

REPUBLIC OF TURKEY
YILDIZ TECHNICAL UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

**THE EFFECTIVENESS OF STORYTELLING ON ENVIRONMENTAL
KNOWLEDGE OF FIFTH GRADE STUDENTS**

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MSc.THESIS

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July, 2019

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Signature

Dedicated to my precious family

ACKNOWLEDGEMENTS

I would like to thank my advisor, Prof. Dr. Bayram COŞTU, for his productive feedback and constant encouragement. The completion of this thesis has been possible with his expert suggestions and effort. I am grateful for guidance in my both academic and professional career throughout my master education.

Additionally, I would like to thank Assoc. Prof. Hakan AKÇAY and Prof. Dr. Osman Serhat İREZ for being part of my committee and their guidance in improving my thesis.

I would especially like to thank my dear friends Sümeyye Öcal and Merve ÇOBAN for their interest and support. I also give special thanks to my close friends for being there when I needed.

I feel so grateful to my colleagues in Mehmet Akif Ersoy İmam-Hatip Middle School for their supports and encouragement in these three years.

Finally, I would like to express my deepest and most sincere gratitude to my parents and brothers for being a constant source of loving, support and strength at all times.

Elif DEMİRCİ

TABLE OF CONTENTS

LIST OF ABBREVIATIONS	vii
LIST OF FIGURES	viii
LIST OF TABLES	ix
ABSTRACT	x
ÖZET	xii
1 Introduction	1
1.1 Literature Review	2
1.2 Objective of the Thesis	11
1.3 Hypothesis	11
2 Framework of The Study	12
2.1 Introduction	12
2.2 Stories and Storytelling	12
2.3 Stories and Science Education	13
3 Methodology	17
3.1 Introduction	17
3.2 Methodology	17
3.3 Participants	18
3.4 Instrumentation.....	19
3.5 Data Collection Procedure	21
3.6 Data Analysis.....	23
3.6.1 Word Association Test	24
3.6.2 Focus Group Interview.....	24

3.7 The Role of Researcher	24
3.8 Ethical Issues	26
3.9 Trustworthiness	27
3.10 Limitations of the Study.....	27
4 Results and Discussion	29
4.1 Introduction	29
4.2 Word Association Test	29
4.3 Focus Group Interview.....	37
5 Conclusion and Recommendations	45
5.1 Introduction	45
5.2 Conclusion.....	45
5.3 Pedagogical Implications and Recommendations.....	48
Appendixes	50
References	66
Publications from the Thesis	70

LIST OF ABBREVIATIONS

MEB	Ministry of National Education of Turkey
SDCA	Story – Driven Contextual Approach
TEMA	The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural Habitats
TESS-India	Teacher Education through School-based Support in India
WAT	Word Association Test
WWF	World Wild Fund

LIST OF FIGURES

Figure 2. 1 A schema for the story-driven contextual approach.....	15
Figure 4. 1 Concept networks formed based on pre-test.....	34
Figure 4. 2 Concept networks formed based on post-test.....	36

LIST OF TABLES

Table 3. 1 Procedure of the study.....	21
Table 4. 1 Total number of answers for each key concept	29
Table 4. 2 The frequency table of response words in pre-test.....	30
Table 4. 3 The frequency table of response words in post-test.....	31
Table 4. 4 Change in students' expression throughout storytelling sessions	42

The Effectiveness of Storytelling on Environmental Knowledge of Fifth Grade Students

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Environmental problems such as global warming, loss of biodiversity, and pollution have a significant role for human beings. Eradication of these variety of problems could be possible only when each individual in each society feels a responsibility and takes the action. Therefore, environmental education has been a vital component of formal education. Even though there are numerous studies on environmental education in both national and international, they are limited to investigate the effects of stories. In this context, this research aimed to investigate the views of fifth grade students concerning environmental issues through storytelling. In accordance with this aim, action research has carried out during the academic year 2017-2018. The study was conducted with 35 students enrolled in Mehmet Akif Ersoy İmam Hatip Middle School. Four stories related to different environmental topics were told participants during four weeks. Qualitative data were obtained through focus group interviews supported by quantitative data analysis of word association test (WAT). WAT included six key words was applied as pre-test and post-test. The frequency tables and concept networks were constructed based on WAT results. Participants discussed the effects of environmental problems, the consequences of environmental problems, and

environmental protection through focus group interviews. According to the results, students mostly associated “human” with “environmental problem” and “environmental pollution” and use of ecological terms increased at the end of implementation. Furthermore, some students used the characters of stories as associated words at post-test and they discussed themes at the stories in focus groups.

Key words: storytelling, story, environmental education, word association test, focus group interview

Hikaye Anlatıcılığının Beşinci Sınıf Öğrencilerinin Çevre Bilgisi Üzerindeki Etkisi

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Matematik ve Fen Bilimleri Eğitimi Anabilim Dalı

Yüksek Lisans Tezi

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Küresel ısınma, nesli tükenen canlılar ve kirlilik gibi çevresel sorunlar tüm insanlık için büyük önem teşkil etmektedir. Bu sorunların ortadan kaldırılması tüm bireylerin sorumluluk hissederek önlem almasıyla mümkün olabilir. Bu nedenle, çevre eğitimi örgün eğitimin temel bir bileşenidir. Hem ulusal hem de uluslararası alanda çevre eğitimi konusunda çok sayıda çalışma olmasına rağmen, hikâyelerin bu alandaki etkilerini araştıran çalışmalar sınırlıdır. Bu bağlamda, bu araştırma beşinci sınıf öğrencilerinin çevre ile ilgili görüşlerini hikâye anlatımı yoluyla incelemeyi amaçlamıştır. Bu amaç doğrultusunda çalışma, 2017-2018 akademik yılında eylem araştırması olarak yapılmıştır. Araştırma, Mehmet Akif Ersoy İmam Hatip Ortaokulu'na kayıtlı 35 öğrenci ile yürütülmüştür. Dört hafta boyunca katılımcılara farklı çevre konularıyla ilgili dört hikâye anlatılmıştır. Kelime ilişkilendirme testinin (KİT) nicel verileri, odak grup görüşmelerinin nitel analizini desteklemek için kullanılmıştır. Altı anahtar kelimedenden oluşan kelime ilişkilendirme testi ön test ve son test olarak uygulanmıştır. KİT sonuçlarına göre frekans tabloları ve kavram ağları oluşturulmuştur. Katılımcılar, odak grup görüşmeleri yoluyla çevre sorunlarının etkilerini, çevre sorunlarının sonuçlarını ve çevre korumasını tartışmışlardır.

Sonuçlara göre, uygulama sonunda öğrenciler çoğunlukla “insan” ı “çevre sorunu” ve “çevre kirliliği” ile ilişkilendirmişlerdir ve öğrencilerin ekolojik terimleri kullanımları artmıştır. Ayrıca, bazı öğrencilerin anlatılan hikâyelerdeki karakter ve temaları son-test anahtar kavramlarında ve odak gruplarındaki tartışmalarda vurguladıkları görülmüştür.

Anahtar kelimeler: hikâye anlatıcılığı, hikâye, çevre eğitimi, kelime ilişkilendirme testi, odak grup görüşmesi

Environmental issues are at the alarming rate for all around the world in recent years. These problems refer to any action which has the harmful effects on living things such as pollution, global warming, and species extinction (Erten, 2004). According to The Living Planet Report by World Wildlife Fund (WWF), consumption of natural resources (ecological footprint) has shown an increase about 190% in the last 50 years (World Wild Fund, 2018). In Turkey, 144 ton plastic waste has polluted the seas every day (TEMA, 2018). On the other hand, Turkish Government has imposed new regulations such as paid plastic bags and zero-waste project in order to protect environment.

In fact, eradication of environmental problems could be possible only when each individual in each society feels a responsibility and takes the action. Therefore, environmental education has been a vital component of environmental protection. Environmental education doesn't only imply taught of basic concepts, but also aims at active participation in environmental problems to generate effective solutions (Türkiye Çevre Atlası, 2004). One of the general objectives of current science curriculum is to enhance students' interest towards environment and to develop positive attitudes (MEB, 2018).

Many studies on environmental education show that students' environmental knowledge, attitudes and behaviors are not at the desired level in Turkey (Erten, 2004). One reason for this problem is stated as that parents and educators are not competent on environmental issues (Türkiye Çevre Atlası, 2004). Demir and Yalçın (2014) express another reason is that environmental education in teacher training programs is ineffective.

Activity- based learning in natural environment is suggested in order to develop the quality of environmental education (Demir & Yalçın, 2014; Erten, 2004, & Türkiye Çevre Atlası, 2004). Although this kind of activities offer students an opportunity to

experience about natural world, there are challenges addressed on both national and international studies. A case study conducted with 12 teachers has concluded that time and work load are two main constraints to effective environmental education (Rahman, Halim, Ahmad, & Soh, 2018).

Furthermore, 51 activities about different environmental topics were assigned to 21 schools in Bursa, Turkey (Şimşekli, 2004). At the end of the academic year, it is found that the sensitivity to environmental education on those schools is inadequate. In summary, Şimşekli (2004) emphasizes several points at the followings:

- Teachers prefer to use practical activities such as paintings or puzzle instead of investigation, experiment, and lecturing.
- Teachers' ability to teach environmental education is insufficient.
- There is lack of equipment which appropriate for students' level.
- Limited time and busy schedule threaten to apply various activities.

Since these challenges decrease the effect of environmental education, Şimşekli (2004) remarks the need for methods that would be practical and applicable for all lessons. Similarly, Erten (2004) claims that environmental objectives should be covered on all lessons. Moreover, it is suggested that environmental education should be given in all settings (Türkiye Çevre Atlası, 2004).

Aforementioned problems at the previous paragraphs give a clue that stories and storytelling would be an effective method for environmental education. Related studies in literature show that stories are practical, applicable, and not time-consuming (Demircioğlu, Demircioğlu, & Ayas, 2006; Jonassen & Hernandez-Serrano, 2002 & Şimşek, 2004). Storytelling does not require high skills or special equipment as much as alternative options does. Besides, it could be easily adapted to different lessons including literature and foreign language. Therefore, stories and storytelling were used in the present study in order to teach environmental issues.

1.1 Literature Review

This section presents the related literature under three headings; environmental issues, environmental issues and stories, and stories and storytelling in Turkey. The

section concludes with the criticism of given studies in order to provide a reasonable transition to the objective of the present thesis.

1.1.1 Environmental Issues

Karahan and Roehrig (2015) investigated effects of learning activities guided by constructionist and social constructivist theories on environmental awareness and perceived need for environmental activism. Twenty-two high school students produced multimedia artefacts including blog posts, videos, and group reports, then their productions were analyzed through a convergent mixed methods design. The findings showed that environmental awareness and perceived need for environmental activism significantly increased after instructions. Moreover, participants were able to express environmental awareness at all levels including national and global level whereas the needs for environmental activism were mostly expressed at personal and school/community levels.

Environmental activism is a key component of active involvement to solve environmental issues. Therefore, Burke (2017) conducted a study with 147 high school students in order to determine whether exposure at an environmental fair raise students' desire to participate in environmental groups as well as their environmental awareness. For this purpose, the environmental fair was organized with the participation of 15 local environmental groups. These groups presented different topics such as loss of biodiversity, habitat destruction, and the energy crisis. According to results of pre-fair and post-fair surveys, students' intent to be involved with environmental groups highly increased.

A qualitative study was conducted with the purpose of comparisons science curriculum in those countries: Turkey, Australia, Singapore, Ireland, and Canada (Derman & Gürbüz, 2018). The objectives related to environmental topics in the primary education and secondary education were categorized into mainly three groups consisting environmental issues, environmental science and health, and environmental activities. As a result of the content analysis, it was found that the objectives in the primary education were not equally distributed to environmental

issues in all countries excluding Canada. For instance, sustainability, dynamics, and succession were not covered at primary education curriculum in Turkey.

In addition to deficiencies on environmental issues aspect, Turkish science curriculum at primary level lacks of objectives regarding environmental activities such as field trip and attitude (Derman & Gürbüz, 2018). On the other hand, the highest frequency of objectives concerning research and project was observed in Turkey. Likewise, the objectives related to the concept of “environment” in Turkey were found to be higher in contrast to the other countries.

There are various studies about environmental topics in Turkey. Kahyaoğlu (2016) has conducted a meta-synthesis study concerning the nature education in Turkey. The study aims to analysis of 25 research including articles, dissertations, and assertions published between 2010 and 2015. As a result of obtained data, the effects of nature education on attitudes towards environment, environmental knowledge, environmental awareness, and cognitive structure are more preferred research topics. In this study, it is observed that majority of the studies are designed as quantitative research. Also, questionnaires are frequently used for data collection whereas mind maps are less preferred as instruments.

In addition to the meta-synthesis, Kahyaoğlu (2016) has also studied on the content analysis of 179 articles about environmental education in Turkey from 2000 to 2013. It was determined that % 62 of these articles consists of quantitative research method while non-experimental design is more preferred by the researchers. Furthermore, standardized tests such as surveys, concern and attitude scales are frequently used method for data collection. Observation and alternative assessment tools are less preferred because preparation of them is time-consuming and there are limited studies related to these methods in Turkey (Kahyaoğlu, 2016).

Another content-analysis on environmental education was conducted by Dasedmir (2018). In a total 124 theses between 2012 and 2016, the importance of environmental education, attitudes towards to environment, and environmental problem are the most studied topics (Dasedmir, 2018). Moreover, a significant number of the studies were applied with university students while elementary school students were selected as participants only in 8 studies. Similar to previous

analyses, it was found that scales for environmental attitude, awareness, and knowledge are the most frequently used data collection method.

One of the national studies regarding environmental issues has carried out at a private high school in İstanbul (Polat, 2013). She has pointed that people who act consciously and who are sensitive to environment would be essential need to solve environmental problems. She has argued that this need can be met only by environmental education particularly from childhood. A word association tests were assigned to 48 ninth graders with the purpose of identification of their cognitive structures throughout an environment course. The study concluded that responses related to environmental scientific terminology increased after the course, however this positive impact didn't take long. The use of scientific terms decreased when the same tests applied to the same participants one year later as a retention test (Polat, 2013).

