

## Developing a Scale for Attitudes toward the Environment

### Çevreye İlişkin Bir Tutum Ölçeği Geliştirme Çalışması

A. Kadir Maskan, Zeki Akkuş and Ramazan Demir  
Dicle University

#### Abstract

The purpose of this study is to develop a valid and reliable Likert-type scale to measure the attitudes of pre-service teachers toward the environment. A 30-item draft attitude scale was applied to 366 pre-service teachers who had attended fundamental physics, chemistry and biology courses (some of them had attended ecology courses) at the Education and Science- Art Faculties at Dicle University during 2002-2003 spring term. To test the validity of the scale and find out its sub-dimensions, a factor analysis was used and five sub-dimensions were found. The first dimension measured anxiety, the second dimension measured enjoyment, the third dimension measured participation, the fourth dimension measured the importance of the environment and fifth dimension measured the students' interest for environmental education. The Kaiser-Meyer-Olkin (KMO) value was 0.84 and the Barlett Test value was 1124.6. The reliability Coefficient (Cronbach alpha) for the whole scale was found to be 0.88. The Cronbach alpha values for the sub-dimensions were 0.74, 0.77, 0.64, 0.66, and 0.53 respectively.

**Key Words:** Attitude scale, attitudes toward environment, environmental concepts, environmental education.

#### Öz

Bu çalışmanın amacı, öğretmen adaylarının çevreye ilişkin tutumlarını belirleyen geçerli ve güvenilir Likert tipi bir tutum ölçeği geliştirmektir. 30 maddeden oluşan tutum ölçeği taslağı, 2002-2003 öğretim yılının ikinci yarısında Dicle Üniversitesi, Eğitim ve Fen –Edebiyat fakültelerinde öğrenim gören ve temel fizik, temel biyoloji ile temel kimya (bazıları çevre bilimi) derslerini okumuş olan 366 öğretmen adayına uygulanmıştır. Testin geçerliliğini belirlemek ve alt boyutlarını bulmak için faktör analizi uygulandı ve beş alt boyut bulundu. Birinci boyut kaygıyı, ikinci boyut hoşlanmayı, üçüncü boyut katılmayı, dördüncü boyut çevre eğitiminin önemini ve beşinci boyut ise çevre eğitimine olan öğrenci ilgisini ölçmektedir. Ölçeğin KMO (Kaiser- Meyer- Olkin) değeri 0,84, Barlett Testi değeri ise 1124,6 olarak bulunmuştur. Ölçeğin bütünü için hesaplanan güvenilirlik katsayısı (Cronbach Alpha) değeri 0,88, alt boyutlar için ise sırayla 0,74, 0,77, 0,64, 0,66, 0,53 olarak bulunmuştur.

**Anahtar Sözcükler:** Tutum ölçeği, çevre tutum ölçeği, çevre kavramları, çevre eğitimi.

#### Introduction

During the past ten years, human beings have turned their attention to the increasing problems of the environment. Among the various problems we impose

on the environment are water, air, noise, soil and space pollution. There is also light and electromagnetic pollution, as well as stray animals, shanty accommodation, the depletion of the ozone layer and global warming. All these are considered to be serious environmental issues.

Moreover, the pressure exerted by the population on the resources and ecological system of the Earth, nutrition, the education, the difficulties we are having in health services, the decreasing type of living creatures, rapid urbanization and unhealthy industrialization can

Yrd. Doç. Dr. A. Kadir Maskan, Dicle Üniversitesi, Z.G. Eğitim Fakültesi, Fizik Eğitimi A.B.Dalı, D.Bakır. akmaskan@dicle.edu.tr

Dr. Zeki Akkuş, Dicle Üniversitesi, Tıp Fakültesi, Biyoistatistik A.B.Dalı, D.Bakır. zakkus@dicle.edu.tr

Doç.Dr. Ramazan Demir, Dicle Üniversitesi Z.G. Eğitim Fakültesi, Biyoloji Eğitimi A.B.Dalı, D.Bakır. rdemir@dicle.edu.tr

all be seen as having created very important environmental problems in the world. One of the basic ways of coping with environmental problems is through organized education. To achieve this, the concepts of the environment must be incorporated into education programs starting from the primary education level and continuing onto the university level. International studies about the achievement of environmental education revealed that teachers' training was very important and necessary to achieve this incorporation (Ünal and Dımişki, 1999; IEEP, 1994).

