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Çevre Okuryazarlığı için Bir Müdahale Yöntemi Önermesi: Hayat Boyu Öğrenme Kapsamında Eğiticiler Atölyesi

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ÖZ:

Çevre okuryazarlığı, herhangi bir toplumda, çevre bilincinin oluşması için ihtiyaç duyulan olgudur. Çevre okuryazarlığı ayrıca, çevre duyarlılığı ile sürdürülebilir ve akıllı çevre ve kentleşmenin yaratılmasında önemli bir girdidir. Kavrama dair kesin bir tanımlama ve uygulama bulunmamaktadır. Çevre okuryazarlığı kavramı anlaşılamadığından, toplumsal bilincin oluşturulması yönünde gerekli eylem ve faaliyetlerde yetersizlikler gözlenmektedir. Çevre okuryazarlığına sahip olmayan toplumlarda; çevreye yönelik olumsuz etkileri olan eylemleri veya tahribatları destekleyen veya yapan, çevre hakkını önemsemeyen ve korumayı öncelik haline getirmeyen bireylerin, idarecilerin ve politikacıların var olması kaçınılmazdır. Sürdürülebilir ve akıllı bir çevrenin, toplumun ve kentleşmenin yaratılabilmesi için yaygın ve kısa vadede en fazla bireye ulaşabilen etkili bir eğitim türü olan hayat boyu öğrenme eğitimiyle topluma müdahale edilmesi gerekmektedir. Bu makale, çevre okuryazarlığının kavramı ve kavramsal dönüşüme dair eleştirel bir düşünden başlayarak, eğiticilerin eğitimi yoluyla çevre okuryazarlığının arttırılmasına yönelik bir yöntem geliştirmeyi amaçlamaktadır. Makalenin hedefi; kamu düzenini sağlama, toplumsal gelişimi ve kentleşmeyi şekillendirme ve çevreyi korumadan sorumlu olan karar vericiler, bu alanda akademik üretim yapan bilim insanları ile sivil toplum kuruluşlarının yöneticilerine pratik, pragmatik ve uygulanabilir bir sonuç önermesinde bulunmaktır. Betimleyici tanımlama yöntemiyle ve multidisipliner bakış açısıyla hazırlanan makalede; çevre ve kentsel planlama disiplini çerçevesinde çevre okuryazarlığı kavramı, literatür ve internet taramasından elde

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edilen bulgularla aktarılmaktadır. Çevre okuryazarlığı literatürünün haritalaması, Türkiye'deki ilgili akademik çalışmalara vurgu yapılarak verilmiştir. Makalede, kavramsal analizi müteakip, okuryazarlığa müdahaleci bir uygulama faaliyeti olarak, hayat boyu öğrenme eğitimi kapsamında eğiticilerin eğitimine yönelik yazar tarafından geliştirilen atölye betimlenmiştir. Atölye önermesi, çevre konusundaki eğiticilere, STK liderlerine, fon sağlayıcılarına, karar vericilere ve meslek insanlarına tavsiye niteliğindedir. Atölye, çevrenin nasıl öğretilmesi, gösterilmesi ve korunması gerektiği olgusunu yeniden şekillendirecek biçimde tasarlanmıştır. Atölyenin içerik önermesi sonrasında, makalenin sonuç kısmında, öneri eğitim yönteminin uygulanması halinde, olası katkılarına dair genel bir değerlendirme yapılmıştır.

ANAHTAR KELİMELER: Çevre Okuryazarlığı, Sürdürülebilirlik, Kentsel Planlama, Eğiticilerin Eğitimi, Hayatboyu Öğrenme

ABSTRACT:

Environmental literacy is needed by any society in order to achieve environmental awareness. It is also an important component of environmental responsiveness and the creation of a sustainable and smart environment and urbanization. There is of a lack precise definition of or implementation for environmental literacy. Since the concept of environmental literacy has not been properly understood, the relevant actors are unable to develop necessary actions and activities for achieving social awareness. For a sustainable and smart environment, societies, and urbanization, there is a need for social intervention by means of lifelong learning education—a widespread and effective form of education that is capable of reaching large numbers of individuals in the short term. This article, starting point of which is the critical consideration of the environmental literacy concept and its conceptual transformation, aims to contribute to environmental literacy by developing a method of implementation through training of trainers. The objective is to present a practical, pragmatic and workable concluding recommendation to decision makers responsible for ensuring public order, shaping the development of society, urbanization and protecting the environment, to researchers involved in academic production in this area, and to the administrators of relevant civil society organizations. Using a descriptive methodology and multidisciplinary perspective, the article explains the environmental literacy concept, in the context of the disciplines of environment and urban planning, with the aid of the findings obtained through a review of the literature and an internet search. An environmental literacy literature mapping is presented with an emphasis on the related Turkish academic studies. Following this conceptual analysis, the article describes the workshop developed by the author for the training of trainers in life-long learning education, which is seen as a mean of intervention with regard to literacy. The workshop has been designed in such a way to reconfigure the matter of how the environment is taught, represented and protected. After making an activity content proposal, the article concludes with a general evaluation of the possible contributions, which the proposed educational method could make when implemented.