Another study which concerns environmental education in Turkey was applied on early grade levels by Yaşaroğlu (2012). In his doctoral dissertation, attitudes and behaviors to environment of fifth and fourth grade students were investigated through both qualitative and quantitative methods. Data analysis found that students' attitudes and behaviors towards environment differentiated based on gender, parents' occupation, education level of parents, and settlement of parents, but there was no difference between grade levels.

1.1.2 Environmental Issues and Stories

Stories give a chance to empathize so they are suggested as a way to understand animals and plants in environmental issues (TESS-India, 2014). Increasing tourism in northwestern Morocco raises concerns for possible environmental consequences (Fanini & Fahd, 2009). For this reason, a story book related to different aspects of ecosystem was prepared and distributed to students. As a result of survey completed by 74 students from rural and urban areas, it was found that stories are effective to increase the awareness to local environmental issues. Moreover, students who live in urban could define certain species despite of the fact that they have never seen them similar to description of their peers in rural areas.

By taking into consideration of socio-scientific issues, Hwang (2011) argued that environmental education should be given through discourse instead of teaching environmental concepts at knowledge level. However, he concluded that many teachers have insufficient ability on environmental instruction because of various reasons. As a result of the study with teachers, Hwang claimed that integration of stories to the curriculum helps teacher to develop their instructions on different environmental topics. For instance, it was reported that alternative energy teaching with whom a teacher 15 years experiences cannot be fully understood without stories.

Folktales as cultural tools might have a significant role on the acquisition of environmental knowledge. 15 stories were collected from different cultures; America, North American Indians, Australian aborigines, Tahiti, Japan, Africa, England, Ireland and Malaysia (Ahi, Yaya, & Özsoy, 2014). The content analysis of these stories showed that they have a wide range of subjects consisting nature-human interaction, pollution, and natural life. Nevertheless, it was found that some stories includes negative behavior such as destroying trees and it was remarked that these stories might serve as bad role model for children.

1.1.3 Stories and Storytelling in Turkey

History is commonly seen as difficult and boring lesson for some students. One of the reasons for this common bias is that history teachers usually prefer direct instruction. That's why, Demircioğlu (2008) offers storytelling as an alternative method for history lessons. In his study, the concept of "tolerance" was taught to eight grade students through historical stories. Semi-structured interviews were conducted with twenty students. Based on students' expressions, it was found that students find history enjoyable and interesting, they change ideas about people who have different religion or ethnicity, and they learn the tolerance with contextual manner.

Similar data related to the effect of stories on tolerance was obtained by Yılmaz (2015). Seventh grade students' attitudes towards short stories were determined based on the interview data and the teacher's diary. As a result of the study, it is

claimed that short- stories enable participants to understand the cultural differences and sense of tolerance. Furthermore, Yilmaz (2015) argues that using short-stories creates more relaxed classroom environment and implements learning in meaningful context.

Solak (2006) has carried out an experimental study in order to assess the vocabulary knowledge of fifth graders by comparison of story – based instruction with traditional lessons. Although the post – test results showed no significant difference between scores of experimental and control group, reflection of students and observations of the teacher concluded that story –based lesson is fruitful in terms of several aspects. Firstly, participation of low achievers was higher in story-based lessons since they did not feel fear of failure. Secondly, students reported that stories are enjoyable manner. Finally, distracting behavior was observed less in story-based lessons because students were highly engaged by stories (Solak, 2006).

Özdemir (2012) has examined the vocabulary knowledge of eight grade students in English lessons at the end of storytelling and role-playing process. This study showed that students in experimental group associated the given vocabulary with meaningful and contextual expressions whereas students in control group used only dictionary meaning of the given word. For instance, students in experimental group state that servant means someone who works in the palace or palace worker while students in control group use the word “server” to define servant without any further explanation.

Özer (2004) applied Total Physical Response Storytelling (TPRS) on fifth grade English lessons and obtained favorable outcomes on students’ development. TPRS which is extended version of Total Physical Response (TPR) strategy uses storytelling to contextualize given vocabulary. TPR is one of the language education methods similar to the 5E model in science education. At the end of the experimental study, the pre-test and post-test results show that storytelling is useful and motivating way to teach foreign language.

Another research was conducted by Dewan (2005) at a private school in Ankara. In this research, various activities were presented to 5th grade students in order to teach English through storytelling. It was observed that storytelling has positive

impacts on students' participation and motivation. Moreover, it was reported that storytelling could be easily adapted to all learning styles considering the Theory of Multiple Intelligence (Dewan, 2005).

Kütük (2007) designed a case study to seek an answer whether storytelling improves students' vocabulary knowledge. Intrinsic Motivation Inventory and The Vocabulary Knowledge Scale were used as data collection tools. According to the results of these two instruments, students' motivation and vocabulary knowledge have increased throughout the storytelling sessions.

An experimental design was conducted by comparing the impacts of storytelling and direct instruction on history topics (Şimşek, 2004). Pre and post-test were given 120 students who enrolled in sixth and seventh grades of a public primary school. According to the comparisons of test scores, there was a significant difference between control group and experiment one. Those who received history lessons through storytelling had higher scores at knowledge and comprehension level as well as total achievement.

Tok and Mazi (2015) carried out a case study which aimed to investigate the effects of stories on reading and listening comprehension. In the line with this purpose, a pre-test and post-test control group quasi-experimental design was applied on 74 fifth grade students. Data analysis concluded that there was no significant difference between the two groups in terms of reading and listening comprehension. The study addressed inadequate time and crowded groups as limitations.

Rapid developments in technology offer the computer assisted storytelling to educators. Yardım (2011) compared computer assisted storytelling and teacher-led storytelling through a pre-test post-test design experimental study. At the end of a three-week implementation, both groups consisted of fifth grade students increased their vocabulary knowledge. However, it was found that students in teacher-led storytelling sessions were more successful in vocabulary learning than students in computer-assisted storytelling sessions. Reasons for this result were listed as; teacher-led storytelling enables students to learn each other, to take responsibility of their own learning, and to experience real-like environment by actively engage in (Yardım, 2011).

Storytelling is an effective way for older students as much as for younger ones. A quasi-experimental design was applied with undergraduate students at pre-intermediate English level (Harmankaya, 2009). In this study, stories were used as folktales and compared with the traditional method in terms of the effectiveness on vocabulary teaching. At the end of the study, the experimental group had statistically higher scores than the control group.

İnal (2010) carried out a similar research with university students who are at advanced English level. According to the post -test results, it was found that experimental group scored significantly higher than the control group. Also, retention test scores showed that experimental group was more successful. Hence, the study concluded that using stories is more useful method for acquisition of vocabulary and memorization comparing to the traditional technique (İnal, 2010).

To sum up, the number of international studies that investigate the effectiveness of stories and storytelling on teaching environmental issues is very limited while it is not found any research on this topic in national literature. In fact, stories are effective for children to understand the differences and others (Demircioğlu, 2008; Yılmaz, 2015). For this reason, stories should be used to enhance awareness about any living things and any environmental problem even they have never been experienced or met by children (Fanini & Fahd, 2009; TESS-India, 2014). Moreover, it was found that stories are useful method for socio-scientific issues (Hwang, 2011).

As a science educator, one of our responsibilities is to enhance students' interest towards environment and to develop positive attitudes (MEB, 2018). Unfortunately, many students find that environmental topics are too boring in comparison to other subjects in science education. In addition, environmental education is not given enough importance by science teachers due to some limitations such as insufficient background knowledge of teachers, time constraints, and inappropriate conditions for nature education (Şimşekli, 2004). Another point to take into account in environmental education is about students' emotions. Educators need to encourage hope for future rather than to remark destructive effects of environmental problems. Using storytelling should be a practical way to teach environmental issues

because it increases students' interest and motivation (Demircioğlu, 2008; Kütük, 2007; Özer; 2004, & Solak, 2006).

In related literature, it was observed that majority of studies using stories was conducted on English teaching and these studies produced favorable outcomes. One advantage of this method is that using stories provides contextual learning (Özdemir, 2012; Yardım, 2011, & Yılmaz, 2015). Since environmental issues contain contextual property in their nature, storytelling would be a fruitful method for environmental education. Another advantage of using stories is that students defined this method as enjoyable (Demircioğlu, 2008; Solak, 2006 & Yılmaz, 2015). This is important for environmental protection because Erten (2004) claims that people protect what they love.

Erten (2004) advocates that endearing animals and plants to children should become one of the main objectives of environmental education. For this purpose, storytelling could be considered as a suitable method. Moreover, Şimşekli (2003) suggests that educators in environmental education should prefer the methods which can be applied on all lessons. In the line with the literature, it is observed that storytelling can be used in different lessons including history and foreign language.

In conclusion, environmental problems such as global warming, loss of biodiversity, and pollution have a significant role for all humanity. Environmental education concerning environmental awareness, environmental activism, and environmental knowledge has a crucial role on dealing with these issues. Nevertheless, there are several issues that restrict the quality of environmental education in our country similar to many other countries such as teachers' ability, students' attitudes or time constraints (Demir & Yalçın 2014; Rahman, Halim, Ahmad, & Soh, 2018 & Şimşekli, 2004). Although there are many studies conducted on environmental issues in the national field, the most of them are lack of qualitative approaches, younger participants, and alternative instrument such as word association or focus group interview (Dasdemir, 2018 & Kahyağolu, 2016).

1.2 Objective of the Thesis

The present study aims to investigate the views of fifth grade students concerning environmental issues through storytelling.

1.3 Hypothesis

Since the present research was designed as action research, the researcher examined the research question instead of hypothesis. There are two research questions of this study as follows:

1. How does affect using storytelling on fifth grade students' cognitive structures based on pre-posttest of Word Association Test (WAT) concerning environmental issues?
2. How does affect using storytelling on fifth grade students' views via focus group interview concerning environmental issues?

2.1 Introduction

This chapter presents a background on the theoretical and the empirical basis of the study. The framework of the stories and storytelling is examined through literature review. Afterwards, the advantages of using stories in science education are explained via related studies.

2.2 Stories and Storytelling

Story refers to *“a narrative is designed to interest, amuse, or instruct the hearer or reader, either true or fictional”* (Dictionary, n.d.). Accordingly, the story is related to interest and instruction from its definition. Stories make contributions to language skills of individuals beginning from early childhood period. Many children get familiarize the stories thanks to bedtime storytelling by their parents. Children who are 4 years old can be able to tell stories based on their real experience or imagination. When they grow up, their capacity to produce stories increases and they construct their own stories. Children who grow up in storyteller families have a potential to assume a role of personal narrator (National Research Council, 2000). Even though storytelling means both telling and writing of stories, this research has focused on the telling of stories by single researcher as author. Several advantages of using stories could be listed as below:

- Facilitates negotiation (Jonassen & Hernandez-Serrano, 2002)
- Helps to memorize knowledge or experience (Jonassen & Hernandez-Serrano, 2002)
- Effective way to construct persuasive arguments (Jonassen & Hernandez-Serrano, 2002)

- Kind of a role-modeling by offering a chance to independently choice good or bad attitude (Jonassen& Hernandez-Serrano, 2002)
- Powerful way to present real events at past (Şimşek, 2004)
- Develops linguistic skills (Şimşek, 2004)

Because of these variety of benefits, stories are used as instruction strategy in many disciplines such as medicine, economy, and education. Moreover, some educators including Bruner advocate that stories are considered as an important component of culture (as cited in Jonassen & Hernandez-Serrano, 2002). Bruner (1990) claims that stories are appropriate tools for social constructionism and social negotiation. He believes that telling stories is a humanly action to make something meaningful. In the book of Acts of Meaning, several features of narrative are explained, in the following, under the discussion of Folk Psychology as an Instrument of Culture:

- *Inherent sequentiality* means constituents of the story such as events or characters have unique sequence. In other words, they do not have a meaning on alone apart from as they are given in the stories.
- *Factual indifference* refers that the power of the story is independent from whether it is real or fictional.
- *Unique way of managing departures from the canonical* means that stories could be used in order to explain the exceptional situation in ordinary patterns.
- *Dramatic quality* implies that stories should include moral commitment.
- *Dual landscape* refers that events in stories simultaneously occur both in general scene and in mental world of the main character.

2.3 Stories and Science Education

Stories and scientific inquiry have similar patterns. For instance; setting a scene, presenting a problem, and resolving the problem are respectively followed in many stories while presenting a context, giving a problem, and producing a solution are main parts of scientific inquiry (TESS-India, 2014). Furthermore, Dahlstrom (2014) advocates that storytelling has a significant role for science communicator. Especially for non-expert audiences, using storytelling contributes to

comprehension, interest, and engagement. Also, it was pointed that people tend to believe in narrative statements rather than logical or scientific arguments. Stories are strongly related to the scientific practices such as modeling. Fuchs (2015) posed a question to identify relationship between formal science and folk science (stories) in modern macroscopic physics. For this purpose, he compared the simulation of formal models with storytelling. In his study, it was found that stories facilitates to understand and to build scientific models. Therefore, stories could be considered as an agent of theory as well as a method for conceptual change model.

Another benefit of stories is that they are effective manner for case-based reasoning. It facilitates the problem solving by storing and identifying experiential knowledge. It was proposed that stories are fundamental methods in order to teach how to apply knowledge learned in schools on problems in informal settings. In addition, likewise to the simulations stories should enable people to substitute themselves in experience which they have never had (Jonassen & Hernandez-Serrano, 2002).

Klassen (2006) defined five domains of context by examining several theories such as constructivism and social constructionism and these are theoretical, practical, social, historical, and affective. Then, he developed the Story – Driven Contextual Approach (SDCA) which is a method for contextual science teaching based on these contexts. According to this approach, contextualization is an effective and useful way in order to minimize the complexity of laboratory works and to comprehend theoretical background of scientific phenomena. Furthermore, scientific discourse is suggested in classrooms by emphasizing the importance of linguistics. Thus, students would act as novice scientists instead of passive observers whereas teachers are responsible for monitoring the process.