The purpose of this study is to develop a new instrument to measure attitudes toward the environment. Anderson (1998) pointed out that future beneficial attitudes several conditions must exist. Firstly, the importance of attitudes in relation to school learning must be realized. In certain conditions, attitudes are important as entry characteristics, as outcomes and as consequences (i.e. unplanned outcomes). Secondly, the precision with which people talk and write about attitudes must be increased. Thirdly, attitude measurement of sufficient technical quality must be developed and used. Such measurements are necessary if the nature of attitudes in the field of education is to improve.

There are not many studies related to the measurement of attitude toward the environment for pre-service teachers in the literature. In this study, if this scale is to be valid and reliable, the attitudes of pre-service teachers toward the environment must be measured by environmentalists and researchers.

#### Method

##### *Instrumentation*

This study requires the use of a scale: the environment attitude scale (EAS) to assess mainly pre-service teachers' attitudes toward the environment. Some items for EAS were taken directly, some of them were adapted from the previous attitude scales (Aiken, 1979; Bryant and Barnes, 1997; Dauphinee et al, 1997; Wise, 1985) and a few of them were developed for this study. To collect expert opinions, 30 statements (half of them positive and half of them negative statements) written on cognitive, affective and behavioral components of attitudes were presented with an evaluative check-list to

the expert group of four people, one of whom was an expert in biology and ecology, two experienced in teaching Education Measurement and Evaluation Courses and one an expert in bio-statistics. The statements were evaluated for construct relevancy, appropriacy of language, expression and attitude statements writing rules. After the expert examination, some statements were rearranged and rewritten. Finally, the instrument was prepared as a five point Likert-type scale, with answers ranging from "fully agree (5)" to "fully disagree (1)".

##### *Participants*

Participants in the study were 366 pre-service teachers from Education and Science- Art Faculties at Dicle University in Diyarbakır, Turkey. All of the participants voluntarily participated in this study. Both genders were represented (240 males and 126 females) in the sample. The survey was conducted during the spring term 2002-2003 in regular class hours.

Why were pre-service teachers included in the study? This was because they had attended fundamental physics, chemistry, biology and (partly) in ecology courses. Therefore, they were expected to have adequate knowledge of basic environmental concepts and processes. The demographic information of participants is given in Table 1.

Table 1.

*The demographic information of participants*

Faculty	Department	n
Education	Physics education	150
	Primary education	170
Science-Art	Biology	46
Total		366

##### *Data Collection and Analysis*

To identify potential variables affecting pre-service teachers' attitudes toward the environment, a pilot study was performed. The pre-service teachers were asked to write down factors influencing their attitudes toward the environment. The results of the pilot study were used to develop items in the EAS. The items obtained were

given to 366 pre-service teachers from Education and Science-Art faculties. They were asked to complete the scale paper together. This made it possible to obtain more sincere responses.

The dimensionality of the 30 items of the EAS was analyzed through factor analysis. Four criteria were considered when evaluating the most appropriate number of factors to extract: The scree test, the eigen-value greater than one criterion, internal consistency coefficients (alphas) and the interpretability of the factor solutions.

### Results

In this study, the KMO (Kaiser- Meyer-Olkin) value was found to be 0.84 and the Barlett test value was found to be 1124.6. The dimensionality of the 30 items of the EAS was analyzed using varimax factor analysis. At the end of the varimax rotation, five factors had eigen-values greater than one and scree plot (Kline, 1994) also indicated five factors which can be seen in Figure 1.