KEYWORDS: Environmental Literacy, Sustainability, Urban Planning, Training of Trainers, Lifelong Learning.

INTRODUCTION:

Environmental literacy (EL) is needed by any society in order to achieve environmental awareness and is based on the concept of environmental protection (UNESCO, 2004; Biswas, 2020; Tuncer Teksoz et al., 2014) and Environmental Education (EE). Environmental education teaches the individuals the way of learning and investigating environment in order to make intelligent, informed decisions about its protection and care (Yates et al., 2019). To grasp environmental education, the individual has to be environmentally literate.

EL is an important component of the creation of a sustainable (Yavetz et al., 2009) and smart environment. All people have an impact on the environment while living in their homes, workplaces, and other habitats. According to the United Nations (UN) Environment [Url-1], environmental literacy is more important than ever as the earth has to accommodate nine billion people by 2050. Since the first Earth Day (April 22, 1970), understanding of the planet and its ecosystem has increased and many international treaties have been signed such as Climate Change [Url-2], concerning ozone-destroying substances Montreal Protocol [Url-3], the protection and use of biodiversity [Url-4], the prevention of desertification [Url-5] and so on. In 1977, several definitions and principles for environmental literacy

and environmental education are accepted at the United Nations Educational, Scientific, and Cultural Organization (UNESCO) inter-governmental conference (UNESCO, 1977).

Despite these efforts, environmental problems and their impacts on human beings and their habitat are accelerating. Many environmental problems require and will require deeper efforts of more individual non-experts with certain skills. Future generations will face growing environmental and urbanization problems and will need to find new solutions in order to implement the international treaties and meet the related national objectives for the great transition to sustainability. The most effective solution to environmental problems is to raise consciousness level of the people about these problems (Tuncer Teksoz et al., 2014).

The UN views education as the key to continued progress and even as the prerequisite for the survival of billions of people. It regards environmental literacy as a step of action for an equitable and sustainable world [Url-6]. According to Coyle (2005), environmental issues and related problems are becoming more complex and burdensome and this leads to incapability of trained experts to cope with demands. Coyle (2005) also notes that public environmental education and simple actions could contribute to a nations' economy.

Kışoğlu et al. (2010: p.772) declare that tackling environmental problems will only be possible through environmental education which is targeting the whole society. For Scholz and Binder (2011) and Ibitz (2017), the earth's ecosystem collapse can be prevented by defining the roles of practitioners and scientists through environmental literacy. The Anthropocene is characterized by integrated human, natural, and built domains of complex systems (Scholz & Binder, 2011). Within this perspective, as environmental literacy is viewed as a modern sustainability challenge, the UN Environment dedicated Mother Earth Day in 2017 to "environmental and climate literacy". The UN environment has also asked citizens to take a stand and support teaching for environmental and climate literacy [Url-7] and to encourage initiatives, networks and partnerships in this direction. However, the response to this appeal in individual countries was subdued, and the initiatives taken remained limited.

Today, the virtual world has invaded the real world and people are becoming separated from nature and losing their respect for life and nature. Although environment education has become part of formal education, the concept of environmental literacy has not attracted sufficient interest in the world. Outside America, efforts to implement it through non-formal education have been few. In developing countries, the concept of environmental literacy is insufficiently understood and valued, and the relevant actors are not fully engaged in activities to teach it.

It is certain that in societies where there is no environmental literacy education and awareness, there will be individuals, administrators and politicians who will support or carry out activities which will damage or have negative impacts on nature. These are the people who do not attach importance to environmental rights or make protection of the nature a priority. Establishing or sustaining environmental literacy levels is a problem area for many countries. However, there is of a lack precise definition of or implementation for environmental literacy. What countries should establish or how to raise consciousness is a question mark.

