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| Research Article / Araştırma Makalesi |

Development Of "Environmental Scale For Children" [1]

"Çocuklar İçin Çevre Ölçeği"nin Geliştirilmesi

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Keywords

1. pre-school
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Anahtar Kelimeler

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Abstract

Purpose: This study aims to conducted to develop an "Environmental Scale for Children."

Design/Methodology/Approach: The research has been planned descriptively. 106 children between 48-72 months participated in the pilot study. The scale was concluded after the statistical analysis of the findings. Statistical analyzes of "Environmental Scale for Children" data were carried out using the ITEMAN statistics program. The scale was prepared with two separate models for boys and girls, was scored as 1 for correct answers and 0 for incorrect answers.

Findings: Item discrimination difficulty index calculations were calculated as the biserial correlation coefficient. Test-retest was conducted with 98 children, and the mean of the items was found as 11.85. The Pearson Correlation coefficient calculated for test-retest reliability was 0.69. This result shows that the test-retest reliability of the measuring tool is at a sufficient level. Total score correlation of the evaluation criteria of the test and Kuder-Richardson 20 (KR-20) reliability analysis was also conducted.

Highlights: This study was prepared from the first author's doctoral thesis.

Öz

Çalışmanın amacı: Çalışma "Çocuklar İçin Çevre Ölçeği"nin geliştirilmesi amacıyla yürütülmüştür.

Materyal ve Yöntem: Araştırma betimsel olarak planlanmıştır. Pilot çalışmaya 48-72 ay arasından 106 çocuk katılmıştır. Ölçek, bulguların istatistiksel analizleri sonucunda tamamlanmıştır. Çocuklar İçin Çevre Ölçeği istatistik analizleri ITEMAN istatistik analiz programı kullanılarak hesaplanmıştır. Kız ve erkek çocuklar için iki ayrı modellemeyle hazırlanan ölçekte puanlama doğru cevaplar için 1, yanlış cevaplar için 0 olarak yapılmıştır.

Bulgular: Madde ayırt edicilik gücü indeksi hesaplamaları çift serili korelasyon katsayısı olarak hesaplanmıştır. Test tekrar test uygulaması toplam çocuk sayısı 98 olup, maddelerin ortalaması 11,85 olarak bulunmuştur. Test tekrar test güvenirliği için hesaplanan Pearson Korelasyon katsayısı 0,69 çıkmıştır. Bu sonuç ölçme aracının test tekrar test güvenirliğinin yeterli sayılabilecek bir düzeyde olduğunu göstermektedir. Ayrıca, testteki değerlendirme ölçütlerinin madde toplam puan korelasyonu ve Kuder Richardson-20 (Kr-20) güvenirlik analizleri yapılmıştır.

Önemli Vurgular: Bu çalışma ilk yazarın doktora tezinden hazırlanmıştır.

[1] This paper is based on a part of the author's doctoral thesis and also had been presented at the 2nd International Conference on Social Sciences and Education Research. İstanbul, Turkey on November 4-6, 2016.

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INTRODUCTION

All kinds of living and non-living environments and relationships include the concept of the environment (Doğan, 2017). The idea of environment can be expressed as the environment in which living things interact in many ways throughout their lives and have social, physical, cultural and economic relations (Gökmen, 2011; Kuzu, 2007; Sungurtekin, 2001). Even though it gained speed after the industrial revolution, humanity faced the heavy consequences of its interventions to the environment for living spaces at different times in history. These results are nowadays in a wide range of other areas of environmental pollution such as air, water, soil, pollution and global warming, the destruction of the danger of extinction of some plant and animal species, the deterioration of ecosystem balances and the rapid depletion and destruction of natural resources. The most effective solution to these problems we face is fulfilling humanity's responsibilities that cause environmental issues. Protection of the environment is the duty of all individuals, and it is possible to overcome environmental problems by providing environmental education starting from an early age. Therefore, environmental education has an important place in raising environmentally sensitive individuals (Akın, 2007; Erten, 2003; Kışoğlu et al., 2010; Madran, 1991; Marcinkowski, 2010; Morgil et al., 2005; Özdemir & Yapıcı, 2010; Sungurtekin, 2001).

