natural resources in a sensible, conscious and hard-line manner only through an increase in the importance attached to life quality and education .In order for environmental problems to be overcome, human beings need to be aware of these problems and take responsibility for solutions (Milfont, 2008).

Our Common Future, a report published in 1987, emphasized that a great deal of importance should be attached to environmental education. A similar emphasis was included in Agenda 21, a plan published in 1992. Even so, it was discovered that individuals did not experience any change regarding the issue during the five years between the two (Clover, 2002). It can be argued that there are three reasons for this. Firstly, an attempt was made to change individual behaviours. However, individual behaviours are too small-scale to overcome environmental problems. The reason for this is that the capitalist system and marketing strategies exercise control all over the world. Next, it is necessary that education should play a crucial role in overcoming the problems and that it should be multi-dimensional. The third and most important reason, though often neglected, is that educational institutions target children and exclude many individuals (poets, authors, politicians, educationalists) that have the ability to guide state policies (Clover, 2002).

Therefore, environmental sustainability is a process that can only be achieved through formal and informal education and experiences on the part of individuals. Overcoming current problems and preventing potential ones are a long and comprehensive process that requires an organization of individuals of all ages and non-governmental organizations and a reregulation of state policies. An important part of this process, education is not something that can be considered independently of culture, economy and politics, and sustainability presents itself as a lifestyle in the new world order (Godotti, p. 1; Kollmuss, Agyeman, 2002).

Conclusions

The present study was conducted on a total of 409 prospective teachers who studied Social Sciences Teaching (102), Science Teaching (104) and Classroom Teaching (113) at Ahi Evran University. The preliminary scale had 68 items whereas the finalized version contained a total of 29 items and more than half of them were excluded on the basis of the item-total correlation values and factor analysis. Furthermore, it was discovered that "The Behaviour Scale for Sustainable Environmental Education" had three factors. The Cronbach's alpha coefficient for the scale was 0.9444, which suggests that it is highly reliable. The purpose of the scale is to determine behaviours towards sustainable environmental education.-

This is a reliable and valid scale which is developed to bring out the behaviours towards sustainable environmental education. It can be used as a precursor for the reason for forming behaviour. The study of scale development was made on a certain group. From the inspiration of this study it can be said larger sample group studies, can be suggested.

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References

Afacan, O., ve Aydogdu M. (2006). The Science Technology Society (STS) Course Attitude Scale. *International Journal of Environmental and Science Education,* 1 (2), 189-201.

Agca, B. (2002). World Summit on Sustainable Development, Implementation Report, (Johannesburg, 26 August-4 September 2002). *International Economical Problems*, 7, 30-40.

Alpar, I. (1997*). Population and Environmental Policies in Turkey. Population, Environment and Development Conference*, T.C.V. Press., November.

Anonymous (1987). *World Commission On Environment And Development, Our Common Future: The Brundtland Report*. Oxford, Oxford University Press.

Benedict, F. (1999) A Systemic approach to Sustainable Environmental Education. *Cambridge Journal of Education*, 29, 433-446.

Biel, A., Eek, D., & Garling, T. (1999). The Importance of Fairness for Cooperation in Public Goods Dilemmas. In P. Juslin & H. Montgomery (Eds.), *Judgment and Decision Making* (pp. 245-259). Hillsdale, NJ: Erlbaum.

Bogner, F. X., Wiseman, M. (2006). Adolescent' Attitudes Towards Nature and Environment: Quantifying the 2-MEV Model. *The Environmentalist,* 26, 247-254.

http://www.springerlink.com/content/09n6k758wv264111/fulltext.pdf, 21.04.2011.

Büyüköztürk, S. (2003). Handbook of Factor Analysis for Social Sciences. (3 rd press). Pegema Press, Ankara.

Calder, W., Clugston, R. M. (2003). Progress Toward Sustainability in Higher Education. *Environmental Law Reporter*, *33*, 10003-10022.

Carmen, C. M., Sanchez, S. J. (2010). The School Curriculum and Environmental Education: A School Environmental Audit Experience. *International Journal of Environmental & Science Education*, 5 (4), 477-494.

Clover, D. E. (2002). Environmental Adult Education: Growing Jobs for Living. *Education and Sustainability: Responding to the Global Challenge. In D. Tilbury (Ed.),* International Union for Conservation of Nature and Natural Resources IUCN, Gland, Switzerland and Cambridge.

Cronbach, L. J., Meehl, P. E. (1955). Construct Validity in Psychological Tests. *Psychological Bulletin, 52,* 281-302.

Cunningham, T. R., A , Williams, N. G. B., & Geller E. S. (2010). Protecting The Planet and its People: How Do Interventions to Promote Environmental Sustainability and Occupational Safety and Health Overlap? *Journal of Safety Research, 41*, 407-416.

During, A. (1998). How Much is Enough? Consumer Society and the Future of the World. TUBITAK-TEMA, June.

Engdahl, I., Rabusicova, M. (2010). Children's Voices about the State of the Earth and Sustainable Development. *A report for the OMEP World Assembly and World Congress on the OMEP World Project on Education for Sustainable Development*, July.

Feng, W., Reisner, A. (2011). Factors Influencing Private and Public Environmental Protection Behaviours: Results From a Survey of Residents in Shaanxi, China. *Journal of Environmental Management*, *92*, 429-436.

Fien, J., Tilbury, D. (1996). *Learning for a Sustainable Environment: An Agenda for Teacher Education in Asia and the Pacific*. Bangkok:UNESCO/Asia-Pacific Programme of Educational Innovation for Development.