Environmental education is limited in content and scope and is far from setting necessary interrelations between the various sustainable development aspects (Biswas, 2020) or able to overcome those problems emerging through the urbanization processes. Environmental education is generally brought up to the critical masses in schools. Those enrolled to formal education in many countries receive an adequate grounding in environmental knowledge from 1980s onwards. However, for Brennan (1994), discipline-based education does not support and encourage or achieve environmental literacy of societies. The general level of environmental literacy of developing or less developed countries is comparatively lower than developed countries. According to Coyle (2005) developed countries need to deploy their designed policies and strategies, curricula, and activities, their many learning facilities, their experts and their institutions more comprehensively in the efforts of other countries.

In addition, a general, conscious, holistic education is not given to adults who have not received such an education or have received an education with a different content. Most adult decision-makers, such as businesspersons, administrators, officials or volunteers, lack environmental education and literacy [Url-8]. This makes it all the more important to provide people with the consciousness they need to understand how their daily choices can affect the environment and what can be done – and hence to address the question of how these things can be taught.

For Coyle (2005), there are two obstacles faced by environmental educators and trainers of environmental literacy: The first one is the merge of environmental education program into the general education curricula. The second one is

how to use media influence in order to achieve environmental awareness and to raise environmental literacy. In America, by 2005, only 1-2% of adults are environmentally literate (Coyle, 2005: p.55). This ratio gives some indications of the importance and urgency of equipping a society with environmental literacy. No recent figure could be found to monitor societies.

This article seeks to propose a multidisciplinary method of education aiming to be an effort for achieving environmental literacy for the sake of the development of sustainable and livable cities and environment. It aims to make a contribution to potential future efforts and activities for the creation of a sustainable and smart environment and urbanization; to the quality of research in this field, and to the protection of the environment. Adopting a descriptive narrative methodology to address the topics of environmental literacy, ecological literacy and smart environment, it is supported by a review of the literature and an internet search.

The article will first discuss the concept of environmental literacy and its contextual transformation. A literature mapping on the development of environmental literacy literature, emergence of the concept in Turkish academic writing are mentioned to present the foundations of differences in action and understanding. In the following section, a proposal will be made for a training workshop starting from literacy, environmental education, environmental literacy education, the workshop method and its role in the lifelong learning education. This methodology integrates the perspectives of and structured by the disciplines of urban planning and environment. The conclusion contains a general evaluation of the potential contribution which the proposed educational method could make when implemented.

1. Environmental Literacy Concept and Contexts

The study has aimed at developing a modeling framework based on three aspects stated in this section: Environmental Literacy, the conceptual context and its transformation and environmental literacy education.

1.1. Environmental Literacy

Literacy is a fundamental requirement for citizens of all ages in the world. This is a human need and it is demanded to ensure communication between individuals (Daudi & Heimlich, 1997). It directly changes the nature of work, the economy and society and so, the individual. Being literate also refers to reading and writing skills and knowledge and competence on a subject. Literacy empowers the individual to develop capacities for understanding, critique and empathy [Url-9]. For the UN Environment [Url-1], literacy allows access to decision-making and participation in democratic processes.

Struggling effectively with illiteracy has the potential to reshape lives. Improving literacy is an essential precondition for economic growth of the nations. Personal development is closely linked to literacy that directly contributes to economic and social independence [Url-10]. People can understand their shortcomings and seek to overcome these.

The concept of literacy also refers to knowledge and capabilities. Literacy issues can be in different topics such as computer literacy, literature literacy, arts literacy. Facts and concepts generate "awareness". That is why; environmental literacy is environmental knowledge, concern and awareness in addition to sustainable use of natural resources (as cited from Hares et al., 2006 by Biswass, 2020).

Education and literacy have always been interlinked in improving quality of life (Biswas, 2020) that is bound to environmental quality. That is why; quality of life is the target of sustainable environment and urbanization efforts. Elements of perceiving, decoding, analyzing and applying environmental information, sustainable use of resources and protection and conservation compose environmental quality (Biswas, 2020). Improvement in the environmental quality depends on knowledge, attitude (effective qualities), values and individual practices (Hens et al., 2010; Tuncer et al., 2000).

Environmental literacy refers to the skill of being able to read and write sufficiently, using typograms. Environmental literacy is also the capability to understand an environmental problem. The capability is the development of analysis, synthesis and evaluation skills upon this skill. Being literate is the initial concern for being a civilized human. It is the achieved skill to ask and learn about our environment. Learning steps must be sequenced and in each step must provide a broad subject content and dynamics of this subject. This includes skill development and application of this skill in the real world (Coyle, 2005: p. 54).

