



## The Effect of Active Learning Based Nature Activities on University Students' Opinions towards Scientific Knowledge and Conceptual Understandings about Nature

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### Abstract

*It is obvious that science and nature is very connected subjects. With the reason of this connection, nature can be a good teaching tool for students to be science thinker and science thinker students will evaluate the nature in a scientific manner. In addition, nature education processes should be arranged according to "research and discovery" teaching strategy and learning processes should enable students' active participation. Therefore, the general purpose of this study was to examine the effect of active learning based nature activities on university students' opinions towards scientific knowledge and conceptual understandings about nature. In order to achieve this purpose, the natural, historical, archeological and the cultural sources of the Cappadocia area were used as teaching tools in the nature activities based on active learning. One group experimental design was used in the study. 19 university students at different grades from different cities of Turkey participated in the study. Scientific knowledge survey and conceptual understanding interviews were used as a data collection tools in the study. Frequency and Man Whitney-U analysis techniques were used during assessment of the data collected in the study. As a result of the study, there wasn't any significant difference found between the pretest and post test results of university students' scientific knowledge. Besides this, students presented more scientific concepts about the nature and natural problems in the post application results of conceptual understanding interviews than the pre-application results in the study.*

### Introduction

The role of educated people in solving environmental problems such as unplanned urbanization, increase in need of energy due to increase in population, inefficient use of natural resources is undeniable (Çınar, Doğu & Meydan, 2008) As the fact that environmental disruption caused by human will be resolved by human is understood, environmental education curriculums are regarded as an important way of raising educated people (Özdemir, 2007)

Besides, environment education given at schools, in other words, teaching environmental subjects at school provides a basis for individuals' environment education. As a consequence of that preparing more effective and efficient environment curriculums became obligatory for teaching environmental subjects (Altın and Oruç, 2008). Because it is clear that environmental problems can be dealt with social efforts after creating a curriculum that is in use all of a country (Chawla and Cushing, 2007).

Nature education activities towards youth and young learners in Turkey accelerated with TUBITAK's (The Scientific and Technological Research Council of Turkey) application of environmental education program in national parks in 1999 (Ozner, 2004). These programs that were started with the aim of exploring the language of nature in the national parks by ecology founded nature education programs, in which teachers, graduate and postgraduate student were included at first, have been planned and applied for teacher candidates and primary education students in recent years (see: [www.tubitak.gov.tr](http://www.tubitak.gov.tr)). These programs for primary education students (especially 4-8 grades) are planned within nature educations and science camps. Moreover, in addition to Ministry of National Education and Ministry of Environment and Forestry which are in the opinion that nature and environmental education should be given in early ages, some non-governmental organizations also carry out projects and works for preschoolers, primary school students and high-schoolers (Erdoğan, 2011).

Active learning includes all the activities that students do and think about what is done. In active learning students not only learn about topic or course subject but also they apply the concept they have learned, search and apply relationship between facts and compare the cases that contradict with their pre-learnings. Owing to these activities students construct their own knowledge instead of the knowledge that teacher transmitted (Chickering and Gamson, 1987; Mattson, 2005). In this study, the effect of active learning based nature education on university students' opinions towards scientific



knowledge and conceptual understandings about nature is studied in general. Because the science improves in line with technologies that human created as a result of observations on nature and natural events through long ages. Therefore in this study students are expected to understand the language of nature and evaluate the running of nature scientifically. Within this main goal, the sub-goals below are searched for answer:

Do active learning based nature activities have an impact on university students',

- opinions on scientific knowledge?
- conceptual understanding towards nature?

## Methodology

The main purpose of the study was to university students' opinions towards scientific knowledge and conceptual understandings about nature by using natural, historical, archeological and cultural sources of Cappadocia region as a teaching instrument with active learning based activities. In order to reach this main purpose single grouped experimental design was used. The study was carried out in Niğde University within the project called 'Ecology Founded Summer Camp in Cappadocia Region' and with the support of Scientific and Technological Research Council of Turkey (TUBITAK). Theoretical parts of environmental activities in the study were realized in Niğde University and field works were done in Cappadocia-Göreme Historical National Park and Aladağlar National Park. Active learning based nature activities lasted for 5 days and was realized between 22 and 29 July 2012. 8 trainers were included in the study.