Stories are assumed as a way to enhance students' emotions and emotions are strongly related to the motivation, attention, memorization and finally learning. Therefore, using stories is one of the basic element of SDCA (Klassen, 2006). Stories provide teachers to engage active engagement of students in the five domains which are theoretical, practical, social, historical, and affective. The schema of SDCA is given at the following:

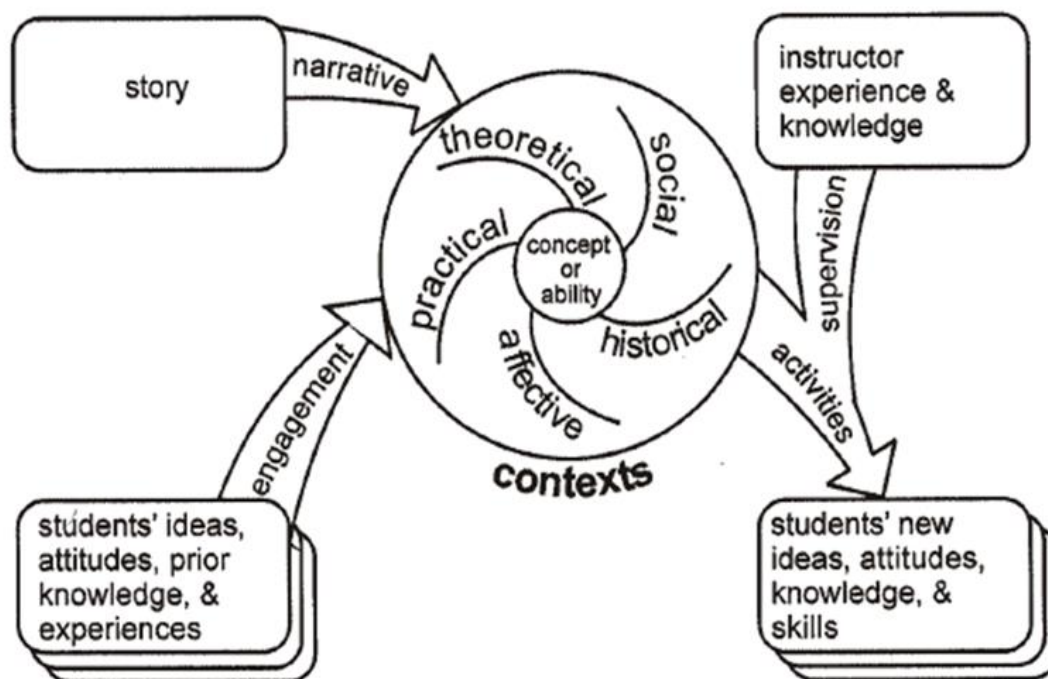


Figure 2. 1 A schema for the story-driven contextual approach

Klassen and Klassen (2014) addressed an important problem that a significant number of students shows low interest to science lessons. As a result, their intellectual involvement are insufficient and efforts to teach science would be useless. Nevertheless, they supported that use of science stories is a useful way to increase interest of students both in class and out-of-school. Moreover, it was suggested to combine the science stories, hands-on activities, and social interaction within the contextual manner.

Mutonyi (2016) has conducted a longitudinal study with secondary school students in Uganda throughout four years. Even though some researchers agree African – American, African, and similar cultures have limited connections to modern science (Mutonyi, 2016), she used cultural manners like stories, proverbs, and anecdotes on teaching scientific concepts. In Mutonyi’s study, researchers used the stories to initiate discussions about health issues. The analysis of data showed that stories contribute to emotional engagement, motivation, and knowledge level of learners.

Even though the most of studies related to stories or storytelling in national areas has focused on English language teaching, there are several research on science education. One of them advocated that stories enhance students’ willingness to learn

chemistry (Demircioğlu, Demircioğlu, & Ayas, 2006). According to the research, stories would be useful to relate scientific concepts with daily lives, to increase students' motivation, and to provide active participation of students. Furthermore, stories should be used to eliminate alternative frameworks and to replace them by scientific ones. It was suggested to use visual materials for promoting effectiveness of stories.

Another research was carried out in order to investigate the effect of scientific stories on learners' creativity and affective properties (Gölcük, 2017). In accordance with this purpose, the study was designed as the convergent parallel mixed method research. The participants consisted of elementary students and data were collected through semi-structured interview, open-ended questions, Torrance Test of Creative Thinking Test, and Attitude toward Science Questionnaire. As a result of the study, quantitative data found no significant difference in terms of students' creativity and attitudes toward science.

In contrary to quantitative data analysis, qualitative findings has shown that students find scientific stories as enjoyable and interesting (Gölcük, 2017). Additionally, students expressed that scientific stories facilitate to make scientific connections in real-life experiences. Finally, some of the students explained that stories should be used in other lessons, particularly in difficult subjects because they claimed that stories are helpful for comprehension. Consequently, it was asserted that stories are effective to create affirmative learning environment.

3.1 Introduction

The purpose of the current study is to investigate the views of fifth grade students concerning environmental issues through storytelling. In the line with this purpose, the present chapter includes information about design of the study, participants, instrument for data collection, procedure, data analysis, ethics, trustworthiness and limitations of the study.

3.2 Methodology

The researcher aims to develop the quality of environmental education concerning the views of fifth grade students in this study. Environmental education is a multidimensional issue comprised of environmental knowledge, environmental awareness, and environmental activism. Furthermore, the effect of storytelling was also investigated related to the objectives of this study. Since the present study aims to reveal students' views such as feelings, attitudes, and thoughts, the research design required qualitative methods. In this context, transformative action research is considered the most appropriate tool among qualitative methods. Action research aims to produce solution based on participants' thoughts and reflections throughout certain practices (Savin-Baden & Major, 2013). Transformative action research can be used synonym with social constructionist action research and promotes high participation with interpretation to investigate different thoughts (Savin-Baden & Major, 2013). In this study, the researcher examines the development on students' views concerning environmental issues as a teacher, therefore she had storytelling training before application of storytelling sessions to her own students.

3.3 Participants

Storytelling and stories could be used for all grade of students (Demircioğlu, Demircioğlu, and Ayas, 2006). However, it is important to start environmental education at early stages such as pre-school or primary school (Demir & Yalçın, 2004). Thus, fifth graders were seen more appropriate than older students for this research because it is more efficient to increase environmental awareness at younger ages (Polat, 2013).

The participants of this study consisted of 35 fifth grade students enrolled in Mehmet Akif Ersoy İmam-Hatip Middle School (males = 12, females = 23). The school is located in Güngören where is in one of the low socioeconomic parts of Istanbul. Although regular classroom environment has too many distracters both for the researcher and participants, it is a more natural setting than isolated teacher room or laboratory to obtain reliable data. That's why, data were gathered at students' own classroom because they would feel more comfortable in familiar environment.

All participants were at the same class and the class was heterogeneous in terms of academic achievement. The researcher was at the same time science teacher of that class, thus the convenience sampling method was used in the present study. Students were between the ages of 10 (n=12), 11 (n=21), and 12 (n=2). Their families were informed the research purpose and the importance of the study via parents' meeting. Participation was provided teachers' encouragement and there was no other inducement.

Pre-test and post-test WAT were simultaneously assigned to all participants. However, one student did not complete the post-test WAT since she was absent on the day of post-test application. On the other hand, focus group interview conducted with 35 participants at first three weeks while the class consisted of 33 students at the last week of focus group interview.

3.4 Instrumentation

In this study, qualitative findings obtained from focus group interviews were supported with quantitative data analysis through pre-posttest of Word Association Test.

3.4.1 Word Association Test

Word association test (WAT) was used as pre-posttest with the purpose of investigation of participants' cognitive structures concerning environmental issues. WAT was a practical instrument which enable researchers to obtain a wealth of data in various fields (Govender, 2002). Semantic linkages in word association test were assumed to cover mental associations, therefore it should be used in examination of cognitive structures, investigation of conceptual frameworks, or determination of conceptual change and retention (Polat, 2013).

In this study, the six key concepts that constitute the WAT are environment, environmental protection, environmental pollution, environmental problem, natural life and biodiversity. These concepts determined based on the key concepts of the unit of Human and Nature in official science curriculum (MEB, 2016). Moreover, the approval of science education professor was received on the determination of these concepts. The WAT was arranged in a separate page for each key concept by cutting A4 paper to six equal pieces (see in Appendix A). Only school numbers of students were asked as personal information not to feel them excited.

In literature, 30 seconds were determined as suitable length of time to complete word association test (Polat, 2013). Nevertheless, pilot testing was conducted in order to determine the amount of time because sample of this study were younger and had lower language skills compared to their peers. Thus, the WAT was applied on another fifth grade class in the same school and it was seen that one minute was appropriate for fifth grade students. As a result of the pilot test, it was not observed any problem with understanding of key concepts which might threat the validity.

3.4.2 Focus Group Interview

Since the primary purpose is to gain deep knowledge rather than intended answers or majority of evidence, focus group interview was used to examine how storytelling influence on fifth grade students' views concerning environmental issues. Despite similarities with individual interview, interview with focus group has its own characteristics. One of them is that focus group interview mostly aims to release opinions of particular group about a particular issue rather than understanding individual differences (Savin-Baden & Major, 2013). Another difference is that social interaction was promoted in focus group interview since social environment is one of the agents that constructs the individual's beliefs, thoughts, and knowledge from the view of Vygotsky.

The researcher moderated focus group interviews after each storytelling session. In order to construct a natural environment as much as possible, interviews were conducted in classroom at usual science lessons. Semi-structured manner was designed because younger students might have a difficulty to give proper answers to closed questions, need open-ended items and it is needed prompts to clarify their thoughts. Main themes of interview questions were mostly determined based on the discussion questions of "the Story of Mr. Fox" which were available on open educational platform TESS – India (Teacher Education through School Based Support in India). The common questions on four focus group interview sessions were as follows;

1. What are the reasons for environmental problems?
2. What are the consequences of environmental problems?
3. What do you suggest to prevent environmental problems?

The purpose of these questions was to investigate fifth grade students' views via focus group interview concerning environmental issues. For this reason, they were analyzed and coded as defined in data analysis process. Moreover, there were several questions asked in order to elaborate discussion and to engage participants in the stories at the following:

- How many of you liked the story?

- How would you feel if you were at the main character’s place?
- What would you like to change in the story?
- What would you do if you were at the main character’s place?

3.5 Data Collection Procedure

First of all, pre-test of WAT were assigned to 35 fifth grade students in the Mehmet Akif Ersoy İmam Hatip Middle School. One week before the implementation of pre-test, participants were acquired a familiarity to word association test technique with simple words such as sun and tree. They were warned not to look at the other papers by reminding that there was no single correct answers and all answers were valuable. Students were assumed to produce ten response words by associating the relevant key concept in 1 minutes. The same procedure were repeated until the completing of all key concepts by all participants. At following four weeks, one story was told by the researcher each week. After storytelling session, focus group interview was conducted and recorded on audiotape each week. Finally, the WAT was given as post-test by following the same procedure in the pre-test. Overall procedure lasted for six weeks (see Table 3.1).

Table 3. 1 Procedure of the study

1st Week	Pre-test of Word Association Test (40 min.)
2nd Week	Storytelling Session (7 min) + Focus Group Interview (21 min)
3rd Week	Storytelling Session (6 min) + Focus Group Interview (26 min)
4th Week	Storytelling Session (12 min) + Focus Group Interview (22 min)
5th Week	Storytelling Session (3 min) + Focus Group Interview (28 min)
6th Week	Post-test of Word Association Test (40 min.)

The pilot study of focus group interview was done to minimize possible limitation at three months ago conducting the study. Firstly, the Story of Mr.Fox and its

discussion questions were chosen and translated to Turkish by the researcher. The plot of story was about a fox who found himself in buildings instead of his forest and family when it emerged from its hibernation. At the end of the pilot study, it was observed that Turkish version of the story wasn't effective as much as the original one and the researcher wasn't competent in storytelling. Consequently, the researcher had received a professional training for storytelling. Additionally, four stories which were written in Turkish or has already translated to Turkish by experts were chosen for implementation. The names of the stories were "Buruşuk Kağıt Parçası", "Denizin Altını Merak Eden Vapur", "Ayı Olmayan Ayı (The Bear That Wasn't)" and "İnsan ve Çevre" and they were ranged based on the official science curriculum objectives. Stories were about different themes to ensure representativeness of general context such as species extinction, pollution, and human-nature interaction, more detailed information about stories were given at further paragraphs.

Story 1

Title: Buruşuk Kağıt Parçası

Writer: Aytül Akal

Related Objective: F.5.6.2.1. Students will be able to express the importance of interaction between human and environment and negative effects of environmental pollution on human health.

Emphasized Environmental Issue: Pollution

Short Summary: One day a piece of crumpled paper falls to the ground from the garbage truck. Although a lot of people pass by, no one pick it up for a variety of reasons. A crumpled paper keeps waiting worriedly until two children comes there...

Story 2

Title: Denizin Altını Merak Eden Vapur

Writer: Aytül Akal

Related Objective: F.5.6.2.2. Students will be able to make suggestions for resolving an environmental problem in its immediate surroundings or in our country.

Emphasized Environmental Issue: Water Pollution, Natural Habitat

Short Summary: Always dreaming of being a submarine, the ferry's dream came true. But the bottom of the sea is not what it would have expected. He decided to return to be the ferry with the children who accompany him in this adventure.

Story 3

Title: Ayı Olmayan Ayı (The Bear That Wasn't)

Writer: Frank Tashlin

Related Objective: F.5.6.2.3. Students will be able to inference about future environmental problems as a result of human activities.

Emphasized Environmental Issue: Species Extinction, Natural Habitat

Short Summary: A bear in the winter hibernation wakes up to find himself in the middle of a factory. He see working machines and stone pile buildings instead of trees, grass, flowers...Also, everyone keeps telling her it's not a bear!

Story 4

Title: İnsanların Çevreye Etkisi

Writer: SEMİH OFSET S.E.K. Publications (Official Course Book)

Related Objective: F.5.6.2.4. Students will be able to discuss examples of benefits and harm situations in human-environment interaction.

Emphasized Environmental Issues: Human-Nature Interaction, Deforestation

Short Summary: Mustafa and his family moved to a big city 5 years ago. He saw factory established in his village when they went to for the summer vacation. A large part of the forest has been destroyed, many of the animals did not appear. On the other hand, many villagers had found work at the factory. Mustafa thought about what to do...

3.6 Data Analysis

3.6.1 Word Association Test

Pre-test and post-test data were documented for each participant. Frequency tables were constituted to examine how many answers had been produced for each key concept and how many of these answers repeated. Data obtained from these frequency tables and cut-off point technique were used in order to develop concept networks. In the cut – off point technique, the point of 3 or 5 less than the highest frequency of answers was defined as the first cut-off point. Other cut-off points were determined by dropping frequencies at regular intervals until the all key concepts came up in the concept network (Waern, 1972; Bahar, 1999). The cut-off point interval in this study was determined as “5”.