By achieving this skill, the relations of humans with other species and or habitat will be learned [Url-11]). EL covers practices and activities to gain knowledge in order to raise the capacity of an individual to act environmentally sensitive in daily life. EL also helps the self to understand how people are related to natural systems in a comprehensive way (Orr, 1990; Erdoğan & Ok, 2011; [Url-12]), and how they might do so that sustainability can be achieved. For this reason, citing Roth (1968) Kışoğlu et al. (2010) defines environmental literacy as the level of knowledge and awareness about the environment. Being environmental literate encompasses a continuum of analytical and emotional competencies (Hares et al., 2006).

Any demand for a solution by the citizens is the expected outcome of environmental literacy educations (Joseph, 2009). In Orr (1990)'s view, an environmentally literate individual is aware of the impact of scientific, technological, cultural and agricultural activities on natural systems work and is able to take decisions and precautions to ensure the sustainability of the environment. Roth (1992), Kışoğlu et al. (2010: p. 777) and Tuncer et al. (2000) make a further definition that summarizes the above explanations: Environmental literacy is the individual capacity used to display knowledge on the environment leading to a change of behavior. Today, as academically accepted, EL includes categories such as knowledge, affect, skills, and behavior (Hsu, 1997; Roth, 1992; Hasimoto-Martell et al., 2012). For Tuncer et al. (2000), 21th century educational systems should include environmental education for environmentally literate citizenry who can take action due to worsening environmental conditions.

Environmental literacy concept includes several components (Erdoğan et al., 2009);

- An understanding of the Earth, human life and the living environment relationship,
- Knowledge on natural systems and processes,
- A familiarity with basic inquiry and knowledge on critical thinking and problem solving skills,
- Ability to interpret any data or information of the environment,
- An understanding of citizenship that can lead to activity participation or actions,
- Empowerment to act and to understand the power of individuals and communities for civic participation.

For Coyle (2005), there are three levels of EL: 1) environmental awareness, 2) personal conduct knowledge, and 3) true environmental literacy. True environmental literacy is distinguished from simple awareness or the possession of instruction in immediate personal conduct by the information level and skills. This is required to construct environmental considerations into daily life. The ethics of responsibility (Orr, 1992) as well as responses and care are also demanded. Relative to another view; levels or degrees of EL can be termed as nominal, functional, and operational (Erdoğan, 2009: p. 40; Kışoğlu et al., 2010: pp. 781-782).

Making a precise definition falls behind the scope of this study as the content differs relative to time, purpose of the action or policy objectives of each actor or decision maker. In this paper, environmental literacy concept has been explained and used in a broader sense. The concept, here, refers to any type of environmental multidisciplinary knowledge with a certain level and access to general environmental education that will able the human being to analyze, to decide and/or to act.

1.2. The Conceptual Context and Its Transformation

For all disciplines (including urban planning, education, engineering, architecture), there is no commonly agreed or exact definition of the environmental literacy concept (Disinger & Roth, 1992, 2000; Tuncer Teksöz et al., 2014). Erdoğan (2009: p. 40) notes that various researchers have defined EL with reference to their own contexts and research findings. The concept has so far been defined only partially in the context of environmental and educational academic studies. And, there has been limited social implementation or academic analysis about its impacts on urbanization and the environmental systematic of the world or alternatives methods to raise EL.

There is a need for literature mapping in order to understand the evolution of the conceptual content and to determine the reasons why EL is disseminated to the whole society. In between 1971-2019, 469 publications have been determined with the "environmental literacy" key word search in Scopus [Url-13]. There are less than 5 publications each year in the time period of 1971-1991. Even though there is a slight increase in the number of publications which is still less than 10 annually, there is a sudden increase after 2010 and reaching its highest point in the year 2019. (Figure 1).