The eigen-values, the percent of variance and the cumulative percent of the five factors are presented in the Table 2.

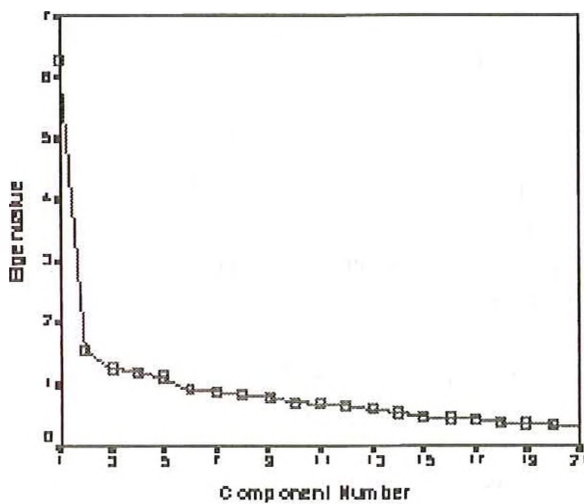


Figure 1. Scree plot of rotated factor.

Table 2.  
The factor structure of EAS

Factor	Eigen-values	% of variance	Cumulative %
1	6.26	29.92	29.92
2	1.59	7.55	37.48
3	1.28	6.09	43.57
4	1.22	5.78	49.36
5	1.13	5.39	54.75

As seen in Table 2, five factors had eigen-values greater than one. They were 6.26, 1.59, 1.28, 1.22, 1.13 which explained 54.75 % of total variance. This result is greater than the result obtained by Kline (1994) and Tabachnic and Fidell (1989) in which they stated that the acceptable variance value of a scale should explain more than 41 % of the whole variance. In our study the factor loadings of 9 items had values below 0.30 and the factor loadings of 21 items varied between 0.41 and 0.75. The result of the 21 items (including 11 positive and 7 negative) agrees with one of the results of the study carried out by Bailey (1987) who reported that the factor loading values would be greater than 0.40. The remaining 9 items were eliminated from EAS. The factor loadings of 21 items under each factor from this analysis are presented in Table 3.

As seen in Table 3, the first factor ( $F_1$ ), named "anxiety", is composed of 6 items and appears to measure pre-service teachers' anxieties toward environmental pollution. The second factor ( $F_2$ ), named "enjoyment", is composed of 6 items and appears to measure pre-service teachers' good feelings toward the environment. The third factor ( $F_3$ ), named "participation", is composed of three items and appears to reflect pre-service teachers' ideas in participating in environmental activities. The fourth ( $F_4$ ) factor, which measures the importance of environmental education named as "importance" and it is composed of four items. The fifth ( $F_5$ ) factor named "interest" included two items that measure students' interest in environmental education. Internal consistency coefficients (alphas) for the sub-dimensions and the total scores were 0.74, 0.77, 0.64, 0.66, 0.53 and 0.88 respectively.

**Table 3.**  
**Rotated Factor structure (varimax with kaiser Normalization)**

Items	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>5</sub>
1. I hate any environmental matters.	72.2				
2. I have never thought of protecting the environment.	67.7				
3. In my opinion, protecting the environment is not a worthwhile subject.	65.0				
4. I admire the person who is aware of the environmental problems.	48.2				
5. Increasing in environmental pollution makes me feel nervous.	46.7				
6. Every government should be obliged to protect the environment.	40.4				
7. I usually enjoy informing people about environmental matters.		65.7			
8. I enjoy reading environmental books.		63.9			
9. I protect the environment under any circumstances.		60.4			
10. Environmental activities are enjoyable to me.		56.4			
11. I would like to obtain more knowledge in environmental matters than I have to.		46.5			
12. I think environmentalism is one of the most respected activities for people.		44.6			
13. The activities of organizations dealing with the environment are not of any interest to me.			70.7		
14. I don't have any feelings about environmental activities.			67.8		
15. I try to apply my knowledge about environmental matters into daily life.			47.0		
16. I would never be tired of being occupied with environmental matters for years.				68.6	
17. I'm interested in environmental matters while I face increasing pollution around me.				64.6	
18. I prefer doing my own business instead of being interested in environmental matters.				55.9	
19. Environmental science should be a compulsory course at all schools, for all levels.				46.7	
20. Environmental science helps people to understand natural events in the universe.					75.4
21. Environmental education helps to develop awareness.					50.9