3.6.2 Focus Group Interview

Qualitative method was used in order to assess the views of students throughout the procedure. Focus group interview was the central method at this study for collection of qualitative data. The researcher used abridged transcript that avoids to type excessive data such as introduction type, irrelevant responses, or moderator directions (Krueger & Casey, 2015). The classic analysis strategy was preferred since the researcher was novice about qualitative approach. This strategy includes basic elements such as several reading, cutting, and sorting for determination of thematic codes (Krueger & Casey, 2015).

3.7 The Role of Researcher

The role of researcher in present study was primarily based on the researcher-director from the Story – Driven Contextual Approach (Klassen, 2006). The researcher who told the stories to students was also the science teacher of them. There were some advantages of the researcher was teacher of the participants of the study at the same time. One of them was that teacher- researcher had the ability to make better inferences to progress of each participant. Another advantage was that students felt comfortable to give their natural reactions throughout data collection period, it was valuable in terms of obtaining reliable data. Moreover, interviewer responsibilities such as establishing rapport and developing appropriate questions

for level of participants were easily handled by the researcher. The last advantage that was discussed in this section actually related to the very early stage of this study. Being a teacher enabled a researcher to develop a significant and feasible research question. During teaching experiences, the researcher observed that significant number of students had lower interest to the environmental topics than other topics in curriculum. They weren't aware of the severity of threats to the nature and they had some misunderstandings related to environmental issues. One of the causes was that especially children in urban areas did not have a chance to observe or to experience a natural life. Another cause was that teachers did not attach necessary importance to environmental issues due to some practical reasons. For instance, the school which the researcher had been working did not have technological opportunities to enrich learning environment with simulations, games and videos. Additionally, classrooms were too crowded thirty-five students in average not to allow effective collaborative activities. Due to these limitations, the researcher have started to be interested in storytelling and stories to develop the quality of environmental education.

In addition, the researcher of this study had multiple roles including storyteller, teacher of young learners, leadership for analysis and moderator of interview due to the nature of research design. First of all, the researcher was aware of the significance of the role of storyteller. Although certain skills such as effective using of body language and tone of voice or being studious were mutually required for effective teachers and storytellers, telling a story entailed many other abilities related on practicing and rhetoric. Therefore, the researcher had received a professional training before conducting the study. Secondly, the researcher had responsibilities as a young learners' teacher due to the fact that participants consisted of fifth grade students. Young learners are more energetic and lost their interest quickly (Solak, 2006), therefore their teachers should be patient and enjoyable. Furthermore, social interaction and collaborative working should encouraged with positive learning environment (Yardımcı, 2011). Positive learning environment was also important for moderator of focus group interview because students could learn from each other through interactions in group. Thirdly, the researcher made the focused and selective observation throughout focus group

interviews because these kind of observation were more suitable than exhaustive observation particularly in educational studies with students. Lastly, the researcher took the responsibility of data analysis of focus group interview since it is advised that the leadership must be the one who are involved in the whole process of study (Krueger & Casey, 2015).

3.8 Ethical Issues

The school administrator, the science teacher of the class in pilot study and students were informed about the purpose and the procedure of this research, the confidentiality of personal information. Owing to the age of fifth grade students, it was asked permission from their parents for the research. Transcription of the interviews, audio files, and data obtained from word association tests were stored in electronic media that was password protected. In addition, students were given a number from one to thirty-five in the study instead of using their names in order to provide confidentiality.

In qualitative research, it is required a consideration of ethical design, treatment of individuals, processes and presentation of products (Savin-Baden & Major, 2013). The first concern is about efficacy of design which has three components: contribution to knowledge, sound methodological basis, and researcher ability. The present study aimed to introduce the storytelling to environmental education as a practical and fruitful method based on the theoretical background discussed in Chapter 2. For this purpose, researcher had received a professional training on storytelling as a practitioner. In the line of these manners, all three concerns of ethical design was accomplished in this research.

Being a teacher of participants brings the second concern about ethical issues in action research and that is treatment of individuals. The researcher paid utmost attention on being fair to treat all students in terms of having right to speak and encouragement for participation especially in focus group intervention. Finally, transparency of process and plausibility of products were explained in the following part as trustworthiness.

3.9 Trustworthiness

Quantitative part of data collection was designed with the purpose of supporting qualitative data. In other words, triangulation strategy was used to validate results in this study. Additionally, both word association test and focus group interview were piloted before implementations in order to obtain reliable and valid data. Translation of stories and storytelling ability of researcher were determined as possible threats for validity of research by the help of pilot studies. As a result, stories which were written in Turkish or translated to Turkish by professionals were chosen and the researcher had received a training for storytelling.

Maturation and testing effect are threats to internal validity of standardized tests (Fraenkel & Wallen, 2008). Therefore, pre-test and post-test were applied on the sixth lesson of Wednesday's schedule in order to minimize maturation effect. In other words, conditions were tried to equalize for both versions of the word association test. Moreover, the time between pre-test and post-test was determined as six weeks in order to prevent the testing effect. Additionally, face validity of the instrument was approved by a science education professor.

In data collection process via focus group, there were several considerations to ensure the accuracy of data. Firstly, clarity of interview questions for participants was checked by piloting. Secondly, the researcher avoided leading questions and made careful observation through interview in order to reveal student's view without being prejudiced by another participant or researcher. With the same purpose, open sharing and safe environment was provided to participants thanks to teacher-researcher role and selection of research site as their regular classroom. Lastly, interpretations and codes were constructed with another two science researchers.

3.10 Limitations of the Study

One limitation of this study is that there were some student who are from different ethnical background have linguistic problems with Turkish. Nevertheless, these students were included in the study as participants because isolation of them would have caused ethical concerns throughout implementation.

The second limitation is about generalization because the present study was conducted with 35 fifth grade students in a public school. Therefore, external validity of the research is limited as the nature of qualitative studies but the findings are transferrable. On the other hand, the sample of this study is too large for focus group interview to gain enough deeper knowledge. For this reason, focus group interviews were repeated four times about different stories in order to give equal opportunity on expression of thoughts for all participants.

Lastly, the study is limited by the duration of implementation because storytelling was used one hour per week during four weeks. This period is not sufficient to evaluate the outcomes of storytelling and the retention of environmental knowledge particularly in young learners.

4.1 Introduction

The aim of the present study is to investigate the views of fifth grade students concerning environmental issues through storytelling. This chapter includes the results of the data analyses with respect to this aim. It starts with the frequency tables and the concept networks formed derived from pre-test and post-test of word association test. Afterwards, analysis of focus group interviews are presented with quotes of participants in English and in Turkish.

4.2 Word Association Test

The first research question of this study was: How does affect using storytelling on fifth grade students' cognitive structures based on pre-posttest of Word Association Test (WAT) concerning environmental issues? According to the results of WAT, the number of answers for each key concept was presented in Table 4.1. It is seen that words associated by the students increased for each key concept. The highest rise occurred in "biodiversity" whereas the lowest one occurred in "environmental protection".

Table 4. 1Total number of answers for each key concept

Key concepts	Total number of words	
	Pre-test	Post-test
Environment	200	232
Environmental protection	167	169

Environmental pollution	190	197
Environmental problem	165	194
Natural life	186	200
Biodiversity	132	177
Total Number	1040	1169

The frequencies of response words for each key concept were determined through examination of all students' pre-test and post-test result. The words which are synonyms or have close meanings were presented in a same category at the frequency tables. As a result of obtained data, Table 4.2 and Table 4.3 indicate respectively response words which have high frequencies in pre-test or post-test. The frequencies of all response words were presented in Appendix B.

Table 4. 2 The frequency table of response words in pre-test

Response Words	Key Concepts	Environment	Environmental Protection	Environmental Pollution	Environmental Problem	Natural Life	Biodiversity
Cleaning		12	14	2	2	9	1
Pollution		12	---	9	10	---	---
Tree		10	---	1	3	6	---
Beauty		9	6	1	1	9	6
Human		7	6	5	3	7	1
Life		6	3	6	3	7	3
Green		6	1	---	---	1	1
Animal		5	1	3	---	4	1
Flower		5	1	1	---	6	1
Street		5	---	2	---	3	---
Protection		5	9	1	1	2	---
Not to Pollute		5	6	1	---	---	---
Safety		1	6	1	1	---	---
Not to Litter		---	5	---	---	---	---

Garbage	---	1	17	1	---	---
Harmful	1	---	5	4	---	5
Malignity	---	---	5	8	1	3
Fight	---	---	---	7	---	---
Problem	---	1	---	11	---	---
Health	2	4	2	---	5	---
Diversity	---	---	---	---	---	9
Illness	---	---	2	2	---	8
Difficulty	---	---	3	1	---	5
Redundancy	---	---	---	---	---	5
Total	91	64	67	58	60	49

According to the Table 4.2, some of the high frequencies belong to the last words of key concepts such as pollution, protection, and problem. Additionally, there are some notable response words that seems to be irrelevant to the associated key word such as fight with “environmental problem” or difficulty and illness with “biodiversity”. Students thought that environmental problem refers to something like having problem with their friends because the word “environment” are also used to define social sphere in Turkish language. On the other hand, garbage has the highest frequency as a result of association with “environmental pollution”. Moreover, cleaning, beauty, human and life are response words of students that were associated with all key concepts. Thus, these response words could be defined as “mutual recurrent words”.

Table 4. 3 The frequency table of response words in post-test

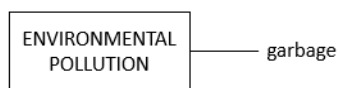
Response Words	Key Concepts	Environment	Environmental Protection	Environmental Pollution	Environmental Problem	Natural Life	Biodiversity
Cleaning		17	15	---	1	14	---
Pollution		14	---	14	19	1	1
Tree		15	2	3	2	10	2
Beauty		3	1	---	1	7	2
Human		7	8	12	9	8	5
Life		10	4	3	2	5	6
Green		5	1	---	1	1	---
Animal		8	5	5	7	10	21

Flower	7	2	1	1	8	3
Grass	7	3	---	---	3	---
Protection	---	2	---	---	4	---
Environment	---	2	2	1	5	2
Safety	---	5	---	1	---	---
Insect	6	1	---	---	2	2
Garbage	1	4	15	16	---	---
Forest	5	---	1	---	4	1
Malignity	---	---	5	4	---	---
Fight	---	---	1	4	---	---
Problem	---	---	5	2	---	---
Health	1	1	---	---	6	---
Diversity	---	---	---	---	---	8
Illness	---	---	4	2	---	---
Difficulty	---	---	2	3	---	2
Redundancy	---	---	---	---	---	5
Nature	8	4	2	---	7	4
Plant	2	5	---	2	4	10
Exhaust	---	---	5	3	---	---
Natural Disaster	1	---	5	4	---	---
Living Things	2	---	2	---	---	8
Generation	---	---	---	---	---	5
Total	119	65	87	85	99	87

As seen in Table 4.3, frequency of the last word of key concepts such as “environmental protection” and “environmental problem” remarkably decreased compared to the pre-test results, whereas students used more different response words with high frequencies. Similarly, another decrease is observed in frequencies of *fight*, *illness*, and *difficulty* which were associated with irrelevant key words on pre-test. Furthermore, *animal* which was associated with “biodiversity” has the highest frequency. Lastly, *tree*, *flower*, and *animal* replaced by *cleaning* and *beauty* as mutual recurrent words.

According to the frequency analysis, the concept networks based on the pre – test results are presented in Figure 4.1.

Cut-Off Point 16 and above



Cut-Off Point 11-15

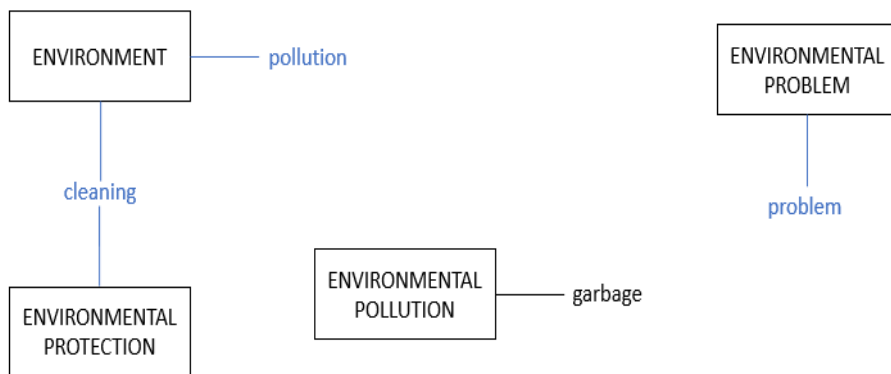


Figure 4. 1 Concept networks formed based on pre-test

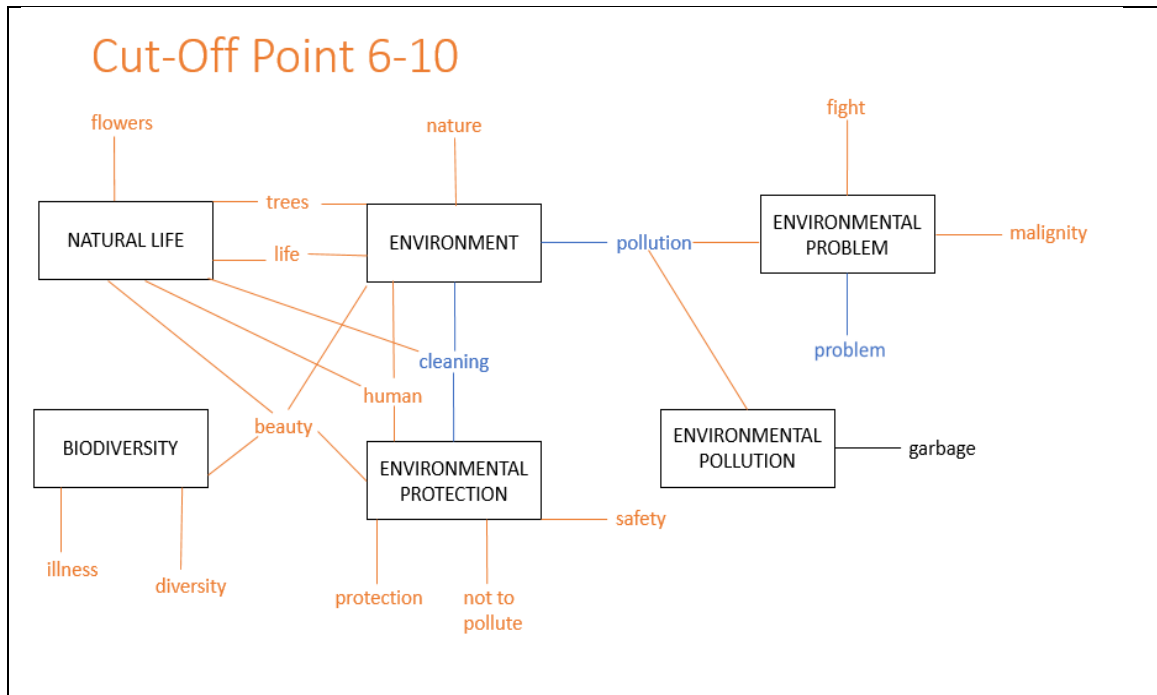


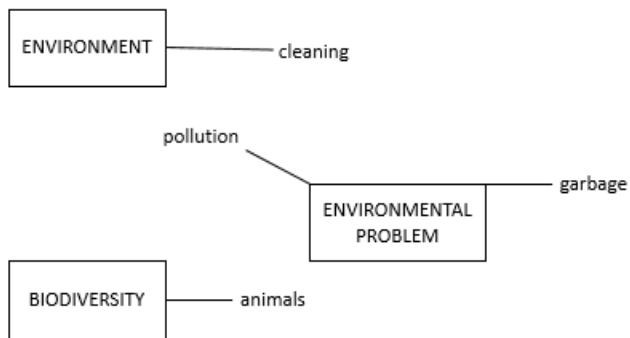
Figure 4. 2 Concept networks formed based on pre-test

