

# **Increasing Social Studies Teacher Candidates' Awareness and Sensitivity towards Environmental Problems with applied field trip Method**

By

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## **Abstract**

*In recent years, urbanization and upsurge in the number of cities have accelerated due to technological developments, industrialization and rapidly increasing population. Because of these developments, while the natural resources are decreasing, domestic waste, one of the environmental pollutants, has begun to create an inconvenience for people in these cities. While environmental pollution, disturbing people in cities, appeared with increased population, due to inadequate education it has begun to threaten the living space of the people. This fact has led people to question the relation between environmental pollution and education once again and also reexamine the curriculum in higher education. Especially the environmental knowledge of the teacher candidates who will bring up the next generation has begun to be examined. By examining the education faculties' curriculum, whether the teacher candidates are equipped enough to raise generations whose environment awareness will be at the highest level begun to be questioned. The purpose of this study is to determine social studies teacher candidates' awareness and sensitivity towards environmental pollution and increasing them further. As a qualitative study, this study was done using the Social Studies Education students studying at Niğde University's Faculty of Education within the 2012-2013 academic year. Data collection tool consists of interview questions that could determine the teacher candidates' awareness and sensitivity towards depletion of natural resources and environmental pollution. Data have been evaluated by qualitative methods and interpreted within the framework of where the applied field trip was done. At the end of the study, it was found that teacher candidates know the factors that pollute the environment, what to do to while consuming tap water, potential results of leaving waste around on the environment and how to recycle the waste. It was also found that teacher candidates applied what they know into their behaviors and attitudes while separating waste at home and while shopping. Furthermore, it was found that the effects of consumption patterns on natural resources in cities and not mentioning this enough in the visual and print media have reflected adversely on the teacher candidates' behaviors. Following the field trip to the recycling facility, social studies teacher candidates' attitudes and behaviors towards the environment showed considerable change.*

**Keywords:** *Environmental Pollution, Environmental Education, Sensitivity, Awareness*

## **1. Introduction**

While the first people tried to survive with hunting and gathering, they always struggled with the environment within the period's resources and began to change the environment as they desire. With industrial revolution, this change has gained momentum and has begun to be the environmental pollution's primary reason. Together with these developments, scientific researches and technology have also developed rapidly. Geography as a science took its place among the other sciences and by examining the mutual relationships between people and environment, geography began to draw conclusions. Geography especially examines the reasons and results of the effect of people on living things in the natural environment. This natural space is called environment or habitat since living creatures depend upon one another through vital relationships, affect each other and also are influenced from each other by different ways (Güney, 2003: 13). In this environment, all living creatures survive by interacting with each other (Alım, 2006:599- 616) because all spaces whether it is a home or house or the entire world where living things live in are called environment (Özey, 2001: 21).

While examining the relationship between people and the environment, the geographer takes into consideration the shape and structure of the ecological system in which the people and the environment have a mutual effect on each other. While examining how people use and organize space, the geographer takes into consideration the shape and structure of the spatial system in which people have a mutual interaction with each other through social and political activities (Tümertekin, Özgüç, 2002: 30). In this spatial system, people have made such a big change that they even began to not distinguish natural environment from the artificial environment. This is because of the rapidly developing industrialization and the increasing world population (Aydın, Kaya, 2011: 229-257). At the end of the 20th century, population growth, industrial progress based on technological developments and pollution threatening countries' natural resources have made environmental problems one of the most important problems (Soran, Morgil, Yücel, Atav, Işık, 2000: 128-139) because people, environment, culture and economy have always interacted with each other. Among these, since the environment has continuously been polluted, sensitivity towards environmental issues and approaches to be followed on this topic have become vitally important in the 21st century. Environmental pollution has become one of the most significant issues and the prevention of this pollution and the protection of the environment have taken an international dimension (Pınarlı and Yonar: 1999: Şahin, Cerrah, Saka, Şahin, 2004). In taking local, national and global precautions, the importance of international conferences should not be disregarded.

While works started especially with the 1972 Stockholm Conference had an effect on taking administrative, legal, economic and technological measures, they also given rise to action plans highlighting environmental education. 1977 Tiflis, 1988 Nairobi-Paris, 1992 Rio conferences and meetings have identified what is environmental education and what kind of teaching strategies should be used (Erdoğan, 2003: 99-110). For this reason, in conferences and meetings about the environment, the importance of environmental education is has been emphasized and it has been stated that environmental education should be given starting at an early age (Timur, Yılmaz, 2011: 303-320). In this, teachers who will raise the future generation have great responsibility. The concept of sustainable development that became important since the mid-1980s turned into environmental education and became a dominant view today. UNESCO replacing the "International Environmental Education Program" implemented within the years of 1975-1995 with "Education for Sustainable Future" can be given as an example to this (Unesco, 1997). For this reason, environmental education is seen as an important tool for sustainable development (Sauve, 1996: Tanrıverdi, 2009).

Environmental problems staying at the top of the world agenda since the last 30 years and measures to be taken for these problems have led scientists to work on this topic intensively. As a result of these works, it is found that prevention of environmental problems depends on the people since they are the reason behind these problems (Erten, 2007). In many countries, there are many studies on the reasons of pollution and how to minimize it. Especially with the 1972 Stockholm Conference, countries have begun to act together against environmental pollution and about environmental education and they also pass laws to prevent environmental pollution. However, while industrialization progressed due to technological developments over the years, population of cities across the world and number of cities have also increased. During this time, while developed countries have made great progress, undeveloped and developing countries did not make progress application wise even if they have passed laws. In 1972, Singapore passed environmental laws to minimize environmental pollution and made great progress. However, with technological developments, Singapore rapidly industrialized over the last 30 years. With population increase, the city also expanded and solid waste and domestic waste increased due to environmental pollution. Even if importance was given to environmental education, rapid industrialization bypassed environmental education (Seik, 1997:277-290).