### Conclusion and Discussion

The KMO and Barlett test values have showed that the construct validity of the EAS were significant at the 0.001 level significance which can measure the pre-service teachers' attitudes toward environment. The internal consistency reliability is quite satisfactory. This result agrees with one of the results of the study carried out by Ray (1975) who reported that the reliability coefficient (alpha) for whole scale was 0.87. Moreover, it supported the interpretation of five sub-dimensions of the attitude toward the environment: (1) having anxiety

about environmental issues, (2) enjoyments of environmental activities, (3) participation in environmental organizations and activities, (4) belief about the importance of environmental education and (5) students' interest for environmental education.

If we apply these valid and reliable measurement devices, we can determine the level of public awareness and knowledge in environmental matters. Awareness of this issue is higher among people with higher education and occupations. Similarly, a high percentage of these people thought that these issues were potential threats to the environment (Mauritius, 1998; Pooley and



O'Conner, 2000). Therefore, education programs should be made more relevant to improve positive attitudes toward the environment.

In conclusion, this instrument can be used by environmentalists and researchers to investigate attitudes toward the environment.

### References

- Aiken, L. R.(1979). Attitudes toward mathematics and science in Iranian middle schools. *School Science and Mathematics*, 57 (5), 870-875.
- Anderson, L. W. (1998). Attitudes and their measurement. In J.P. Keeves, (Ed.), *Education research, methodology, and measurement: An international handbook*. New York: Pergamon Press.
- Bailey, K. (1987). *Methods of social research* (3rd Ed.). London: Collier Macmillan Publishers.
- Bryant, N. C. & Barnes, L. L. B. (1997). Development and validation of the attitude toward educational measurement inventory. *Education and Psychological Measurement*, 57 (5), 870-875.
- Dauphinee, T. L, Schau, C. & Stevens, J. J. (1997). Survey of attitudes toward statistics: Factor structure and factorial invariance for women and men. *Structural Equation Modeling*, 4, 129-141.
- IEEP. (1994). An environmental education curriculum for pre-service education of secondary level teachers. *UNESCO – UNEP-IEEP: Environmental Education Series*, 43.
- Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.
- Mauritius. (1998, April). *Survey of public awareness and attitude towards environment*. Retrieved November 15, 2003 (de indirildi) from the world wide web:<http://ncb.intent.mu/eurd/minenv/survey.htm>.
- Pooley, J. A. & O'Connor, M. (2000). Environmental education and attitudes. *Environment and Behaviour*, 32 (5), 711-724.
- Ray, J. J. (1975). Measuring environmentalist attitudes. *The Australian and New Zealand Journal of Sociology*, 11 (2), 70-71.
- Tabachnic, B. & Fidell, L. (1998). *Using multivariate statistics* (2nd ed.). Northridge: Harper Collins Publishers.
- Ünal, S. & Dırmışkı, E. (1999). UNESCO –UNEP Himayesinde çevre eğitiminin gelişimi ve Türkiye’de ortaöğretim çevre eğitimi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 16-17, 142-154.
- Wise, S. L. (1985). The development and validation of a scale measurement attitudes toward statistics. *Educational and Psychological Measurement*, 45, 401-405.

Geliş	13 Mart 2004
İnceleme	12 Nisan 2004
Düzeltilme	9 Şubat 2005
Kabul	3 Mart 2005