Figure 4.1 can be interpreted as follows;

1. For the cut-off point 16 and above, there was only one key concept emerged within this range. It was determined that 17 students associated “environmental pollution” with *garbage*.
2. For the cut-off point 11 to 15, both “environment” and “environmental protection” were associated with *cleaning*. Also, students associated “environment” with *pollution* which is a negative term while “environmental problem” was associated with its last word.
3. For the cut-off point 6 to 10, all key concepts appeared and associated words slightly increased. However, there were several issues. Firstly, there was no direct association among key concepts. Secondly, “biodiversity” which was a new term for students was associated with *illness*. Finally, to associate “environmental problem” with *fight* points the misunderstanding of this concept because the word “environment” is also used in order to define social-behavioral problems in daily life.

According to the frequency analysis, the concept networks based on the post – test results are presented in Figure 4.2.

Cut-Off Point 16 and above



Cut-Off Point 11-15

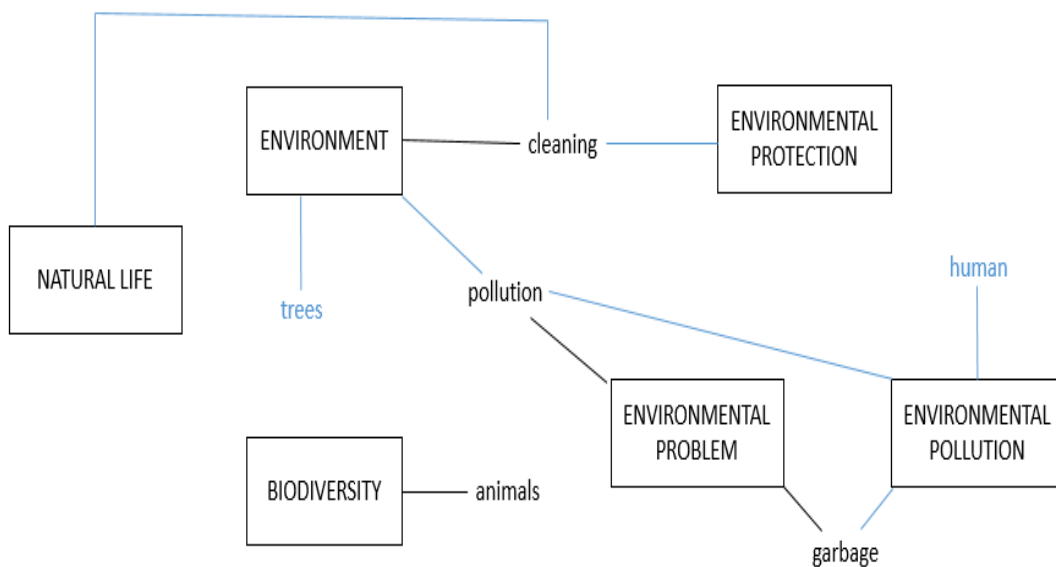


Figure 4. 3 Concept networks formed based on post-test

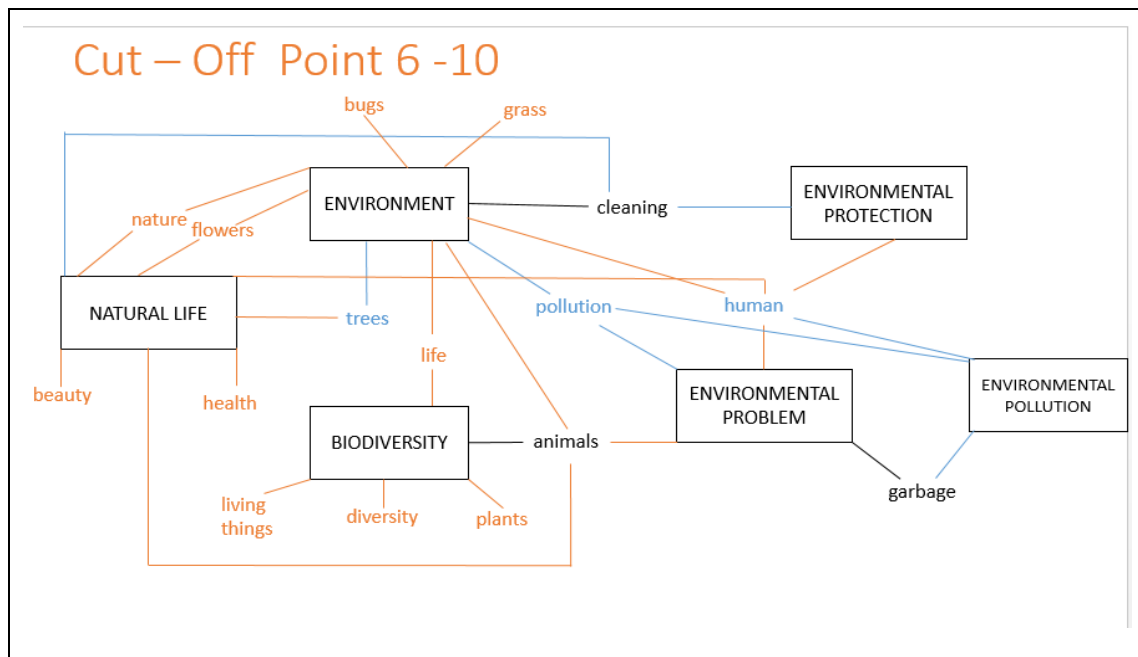


Figure 4. 4 Concept networks formed based on post-test

Figure 4.2 can be interpreted as follows;

1. For the cut-off point 16 and above, it was observed that associations of key concepts increased in comparison to pre-test. In this range, “environment”, “environmental problem”, and “biodiversity” were associated with different response words instead of “environmental pollution”.
2. For the cut-off point 11 to 15, it was determined that all key concepts were associated with different words. Nevertheless, there was no direct association of key concepts between each other similar to pre-test.
3. For the cut-off point 6 to 10, it was observed that students made more meaningful associations. For instance, “environment” was associated with natural concepts such as *bugs*, *flowers*, and *grass*. Moreover, *animals* and *human* were amongst the most frequently used response words.

In brief, participants produced more response word for each key concept in the post-test than the pre-test. The number of associated words for “environmental protection” has risen to 169 from 167. Despite the fact that this raise seemed to be insignificant as quantitative data, there were several important points on qualitative analysis of response words. Nine students associated “environmental protection” with *police*, *soldier*, and *headman* in pre-test whereas these words were not used in post-test. Instead of these words, students produced response words which could

be considered as suggestion for environmental protection. For instance, *competition, recycling, project, poster, story* and *TEMA* were among associated words in post-test.

On the other hand, inter-connections between key concepts were not observed in both pre-test and post-test. This situation could have resulted from that majority of key concepts consisted of two words such as “environmental pollution”. For instance, participants may have responded quickly as “pollution” by thinking that pollution and environmental pollution had the same meaning.

As a result of the comparisons of frequency tables pre-test and post -test, it is observed that associations of ecological terms such as trees, flowers and animals were developed for each key concept with high frequencies. The first key concept of WAT is “environment” and pollution and cleaning were equally used as response words to it in pre-test. In post-test, cleaning has acquired highest frequency for “environment” whereas pollution was ranked as the second, together with tree. Moreover, frequency of ecological terms such as flowers, bugs, grass, and animals has increased as seen in concept network of post-tests. These finding showed that students have started to link “environment” with primarily positive meanings and ecological terms at the end of the storytelling sessions.

In addition, the story which is told at second week about water pollution focuses on a boat as a main character. Although boat and water pollution were not used as response words in pre-test, it is observed that both of them were associated with “environmental pollution” as a result of post-test. Similarly, the story at the third week is about a bear threatened with extinction and it is shown that bear was associated with “biodiversity” in post-test.

4.3 Focus Group Interview

The second research question of this study was: How does affect using storytelling on fifth grade students’ views via focus group interview concerning environmental issues? Participants discussed the same three questions regarding four different stories during four weeks. Findings of focus group interviews were analyzed in major themes in the following sections.

4.3.1 Reasons for Environmental Problems

One of the questions which were asked to students in four focus group interviews was: What are the reasons for environmental problems? Responses to this question were resulted in those codes: "human", "animals", and "disasters". The majority of students reported that people results in environmental pollution. Some students directly indicated to human such as "*people, insensitivity (in Turkish: insanların duyarsızlığı)*" while some of them clarified in unstraightforward way such as:

S2: "throwing litter (in Turkish: yerlere çöp atılması)"

S5: "factories (in Turkish: fabrikalar)"

S7: "exhaust fumes (in Turkish: egzoz dumanları)"

S16: "People waste their food and throw away (in Turkish: İnsanların yemeklerini israf edip çöpe atmaları)"

S26: "cutting trees (in Turkish: ağaçların kesilmesi)"

Many students pointed that disasters or weather events cause the environmental pollution. For example:

S8: "earthquakes (in Turkish: depremler)"

S14: "natural disasters (in Turkish: doğal afetler)"

S20: "hurricanes (in Turkish: kasırgalar)"

S27: "fires (in Turkish: yangınlar)"

Significant number of students expressed that animals lead to environmental pollution as following:

S4: "Animals throw shells at the things they eat. (In Turkish: Hayvanlar.....yedikleri şeylerin kabuklarını atıyorlar.)"

S7: "Things that were not eaten by animals cause the pollution. (In Turkish: Avlanan hayvanların yemediği kısımlar kirlilik oluyor.)"

S23: "feces of animals (in Turkish: hayvanların tuvaletlerini yapması)"

Some students claimed that *natural disasters, fires, and weather events* bring on environmental problems. However, they did not explain in detail when the researcher asked them to give justification. Moreover, one student “S21” indicated “*sound*” as a reason for environmental problems without further explanation. In the same focus group session, another student “S24” explained, “*Loud sounds results in broken glasses, so environmental pollution happens. (In Turkish: Yüksek sesler cam kırılmasına sebep olup çevre kirliliği olur.)*”

4.3.2 Outcomes of Environmental Problems

Second question of focus group interview was: What are the consequences of environmental problems? Responses of participants were categorized in to “human”, “plants”, “animals”, “all living things”, and “the earth”. Majority of students reported effects of environmental problems in terms of human life. For example;

S20: “Life becomes harder diseases... (In Turkish: Hayat zorlaşırhastalıklar...)”

S7: “Air contaminated by exhaust fumes can cause diseases like difficulty in breathing (in Turkish (in Turkish: Egzoz dumanlarıyla kirlenen hava nefes darlığı gibi hastalıklara sebep olabilir.)”

S24: “Prices would increase, life becomes expensive. (In Turkish: Zam gelir, hayat pahalı olur.)”

S4: “... could lead to the cancer. (In Turkish: Kansere sebep olabilir.) ”

S22: “Manufactured gases can prevent the vision of a pilot. (In Turkish: Fabrika gazları bir pilotun önünü görmesini engelleyebilir.)”

Many students pointed the effects of environmental problems to the earth as following:

S18: “Icebergs could melt. (In Turkish: Buzullar eriyebilir.)”

S19: “Atmosphere could be damaged. (In Turkish: Atmosfere zarar verebilir.)”

S26: “Clouds would be harmed and dirty rain could occurs. (In Turkish: Bulutlara zarar verir, yağmur kirli yağabilir.)”

S8: “water pollution (in Turkish: suların kirlenmesi)”

Some participants reported outcomes of environmental problems only regarding animals whereas some of them defined with respect to plants. However, the number of responses that were coded as plants were slightly higher than the number of responses regarding animals. Several examples of both cases were presented respectively in the following:

S28: "Fishes could die. (In Turkish: Suyun içinde yaşayan balıklar ölebilir.)"

S14: "Deaths of animals increase. (In Turkish: Hayvan ölümleri çok olur.)"

S15: "I watched at news: the sea is polluting, fishes are washing up onto a shore. (In Turkish: Haberlerde gördüm, deniz kirleniyor, balıklar karaya vuruyor.)"

S5: "Plants which are grow in the soil could be damaged. (In Turkish: Toprakta yetişen bitkiler zarar görebilir.)"

S22: "Plants weathering (in Turkish: Bitkilerin solması)"

S24: "Factory fumes could prevent trees to photosynthesize. (In Turkish: Fabrika dumanları ağaçların oksijen yapmasını engelleyebilir.)"