When it comes to works in England, a developed country, there is a different picture. With technological developments and industrialization, England has informed her people in the matters of environmental pollution and environmental education and has also taken necessary measures. Studies done about environmental sensitivity also shows this. In a study carried out with children at 5-6 ages, it is found that

## Increasing Social Studies Teacher Candidates' Awareness and Sensitivity towards Environmental Problems with applied field trip Method

children are interested in environmental and nature-related issues but it is also found that the school curriculum do not spend much time on these subjects (Bonnett and Williams, 1997). However, with a study done later on studies on environment and environmental education in England gained momentum and considerable progress was made in applied environmental education in schools. In fact, applied environmental education made students more sensitive towards environment (Littledyke, 2002:1-19). Around the same years, another comparative quantitative study done at English and Mexican schools shows that Mexican teachers are aware of environmental education and teach environmental issues in their classrooms. However, since the environmental education was not an applied one, it was found that students were not sensitive enough about environmental subjects. On the other hand, in England teachers were not only aware but they also taught applied environmental education and used materials and equipment to teach. In the study, it was stated that compared to Mexican students English students were both sensitive and more knowledgeable about environmental issues. Furthermore, it was also stated that compared to English families, Mexican families were not sensitive towards the environment and this reflected negatively on children's attitudes and behaviors (Barraza, Walford, 2002:171-186). In Hong Kong where industry and economy have developed considerably, environment has begun to gain importance in 1980s but including and implementing environmental education within the school curriculum have taken time. A study about whether to have applied environmental education or not in the school curriculum was conducted and teachers' views were taken. In this study, teachers state that applied environmental education is more effective on students' attitudes and behaviors (Lee, 2000: 95-115). Studies carried out in Finland, one of the developed countries of the European Union, show that people are more about environmental education because environmental education is included sufficiently in the curriculum and environmental education is taught in the nature. This increases teachers' and students' awareness and sensitivity towards environment. Another study shows that nature schools make students more sensitive towards sustainable developments (Jeronen, E Jeronen, J. Raustia, 2009: 1-23). Curriculum and pedagogical system within the Australian education system have also demonstrated that this system encourages environmental teaching of children in the forests or within natural environments. When this encouragement is also supported by the family members at home, awareness and sensitivity become more meaningful (Cambino, Davis, JRowntree, 2009: 1-129).

Today, it is seen that while students' attitudes and behaviors in developed countries towards environmental education and environmental pollution turn out positive, students' attitudes and behaviors in undeveloped and developing countries towards environmental education and environmental pollution did not change much even if these countries passed laws on environmental education after 1972. When studies done in some of these countries about environmental education are examined, this conclusion can be drawn easily. In fact, in a study conducted in Greece, a European Union member country, two groups were formed and two different methods about environmental pollution were used in these groups. To the first group, the subjects were taught by applied experiments. To the second group, the subjects were taught by lecture. Survey method was used in both groups. However, the results came out different in both groups. While the results of the first group were positive, the results of the second group were negative. Awareness and sensitivity levels of the second group were lower compared to the first group. This clearly demonstrates the importance of applied education. Not the development level of countries but whether applied environmental education is used or not is more important. However, applied education is much more common in developed countries since these countries have the necessary monetary funds (Stavridou, Marinopoulos, 2001: 31-41). There are studies that were done to demonstrate the differences between students in terms of economic development level and environmental awareness. For example, in a study conducted in the city of Karachi in Pakistan where state schools and private schools were compared, it was found that there was no significant difference between teachers' knowledge in subjects related to environment but there was a significant difference in students' sensitivity towards environmental pollution. This is because while applied environmental education has been provided in private schools and lectures were the main teaching method used in state schools. Economic development level and opportunities and resources in education affect students' attitudes and

behaviors towards environmental pollution (Yousuf, Bhutta, 2012: 154-165). Bangladesh, a developing country, also passed environmental laws after 1972 Stockholm Conference, established the Bangladesh Environmental Education Commission and included courses on environment in the school curricula. However, as a country they did not include their concerns about environmental pollution in their development policies and they could not raise the society's awareness (Masum, Akhir, 2009). In a study conducted in Mysore, India, it was found that teachers in private schools were more environmentally aware and sensitive compared to teachers in state schools. Not putting emphasis on environmental education in university curricula and teacher candidates not being knowledgeable about environmental education are among the shortcomings of Indian universities. Furthermore, it was found that there were significant differences in terms of environmental education between teachers working in rural and urban schools. According to the survey's results, to protect the environment environmental education should be given more emphasis in formal and non-formal education system since there are many shortcomings related to environmental education. India tried to make environmental education a part of their formal education system and prepared teaching materials to teach subjects about the environment more effectively (Larijani, 2010: 121-124).

In recent years, while progress has been made related to environmental pollution in developing or undeveloped countries, environmental pollution has been increasing, too. No matter where in the world environmental pollution happens, it affects all the people in the world. Therefore, regardless of economic development level, all countries should inform their citizens about environmental education and should create a sensitive society.

Çünkü dünyanın yapısında bir büyüme gerçekleşmezken, üzerindeki yaşayan insan nüfusu artmakta ve doğal kaynaklar tüketilmektedir. Üstelik sanayileşme, şehir sayısını artırarak çevreyi kirletmekte ve yaşanmaz hâle getirmektedir. Bu çevre kirliliğinin en büyük özelliği mahalli değil küresel olmasıdır. Bu çevre sorunları din, dil, ırk, yaşlı-geç, kadın-erkek, zengin-fakir ayırmaksızın hepimizi etkiler. Bundan dolayı hiç zaman kaybetmeden ülkeler ve toplumlar üzerine düşeni yapmak zorundadır. Bu konuda eğitimin rolü oldukça büyüktür (Erten, 2005: 91-100).