Throughout their development, children are significantly influenced by the environment they grow up in, and natural environments are very beneficial for children. Open spaces and fresh air are essential as they allow children to move quickly (Fjørtoft, 2001; Rivkin, 1995). Children learning through play were very open to learning while they were outside. While children learn in nature, they are more courageous and more willing to explore their surroundings. Thus, their knowledge and comprehension skills develop in nature, and they interact with nature in time. This interaction raises awareness in adulthood in terms of seeing themselves as part of nature, not the owner and ruler of nature. In addition, the desire to protect nature increases in individuals who know the heart and develop a knowledge of nature (Carling, 2013; Cooper, 2010; Kos, 2010). Since the preschool period is significant in the formation of attitudes towards the environment and environmental knowledge (Basile, 2000), the environmental knowledge acquired at a young age, the positive attitude towards the environment, and its interaction with the environment provide the basis for the formation of a society that is sensitive to environmental problems in adulthood (Kuzu, 2007; Şimşekli, 2001).

We come across the concept of environmental education, which aims to solve environmental problems and protect and improve the environment. In addition to providing information, it is among the aims of environmental education to bring ecological values and behaviors to the desired level and ensure that individuals develop positively about the environment. In addition, environmental education should be a practical education that will explain nature because understanding nature affects children's behavior towards nature. Since early childhood is a fundamental period in the formation of environmental attitudes, it is difficult to change the perspectives developed in this period. Therefore, the primary purpose of environmental education is to create permanent behavioral changes and appropriate environmental attitudes. Since having a negative attitude towards the environment will cause indifference to environmental problems and even the formation of the issues, it is essential to raise awareness of the environment and environmental problems with environmental education in the first years of life. In this way, the instinct to adapt and protect the environment from an early age will develop (Basile, 2000; Kahyaoğlu, 2009; Mustapa et al., 2016; Palavecinos et al., 2016; Palmer, 1995; Shin, 2008 Sungurtekin, 2001; Şimşekli, 2004; Wilson, 1996). In addition, since environmental education develops skills such as synthesizing knowledge, critical thinking, problem-solving, and decision-making, it should be started in the preschool period and given at all educational levels (Morgil et al., 2005; Uzun, 2005; Yılmaz et al., 2002).In studies conducted within the scope of environmental education in early childhood, it has been concluded that the environmental education programs applied to the development of children's environmental awareness(Ahi & Alisinanoğlu, 2016; Carter, 2016; Cevher Kalburan, 2009; McClain, & Vandermaas-Peeler, 2016; Somerville & Williams, 2015). Ayvaz et al. (1999) mentioned three compulsory reasons for the beginning of environmental education in the period, and environmental education is of critical importance in preschool education programs due to for the self. Interaction with the natural environment enriches learning, a different perspective. It gives angle and improves the quality of life. Because nature allows people to live in peace. Early ages are essential for children as they are critical periods for awareness because human activities impact the Earth so that the young generation can develop solving ecological problems.

Looking at environmental education literature, there were many studies conducted to examine primary school students' attitudes and university students' attitudes towards the environment and teachers' views on environmental education (Alp et al., 2006; Berberoğlu & Tosunoğlu, 1995; Güler, 2009; Kiraz et al., 2018; Özdemir, 2007; Öztürk & Zaimoğlu Öztürk, 2015; Şengül, 2001; Tuncer et al., 2005; Özsoy et al., 2011; Teksöz et al., 2010; Uzun & Sağlam, 2007; Yılmaz et al., 2004). In some of these studies, the observation form (Aydın & Aykaç 2016; Güler-Yıldız et al., 2017) and interview technique (Güzelyurt & Özkan, 2018) and it was developed for preschool children (Büyüktaşkapu Soydan & Öztürk Samur, 2017; Cevher-Kalburan, 2009; Özkan et al., 2020) and scales adapted to Turkish are also available (Kahriman-Öztürk et al., 2012).

Although measurement tools have been developed for preschool children to measure the effectiveness of environmental education studies recently, the differences they show in terms of content reveal that measurement tools are insufficient in the field. In the light of this information, this study was developed to measure the effectiveness of comprehensive environmental education given to preschool children.

METHOD/MATERIALS

The research has been planned descriptively. In the study, the "Environmental Scale for Children" was developed to measure environmental education given in the preschool period. The descriptive model is a method that is used to present an existing situation (Yıldırım & Şimşek, 2006).