Fraenkel, J. R., Wallen, N. E. (1996). *How to Design and Evaluate Research in Education*. (3rd Edition). McGraw-Hill, Inc.

Gallagher, J., Wheeler, C., McDonough, M., & Namfa, B. (2000). Sustainable Environmental Education for a Sustainable Environment: Lessons From Thailand for Other Nations. *Water, Air, and Soil Pollution.* 123: 489-503.

Gable, G. G. (1994) Integrating case study and survey research methods: an example in information systems. *European Journal of Information Systems* 3 (2): pp. 112-126.

Florian, G. K., Sybille, W. L., & Fuhrer, U. (1999) Environmental Attitude and Ecological Behaviour *Journal Of Environmental Psychology, 19* (1), 1-19.

Halpenny, E. A. (2010). Pro-Environmental Behaviours and Park Visitors: The Effect of Place Attachment. *Journal of Environmental Psychology*, *30*, 409-421.

Hansmann, R. (2009). Linking the Components of a University Program to the Qualification Profile of Graduates: The Case of a Sustainability-Oriented Environmental Science Curriculum. *Journal of Research in Science Teaching, 46* (5), 537-569.

Herrae, A. (2006). Biomolecules in the Computer. *Biochemistry & Molecular Biology Education.* 34 (4), 255-261.

Hungerford, H. R., Volk, T. L. (1990). Changing Learner Behaviour Through Environmental Education. *The Journal of Environmental Education*, *21* (3), 8-21.

Jensen, B. B., & Schnack, K (2006). The Action Competence Approach in Environmental Education. *Environmental Education Research,* 12 (3-4), 471-486.

Jeronen, E., Jeronen, J., & Raustia, H. (2009). Environmental Education in Finland – A Case Study of Environmental Education in Nature Schools. *International Journal of Environmental & Science Education, 4* (1), 1-23.

Kaiser, F. G., Wölfing, S., & Fujrer, U. (1999). Environmental Attitudes and Ecological Behaviour. *Journal of Environmental Psychology, 19*, 1-19.

Kaiser F. G., Oerke, B., & Bogner, F. X. (2007). Behaviour-Based Environmental Attitude: Development of an Instrument for Adolescents. *Journal of Environmental Psychology*, *27*, 242-251.

Kollmuss, A., Agyeman, J. (2002). Mind The Gap: Why Do People Act Environmentally and What are the Barriers to Pro-Environmental Behaviour? *Environmental Education Research*, *8* (3), 239-260.

Novak, M., Langerová, P. (2006) Raising Efficiency in Teaching Mathematics in Non-English Speaking Countries: An Electronic Bilingual Dictionary of Mathematical Terminology. In: *Proceedings of 3rd International Conference on the Teaching of Mathematics at the Undergraduate Level.* Istanbul.

Qablan, A. M., AL-Ruz, J. A., Khasawneh, & Al-Omari, S. A. (2009). Education for Sustainable Development: Liberation or Indoctrination? An Assessment of Faculty Members' Attitudes and Classroom Practices *International Journal of Environmental & Science Education, 4* (4), 401-417.

Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods* (2nd Edition). London: Sage Publication.

Pearson, S., Honeywood, S. (2005). Not Yet Learning for Sustainability: The Challenge of Environmental Education in a University *International Research in Geographical and Environmental Education*, *14* (3), 173-186.

Posner, M. (2004). Neural Systems and Individual Differences. *TC Record.* Retrieved 3/08/2005, from http://www.tcrecord.org/PrintContent.asp?ContentID=11663

Schwartz, S. H., Howard, J. A. (1982). Helping And Cooperation: A Self-Based Motivational Model. In V. J. Derlega, & J. Grzelak (Eds.), *Cooperation And Helping Behaviour: Theories And Research* (pp. 327–353). New York: Academic Press.

Tilbury, D., Stevenson, R. B., Fien, J., & Schreuder, D. (Eds.). (2002). Education and Sustainability: Responding to the Global Challenge, Commission on Education and Communication, IUCN, Gland, Switzerland and Cambridge.

Taciano, L. M. (2009). The Effects of Social Desirability on Self-Reported Environmental Attitudes and Ecological Behaviour. *Environmentalist, 29*, 263-269.

Tavsancıl, E. (2002). *Measurement and Data Analysis of Attitudes by Sppss*. Nobel Press. Ankara.

Tezbasaran, A. (1996). *Likert-Type Scale Development Guide*. Turkish Psychological Association Press.

Thurstone, L. L. (1959). *The Measurement of Attitude: A Psycho-Social Method and Some Experiments.* Chicago: Univerity of Chicago.

Tuncer, G., H. Ertepinar, C. Tekkaya, S. Sungur (2005). Environmental Attitudes of Young People in Turkey: Effects of School Type and Gender. *Environmental Education Research, Vol. 11, No. 2, April 2005, pp. 215-233*

Uslu, O. (1989). Environmental Problems of Industrialization and Urbanization, A Discussion in Terms of Permanent and Balanced Development Concept. *T.C.S.V.Press.* October.

Uslu, O. (1997). The Place of Sustainable Development in Economic and Ecological Applications, *Practice in Sustainable Development*, T.C.S.V.Press, November.

Uzun, N. (2007). A Study on the Secondary School Students' Knowledge and Attitudes Towards the Environment. Unpublished Doctoral Dissertation. Hacettepe University Science Institute. Ankara.

Yucel, F. (2003). The Union and the Opposition Environmental Protection and Economic Development for Ensuring Sustainable Development. *Cukurova University Institute of Social Sciences Journal of Social Sciences*, *11* (11), 100-120.

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