Since, although there is no expansion in the world structure, population living within it is increasing and natural resources are being consumed perpetually. Furthermore, industrialization pollutes an environment by means of increasing the number of cities and the environment becomes uninhabitable. The most significant feature of environmental pollution is its being global not local. Such environmental problems influence us regardless of religion, language, race, the old-the young, woman-man and the rich-the poor. Hereby, all countries and societies should do their full share of work as soon as possible. Education plays a pivotal role in this matter (Erten, 2005: 91-100). Making sure future generations live in healthier and safer environments is possible with raising sensitive individuals. It is essential that individuals who created environmental problems should become aware of their responsibilities in the creation of these problems. This is only possible with an effective environmental education (Şahin, Cerrah, Saka, Şahin, 2004; Altın, Bacaklı and Yıldız, 2002; Soran, 2000). It is a known fact that in addition to environmental education, people should make radical changes in their lifestyles. Without these, global environmental problems will not be solved (Kawashima, 1998).

In recent years, world countries aware of environmental problems have begun to make environmental education compulsory and applied. These countries consider environmental education among the most significant issues and public and private institutions of these countries support their governments. In our country, environmental education has begun to gain more importance after 2000. However, although Turkey has started environmental sensitivity works in 1950s like all developing countries, application of these works has took time. The first voluntary agency of the county is Türkiye Tabiatı Koruma Derneği (Nature Reserve Foundation) established in 1955. The number of environmental voluntary agencies has increased since 1970s. Some of these are voluntary agencies interested in only one aspect of the environment such as Kırsal Çevre ve Ormanlık Sorunları Araştırma Derneği. Other voluntary agencies

pay attention to the whole environment such as Türkiye Çevre Eğitimi Vakfı, Türkiye Doğal Hayatı Koruma Derneği, Çevre ve Kültür Değerlerini Koruma Vakfı (ÇEKÜL), Doğa Derneği, The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection Of Natural Habitats (TEMA), etc. (Neyişçi, 1995; Kayıkçı, 2003; Tecer, 2007; Bodur, 2010; Cited by: Aydın, Kaya, 2011). Although Turkey began to focus on the environment as a government policy in 1970s, environmental education as a whole was discussed first in 1994 in the Environmental Specialization Commission Report of the Seventh Five-Year Development Plan prepared by Prime Ministry State Development Undersecretaryship (Akçay, 2006). In developing countries, applications of decisions taken at country level have always been a slow process. Environmental rights were adopted with the 1982 Constitution and environment related treaties were signed. However, environmental education has begun to be really discussed at the end of 1980s. Still, environmental education was not discussed at pre-school, elementary and middle school before 1991 (Meydan, Doğu, Dinç, 2009). In 1992, Ministry of National Education included Environment, Health, Traffic and Reading as a course to be taught at all grade levels in elementary schools but ended the teaching of the course in 1997 (Alkış, 2002). Even though there is no course on environment in Turkey's pre-schools, elementary, middle and high schools, environmental issues are included in other courses' curricula. Özel Çevre Okulları and Özel Doğa Okulları, private schools in Istanbul, try to raise their students' environmental awareness at all grade levels (Akçay, 2006). In addition, private and public institutions have been providing environmental education to the families and children by organizing camps. For instance, Ecology-based Nature Education Programs that were developed and taught by experts from universities have been organized by TUBİTAK every year (Meydan, Doğu, Dinç, 2009). However, when the education programs of education faculties are examined, it is seen that there are only few courses with environmental content. The departments that offer courses with an environmental content are Social Studies Education, Primary School Teaching, Geography Education, Science Education and Biology Education. The aforementioned courses within these departments are Environmental Problems, Today's World Problems, Environmental Education and Environmental Science (Alim, 2007). Since these courses are not applied courses, teacher candidates are not adequately informed, their sensitivity is not raised enough and the courses do not go beyond rote memorization. In a technologically developing globalized world, despite some small-scale efforts in our country together with positive developments in other countries, unfortunately people have been destructing the environment very day. If the necessary measures are not taken as soon as possible, the destruction of the environment will also destroy people and there will be no world to be left for the future generations. To leave behind at least a breathable world, this qualitative study was done with the social studies teacher candidates to increase their awareness and sensitivity towards environmental problems.

### ***Purpose of the Study***

For this study, during the 2012-1013 academic year second year Social Studies students of Niğde University's Faculty of Education went on an applied field trip for their elective course titled Human Geography and Education. During this field trip, students went to a recycling facility to observe how waste that cause environmental pollution is recycled on-the spot. By doing this, this study's purpose is to increase social studies teacher candidates' awareness and sensitivity towards environmental problems.

## **2. Method**

In the study, qualitative method was used to get an in-depth information on whether applied field trips can be used to identify and increase social studies teacher candidates' awareness and sensitivity towards depletion of natural resources and environmental pollution (Drever, 1997; Yıldırım ve Şimşek, 1999; Aktaran: Meydan, Doğu, Dinç, 2009). Therefore, this study used case study method (Marriem,1988).

### ***Study Group***

The study group is made up of 35 second year Social Studies students of Niğde University's Faculty of Education who were taking the elective course titled Human Geography and Education. Case study

method was applied to these 35 students. It is not appropriate to generalize the results of these study to all the social studies teacher candidates in Turkey. However, since the study is a case study, it is possible to draw some conclusions from the obtained data.

**Data Collection Tool and Collection of Data**

First, theoretical framework has been formed to assess findings and present suggestions after doing an extensive literature review. Based on the literature, a semi structured interview was developed to identify awareness and sensitivity of social studies teacher candidates who had taken the Human geography and Education course towards depletion of natural resources and environmental pollution. All the questions of the measurement tool were based on literature and were directly related to depletion of natural resources and environmental pollution. Three educational scientists' opinions were taken on the developed measurement tool and a pilot study was carried out with 10 third-grade and 15 fourth-grade social sciences teacher candidates to get accurate results from the study. Results obtained from the pilot study have been discussed with educational scientists and faculty members from the Departments of Primary Teaching and Science Education and accordingly the study measurement tool took its final shape. Interview forms were filled out following the applied field trip to the recycling facilities. When the interview forms were given to the teacher candidates, they were informed that the study would be a scientific study and the results would also be scientific.