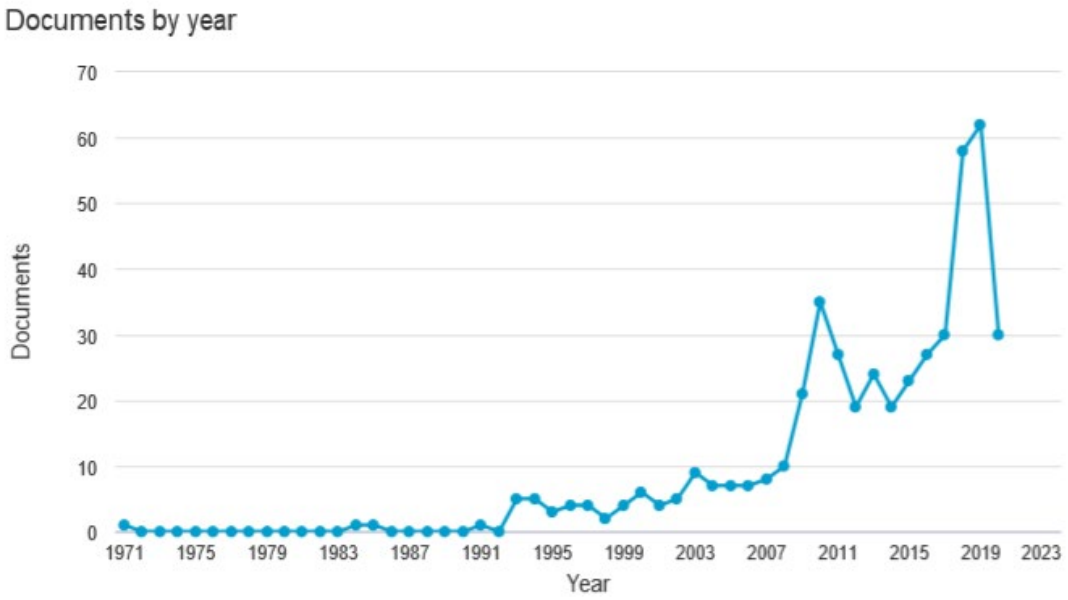

Figure 1. Document by Year Analysis, 1971-2019. "Environmental Literacy" Keyword Search [Url-13].

The environmental literacy concept is in use for a few decades within environmental education (Erdoğan, 2009: p. 38; Kaya & Elster, 2019). The first definition is made by Roth (1968) (McBride, 2013). Till 1990s, publications were covering simplistic information. Roth (1992: p.17) explains EL as the capacity to increase the well being of the systems of the environment and to take action to achieve this. Roth (1968) and Harvey (1977) have determined three EL levels: Environmentally literate, environmentally competent, and environmentally dedicated.

Brennan (1994) is one the first to define environmental literacy and academically have written on the importance of this concept for societies. In the same vein, Disigner and Roth (1992: p.2) described EL as the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore or improve their health. A conceptual differentiation is observed after 1990s. It can be the result of the initial impacts of climate change around the world. The publications covered knowledge of complex environmental notions and decision making skills (Tuncer et al., 2000). These are attempts to define the concept (Schneider, 1997) and components of the literacy education (Erdoğan, 2009). The EL has been explained by four elements; knowledge, skills, affect and behavior (Disigner & Roth, 1992).

In the middle of the 1990s, Simmons (1995) developed an EL Framework. This framework has focused on cognitive (knowledge and skills), affective, environmentally responsible and observable behavior, and involvement in environmentally responsible behavior. In between 2000-2010, as environmental literacy is viewed as a cross-disciplinary subject, we can observe interdisciplinary and multidisciplinary studies such as the study of how to build EL through the use of GIS (Lo et al., 2002), EL implementation in other fields such as building professions (Graham, 2000), EL levels of teachers and students (Yavetz et al., 2009), EL components (Erdoğan et al., 2009; Erdoğan & Ok, 2011) and EL principles (Cole, 2007).

After the year 2010, the impacts of climate change and global warming could be more severely sensed by the human beings. This naturally brought up the extending number of publications on conceptual definition and educative practices of EL. A search for new concepts could be observed: Concepts like environmental literacy, literate citizenry, ecological literacy, and ecoliteracy have emerged (McBride, 2013). Educators' visions and future strategies (Potter, 2020) are also questioned. Elementary, secondary education and, college students and older adults (Tuncer Teksoz et al., 2014; Maulaa et al., 2019) generally form the study universes.

Modeling and measuring EL (Maurer & Bogner, 2020; Clayton et al., 2019); assumption of personal responsibility and values, attitudes and behaviors towards environment (Biswas, 2020); efforts to reach a consensus on or to define the framework including concepts, contexts, and competencies of EL (Kaya & Elster, 2020); the relationship between urban construction and EE (Wu et al., 2020); women and EL related issues (Asteria, 2019; Asteria et al., 2016);

citizen science and behavioral change (Hsu et al., 2019); alternative methods of EL education (Pan & Hsu, 2020); online portals (Rahayu, 2020); energy conservation related values and behaviors (Maurer et al., 2020) are some of the recent study subjects that can be listed.