### *Implementation of Study Curriculum*

In general the content of the study was realized under 15 titles. These are (1) drama in nature, (2) nature-art integration, (3) museum visits, (4) pet care, (5) ecology games, (6) ecological environments and human, (7) mountaineering, (8) herbarium, (9) insect training, (10) the world without human, (11) eco-city, (12) animal products in supermarkets, (13) butterfly collection, (14) field work in Aladaglar, (15) field work in Cappadocia-Goreme historical national park.

Before implementing the real study, a pilot study was conducted and evaluated. As a result of the evaluations made, a general program for 5 days was prepared under the titles stated above.

## Participants

Geographical area sampling method, which was usually used in qualitative researches, was used while selecting the students that would participate in the study. The reason why this sampling had been chosen was to create a study group enabling maximum diversity in terms of students' characteristics as target population of the study was wide. According to geographical area sampling method, during the study, the university students that volunteered by filling in the application form on the website of Nigde University was grouped according to the seven geographical areas of Turkey. After this study 19 students from different departments were selected- by using the project budget in the most efficient way-.

## Data Collection Tools

The first data collection tool was "Scientific Knowledge Survey". This data collection tool was applied to evaluate students' opinions on the nature of scientific knowledge quantitatively. 'Scientific Knowledge Survey' that was developed by Küçük (2008) included totally 16 items and students were supposed to prefer one the answers changing among I agree, I have no idea, I disagree. The original Cronbach alpha value of the scale was .65. For this study we also calculated Cronbach alpha. The Cronbach alpha value for this study was .72. The scale was applied twice; the first one was before starting activities (the first day of the study) and the second one was after applying the activities (the last day of the study). The survey lasted approximately for 10 minutes.

The second data collection tool was Conceptual understanding Interview Form which was used in order to define contribution of nature activities to students' conceptual understandings. The structured interview form was used before and after the study. The form was prepared within the framework of main topics that would be mentioned during the study and four point grading system was applied. Under each topic item, there was given space to enable students to make explanations.

## Coding and Analysis

Content, frequency and Man Whitney-U analysis techniques were used during assessment of the data collected in the study. In the analyses of qualitative data that would be gathered from 'Scientific Knowledge Survey', Man Whitney-U analysis techniques were used. SPSS program was used for this



analysis and .05 was accepted as significance level in interpretation of results. Content and frequency analysis techniques, which are used in quantitative researches, were used for 'Conceptual Comprehension Interview Form'. While analyzing these forms the data gathered were coded with numbers. For example the first student was coded as S1 (Student one) and the second students as S2 (Student two). The data coded with numbers were examined and categorized by two researchers. The data, which were categorized by two researches, were discussed and reviewed by research group then the categories were put into final form. And finally all the answers that students gave were examined according to these categories and tabularized after calculating frequency values.

## Findings

### *Findings Obtained From the Analysis of Scientific Knowledge Survey*

In this study 'Scientific Knowledge Survey', which was developed by Küçük (2008) was used in order to evaluate students' opinion on scientific knowledge quantitatively. The survey included totally 19 items regarding scientific knowledge. Mann Whitney U- Test analysis technique was used on pretest and posttest results obtained as a result of applications and the results were shown on Table 1.

Table 1.

*Mann Whitney U- Test results of students' 'scientific knowledge survey' pretest and posttest results*

	N	MeanRank	Rank Sum	U	P
<b>Pretest</b>	19	18.95	379	169	.396
<b>Posttest</b>	19	20.05	441		

When Table 1 is examined, it is seen that mean rank of pretest scores of 'Scientific Knowledge Survey' participating students is 18.95, rank sum is 379, mean rank of posttest scores is 20.05 and rank sum is 441. When p values ( $P = .369 > .05$ ) are examined, it was seen that there is not a significant difference between two tests. As students' posttest mean ranks are higher than pretest mean ranks, it is seen that this difference is not significantly meaningful.