**3. Analysis and Data Interpretation**

After the subject of recycling was taught in the classroom during the Human Geography and Education course, an applied field trip was taken to a paper recycling and plastic recycling facilities and to a water treatment facility. After the teachers candidates who went on to this field trip filled out the forms, the data was analyzed first. The data was interpreted after an answer key was developed. In this study that aims to identify and increase social studies teacher candidates' awareness and sensitivity towards depletion of natural resources and environmental pollution, the teacher candidates were asked not to write their names on the forms. Each measurement tool was numbered and later evaluated.

**4. Findings and Conclusions**

Seventeen females and 18 males, a total of 35 social sciences teacher candidates, participated to the study. Demographic information of students participating in the study is given in Table 1.

**Table 1. Study Group's Information**

Variables		F	%
Department	Social Studies Education	35	100
Sex	Female	17	
	Male	18	
Age	19	4	
	20	13	
	21	11	
	22	4	
	27	3	
Are you a member of any foundation related to environment?	Tema	-	
	Doğa Derneği	-	
	No, I am not member	35	

**Question 1:** "What is environment and environmental pollution? What are the factors polluting the environment? What can we do to prevent environmental pollution?"

### ***Scientific Explanations***

Environment can be defined as a habitat where people or any living creatures live. This includes three big environments: earth, water and air (Özey, 2009: 4). All elements that influence an individual's or a society's physical, biological, socio-psychological, socio-economic and cultural life are called environment (Özmen et al, 2000). In the widest sense, environment is a habitat of living creature. In the most general sense, it is the habitat of a living creature. In the ecological sense, it is a term including all living and non-living things (Berkes and Kışlalıoğlu, 1993: 42; Çubuk and Karacaoğlu, 2003: 189-198). Everything that is outside of an organism is called an environment (Beyhun et al, 2007).

Factors creating environmental pollution are unplanned urbanization, incorrect site selection for industry and development, incorrect land use, lack of infrastructure, lack of recycling and treatment facilities for industries' waste, unplanned agricultural activities and increase in population (Yücel, Morgil, 1998).

To prevent environmental pollution, there should be more activities in formal education programs to increase environmental sensitivity. Students should be adequately informed about environmental non-governmental organizations. Students should be given opportunities to attend scientific activities about the environment like panels, seminars, conferences. Environmental education should not just be considered a part of formal education. Environmental education should be considered lifelong and programs should be developed accordingly (Aydm, Kaya, 2010).

### ***Student Opinions***

Students defined environment as a habitat of living and non-living things; habitat where people live; living space of all living and non-living things; everything that includes natural, social and cultural factors; everything we see around; habitat where living things continue their life; human and natural environment where people and animals exist; habitat where living and non-living things live altogether and affect each other; habitat that is necessary for life and that provides people's needs and where people, animals and plants interact with each other in the ecosystem; place where people interact from birth till death.

Students defined environmental pollution as people unconsciously damaging their surroundings; deterioration of some elements that make up life for a reason; people polluting their surroundings; damage given by people to their surroundings; polluting our surroundings with waste; accumulation of solid, liquid and gas pollutants from various resources in air, water and earth; littering the nature; polluting the surroundings we live in and making it inhabitable; natural imbalance because of people and disasters; our surroundings becoming inhabitable.

Students considered the following as factors leading to environmental pollution: domestic and factory waste, fossil waste, people, paper, batteries, gas, fast-growing technology, agricultural pesticide use, plant and animal waste, exhaust gas, burning the garbage, lack of education, destruction of forest, tank accidents, unconscious consumption, chimney smoke, lack of infrastructure, unplanned urbanization, deodorants, DDT pesticide, coal consumption, factory waste.

To prevent environmental pollution, students made the following suggestions: we should raise people's awareness; we should be conscious consumers; we should raise people's awareness through seminars; some measures like treatment, recycling and environmental planning should be taken, filters should be attached to the factory chimneys, pesticides should not be used in agriculture, we should keep the environment clean; municipalities should do their duties; SUVs should be used less; reusable bags should be preferred rather than plastic bags, public transportation should be preferred; natural fertilizer can be used in agriculture; we should turn the volume of radio and television down; environmental laws should be passed; sanctions and penalties should be imposed.

**Question 2.** "What things should we consider while drinking tap water? Please write down which processes water goes through until it comes to our taps?"

***Scientific Explanation***

Water is a colorless and tasteless compound that can also be mixed into production processes as component. A water molecule contains oxygen and hydrogen atoms (Güney, 2004: 107). Water is categorized as groundwater and surface water. Groundwater is located beneath the earth's surface and cannot flow to the surface. These water can flow to the surface via artesian wells. Surface water is water on the surface of the planet such as in a stream, river, lake, sea or ocean. Rivers and lakes are the resources of economic activities such as tap water, irrigation water, power generation and fishery. Constituting 70% of the human body, water is an important resource for people and other living things. Water is needed to do agriculture. When compared to other energy resources, electricity power is the cleanest and most convenient energy resource that do not cause environmental pollution (Özey, 2009: 157). Tap water is generally obtained from surface water like rivers, lakes and dams ([web.ogm.gov.tr/birimler/arastirma](http://web.ogm.gov.tr/birimler/arastirma)). After water is collected and rested in the resting pools, it goes through certain physical and chemical processes. After these, the water is stored in storages and water is transferred to people's residences from the storages or from the source directly through pipes. While drinking water, people take into account whether the water is drinkable and went through the necessary processes.