In Turkey, the concept gained importance in the academic writings by 2000s. Publications mainly originated from the education sector and focus on assessment of literacy levels of formal education students and teachers. Content examples of publications are as follows: Teacher education programs (Tuncer et al., 2000; Erdoğan & Ok, 2011; Tuncer Teksoz et al., 2014, Yates et al., 2019), course books analysis (Uyar & Ensar, 2016), quantitative and comparative studies on the elementary level (Erdoğan et al., 2009; Ozsoy et al., 2012), comparative studies on ecological awareness and environmental responsibility of students (Bajd & Leščanec, 2011) or the relationship between proponents of energy sector investments and EL (Topaloğlu et al., 2019). In these publications, EL is seen as a function of sensitivity, knowledge, skills, attitudes and values combined with personal development (Tuncer et al., 2000). This may be the result of eco-schools program mentioned by Ozsoy et al. (2012) and implemented by the Turkish Foundation for Environmental Education since 1995.

Almost 10 years later the initial definition of EL, Erdoğan (2009: p.43, citing Wilke, 1995 and Simmons, 1995) defined the EL and its dimensions as cognitive dimensions (knowledge and skills), affective dimensions, additional determinants of environmentally responsible behavior, and involvement in such behavior. For Erdoğan (2009: p. 47) components of EL are; knowledge of natural history and ecology, knowledge of environmental problems and issues, socio-political economic knowledge, skills, affect and determinants of behavior, responsible of environmental behavior. Görmüş (2019) added several other components to these such as ecological knowledge, socio-political knowledge, and general knowledge on environment, cognitive skills and environmentally responsible behaviors.

Between 2017 and 2018, an environmental literacy research was carried out for formal education by the Turkish Ministry of National Education and Bremen University, Germany (Kaya & Elster, 2019).

1.3. Environmental Literacy Education

There are different world exercises in different levels and forms of EL education: Many developed countries already provide environmental literacy education (Daudi, 1999), mainly to formal education students and their educators. There are even specialized organizations and programs for this purpose mainly in the USA, such as the Environmental Literacy Council (Washington DC) [Url-14], the Environmental Literacy Assessment Consortium (founded by US and Australian universities) or the Oregon Environmental Literacy Program. The Environmental Literacy Council is an independent body of academicians and educators working on science-based information [Url-15, 16].

Eco-schools program aims at environmental education through action-based learning for environmentally literate people [Url-17]. It has been established in 68 countries and 59000 schools. Another example can be given from Taiwan: An environmental education program (one-day) in the formal education level for environmental literacy is implemented. Results of the education have been published by Pan and Hsu (2020). The study showed retained effects of the exercise on students' environmental knowledge, environmental responsibility and action and locus of control after the exercise within a short period of time. Since 1993, the University of Georgia requires undergraduate students to complete at least one course in environmental literacy prior to graduation (Lo et al., 2002).

Schneider (1997) and Norris (2012) note that it is impossible for all students to gain a detailed knowledge about the environment and propose that how to ask three questions should be taught to them: "What can happen?", "What are the possibilities?" and "How do you know?" [Url-11]. He claims that students should have the ability to evaluate the process. The student should have a basic level of knowledge on scientific and technological principles and policies in order to understand the answers of these three questions.

Coyle (2005: pp. 58-59) also refers to Volk and McBeth's (1997; 2005) ideas in order to present the impact level of instructional and learning approaches relative to the variables of 32 different studies on environmental literacy. According to Coyle (2005), traditional courses, community investigations, instructional units, supplemental magazines and instruction in the classroom, field trips and out-of-class activities, residential camps, college level environmental courses, workshops for teachers and adults, television documentaries and other workshops have positive impacts.

Outdoor learning is also an ingredient of environmental literacy education. Combining environmental education into outdoor experiences is viewed as a fruitful approach (Coyle, 2005: p. 61; [Url-8]). Making outdoor EL courses seems to create better learning experiences (Coyle, 2005: p. 61). For Kellert and Derr (1998) and Schatz (1996), outdoor education experiences positively affect behavior. On the other hand, for Clayton et al. (2019), compared to the student groups, adults had less enjoyment of nature experiences.

"Environmentally literate citizenry" (Erdoğan, 2009:37; Erdoğan & Ok, 2011) is the expected outcome of the EE (See: Kışoğlu et al. (2010) for the characteristics to be found in environmentally literate individuals). With the same understanding, Harvey (1977: p. 67) indicates that developing "EL citizenry" or "environmental literacy" is the major result. Environmentally literate person can be defined as one who has basic skills, understandings, feelings for the environment (Harvey, 1977) and will to change the relationship between the individual and the environment. Reading is a must for those who are literate. Interpreting the environment and taking action is the other must for the environmentally literate citizen (Hungerford & Peyton, 1976). Action and critique comes naturally when a person is environmentally literate.