Moreover, many students expressed outcomes of environmental problems in terms of all living things or multiple agents such as human and animals as following:

S19: "Living thing could die because of mass poisoning. (In Turkish: Canlılar toplu halde zehirlenip ölebilir.)"

S22: "People and animals could die. (In Turkish: İnsanlar ve hayvanlar ölebilir.)"

S7: "Air pollution.....losing lives of fishes and other living things. (In Turkish: Hava kirliliği.....balıkların ve diğer canlıların hayatlarını kaybetmesi)"

S6: "All living things, fishes would die. (In Turkish: Tüm canlıların, balıkların ölmesi)"

4.3.3 Prevention of Environmental Problems

The last question which was analyzed in focus group interview was: What do you suggest to prevent environmental problems? Participants addressed various solutions to environmental problems throughout the discussions. These responses were evaluated and almost equally distributed to three main categories at the end of several rounds of reading transcripts. Firstly, students addressed that simple

actions taken by themselves or local administrations such as increasing of garbage cans. In this context, many students claimed that warning people not to throw litter would be important for prevention of environmental problems.

S16: "by warning people (in Turkish: insanları uyararak)"

S17: "Caution signs could be hanged everywhere. (In Turkish: Her yere uyarı tabelaları asılabilir.)"

S2: "It could be solved if people do not throw litter. (In Turkish: İnsanlar yere çöp atmazsa çözülebilir.)"

S4: "It should be increased the number of garbage cans. (In Turkish: Çöp kovalarının sayısı arttırılmalı.)"

S8: "It must be used something to prevent car exhaust. (In Turkish: Araba egzozlarını önleyici şeyler takılmalı.) "

Secondly, students considered that punishment and reward system would be effective in order to solve environmental problems. Some of them suggested legal sanctions including penalty fine and prison sentence whereas some students addressed the prize competitions. For instance;

S19: "It could be sentenced to imprisonment. (In Turkish: Hapis cezası verilebilir.)"

S22: "fine for people who are throwing litter (in Turkish: para cezası, çöp atanlara)"

S23: "competitions at all countries.....tablets to minors and iPhone to adults. (In Turkish: tüm ülkelerde yarışma.....küçüklere tablet büyüklere iPhone.)"

S24: " By putting cameras in the trash cans, the people who put the garbage in the garbage bin will be rewarded, and the ones who do not throw it will be punished. (In Turkish: Çöp kutularına kamera koyulup çöpünü çöp kutusuna atanlar ödüllendirilecek, atmayanlar cezalandırılacak.)"

S21: " to put the people who are polluting the environment to work in the field (in Turkish: çevreyi kirletenleri tarlada çalıştırmak)"

Thirdly, many participants made suggestions on educating people via posters, projects and commercials about environmental protection. Some of them shared their opinions concerning simple inventions especially to collect the garbage.

S13: "Booklets can be distributed to people. (In Turkish: İnsanlara broşür dağıtılabilir.)"

S1: "People should be trained. (In Turkish: İnsanlara eğitim verilmeli.)"

S20: "Cleaning robots can be made. (In Turkish: Temizlikçi robotlar yapılabilir.)"

S6: "Waste collecting boxes such as basketball hoops can be made, it becomes fun. (In Turkish: Basketbol potası gibi atık toplama kutuları yapılabilir, eğlenceli olur.)"

S9: "Posters can be prepared. (In Turkish: Afiş hazırlanabilir.)"

S18: "recycling projects (in Turkish: geri dönüşüm projeleri)"

To sum up, many students had different views of the same issue and advocated their views with various arguments although focus group design has a disadvantage to affect to each other among participants. In contrary to the prepossession, participants shared their opinions and produced various solutions to environmental issues through social interactions. It is reported certain changes in the view of some students, but these changes seemed to be related in the effects of stories (see in Table 4.4).

Table 4. 4 Change in students' expression throughout storytelling sessions

Students	Related Question	Students' Responses
S8	What are the reasons for environmental problems?	<ul style="list-style-type: none"> - Earthquakes (1st week) - Fabric fumes, weather events (2nd week) - Deforestation (3rd week)

		<ul style="list-style-type: none"> - No response reported (4th week)
S2	What are the consequences of environmental problems?	<ul style="list-style-type: none"> - Sick people get worse (1st week) - Animals loses their lives (2nd week) - Plants are affected (3rd week) - No response reported (4th week)
S23	What are the consequences of environmental problems?	<ul style="list-style-type: none"> - People poisoning (1st week) - No response reported (2nd week) - Death risk of living things (3rd week) - No response reported (4th week)
S19	What do you suggest to prevent environmental problems?	<ul style="list-style-type: none"> - It could be sentenced to imprisonment (1st week) - Awareness of people (2nd week) - People should be conscious (3rd week) - All people get the right to be warned 3 times, then they are fined. (4th week)

It is claimed that these students showed the positive development on environmental conscious throughout implementation based on their expressions. For example, S8 stated earthquakes as the reasons for environmental problems at the first week, then he remarked man-made factors such as fabrics and deforestation. At the discussion on consequences of environmental problem, both S2 and S23 reported the effects on human life. However, they started to consider other living thing at following weeks. At that point, it should be noted that deforestation, animals and natural habitat were frequently emphasized themes at the stories. Lastly, S19 suggested a radical solution that is taken by government at first, she slightly changed their expressions and produced a practical suggestion.

Conclusion and Recommendations

5.1 Introduction

The purpose of this study to investigate the views of fifth grade students concerning environmental issues through storytelling. In accordance with this purpose, this chapter starts with a general overview of the important findings. Following that, pedagogical implications and recommendations are listed.

5.2 Conclusion

Stories are simple communication tools which have strong influences on human nature (Bruner, 1990). They provide the ability to put individuals imaginatively in another's place and help to develop powerful arguments (Jonassen& Hernandez-Serrano, 2002). Moreover, stories facilitate understanding and memorization of knowledge thanks to contextualization (Özdemir, 2012; Yardım, 2011; Yılmaz, 2015). These benefits impress educators and researchers on investigating effects of stories and storytelling to various areas included literature, history, and language education. Nevertheless, the review of literature shows the lack of studies concerning stories in environmental issues despite the quality of environmental education is considered insufficient in both national and international studies (Demir and Yalçın 2014; Rahman, Halim, Ahmad, & Soh, 2018; Şimşekli, 2004). In this manner, the present study aimed at examination of the views of fifth grade students related environmental issues through storytelling.

As noted before, action research carried out with 35 fifth grade students with the purpose of investigation their views related environmental issues based on the Story-Driven Contextual Approach (Klassen, 2006). The researcher posed two research questions as: "How does affect using storytelling on fifth grade students'

cognitive structures based on pre-test and post-test of Word Association Test (WAT) concerning environmental issues?” and “How does affect using storytelling on fifth grade students’ views via focus group interview concerning environmental issues?” Both qualitative and quantitative data were collected with regard to these questions during six week period.

As a result of the word association test, the number of response words for each key concept in post-test were higher than in pre-test and it was as a clue of better understanding of these environmental concepts (Ercan, Taşdere, & Ercan, 2010). For instance; the number of associated words for “environmental problem” has risen to 194 from 165. At the end of implementation, students mostly preferred ecological terms to associate key concepts instead of words used in daily life because stories provided meaningful context to students (Özdemir, 2012; Yılmaz, 2015). In pre-test, students mostly associated *beauty with* “environment” while *bugs, flowers,* and *grass* were used as associated words for the same concept in post-test. Another finding is that number of students who associated *human* with “environmental problem” and “environmental pollution” increased in post-test. Similarly, most of the students considered the human as a reason for environmental problems through focus group interviews.

In addition to the reasons for environmental problems, students also discussed the environmental protection and the effects of environmental problems in focus group interviews. Majority of students stated that environmental problems have an effect on the human life when discussing the consequences of environmental issues. However, the results also showed that significant number of students were aware of the effects of environmental problems on other living things and the earth. Some students expressed their thoughts with a holistic view at the end of the implementation whereas they considered the problems from only humans aspect at the beginning. In the manner of environmental protection, students focused on suggestions for creative inventions, legal sanctions as well as the simple actions could be taken by themselves, focus group interviews concluded that student developed various opinions in order to prevent environmental problems.

In focus group interview, students mostly addressed the themes emphasized in the stories during implementation such as dropping litter, deforestation, fabric fumes and water pollution while students used the characters of stories as associated words in post-test even though they had low frequencies. Additionally, positive changes in the views of some students were reported throughout the discussions.

On the other hand, some participants discussed the environmental issues independently from the stories and preserved their opinions throughout four weeks. For instance, they claimed that natural disasters and animals leads to environmental problems. Additionally, it was noted that seven students did not want to participate in any focus group interview even though they carefully followed the storytelling sessions. Three of them were Syrian children who had difficulty with speaking in Turkish while others were also uninterested to usual science lessons.

In related literature, the studies found that stories are motivating and interesting for students (Özer, 2004; Yılmaz, 2015), it was confirmed based on the participants' reflections in this study. Moreover, it was observed that students showed less distractive behaviour and maintained their attention longer in the implementation process. According to Solak (2006), story-based lessons are effective to increase the participation of low achievers who had fear of failure. In this study, it was observed that majority of class had higher participation in lessons including some students who had low academic performance.

Consequently, this research is important due to the lack of studies about storytelling concerning environmental issues and it is needed to consider in the light of its limitations. Both word association test and focus group interviews concluded corresponding results in terms of the views of students concerning environmental knowledge. According to the results, storytelling contributed to environmental knowledge of many participants whereas it is not found a significant effect on some of them. When the research is evaluated from a holistic perspective, it is concluded that storytelling is an effective and practical way to environmental education.

5.3 Pedagogical Implications and Recommendations

The current study does not imply that storytelling is the best way for environmental education and not attempt to prove any theory. Researcher aims to suggest that storytelling is an effective method to teach environmental topics by emphasizing its utility and efficacy. The study concluded favorable outcomes despite of the several limitations as noted before. In order to develop the quality of method and to gain more insights in academics aspects, pedagogical implications and recommendations for future research are presented as follow:

- Science teachers may give more emphasize stories on their lessons, particularly on environmental science topics.
- It is essential to make rehearsal for storytelling and to choose an appropriate story for learners.
- Storytelling and stories could be used for all grade of students, however most of the stories about environmental issues were written in Turkish for young learners. Therefore, there is a need to write or to translate more stories especially for seventh and eighth graders.
- Individual interviews could be applied after focus group discussions to gain deep understanding about participants.
- Cross-sectional studies should be carried out in order to obtain a more holistic insight.
- Longitudinal studies should be conducted to investigate long-term effects of stories.
- Further research on stories for environmental issues would be designed as narrative approaches. Students would be able to share their own stories based on their experiences and observations. In that case, results would be more efficient and valuable in educational aspects.

Word Association Test

Okul No:	Okul No:
ÇEVRE	ÇEVRE SORUNU
ÇEVRE	ÇEVRE SORUNU
ÇEVRE	ÇEVRE SORUNU
ÇEVRE	ÇEVRE SORUNU
ÇEVRE	ÇEVRE SORUNU
ÇEVRE	ÇEVRE SORUNU
ÇEVRE	ÇEVRE SORUNU
ÇEVRE	ÇEVRE SORUNU
ÇEVRE	ÇEVRE SORUNU
ÇEVRE	ÇEVRE SORUNU
Okul No:	Okul No:
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
ÇEVRE KORUMA	ÇEVRE KİRLİLİĞİ
Okul No:	Okul No:
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK
DOĞAL YAŞAM	BİYOÇEŞİTLİLİK

B

Frequency Lists

* The whole list of frequencies for each key concept were presented in Turkish which was the mother tongue of participants in order to prevent any misunderstanding due to translation.

Table A. 1 Frequencies of the key concept "çevre"

ÇEVRE			
ÖN TEST		SON TEST	
YANIT KELİME	FREKANS	YANIT KELİME	FREKANS
TEMİZ/LİK	12	TEMİZ/LİK	17
KİRLİ/LİK	12	AĞAÇ	15
AĞAÇ	10	KİRLİ/LİK	14
GÜZELLİK	9	HAYAT	10
İNSAN/LİK	7	DOĞA	8
HAYAT	6	HAYVANLAR	8
DOĞA	6	İNSAN/LİK	7
YEŞİL/LİK	5	ÇİM	7
HAYVAN	5	ÇİÇEK	7
ÇİÇEK	5	BÖCEK	6
SOKAK	5	ORMAN	5
HAVA	4	YEŞİLLİK	5
PARK	4	AYI	4
MAHALLE	4	YAŞANILAN YER	4
CADDE	4	GÜZELLİK	3
OKSİJEN	4	ÇÖP	3
MUTLULUK	3	KUŞ	3
ÇİM	3	OKUL	3
ORTAM	3	ÇÖP KUTUSU	2
OKUL	2	SU	2
ARABA	2	BİTKİ	2
ÇÖP	2	KEDİ	2
ORMAN	2	KÖPEK	2
KİRLETMEME	2	PİKNİK	2
YER	2	BİNA	2
TOPRAK	2	OT	2
YOL	2	VATANDAŞ	2
BİNA	2	CANLILAR	2

ÇEVRE	2	HAVA	2
KALDIRIM	2	BAHÇE	2
DENİZ	2	ÇÖP ATMA	2
TOPLULUK	2	ÇÖPLÜK	2
EV	2	DOĞAL GÜZELLİK	1
SAĞLIK	2	GÜZEL KOKU	1
BİTKİ	2	TAŞ	1
DOĞAL GÜZELLİK	1	BETON	1
HOŞ	1	YOL	1
SAĞLAM	1	BAHAR	1
ARKADAŞ	1	BEYAZ	1
POLİS	1	SAĞLIK	1
RAHATLIK	1	YARIŞMA	1
GEZİ	1	SINIF	1
FERAH	1	GÖL	1
HAVA KİRLİLİĞİ	1	NEHİR	1
GÜZEL KOKU	1	AKARSU	1
SAKİN	1	ÖNEM	1
SESSİZ	1	YAPRAK	1
ETRAF	1	TAVŞAN	1
BAHAR KOKUSU	1	DÜNYA	1
SALINCAK	1	OKSİJEN	1
TAHTERAVALLI	1	CAM	1
KAYDIRAK	1	KAĞIT	1
FİDAN	1	DEFTER	1
SU	1	VARLIKLAR	1
KALABALIK	1	TEMİZ HAVA	1
MANAV	1	YIKIM	1
GÜL	1	ATIK	1
DAĞ	1	PLASTİK	1
ÇAYIR	1	DEPREM	1
KUŞ	1	GÜNEŞ	1
BÖCEK	1	EV	1
YAPI	1	SOKAK	1
BERABERLİK	1	SOKAK LAMBASI	1
SAFLIK	1	BİLGİ	1
HUZUR	1	ARABA	1
GÜVEN	1	ARABA ÇEVİRMESİ	1
EĞLENCE	1	YAPI	1