To clear organic and inorganic contamination in the water, iron chloride is used as coagulator. Water is mixed for 20 minutes so that flocculation occurs. Water is transferred from the flocculation unit to sedimentation unit and settles there for 3,5 hours. Settled water goes into the filter unit from the sedimentation unit. Settled water is automatically distributed via regulating valve, outlet structure, level meters in storages and storage inlet valves. There is an online data communication between each storages and between each storage groups and treatment facility's central control unit. From the time when water enters the treatment facility and until it leaves the facility, all values, flows, levels, chemical dosing, filter back washing, outlet water levels, storage levels, active pumps, malfunctions, etc. are recorded in the SCADA and will not be erased. Fine-grain scale organic and inorganic pollutants that are not separated away in sedimentation pools and not removed from the water with flocculation are kept in the filters and they are separated from the water. Following certain filtration period, inflow slows down because of small particles. When the head loss meter placed on each filter reaches a certain point, filter beds should be washed. Filter beds are washed automatically. Before filtered water passes to contact tank, it is transferred to the body of water and wash water catchment tank. This is because of keeping back washing water in the facility continuously. As a consequence of filter wash, back washing water spilled from filters and cloudy water from sludge thickener are transferred to the washing water recuperation tank. Here, contaminated water is kept in tank to enable precipitable solids precipitate with body of water for a while. Precipitated water (on the surface) is transferred back to the inlet. Chlorine dosaging is automatically carried out in the outlet discharge pipe of the washing water interception channel. Water on the surface is transferred to the inlet, concentrated sludge, to the body of water and filter press structure and filter press is distributed to the sludge pumps. Liquid chlorine obtained from pipes is transformed into gas in evaporators and is directed to the chlorinator and finally directed to the system. When the leakage or damage occurs, detectors are available to establish abnormal chlorine condensation in chlorinator room and barrel store. Water is transferred to the related storages from pump stores with pumping lines through CTP pipes. Within the treatment facility, SCADA system is built to control and import data with fiber optic method between treatment facility and storages via transmitter. The facility is continuously monitored with online analyzers and all dosing processes together with features of untreated water and amount of it can be automatically done ([adana-aski.gov.tr/web/catalan.aspx](http://adana-aski.gov.tr/web/catalan.aspx)).

Filtrelenmiş su temas tankına geçmeden önce cazibe ile yıkama suyu tutma tankına gönderilir. Bunun amacı tesiste sürekli olarak geri yıkama amaçlı su tutmaktır. Filtrelerin yıkanması neticesinde filtrelerden savaklanan geri yıkama suyu ile çamur yoğunlaştırıcıdan gelen bulanık su, yıkama suyu geri kazanma

tankına gönderilir. Burada kirli su, çökebilir katıların cazibe ile çökmesine imkân vermek üzere bir süre tankta tutulur. Çökelen su (üstte kalan) ise giriş yapısına geri gönderilir. Yıkama suyu tutma tankının çıkış deşarj borularında klor dozlaması otomatik olarak yapılır. Üstte kalan su savaklanarak giriş yapısına, yoğunlaşan çamur cazibe ile filtre pres binasına iletilmekte ve filtre presi çamur pompalarına dağıtılmaktadır. Tüplerden alınan sıvı klor, evaporatörlerde gaz haline dönüştürülür ve klorinatörlere yönlendirilir buradan da sisteme verilir. Sızıntı veya hasar olduğunda klorinatör odasında ve varil deposundaki anormal klor yoğunlaşmasını tespit edecek detektörler mevcuttur. Su, pompa istasyonlarından ilgili depolara CTP borulu pompaj hatları ile aktarılmaktadır.

### ***Student Opinions***

While consuming tap water, students pay attention to whether there is a treatment facility or not, not being wasteful, water's color, taste and smell, whether it is chlorinated or not, lime in water, its cleanliness, ph level, water's source, clarity and quality of the water and its hardness degree being between 17 and 22.

Students stated that water goes through certain process before it comes to the taps in our homes. First, chlorine is added to protect water from arsenic. Then, it is provided for consumption through pipes following certain treatments. Rivers and melting ice are used as water sources. Storages are built and water is transferred to the houses after treatment. First, water is disinfected and unwanted particles go through the settling process in the settling basins. Ph level of the water is adjusted. Last, water goes through a filtering process. Therefore, water goes through three stages. These are disinfection, settlement and filtering. The water first stored in pools. Later water goes through settlement, chlorination and physical sedimentation. According to the students, this is how potable water is treated.

**Question 3.** What is garbage or domestic waste? What are the potential consequences of littering waste to the environment? What are your suggestions for controlling waste?

### ***Scientific Explanation***

Domestic solid waste consist of domestic waste in residential areas, plant waste in parks, gardens and green fields, treatment sludge from domestic waste water treatment facilities, excavation soil and debris (Baran, 1995). Waste is a unused harmful or harmless substance that the initial user has no further use for it (Soran, et al, 2000). In general, waste is defined as solid substances produced by factories and public workplaces (Cici et al, 2005). Waste, in the simplest term, is what remains from the objects we use and therefore what we dispose of (Özey, 2001: 187-188).

Because of the methane gas produces in itself and because of the inappropriate land structure, when waste is stored primitively, there may be fire, landslides and explosions. In this respect, domestic waste collection is a significant problem in itself across the world. When collected waste is dumped at places called dumps, nearly every country faces environmental pollution and health problems, especially by the people living close to these dumps. Another significant matter discussed in countries is collecting waste separately at the source and recycling them. In this respect, developed countries have made great progress. (Özey, 2001: 188). Potential consequences of dumping waste in the nature are visual pollution, bad smell, air pollution, soil pollution, spreading diseases, mixing of dirty water into the underground water and generating germs (Güney, 2002).

### ***Student Opinions***

Students defined garbage as capsules of used belongings; things that would not be used again after being used; what happens in the nature when we leave behind more than what we need; waste after substances are used; disposable, old and worn-out things; everything that is used and useless; items that cannot be used; materials useless for people; waste polluting the environment; food waste; waste that is left behind after an item is used.