For Erdoğan (2009: p.5) and citing Goldman et al. (2006) Erdoğan and Ok (2011), the environmentally literate person uses societal and institutional values, skills and knowledge to take action. Brennan (1994) defines an individual as an environmentally literate if the person is sensitive to ecology and has values and information about processes of nature. Being literate will help the being to participate actions aiming to prevent degradation of the nature. In short, environmentally literate people can address an environmental problem and protect the environment. Sensitivity to environment can be merged to their way of living.

Several studies suggest that teachers do not have adequate EL competency for teaching EE (Yates et al., 2019; Amirshokoohi, 2010; Surmeli, 2013; Teksoz et al., 2010). To achieve environmental literacy, the quality of educators and teaching must be raised [Url-18]. In order to raise quality, high qualification requirements should be introduced for those who will be involved in literacy education.

2. A Method Proposal: Educative Workshop for Lifelong Learning (LL)

The target group for environmental literacy is the whole of society. And, school education, distance learning and lifelong learning (LL) constitute the options for teaching EL. EL education is a social need that has to be provided after the elementary and secondary education. Environmental literacy is also a subject that can't be restricted only to these schools. It is a widespread concept and is related to spreading of environmental awareness across all segments of the society through formal and informal medium of discourse (Biswas, 2020). Lifelong learning is viewed by the author as the most suitable method that can achieve education of the public at large.

Education can be divided into sub categories of formal (non-formal) and informal (Singh, 2013). Formal education is subject to entry requirements and generally involves degree and diploma programs in Turkey. Non-formal education is a form of education having no requirements and leads to the award of certificates. Formal education institutions comprise primary schools, middle schools, high schools and universities. Public education centers, vocational training centers and private classes form non-formal education institutions. Non-formal education may also be referred to as lifelong learning.

The goal of lifelong learning is to provide education to those outside the formal education system, who has never been to school or who have left their education incomplete. Those who wish to develop expertise in certain areas or to change their areas of expertise, with an unconditional educational opportunity via certified programs are also included to lifelong learning. While different names and divisions are in use in different countries, the levels and categories of education are similar to what is described here.

Education and training is also provided online and via distance learning, but those programs that lead to a diploma or degree form part of formal education, while those that provide certificates are included in non-formal education. Whatever method of education is used, lifelong learning is a widespread and is n effective form of education that is capable of reaching large numbers of individuals in a small amount of time [Url-19].

Although the public performs poorly on basic environmental literacy questionnaires, 95% of the respondents support environmental education in schools (Coyle, 2005). Most of the Americans want environmental education to continue into adulthood, and people have the will to understand environmental issues and the ways these affect their daily lives

[Url-8]. Over 85% of the public want government agencies to organize environmental education programs. A majority (80%) also requires private companies to be involved to this education system in order to train their employees (Coyle, 2005).

Lifelong learning should be accepted by the public. It provides benefits for the self, their families, working environments, their employers, so the public at large. According to Coppola (1999), this should be explained to the society to raise consciousness on the issue. Improved adult literacy depends also on improved skills of ICT (internet, texting, email, etc.). This is a need to bridge the digital divide between generations and to close gaps (Lapa & Cardoso, 2013).

The lifelong learning approach has important advantages for the inculcation of environmental literacy. In the societies in which we live today, lifelong learning education would seem to be the most effective way of conveying the importance of the sense of nature, place and time to the public. Through lifelong learning programs and activities, the majority of the public can be trained in a relatively short period of time. This will help the participating individuals to understand the role each one plays in the conservation of biodiversity. The participants must be selected among adults aged 18-65.

The inadequacy of trainers constitutes a problem in the teaching of environmental literacy to adults. Priority of education should be given to both trainers and educators already involved in environmental literacy, environmental education, and who wish to acquire environmental consciousness. They will be teaching the public on how to understand and discover their environment in order to give decisions at the expected way and time. The trainers will need a basic knowledge of the environment, the weather and the climate, water, land management, carbon emissions, ecological systems, energy use, citizenship [Url-11]. They will also need to show a standard level of understanding about the related science, technologies, teaching methodologies and policies. In short, the trainers should have a certain level of EL to begin with, and should therefore they should be the initial target group and be provided with education in the first phase of any program. The trainers must be trained themselves in a way they can understand the environment and human-environment relations. Literature and knowledge should also be taught.

2.1. The Workshop

A model of education for achieving environmental literacy goals of a society that could be implemented in the quickest, most efficient and possible way should be designed with the above considerations. The workshop is an innovative, interactive, and informative activity which can be implemented in the effort to explain and understand the environment and to disseminate the outcomes of learning to people of all backgrounds. It is therefore; an appropriate means of developing the skills of trainers who are to contribute to improvements in the quality of the environment by developing the knowledge and critical thinking skills of adults within and outside schools or other places of education (Michalopoulou, 2014). This type of activity is the predominant model of professional development in the USA (National Staff Development Council, 2001).