Study Group Data Collection

Children who will take part in the preliminary implementation and test-retest study in the scale development process were selected from independent kindergartens affiliated to the Ministry of National Education in Mamak, Altındağ, Gölbaşı, Çankaya and Yenimahalle districts. These schools have been chosen to provide easy access and to accommodate different socioeconomic level groups. Considering the functional status of the parents of the children, children of lower, middle and upper socioeconomic level families were included in the scale development study with equal distribution. In the development of the Environmental Scale for Children, for preliminary implementation, 48-72 months, 106 children were examined in independent kindergartens affiliated to the Ministry of National Education after permits obtained from the Ankara National Education Directorate. As for the test-retest study, 98 children trained in independent kindergartens affiliated to the Ministry of National Education constitute the study group for scale development.

The Development of Environmental Scale for Children

The scope of the scale was determined by interviewing preschool teachers, specialists, and environmental engineers. Scale items were applied to 3 children in the preschool age group after being photographed. The children's feedbacks were evaluated, and the expressions of the things were readdressed. The number of items created in the first phase (23) did not change after completing the scale.

The items of the scale were evaluated by a total of 9 people, including 2 teachers working in the university kindergarten, 1 teacher working in a kindergarten affiliated to the Ministry of National Education, 1 teacher working in an institutional kindergarten, 1 teacher working in a private kindergarten, 1 environmental engineer, 1 teaching assistant working in the field of assessment and evaluation, 1 assistant professor working in the field of environment and 1 assistant professor in preschool teaching department working in the field of environment. After taking expert opinions, the 23 items determined were photographed with child models, with a girl's figure for girls and a boy's figure for a boy. Then the photos were edited to create suitable environments. In the assembly works, attention has been paid to the visuals to be understandable. It is aimed to make "water" that is transparent, especially in water-related substances, understandable. After the photomontage work in the scope of validity and reliability, 106 children aged 48-72 months who were educated in independent kindergartens attached to the Ministry of National Education were studied. As a result of this preliminary work, unintelligent photographs were identified, and the pictures of these items were re-montaged. None of the things in the scale were removed since they were modified due to statistical analysis. Statistical analysis of the data was performed after the application, and it was determined that the scale was valid and reliable.

Figure 1. Environmental Scale for Children

Data Collection

In collecting the data on the scale to be developed, in line with the permits obtained from the Ankara Provincial Directorate of National Education, the study was conducted with independent kindergartens affiliated with the Ministry of National Education. For preliminary application, in the 2011-2012 school year, children were interviewed by the researcher themself in independent kindergartens attached to the Ministry of National Education located in Yenimahalle, Çankaya, Mamak and Gölbaşı districts of Ankara Province. During the study, care was taken to ensure that the child and the researcher sat face to face on a table. For the girls, the scale material was used with the girl model, and for the boys, the scale material was used, including the male model. Pictures are shown to the child, "What are they doing in this picture?" To check if he understands the image. He is asked.

1.a. Which one do you pretend to while bathing in the bathroom? How not to use water?

1.b. Which of the kids in this picture is acting right? Why is that?

An answer sheet is prepared for each child. For correct answers, 1 is written on the answer sheet, and 0 is written for wrong answers. For a test-retest study that was used during the scale development phase, the study was carried out in different kindergartens located in Yenimahalle, Çankaya, Mamak, and Gölbaşı districts of the province of Ankara mentioned above in the 2012-2013 school year. The scale developed protected the number of 23 items determined by the experts after studies conducted within the scope of validity reliability.

Statistical Analysis of The Data

ITEMAN analysis statistics program was calculated by using statistical analysis of " Environmental Scale for Children. " Item discrimination difficulty index calculations were calculated as the biserial correlation coefficient. To evaluate the reliability of the test-retest study, the relationship between the two sets of points obtained by applying the test twice at specific intervals to the same group was calculated by Pearson's correlation coefficient in the IPM analysis program.

FINDINGS

Table 1. The results of pre-application item discrimination analysis for"The Environmental Scale for Children"

Item	Item Discrimination (Correlation) r_{jx}
1	0,50
2	0,40
3	0,45
4	0,60
5	0,68
6	0,53
7	0,51
8	0,58
9	0,66
10	0,51
11	0,39
12	0,53
13	0,71
14	0,78
15	0,30
16	0,57
17	0,71
18	0,43
19	0,37
20	0,54
21	0,47
22	0,18
23	0,62

0.30 and above discriminative correlation value has been accepted adequate.

Item change has not been required since it fluctuates between minimum 0.18 (22nd item) and maximum 0.78 (14th item).