According to students, consequences of dumping waste to the environment are environmental pollution, disturbance in the natural balance, difficulty in recycling, destroyed environment where the garbage is dumped, unpleasant smell and view, health problems, air, water and soil pollution.

Students' suggestions on controlling waste are as follows: municipalities should buy waste collection vehicles; people should be informed; legal measures should be taken; waste should be separated and recycled; the number of recycling and garbage cans should be increased; individuals should be educated; the number of recycling facilities can be increased; garbage should be separated according to types; various sanctions should be imposed, easily degradable materials such as paper bags should be used; factory waste should be governmentally supervised; more importance should be given to the environment.

**Question 4.** “What is recycling? What kind of waste can be recycled?”

***Scientific Explanation***

Recycling is the process to change waste into other products or energy by using the waste's characteristics through physical, chemical or biochemical methods (The Republic of Turkey, Ministry of Health, Regulation on Solid Wastes Control. Official Gazette dated 1991 and numbered 20814). Recycling is to make waste reusable by reprocessing it. Waste like glass and paper can be recycled (Soran, et al, 2000). They are materials that can be reuse after going through some processes (Yücel, Morgil, 1998). Renewal of most of the raw materials that are obtained from the nature and are used in various productions take time. Some of them run out. These are some of the issues that the countries think about. Therefore, various projects are developed and implemented for “recycling” purposes in many countries (Orhaner et al, 2001). Recycling is a process in which useless and expired products are changed into the raw materials that can be used in manufacturing and it is recycling method applied in backward logistics the most (Alaykiran, Güner, 2013).

Efficient recycling network is possible with efficient backward logistic network following the steps of collecting the products from customers, decomposing them and recycling them in the appropriate facility. Another issue is how the products obtained from the customers would be broken into pieces. Although decomposing a product into the littlest piece is costly in terms of time spent on it, it is profitable in terms of the results. Using less resources to break a product into pieces will lead to less recyclable material to be gained from the product (Alaykiran, Güner, 2013).

***Student Opinions***

Students defined recycling as reusing the used substances in the nature; preparing the wastes for use after decomposing them and purging them from bacteria; making a new object from used ones in a recycling facility; making garbage and waste reusable; changing and reusing the garbage or domestic waste.

According to students, recyclable waste are plastic, paper, glass, carton, iron, water, domestic waste, metal, aluminum, battery, engine oil, electronic tools, newspapers, cans, automobile devices and iron-steel.

**Question 5.** “What is waste paper? Where are the places that waste paper can be collected? How can we use waste paper appropriately?”

***Scientific Explanation***

Paper is defined as a layer that can be pressed on it and that is produced by pressing together moist fibers, cellulose pulp, mechanically or chemically or repulping the used paper (Yakut, 2012). With its use in cultural and industrial fields, paper is one of the most necessities of today. From this aspect, paper production is also considered as a sign of civilization (Gavcar, Aytekin, 1999).

Wastepaper is any kind of discarded paper, carton or paperboard that were used in any field. Waste papers is recyclable raw materials that can be used in the production of many kinds of paper. It has an economic and commercial (ged.org.tr/tr/index.php/80-col/79-col1). Even if they are not sent to the end use location, torn papers from paper factories, scrap paper produced during recycling, misprinted newspapers in printing press and surplus newspapers are considered as waste paper. On the other hand, any kind of disposable blotting paper that are after use and cleaning paper do not have economic values as commercial waste since they cannot be recycled due to hygiene and health considerations.

Places where waste paper can be collected from are houses, private and public and industrial institutions (Orhaner, Alkibay, Tunç, 2001). Municipalities can build paper "moneyboxes" and waste paper and unused books can be collected on a regular basis inside these boxes. People's awareness can be raised and their help and contribution can be ensured. Raising awareness and making sure paper is not going to the garbage reduces the expenses made for carrying and disposing solid waste and removing them. This is also important for the health of people that work in the dumps. Furthermore, it is a fact that garbage disposal systems damage the environment (a-ged.org.tr/tr/index.php/).

Only 43% of the paper in Turkey can be collected. However, since the collection is not done based on a modern system, some paper is collected by people separating the garbage. Paper collected in this way have two problems. First, the quality of the paper gets worse. Second, garbage scattered around during the separation is a threat to the public health and pollutes the environment. A systematic collection system should be put in place (a-ged.org.tr/tr/index.php/). To make the most out of waste paper, the textbooks may not go through changes every school years. When the textbooks change, the school administration may buy the old textbooks from the students at a cheap price and can send them to recycling. Also, little garbage press machines can be placed at schools to recycle paper without causing damage to the waste paper (Orhaner, Alkibay, Tunç, 2001).

In our country, products made using the waste paper collected are packaging boxes (refrigerator, television, etc.), chromium cardboard (medicine, detergent and other packaging boxes), cleaning paper (napkin, handkerchief, toilet paper, etc.), writing paper (notebooks and books), egg cardboards, roof coatings (corrugated). Industrial institutions using paper in production make investments and try to use waste paper as much as possible (a-ged.org.tr/tr/index.php). Paper and cardboard types produced and consumed in our country are: printing paper (high grade and medium grade paper), newspapers (low grade paper), wrapping paper, packaging paper, kraft paper, corrugated cardboard, cigarette and special thin paper, cleaning paper, cardboards (Gavcar, Aytakin, 1999).

People should be educated and the relationship between paper, forest and waste paper should be included in primary school curricula. Also, people's awareness should be raised and they should be able to collect paper and other recyclable materials like plastic bottle, glass, metal, iron, fabric and plastic bag at separate places rather than the regular trash. There should be serious and effective works for reusing the waste paper using the written and visual media. Public and private paper mills should be technologically advanced. Recycled paper should be used in schools, private and governmental agencies. Placing messages explaining the importance of paper and how it is produced in front of and end of every book should be made compulsory by the Ministry of Culture and Ministry of National Education (a-ged.org.tr/tr/index.php/).