DÜNYA	1	SORUMLULUK	1
BAKKAL	1	PARK	1
ÇOCUK	1	ORTAM	1
BEBEK	1	UYKU	1
ZARARLI	1	TOPLULUK	1
FAYDALI	1	SORUMSUZLUK	1
KEDİ	1	KULLANMA	1
SEVGİ	1	OTEL	1
UYKU	1	MUTLULUK	1
TRAFİK	1	RAHATLIK	1
TEKNOLOJİ	1	MAĞARA	1
GİZEMLİ	1	BANK	1
MERKEZ	1	BÜFE	1
KAYNAK	1	BAKKAL	1
ÖNEM	1	TOPRAK	1
DOĞAL	1	KOLİ	1
NEFES	1	ÇENE	1
TABİAT	1	SALATALIK	1
GERİDÖNÜŞÜM	1	SONSUZLUK	1
		İYİ	1
		KİRLETMEMEK	1
		PİSLETMEME	1
		YAŞAMA BAĞLANMA	1
		ETRAFIMIZ	1
		ROBOT ÇÖP KUTUSU	1
		DENİZ	1
		ÇAMUR	1
		PARA CEZASI	1
		YANGIN	1
		YÜRÜYÜŞ	1
		BIYOÇEŞİTLİLİK	1
		EL DEĞMEMİŞ	1
		ÇALILIK	1
		ÇÖP KAMYONU	1
		GEZİ	1
		DOĞAL AFET	1
		DOĞAL YAŞAM	1
		DOĞALLIK	1

Table A. 2 Frequencies of the key concept "çevre koruma"

ÇEVRE KORUMA			
ÖN TEST		SON TEST	
YANIT KELİME	FREKANS	YANIT KELİME	FREKANS
TEMİZLİK	14	TEMİZLİK	15
KORUMA	9	İNSAN	8
GÜZELLİK	6	GÜVENLİK	5
KİRLETMEME	6	GÜZELLİK	5
İNSAN/LİK	6	BİTKİ	5
GÜVENLİK	6	DOĞA	4
ÇÖP ATMAMA	5	YAŞAM	4
SAĞLIK	4	HAYVANLAR	4
KOKU	4	AĞAÇ	4
POLİS	3	ÇİÇEK	4
GÖREV	3	ÇÖP	4
HAYAT	3	ÇÖP ATMAMA	3
SEVGİ	2	ÇÖPÇÜ	3
AHLAK	2	YARIŞMA	3
ASKER	2	SORUMLULUK	3
JANDARMA	2	YER	3
ÖNEM	2	ÇİMEN	3
DUYARLILIK	2	ÇÖP KUTUSU	3
İYİ	2	ROBOT	3
BARIŞ	2	KORUMA	2
TOZ	2	PROJE	2
ZARAR VERMEME	2	GÖREV	2
GÜVEN	2	SEVGİ	2
BİNA	2	BAKIM	2
ÖZGÜVEN	2	ÇAMUR	2
SORUMLULUK	2	ÖNEM/Lİ	2
GÜZEL MAHALLE	2	DÜZENLİ	2
ÇÖP ATANLAR	1	YARDIMLAŞMA	2
SAFLIK	1	ÇEVRE	2
BAKMAK	1	BALIK	2
YARDIMLAŞMA	1	ODUN	2
ÇİÇEKLERE ZARAR VERMEME	1	KİRLETMEME	1
TEMİZ HAVA	1	SAĞLIK	1
SAHİP ÇIKMA	1	GERİ DÖNÜŞÜM	1
YEŞİLLİK	1	DOĞAL ORTAM	1
BİTKİLERİ KORUMA	1	DOĞAL YAŞAM	1
SLOGAN	1	BÖCEK	1

KOLAYLIK	1	ASLAN	1
BESLEME	1	KÖPEK	1
BARINMA	1	KEDİ	1
İLAÇLAMA	1	AT	1
TELEVİZYON	1	İSADEM	1
TEMİZ CADDE	1	SÜPER KAHRAMAN	1
BİLGİ	1	SU	1
ALARM	1	SAYGI	1
SEL	1	ZARAR VERMEMEK	1
ÇÖPLÜK	1	AĞAÇ KESMEMEK	1
BİRLİK	1	HAYVANLARA VURMAMAK	1
ZABITA	1	PANKART	1
BİZ	1	ÇİÇEKLERİN SOLMASI	1
KORKUSUZ	1	BROŞÜR	1
BERABERLİK	1	YAZI	1
ÇÖP KUTUSU	1	ÖYKÜ	1
BAHAR	1	VATANDAŞ	1
YAZLIK	1	ÖRTÜ	1
MUHTAR	1	ZAMAN	1
HEYELAN	1	VAKIFLAR	1
BİRİKTİRMEK	1	DENİZ	1
OKSİJEN	1	YEŞİLLİK	1
UYARMAK	1	AY	1
ÇALIŞMA	1	GÜVEN	1
LİDERLİK	1	DÜNYA	1
BAHÇE	1	ÇOCUK	1
BİLİNÇLİLİK	1	TEMA	1
AİLE	1	PİSLİK	1
KARDEŞ	1	AMBALAJ	1
ÇEVRE	1	İYİLİK	1
ÇEVREYE SAYGI	1	ARABA	1
KORUNAN ÇEVRE	1	KAŞIK	1
ÇEVREYİ SEVENLER	1	ANLAYIŞ	1
ÇEVREYİ SEVMİYENLER	1	VİCDAN	1
DOĞALLIK	1	ATIK	1
HAYAT KURTARMA	1	MUTLULUK	1
HAYVAN	1	ADALET	1
YANGINI ENGELLEME	1	OKSİJEN	1
SORUN	1	HUZUR	1
GİRİŞİMCİLİK	1	AYAKKABI	1
DEPREM ÇANTASI	1	ÇÖP ATAN	1
MUTLU	1	SIRA	1

NEŞELİ	1	MASA ALTI	1
SIKINTISIZ	1	PANO	1
FAZLA KOŞMAMA	1	OTOMATİK DİREK	1
GÜZEL BAKMA	1	KONUŞAN DİREK	1
GÜZEL YER	1	ÇÖP TOPLAYAN DİREK	1
SAYGI	1	GÜNEŞ	1
HAVA	1	PİL ATMAMA	1
PİLOT	1	PLASTİK ATMAMA	1
DÜŞÜNCE	1	TOZ YAPMAMA	1
		DAVRANIŞ	1

Table A. 3 Frequencies of the key concept "çevre kirliliği"

ÇEVRE KİRLİLİĞİ			
ÖN TEST		SON TEST	
YANIT KELİME	FREKANS	YANIT KELİME	FREKANS
ÇÖP	17	ÇÖP	15
KİRLİ/LİK	9	İNSAN	12
ZARAR/LI	5	KİRLİ/LİK	9
KÖTÜ	5	KÖTÜ/LÜK	5
DUMAN	4	HAYVAN	5
KAĞIT	4	EGZOZ	5
OKSİJENSİZLİK	4	DOĞAL AFET	5
ZOR YAŞAM	3	PİS/LİK	5
OKSİJENSİZ	3	FABRİKA	4
ÖLÜM	3	SORUN	4
HAYVAN	3	ŞİŞE	4
ÇÖPLÜK	3	HAVA KİRLİLİĞİ	4
PLASTİK	3	PİL	4
PİS	3	DUMAN	3
ATIK	3	HASTALIK	3
ŞİŞE	3	ÖLÜM	3
İNSAN	3	ÇÖPLÜK	3
HASTALIK	2	ARABA	3
SOKAK	2	FABRİKA DUMANI	3
DOĞA	2	ATIK	3
ORMAN	2	ZARAR/LI	2
TEMİZ/LİK	2	ZOR YAŞAM	2
KÖTÜ KOKU	2	ÇÖP ARABASI	2
İĞRENÇ	2	ÇÖPÇÜ	2
TOZ	2	ÇÖP KUTUSU	2

BÖCEK	2	AĞAÇ	2
YANGIN	2	KOKU	2
SEL	2	PLASTİK	2
HAVA KİRLİLİĞİ	2	SU KİRLİLİĞİ	2
DÜNYA	2	DOĞA	2
PİS KOKU	2	ÇEVRE	2
PAKET	2	CANLI/LAR	2
HAVASIZLIK	2	GERİ DÖNÜŞÜM	2
ÇEVRE	2	SORUMSUZLUK	2
KOKU	2	AĞAÇLARIN KESİLMESİ	2
HAYVANLARIN ÖLMESİ	1	KAĞIT	1
YAŞAM	1	OKSİJENSİZLİK	1
DEPREM	1	BIYOÇEŞİTLİLİK	1
AFET	1	HAVASIZ	1
KİRLETMEMEK	1	ÖLÜM TEHLİKESİ	1
CAM	1	HASTANELİK	1
TOPRAK KİRLİLİĞİ	1	TUVALET	1
SU KİRLİLİĞİ	1	SEL	1
ORMAN KİRLİLİĞİ	1	ARABA KAZASI	1
PİL	1	İLAÇ	1
BİLİNÇSİZLİK	1	CANLILARIN ÖLÜMÜ	1
İNSANIN SUÇU	1	ÇİRKİN	1
KÖTÜLÜK	1	ÇAMUR	1
KARTON	1	CEVAPSİZ	1
SAĞLIKSIZ	1	YANITSIZ	1
TERTEMİZ	1	İĞRENÇ	1
GÜZEL	1	TEHLİKE	1
GÜZEL OLMAYAN	1	PİS KOKU	1
ÇÖPÇÜ	1	ÇÖP KOKUSU	1
ÇÖP TOPLAYANLAR	1	YANGIN	1
ÇÖP KUTUSU	1	BAKIMSIZ	1
ÇÖP BİDONU	1	ORMAN	1
YER	1	PİKNİK	1
ÇÖP ARABASI	1	ÇİÇEK	1
ÇÖP MAKİNESİ	1	ÇİMEN	1
HAYATSIZ	1	KİRLİ ORTAM	1
ÇİRKİN	1	BAKMAK	1
İNSAFSIZLIK	1	ÇÖP ATMAMA	1
TERBİYESİZLİK	1	MİKROP	1
KÖTÜLÜK	1	EĞLENCESİZ HAYAT	1
İHANET	1	KİRLİ SOKAK	1
PİKNİK	1	KİRLİ APARTMAN	1

AİLE	1	ÇİKOLATA	1
KÖK	1	ŞİKAYET	1
BALIK	1	ÇENGELLİ İĞNE	1
EV	1	DEFTER	1
OKUMA	1	ABUR CUBUR	1
KORUMA	1	YERE ÇÖP ATMA	1
AKARSU	1	ORMAN YANGINI	1
ÇİMEN	1	BİNA	1
GERİ DÖNÜŞÜM	1	KAVGA	1
YAŞAYAMAMA	1	KÖTÜ ALIŞKANLIK	1
ÖLÜM TEHLİKESİ	1	DÜNYA	1
ÖLÜ CANLAR	1	SİGARA	1
İLTİHAP	1	DONDURMA	1
HAYAT	1	TOPRAK KİRLİLİĞİ	1
HAVA	1	VAPUR	1
OKSİJEN	1	GEMİ	1
YILAN	1	DUYGUSUZLUK	1
TAŞ	1	ÇÖP KOVASI	1
ÇAMUR	1	ANLAYIŞSIZLIK	1
MİS KOKULU	1	METAL	1
ÇİÇEK	1	CAM	1
DENİZ	1	KEDİ	1
NEFESSİZLİK	1	YAŞAM	1
DÜŞÜNCE	1	ZORLUK	1
YALNIZLIK	1	OKUL	1
UYMAYAN	1	KALEM	1
GÜVENSİZLİK	1	KUTU	1
SIKICI	1	ÇEVRE SORUNU	1
STRES	1	İNSANLARIN HATASI	1
MALZEME	1	AĞAÇLARIN FAZLALIĞI	1
SAĞLIK	1	KÖTÜ İNSAN	1
TOPRAK	1	YERİ KİRLETME	1
AĞAÇLAR	1	KÖTÜ KOKU	1
MUTSUZLUK	1	ÇÖP ATMA	1
İNSANLIK	1	DEFTER	1
MİS HAVA	1		
SAFLIK	1		
AHLAKSIZ HAREKET	1		
SINIF	1		
METAL	1		
ÇÖP KOVASI	1		
ÇÖPLERİMİZ	1		

Table A. 4 Frequencies of the key concept "çevre sorunu"

ÇEVRE SORUNU			
ÖN TEST		SON TEST	
YANIT KELİME	FREKANS	YANIT KELİME	FREKANS
KİRLİ/LİK	10	ÇÖP	16
KÖTÜ/LÜK	8	KİRLİ/LİK	13
KAVGA/Dövüş	7	İNSAN	9
SORUN	5	HAYVAN	7
ÇÖP	4	PİSLİK	6
YANGIN	4	KÖTÜ/LÜK	4
SORUMLULUK	4	KAVGA/Dövüş	4
HEYELAN	3	HAVASIZ	4
ZARAR/LI	3	KÖTÜ KOKU	4
PROBLEM	3	DOĞAL AFET	4
DEPREM	3	YANGIN	3
ARABA	3	ÖLÜM	3
İĞRENÇ YER	2	ZORLUK	3
HAVA KİRLİLİĞİ	2	EGZOZ	3
DUMAN	2	DUMAN	3
YAŞAM	2	AĞAÇLARIN KESİLMESİ	3
HASTALIK	2	SORUN	2
ÇÖZMEK/ÇÖZÜM	2	SORUMLULUK	2
YOL	2	ZARAR/LI	2
CEZA	2	SEL	2
POLİS	2	HASTALIK	2
AĞAÇ	2	ÇÖPLÜK	2
TEMİZLİK	2	KAĞIT	2
KİRLETME	2	PİS KOKU	2
ÇÖP ATMA	2	SU KİRLİLİĞİ	2
İNSAN	2	TOPRAK KİRLİLİĞİ	2
ŞİŞE	1	KÖTÜ YAŞAM	2
KÖTÜ KOKU	1	SORUMSUZLUK	2
İĞRENÇ ŞEY	1	YERİ KİRLETME	2
KÖTÜ KOKANLAR	1	KOKU	2
TEHLİKE	1	PROBLEM	1
ÖLÜM	1	DEPREM	1
RAHATSIZLIK	1	ARABA	1
ÇEVRE KÖTÜLÜĞÜ	1	VOLKAN	1
SORUMSUZLUK	1	KASIRGA	1