Table 2 shows the item discrimination results of test-retest study for 'The Environmental Scale for Children'.

Table 2. The item discrimination results of test-retest study for "Environmental Scale for Children"

Item	Item Discrimination r_{jx}
1	0,37
2	0,51
3	0,49
4	0,41
5	0,73
6	0,33
7	0,52
8	0,78
9	0,57
10	0,78
11	0,78
12	0,63
13	0,73
14	0,56
15	0,73
16	0,54
17	0,55
18	0,46
19	0,01
20	0,52
21	0,40
22	0,59
23	**0,60**

The discriminative correlation value, which is 0.30 and above, has been accepted adequate. Item change has not been required since it fluctuates between minimum 0.01 (19th item) and maximum 0.78 (8th, 10th, and 11th items).

Table 3 shows the pre-application results of the item difficulty for the Environmental Scale for Children.

Table 3. The pre-application results of the Item difficulty index for "Environmental Scale for Children"

Item	Item Difficulty (P_j)
1	0,29
2	0,48
3	0,65
4	0,65
5	0,75
6	0,39
7	0,71
8	0,87
9	0,86
10	0,52
11	0,92
12	0,73
13	0,88
14	0,85
15	0,58
16	0,90
17	0,73
18	0,34
19	0,20
20	0,78
21	0,75
22	0,08
23	0,78

Item discrimination difficulty index calculations were calculated as biserial correlation coefficient.

Item difficulty index values change between minimum 0.08 (22nd item) and maximum 0.92 (11th item).

When the data were examined, it was determined that the most prevalent item in the preliminary result of the studies is Item 11, which relates to helping animals in need of assistance in the street, and Item 22, which is related to composting (fertilization). In the light of the data, it is possible to suggest that the 11th item has the highest rate of awareness because it is related to the

situations that children frequently encounter in their immediate surroundings. Besides, the reason why the 22nd item which is associated with composting (fertilization) has the lowest score might be explained by that it is not possible for the children to apply it in their lives, and that they cannot observe the adults practicing it.

Table 4 shows the results of the test-retest application item difficulty for the Environmental Scale for Children.

Table 5. The descriptive statistics obtained from the preapplication of "The Environmental Scale for Children"

The number of the items	23
N	106
Average	14,65
Median	15,00
Standard Deviation	3,58
Skewness	-0,88
Kurtosis	1,48
Average Item Difficulty	0,64
KR-20	0,72

For preapplication, it is concluded that the number of children is 106, the item average for the Environmental Scale for Children is 14.65, the median is 15.00, and the standard deviation is 3.58. Kurtosis is 1.48, while skewness is -0.88. Besides, while the average item difficulty is 0.64, KR-20 is calculated as 0.72.

Blair and Goedhart (2012) developed a scale of 63 items on their work on science instruments and attitudes to climate change (ACSI). Thanks to the fundamental components of factor analysis results, it has been concluded that all the scale is one-dimensional. Cronbach Alpha value has been between 0.71 and 0.80 with internal reliability.

The study by Powell et al. (2011) aimed to verify the scale measuring the attitudes towards the school for the environmental education program applied in the secondary schools. The study was conducted to develop and verify the scale of three subscales; following the environmental education program given to secondary school children, after-school environmental responsibilities, character development, and attitudes towards the school were examined.

The scale was first developed using the approvals of the factor analysis, and then for crossover approval with the data collected prior to the environmental education program, approvals for the longitudinal multiple factor analysis were used 3 months after the program. According to the results, the triple scale created to be valid and reliable seems to support the triple effect model.

In the study that Uzun and Sağlam (2006) conducted in 'Developing Environmental Attitude Scale for Secondary School Students and its Validity,' the lowest score obtained from the scale was 48, while the highest was 133 (Ranj=85), and the general average was calculated as 92.59. The average value was found at 93.00, which was close to the median. The standard deviation was 13.08, while the variance was 171.02.

As is known, the t-test is the prerequisite for normal distribution of data in comparative tests such as variance analysis. The "0" of the skewness coefficient (SK) indicates the full symmetrical distribution according to the average. If the coefficient of skewness is within the range of +1 to -1, it can be interpreted that the scores do not show a significant deviation from the normal distribution (Büyüköztürk, 2005). In the analyzes, the skewness coefficient of the scores was calculated as ".007" (Table 5). The value obtained is close to zero, and accordingly, it is possible to say that the scores are normally distributed, as stated in Uzun and Sağlam's research.