#### ***Student Opinions:***

Students define waste paper as discarding paper after use; unused paper; paper discarded after a while; useless and featureless paper; any kind of paper or cardboard that have lost its function and have been discarded; paper dumped into the trash; paper that is not needed after use.

According to students, places where waste paper can be collected are schools, recycling boxes, our own surroundings, recycling factories, printing houses, private after-school institutions, workplaces, waste paper stores of municipalities, private institutions, public institutions and garbage containers.

Students' suggestions about waste paper are as follows: waste paper should be collected in the appropriate places and recycled; they should be processed in recycling facilities; we should store them separately from the regular trash; we should not mix them with domestic waste; municipalities should regularly collect paper from the recycling boxes.

**Question 6.** "Which garbage do you separate at home? What can be done to reduce this garbage?"

### *Scientific Explanation*

Only returnable bottle and paper are separated at homes. The reason why others are not separated is that municipalities collect this trash together, not separated (Erten, 2003). The recycling symbol is composed of three mutually chasing arrows. These arrows symbolize reduction of waste production, reuse and recycling. Firstly; we should try not produce waste and prevent unnecessary waste production. Then, if it is possible to reuse a used product once again, it should be reused with the same purpose or with a different purpose. Reused waste that cannot be used again should be collected separately and recycled. These are food waste, furniture waste, glass bottles, paper, cardboard, cans, fuel waste, glass containers, metal packages, plastic packages, paper-cardboard packages, oil tins and drinking cans (tubitak.gov.tr/tubitak\_content\_files/vizyon2023).

Amount of waste should be reduced and products with fewer packaging rather than laminated packaging should be preferred. Unnecessary products that will not be used and redundant should not be purchased. Instead of buying disposable products that will be thrown to the garbage after just one use, long-lasting products like cloth bags and rechargeable batteries should be preferred. While shopping, reusable cloth bags should be preferred rather than plastic bags. When the product inside a packaging is finished, the packaging should be used as a storage container or any other way instead of throwing it to the garbage. Recyclable products should be preferred (ekookullar.org.tr/ckfinder/userfiles/files/cop\_atik\_kitabi).

### *Student Opinions*

The garbage students separate at home are paper and plastics, metal, plastic bottles, plastic bags, glass, nylon, batteries and electronic waste. Unfortunately, the number of students who do not separate is high. The reason behind this high number is because the municipalities collect all the garbage together.

Students' suggestions to reduce garbage are as follows: We should not use redundantly. Garbage will be minimized with less consumption. People should consume consciously. We should avoid overconsumption. We should not purchase more than necessary and we should use the things we buy appropriately. Garbage can be minimized by recycling. Garbage should be collected by the authorities and delivered to the recycling facilities. Municipalities should be create a separate branch for this. Recycling facilities should be built. Recyclable products can be used.

**Question 7.** "Do you pay attention whether the things you buy are recyclable or not while shopping? What do you do?"

### *Scientific Explanation*

In a study that examined whether pre-school teacher candidates pay attention if the food packages they bought were recyclable or not, the following were found. Although the teacher candidates' knowledge about recyclable food packages was around 70%, their application of this knowledge was only around 20% (Erten, 2005). This is unfortunately true for all the future teachers that are studying at different departments of education faculties in Turkey. In another study where the survey was created by Erten and

his friends, preschool teachers' environmental awareness level of the teachers were examined. The results were similar for this study, too (Erten et al, 2003).

***Student Opinions:***

During shopping, students pay attention to the following: We look if the packaging has a recycling symbol. I prefer to buy glass products. I prefer bags that will dissolve 100% in the nature. I prefer products made of paper or glass. Most students stated that they did not pay attention whether the products they bought were recyclable or not. Not having a market around them and the municipalities collecting all of the garbage together without separating them as the reasons behind this.

**Question 8.** “What are the effects of consumption habits and luxurious life in cities on natural resources?”

***Scientific Explanation***

While production has been made to meet people's needs for centuries, balance between production and consumption has changed with the industrial revolution in the 19th century. Consumption of surplus products created from the developments in manufacturing technology became a problem. At the same time, concepts of work and lifestyle have also changed and people began to migrate to the cities to work. While a new lifestyle has been developing in cities, companies began to pay more attention to advertisements to sell more than what people need and to tempt them to have a luxurious life. Today, damages caused by consumption is known by the public and are discussed. Depletion of natural resources, increase in the number of consumers together with population increase, global warming and upset in the natural balance are the primary problems. To make people buy the things they do not need concepts like public relations and marketing created. So, people continued to purchase goods they do not need. Therefore, the 20th century witnessed the formation of a consumption society in which people use and discard products and purchase new ones all the time. There are various ecological problems in the world caused by lifestyle based on consumption. Global warming caused by greenhouse gas emissions into the atmosphere is one of the most important problems threatening our future. Primary reasons of global warming are fossil fuels such as petrol, coal and natural gas. While these fuels are used in industries, it is also included in many of the products we use in our daily lives. For instance, in a study conducted in 2004, greenhouse gas emissions of American cars was 314 million metric tons. This number equals to a train that is run by 55 thousand million kg coal and that travels around the world twice. Population increase across the world means that the number of consumers will also increase and accordingly environmental damage will increase. In addition to these, another important problem caused by consumption is wastefulness. Especially in the US, huge dumping areas have been created in so many countries and many products that cannot dissolve in nature are threatening our lives. According to a 2000 data, the US and other western countries constitute 11,6% of the world population and make the 60,2% of the purchases in the world. At the same time, western style consumption is gradually spreading to the other parts of the world. A culture of use-and-throw that is a result of life style based on consumption leads to an increase in wastefulness. Using a new nylon bag every time people shop and using disposable cups instead of glass cups at workplaces increase waste that cannot dissolve in nature. If consumption habits continue in this direction, there will be irrevocable destruction or destruction that cannot be healed (inet-tr.org.tr/inetconf17/bildiri).