PİS	1	HAREKET	1
GÜVENLİK	1	EROZYON	1
TOZ	1	PARK	1
KÖTÜ MAHALLE	1	DAĞINIKLIK	1
PİS MAHALLE	1	FABRİKA	1
İĞRENÇ MAHALLE	1	TEKNOLOJİK EŞYA	1
YALANCI MAHALLE	1	TRAFİK KAZASI	1
OLUMSUZ	1	PLASTİK	1
İYİ OLMAYAN	1	OKSİJENSİZLİK	1
HAYVANLARIN TARTIŞMASI	1	ARIZA	1
SEL	1	CANİ HAYVAN	1
GÖREV	1	YER	1
UYARMAK	1	İĞRENÇ	1
SÖYLEMEK	1	MİDE BULANDIRICI	1
KIRIK YAPI	1	ÇEKİLMEZ	1
ESKİ ŞEY	1	CEVAP	1
ODAKLANMAK	1	DÜZENSİZLİK	1
DÜŞÜNMEK	1	KOKMAK	1
KOKU	1	ÇÖPÇÜ	1
ZORLUK	1	EVSİZ	1
ATEŞ	1	ÇÖP ARABASI	1
ÇİM	1	ATIK	1
DAL	1	ÇİÇEK	1
UZAY	1	GÜVENLİK	1
MAHALLE	1	BAKIM	1
TEKNE	1	TEMİZLİK	1
BAĞIRMA	1	ÇEVRE	1
MAHKEME	1	TUTMAK	1
HAPİS	1	UYMAK	1
KURAL	1	BİTKİ	1
SUÇ	1	YOSUNLUK	1
HIRSIZLIK	1	HASAR	1
PARA	1	AĞAÇ	1
BELEDİYE	1	YEŞİLLİK	1
KONUŞMA	1	ÇÖP KUTUSU	1
ÖFKE	1	KİRLİ DENİZ	1
ÖNEM	1	KÖTÜ ALIŞKANLIK	1
DÜŞÜNCE	1	BAĞIMLILIK	1
ÖZGÜVEN	1	İLAÇ	1
KÖPEK	1	ŞİRİNGA	1
ENGELLİLERİNİN DAR YOL	1	CİMRİLİK	1
SAVAŞ	1	KÖTÜ DÜŞÜNCE	1
BİR SORUN	1	YEMEK KABUĞU	1

AĞAÇ KESİMİ	1	DÜNYA	1
KONU	1	SES	1
ÇÖPÇÜ	1	BULANTI	1
BAKTERİ	1	GÜBRE	1
OKSİJENSİZLİK	1	BİTKİLERİN YOK OLMASI	1
HAVASIZ	1	ÖNLEM	1
PİKNİK	1	KANSER	1
BİNA	1	TEHLİKE	1
TARTIŞMA	1	FELÇ	1
ORMAN	1	KÖTÜ ÇEVRE	1
DOĞA	1	TEMİZ OLMAMAK	1
SIKICI HAYAT	1	SORUNLU OLMA	1
İNSAFSIZLIK	1	KİRLİ ÇEVRE	1
TERBİYESİZLİK	1	HAVA KİRLİLİĞİ	1
ÇEVRENİN DUYARSIZLIĞI	1	KAMYON	1
KÖTÜ AHLAK	1	ÇİT	1
PİS MUAMELE	1	BAHÇE	1
HAYATIN SORUNU	1	ÇAKMAK	1
TEHLİKELİ ÇEVRE	1	İLGİNÇ	1
ZARARLI MADDE	1	KARGAŞA	1
ÇEVRE KİRLİLİĞİ	1	HAYVANLARIN ZARAR GÖRMESİ	1
İNSAN SORUNU	1	OT	1
PLASTİK ATIK	1	FABRİKA DUMANI	1
İĞRENÇ	1	HAYVANLARIN KİRLİLİĞİ	1
KORUMA	1	SAMAN DAĞILMASI	1
YERDEKİ ŞEYLER	1	ŞİŞE	1
GERİ DÖNÜŞÜM	1	HAYAT	1
GÜZEL BAKIM	1	GÜZELLİK	1
ŞEYLER	1		

Table A. 5 Frequencies of the key concept "doğal yaşam"

DOĞAL YAŞAM			
ÖN TEST		SON TEST	
YANIT KELİME	FREKANS	YANIT KELİME	FREKANS
TEMİZ/LİK	9	TEMİZ/LİK	14
YAŞAM	7	HAYVANLAR	10
İNSAN/LİK	7	AĞAÇ	9
GÜZEL/lik	9	İNSAN/LİK	8
ÇİÇEK	6	ÇİÇEK	8
AĞAÇ	6	GÜZELLİK	7
SAĞLIK	5	DOĞA	7

HAYAT	4	YAŞAM	5
MUTLULUK	4	SAĞLIK	5
HAYVAN	4	ÇEVRE	5
DOĞALLIK	4	DOĞAL/LIK	4
EV	4	BİTKİLER	4
SEVGİ	3	ORMAN	4
ÇEVRE	3	KORUMA	4
DOĞAL	3	MUTLULUK	3
BİTKİ	3	TEMİZ HAVA	3
	3	DENİZ	3
SOKAK	3	ÇİMEN	3
HAVA	3	SU	3
GÜZEL YAŞAM	3	YEMEK	3
DOĞA	3	KOKU	3
İYİLİK	2	HAVA	3
ORMAN	2	HUZUR	3
RAHAT	2	TOPRAK	3
BESLENME	2	BARINMA	3
BARINMA	2	GÖL	2
KORUNMA	2	OKSİJEN	2
KOKU	2	BAHÇE	2
ÇOCUK	2	GÜZEL KOKU	2
GÜNEŞ	2	BÖCEK	2
OKSİJEN	2	SORUMLULUK	2
MEYVE	2	YAŞAMAK	2
PARK	2	UYKU	2
HUZUR	1	HAYAT	1
SEBZE YEMEK	1	DÜNYA	1
SPOR	1	YEŞİLLİK	1
SU	1	NORMAL	1
DERE	1	KOLAYLIK	1
YAĞMUR	1	SAĞLIKLI BESLENME	1
TOPRAK	1	BAHAR	1
YEMEK	1	HERŞEY	1
İÇECEK	1	TABIAT	1
İSTEDİĞİN GİBİ YAPMA	1	MİS	1
İSTEDİĞİN GİBİ YAŞAMA	1	MUHTEŞEM	1
SAYGI	1	ANNEANNEMİN EVİ	1
YEŞİLLİK	1	ÖRTÜ	1
ANANEM	1	DENGELİ BESLENME	1
ARABA	1	MİS KOKU	1

BİSİKLET	1	FERAHLIK	1
ORMAN	1	BİYOÇEŞİTLİLİK	1
TABİAT	1	DOĞAL VARLIKLAR	1
DOĞAL GÜZELLİK	1	İNSAN OLMAMASI	1
CADDE	1	BEŞERİ OLMAYAN	1
DOĞA VE YAŞAMI KORUMA	1	RAHATLIK	1
BİZ	1	SÜPER	1
AVM	1	HARİKA	1
ÇAY	1	İYİ YAŞAM	1
BEBEK	1	AĞAÇ KOKUSU	1
YETİŞKİN	1	ÇİÇEKLERİN RENGİ	1
İŞ	1	EĞLENCELİ HAYAT	1
KIYAFET	1	BİNA	1
GÜZEL HAVA	1	PİS HAVA	1
OLMAK	1	KİRLİLİK	1
ENERJİK HAYAT	1	MEYVE	1
SEBZE	1	SEVMEK	1
DOĞAL HAYAT	1	BESLENME	1
BEŞERİ	1	GÜLME	1
DÜZEN	1	TEMİZ SOKAK	1
ÇÖPÇÜ	1	DOĞMAK	1
DİYET	1	KORUNMAK	1
OT	1	SPOR	1
ÇALI	1	GÜZEL HAVA	1
EĞLENCE	1	KAMP	1
ÇEVRE DÜZENİ	1	PİKNİK	1
TRAFİKSİZ HAYAT	1	YARDIM	1
ZAMAN	1	YARDIMLAŞMA	1
ORTAM	1	SAF	1
KÖTÜLÜK	1	BAL	1
YAŞAMA	1	ARI	1
DÜZGÜN YAŞAM	1	ANLAYIŞ	1
DÜZENLİ	1	İYİLİK	1
SAF	1	TARİH	1
MASUM	1	KALEM	1
SIRADAN	1	MAĞARA	1
YAPAYSIZ	1	DEMİR	1
YARATICI	1	FAYDALI	1
İYİLİK	1	KİRLETME	1
DENGELİ	1	ZARAR VERMEMEK	1
KORUMA	1	İYİLEŞTİRME	1
İYİ YAŞAM	1	COŞMAK	1

MARKET	1		
ÇİMEN	1		
MEMLEKET	1		
BAHÇE	1		
OYUN	1		
DOĞADA YAŞAM	1		
BÖCEK	1		
YİYECEK	1		
YAŞAM	1		
HAYALLER	1		
NEŞE	1		

Table A. 6 Frequencies of the key concept "biyoçeşitlilik"

BİYOÇEŞİTLİLİK			
ÖN TEST		SON TEST	
YANIT KELİME	FREKANS	YANIT KELİME	FREKANS
ÇEŞİT/LİLİK	9	HAYVAN/LAR	21
HASTALIK	8	BİTKİ	10
GÜZEL/LİK	6	CANLI/LAR	8
ZARAR/LI	5	ÇEŞİT/LİLİK	7
ZOR/LUK	5	YAŞAM	6
FAZLA/LIK	5	FAZLA/LIK	5
KÖTÜ	3	NESİL	5
ÇEVRE	3	İNSANLAR	5
DEĞİŞİK	3	TÜKENME	4
GEÇERSİZ	3	DOĞA	4
HAYAT	2	DİNAZOR	3
TOP	2	KÖPEK	3
SEBZE	2	KEDİ	3
YEMEK	2	TÜR	3
MEYVE	2	ÇİÇEK	3
BİYOLOJİ	2	GÜZEL/LİK	2
MİYO/LUK	2	ZOR/LUK	2
CANLI/LAR	2	ÇEVRE	2
TEKNOLOJİ/K	2	FARKLILIK	2
BİLGİ	2	DEPREM	2
KÜÇÜK	2	NESLİ TÜKENMİŞ	2
FARK/LILIK	2	AT	2
BİLİM	2	KAPLAN	2
FEN	2	TAVŞAN	2
MADDE	2	ARI	2

DERS	2	BÖCEK	2
KALEM/LİK	2	AĞAÇ	2
DENEY	2	RENK	2
YAŞAM	1	SEL	2
TEHLİKE	1	KİRLİLİK	1
KRANPON	1	KURUYEMİŞ	1
ÇİRKİN	1	KURUYEMİŞ	1
TAZELİK	1	BİNA	1
SOSYAL MEDYA	1	CANLI ÇEŞİTLİLİĞİ	1
TATLI	1	BİYO HAYVANI	1
TEMİZ	1	HAVASIZ	1
DOLANDIRICI	1	PİS HAVA	1
GERÇEK OLMAYAN	1	SEBZE	1
ENTERESAN	1	MEYVE	1
ŞAŞIRTICI	1	MOA KUŞU	1
OLAĞANÜSTÜ	1	MAMUT	1
HASTAYA VERİLEN İSİM	1	ZEBRA	1
BÜTÜNLÜK	1	ASLAN	1
HERŞEY	1	KUŞ	1
ÇİÇEK	1	DOĞAL	1
HAYVAN	1	SOLUCANLAR	1
VARLIK	1	ARTIŞ	1
KAVRAM	1	NÜFUS ARTIŞI	1
YEŞİL	1	BİYOLUK	1
RENK	1	ÖRTÜ	1
YAPI	1	TOMURCUK	1
EŞYA	1	BUKET	1
BÜYÜK	1	MAĞARA ADAMLARI	1
SEÇENEK	1	YAŞAYAMAMA	1
AYRIM	1	EKONOMİ	1
FOBİ	1	FAYDA	1
HOBİ	1	SAYI	1
CANLI FAZLALIĞI	1	BİLİM	1
MİKROP ÇEŞİTLERİ	1	ORMAN	1
KURGU	1	VARLIK	1
KİMYA	1	ORKİDE	1
İNSANLARIN DEĞİŞKENLİĞİ	1	ÇOCUK	1
ZEVK	1	ŞEHİT	1
KİLO	1	OKSİJEN	1
ÇEVRE BİLİMİ	1	GÖL	1
ZARURİ ŞEY	1	ATIK	1
GARİP	1	ELBİSE	1

BAĞIMLILIK	1	AYI	1
GÜZEL UĞRAŞ	1	ORLA	1
LAZIM DEĞİL	1	GERGEDAN	1
AĞIR EŞYA TAŞIMA	1	FOK	1
HASTA ÇEVRESİ	1	PENGUEN	1
NEŞE	1	YAVRULAR	1
MUTLU	1	ŞİRİN	1
		EBEVEYN	1
		EŞYA	1
		ZAMAN	1
		ÖLÜM	1
		TARİH	1
		DAĞLAR	1
		SU KİRLİLİĞİ	1
		TOPRAK KİRLİLİĞİ	1
		HAVA KİRLİLİĞİ	1
		DUMAN	1
		DENİZ	1
		HEYELAN	1
		ÇIĞ	1
		TOPRAK KAYMASI	1

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Publications from the Thesis

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Conference Papers

1. Paper 1: Elif, D.; Cořtu, B. (2019, April). *Using Storytelling to Teach Environmental Issues*. Paper presented at the 1st International Symposium on Education and Change, ISEC, İstanbul.