Table 6. Descriptive statistics obtained from "The Environmental Scale for Children" test-retest application

The number of Items	23
N	98
Average	11,85
Median	12,00
Standard Deviation	3,97
Skewness	-0,39
Kurtosis	-0,64
Average Iten Difficulty	0,52
KR-20	0,76

For the test-retest application, the total number of children was 98, and the items' average was 11,85. The median of the environmental scale for children was 12.00, and the standard deviation was 3.97. Also, in the preliminary application, the kurtosis was 1.48, the skewness was -0.88, the test re-test kurtosis was -0.64, the skewness was -0.39. This shows that the distribution of the group is close to normal.

While the average item difficulty for pre-application was 0.64, due to the rearrangements with the items 3, 4, 9, 11, 14, 15 and 22, the average item difficulty of the test-retest study was calculated as 0.52. After the alterations and the arrangements, it is safe to claim that the test has shifted from easy to moderate.

The preliminary practice's KR-20 value, which was 0.72, rose to 0.76 after the reliability regulation. This demonstrates that the rules on the items have a positive effect on the test and that the internal consistency reliability of the test increases.

The Pearson Correlation coefficient calculated for test-retest reliability was 0.69. This result shows that the test-retest reliability of the measurement tool is at a level that can be considered satisfactory.

To determine the overall reliability of the test using the data obtained from the test applications in the study, total item correlation and Kuder Richardson-20 (Kr-20) reliability analyzes were performed.

According to the results of the preliminary application, the answers to the test items to examine the internal consistency between the test scores obtained and 'the Environmental Scale for Children' were 1 and 0, the relationship between the reliability of Kuder Richardson-20 (KR-20), the scores obtained from test items and the total score of the test was calculated by the total item correlation.

As a result of the preliminary application, the item analysis results of the 'environmental Scale for Children' were examined, and the reliability coefficient (KR-20 = 0.72) and the total item correlations were found to be sufficient for the whole test. As a result of the item analysis, the total item correlation and KR-20 value of all the items on the test were found high. It was concluded that the test was ready to be applied for the sample group, which was determined after the visual arrangements of items 3, 4, 9, 11, 14, 15 and 22 for the validity and reliability study.

After environmental education program provided to secondary school children, after-school environmental responsibilities, character development and attitudes of the children to the school were investigated by Powel et al. (2011) in the study to develop and verify a scale measuring environmental responsibility, character development and attitudes toward the school (consisting of three subscales). The measurements conducted three months after the program supported the three-factor model, and the scale for which three scales were developed have been produced in the triplicate stages, which seem valid and reliable.

CONCLUSION

In item discrimination results of the scale in the preliminary application, the discriminative correlation value 0.30 and above has been accepted as adequate. Item change has not been required since it fluctuates between a minimum of 0.18 (22nd item) and a maximum of 0.78 (14th item).

In item discrimination results of the scale in the preliminary test-retest application, the discriminative correlation value 0.30 and above has been accepted as adequate. Item change has not been required since it fluctuates between a minimum of 0.01 (19th item) and a maximum of 0.78.

Preliminary application of the scale's item discrimination difficulty index calculations was calculated as the biserial correlation coefficient: Item difficulty index changes between minimum 0.08 (22nd item) and maximum 0.92 (11th item).

Item difficulty index for test-retest application changes from minimum 0.07 (19th and 22nd items) to maximum 0.09 (9th item). In that case, it can be concluded that the items that are answered correctly the most are items 19 and 22, while the item getting the least correct answer is item 9.

According to the descriptive results obtained from the preapplication of the Environmental Scale for the Children, in the preliminary application performed with 106 children, the average of the items has been found 14.65. In the analyses, the coefficient of skewness of the scores has been calculated as .007, and the obtained value is close to zero. In that case, it is possible to suggest that the scores are normally distributed.

In the light of this information, the Environmental Scale for the Children that is developed is ready and suitable to be used.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Examples of author contribution statements

In this article, which was prepared from the doctoral thesis of the author in the first name, the author in the second name is the thesis consultant.

Researchers' contribution rate

In this article, which was prepared from the doctoral thesis of the author in the first name, the author in the second name is the thesis consultant.

Ethics Committee Approval Information

The necessary permissions for this article, which was produced from the first author's doctoral thesis published in 2015, were obtained from the national education directorate to which the institutions to be implemented are affiliated.

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