Although leftovers thrown in to the garbage is an interesting criteria in determining welfare level of societies, leftovers do not constitute all the organic substances. Even a pinch of grass is organic waste. Paper, cardboards and similar materials constitute approximately 20-40% of domestic waste. Just newspapers constitute 18% of dumped waste materials. Developed industrial countries are trying to solve these environmental problems by technological changes. However, the consumption society that has been created and the products offered to this society have also created the waste and garbage problem (APAN, 2009). Luxurious life and current consumption habits are also threats to the environment. When we

consider the fact that world population has been increasing rapidly and the natural resources are not limitless, it is evident that precautions should be taken urgently (Meydan, Doğu, Dinç, 2009).

### *Student Opinions*

Students gave the following as the effects of luxurious life in cities on natural resources: forests are destroyed; natural environments are polluted; natural environment are destroyed due to luxurious buildings; using private cars and deodorants causes environmental pollution; industrial institutions pollute the air with their smoke; natural beauty is destroyed because of holiday camps built in bays and gulfs; using an item only once causes overconsumption of natural resources and natural resources run out faster; more production is needed because consumption is more; natural areas are turned into agricultural areas; water is pollution; SUVs emit harmful gases into the atmosphere.

**Question 9.** “Do you think visual and written media in Turkey pay enough attention to recycling?”

### *Scientific Explanation*

In the literature, there have been various suggestion on media's responsibility on issues related to environment. Some of these are as follows: Society can be informed through media organs like television, newspaper and magazines. Advertisements, films and TV series can give information on environment and environmental problems. There could be some programs where published articles can be discussed. News programs can make segments on environmental problems across the world. Media can be vital in awareness raising. Programs that will raise environmental awareness can be created. All these show how media can be an effective tool against environmental problems. It is believed that written and visual media will be effective in environmental education and literacy since subjects that people are informed about and affected by given by mass media. Because of this almost every student believe that media has an important place in environmental education. In fact, media has an important place in students' environmental literacy and how they reach information (Kocalar, Balci, 2013). It is important to create an awareness on this subject in the society. For this purpose, any kind of communication tool can be used and cooperation with nongovernmental organizations can be built. The concept of environmental-friendly television can be backed. Brief information can be given on the television or series that are watched the most can discuss these subjects in their scripts. Municipalities can be forced to collect the garbage separately. Congresses and meetings can be held online as much as possible. Air conditioner use, one of the leading causes of global warming, should be minimized (Kondolot, Beyazova, Özmert, Şahin, Ulukol, Gökçay, 2012). Moreover, posters, placards and leaflets should be made and distributed through the written and visual media to inform the society on how to collect solid waste and to raise awareness (Çoban, Kılıç, 2009).

### *Student Opinions*

Students' opinions on how much importance is given to recycling by the media is as follows: Yes, media is paying enough attention to this subject but people are ignoring what is being done. There are recycling bins even in the markets. media is focusing on this subject more. Foundations are working on this subject, too.

Some students believed that media was not paying enough attention on this subject. Environmental issues are not brought to the front. If media was paying enough attention, environment would not be this polluted. Students also stated that they could not find recycling bins to throw their paper.

**Question 10.** “Following the field trip to the recycling facilities, was there any change in your attitudes and behaviors? If there was change, what are these?”

### *Student Opinions*

The following are the statements the students gave on their attitudes and behaviors after the field trip: We should pay more attention the our waste and reduce the damage we give to the environment. I have begun

to collect the garbage thrown around. When I learnt about the contribution of waste paper to our country's economy, I have begun to look for recycling signs and I have begun to explain what I know to the people around me. I have begun to separate my garbage. I understood the value of water. I try not to be wasteful. I believe we have to take care of our environment more. I stopped using plastic materials. I began to throw my recyclable garbage into the recycling boxes.

#### 4. Conclusion and Suggestions

While environmental education is given as applied courses in the developed countries across the world, it is still taught traditionally and theoretically in developing countries and therefore schools cannot raise students' awareness. Even if they have learnt the subject, they cannot show the necessary behavior. Educated parents have also positive effect on the application of necessary student objectives. Like the developed countries, environmental education in our country should be applied. Teacher candidates should have applied environmental education so that their attitudes and behaviors towards the environment change for the better. Environment related curriculum objectives cannot be attained without an applied course. Works like sustainable applied environmental education, common in European countries, should be more effective and comprehensive. Within this framework, a qualitative study where students went on a applied field trip was conducted with social studies teacher candidates.

The applied trip's purpose was to determine the trip's effect on social studies teacher candidates' attitudes and behaviors towards the environment. Field trip was done to the paper recycling and plastic bottle and plastic recycling facilities owned by private companies and also to Adana Municipality's water treatment facilities. At the end of the study, it was found that social studies teacher candidates were knowledgeable enough about environment and environmental pollution, factors polluting the environment, what should be paid attention to while using tap water and the processes tap water is subjected. It was also found that teacher candidates' awareness on not to use natural resources more than needed increased. As a result of the study, the students' environmental awareness increased on the following subjects:

- potential consequences of littering waste to the environment
- recycling, waste paper, places where waste paper can be collected in and what should be done to make the most of waste paper
- how to separate the garbage for recycling
- paying attention to whether the things they buy at the market are recyclable or not
- the effect of consumption habits and city lifestyle on the environment

The attitudes and behaviors of students who stated that visual and written media do not pay enough attention to recycling changed after the field trip taken to the recycling facilities. This study aims to show the importance of including applied field trips into environmental education. Because of the field trip and because the students saw how waste can turn into sustainable resources, there was an increase in students' awareness and sensitivity. Since the students were able to turn what they have learnt into behavior, this study shows the importance of an applied education.

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Increasing Social Studies Teacher Candidates' Awareness and Sensitivity towards Environmental Problems with applied field trip Method

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