### *Findings Obtained from the Analysis of Conceptual Understanding Interview Form*

'Conceptual Understanding Interview Form' was used to define contributions of study program applied on students' *conceptual understanding*. The form was used in the study was applied before and after the study to students.

When post-application frequency values and pre-application frequency values of students were compared, it was clearly seen that there was a transition to 'I know it well' option in the post-application frequency. 19 students could put forward some ideas for the all items in the first application. This means students have some information about the study subjects before the applying study curriculum. Besides, when students' answers were examined, it was seen that the number of students' post-application explanations were more than students' pre-application explanations. But, when we search the post applications, we realized that the post application opinions are more scientific. And students presented some new concept in the past-applications like solar energy, GMOs, naturel resources, underground resource, irregular hunting, ozone layer, radioactive contamination, acid raining, and food chain.

## Results and Discussion

The first research question put to reach this general objective was that 'Do active learning based nature activities have an impact on university students' opinions towards scientific knowledge?'. As a result of Man Whitney U analysis carried out regarding this sub-problem, any significant differences ( $p = .396$ ) were found. So it is concluded that active learning based nature activities didn't had an impact on students' opinions towards scientific knowledge.

The second sub-problem of the study was that 'Do active learning based nature activities have an impact on university students' conceptual understanding towards nature?'. As a result of qualitative analyses carried out to reply that sub-problem, it was clearly seen that students transmitted to 'I know well' option when students' post-application and pre-application frequency values were compared. In conclusion it could be deduced that an ecological education given with active learning based activities had an effective impact on students' conceptual understandings towards nature. In the study that was carried out by Manzanal, Barreiro and Jiménez (1999), it was concluded that fieldwork studies enabled students to explain ecological concepts. It was also concluded that environmental education study that was carried out by Ogurlu, Alkan and Gündoğdu (2010) environmental education increased teacher



candidates' level of knowledge on nine different topics towards environment. In the study carried out by Laaksoharjua, Rappea, Kaivolab (2012) it was concluded that garden activities had been an effective applied environmental education activity and that primary school students developed social skills in an effective way. All these results can indicate that students can develop high level learning skills towards science by means of nature activities.

### References

- [1] Arslan, M. (1997). Changes in environmental awareness and environmental education [Çevre bilincindeki değişimler ve çevre eğitimi]. *Education and Life*,, September, 23-28
- [2] Chickering, A. & Gamson, Z. F. (1987). Seven principles for good practice. *AAHE Bulletin*, 39: 3-7. Retrived from <http://www.unm.edu/~oset/UsingActiveLearning.html> on 22 Feb 2009
- [3] Çınar, D, Doğu, S. & Meydan, A. (2008). The pre-service primary school teachers' opinions related to their program within the context of the environmental issues [Sınıf Öğretmeni Adaylarının Çevreye Karşı Tutumları] VII. National Classroom Teacher Education Symposium (2-4 May), Nobel Publication, Ankara.
- [4] Erdoğan, M. (2011). The Effects of ecology-based summer nature education program on primary school students' environmental knowledge, environmental affect and responsible environmental behavior. *Educational Sciences: Theory & Practice*. 11(4) Autumn, 2223-2237
- [5] Laaksoharjua, T., Rappea, E. & Kaivola, T. (2012). Garden affordances for social learning, play, and for building nature–child relationship. *Urban Forestry & Urban Greening*, 11, 195– 203
- [6] Manzanal, R. F., Barreiro, L. M. R., & Jimenez, M. C. (1999). Relationship between ecology fieldwork and student attitudes toward environmental protection. *Journal of Research in Science Teaching*, 36(4),431-453
- [7] Mattson, K. (2005). Why “active learning” can be perilous to the profession. *Academe*. 91(1). 23-26.
- [8] Özdemir, O. (2007). A new environmental education perspective: Education for sustainable development. *Education and Science*. 32, 23-39