The workshop is designed to provide a foundation in the content of environmental literacy with a special focus on concepts that are challenging for participants to learn. It has the aim of answering the question of how trainers must read the environment in order to teach adults, and how they can discover, investigate and be aware of their environment. The program of such a workshop needs to define the tools and methods to be used for the protection of the environment and while specifying what the trainer-student relationship should be in each subject area. Basic knowledge should be given on subjects and methods that can be integrated into lesson plans. The workshop needs to be preceded by a discussion of the examples of standard tables, case studies, teaching tips, pictures of practice, visits to facilities or the field, and student thinking to which each teacher must refer.

The workshop has the objective of presenting which questions and answers can be given to meet the need to raise environmental literacy and which strategies can be implemented to stimulate demand for learning about how to protect the environment. Another issue is how people of different cultures and backgrounds can engage in literacy teaching and develop mechanisms and methods for teaching and cooperating in the protection of the environment. The workshop must attempt to seek and find ways to collect, disseminate, and share correct data and information starting from the very roots of life – nature and the environment. The other objectives are: to strengthen the professional competencies of adult literacy teachers, teachers in schools, academics and professionals involved in environmental education; to raise the professional profile of adult literacy educators; to help the participants to learn and form habits

of the best ways of meeting their social and cultural needs, and to provide them with the ability to evaluate the credibility of the process.

The methodology of the workshop is: to introduce trainers to ways and methods of developing basic reading and writing skills in order to communicate with their students, to learn, to teach and to protect the environment; to improve their educational capacities and field knowledge; to clarify the need to be literate, and to enable them to acquire research and problem-solving skills. Besides enabling participants to learn how to teach environmental literacy, it is important to present ways of making decisions and taking actions that create and maintain an optimal relationship between the trainers, their students, and the environment.

The workshop has to make use of innovative teaching and be planned in such a way as to serve as a teachers' guide in the end. Smart education technologies should be an integral part of the learning process as they correlate directly to the pedagogical and methodological preparation of the trainers and their practical experiences (Kasperiuniene & Daukilas, 2017). With technology use, trainers will have the opportunity to pay attention to each student and to help the learners to be aware of themselves and their fields of professional expression (Kasperiuniene & Daukilas, 2017). The workshop has to focus on literacy teaching practices, issues, activities, and feelings. The workshop should aim to develop literacy skills through practical, real life and/or workplace examples [Url-9]. Basic writing and reading skills in addition to computer software must be a prerequisite.

2.2. Workshop Modules and Program

Although non-implemented, the proposed EL workshop can be universally applied. The workshop is designed at the hypothetical level based on the European Union (EU)'s lifelong learning objectives [Url-19]. On site visits are also merged to the program. The workshop is expected to deepen the knowledge of the participants and to teach them how to learn, speak, read, feel, and write the environment through sessions on different subjects, the sharing of experiences and case studies of literacy teaching methodology and pedagogy. It is also designed to facilitate intercultural dialogue and the cultural diversity among the participants within a real world context. It will provide participants the background knowledge which they require in order to feel competent and comfortable when teaching knowledge on environmental protection and urbanization processes, to promote the participants' ability of self-discovery and to develop their problem-solving skills.

The basic modules of the workshop can be listed as follows:

- To learn the environment – This module includes informative activities such as lectures and speeches by professionals and visiting experts on key issues like: an introduction to environmental policies and strategies, the right to literacy, climate change, energy, and water. An interactive dialogue has to be held. Vocabulary of the environment and efficient ways of using ICT has to be taught.

- To speak the environment – Participatory activities must be planned before and during the workshop. Selected, confirmed participants can present their environmental literacy experiences as case studies. They can do environmental homework to explain the problems, activities and lessons learned that have arisen during the teaching of environmental literacy. The homework can be presented by the participants during the workshop. This will develop the oral communication skills of the trainers.

- To read the environment – This module should provide the trainers with models for protecting the environment at home, in school and in their neighborhoods in the light of current and potential problems.

- To feel the environment –During the workshop at least two study visits should be made for the trainers to feel the environment and the nature, to learn how a site study can be made and to understand how students perceive environment and how to develop their cognitive skills. One study visit could be to a pollutant facility and the other to a nature reserve. This can be decided by the workshop organizers in consideration of the facilities and resources in the immediate vicinity. An educator could demonstrate ways of transforming waste products into artwork or useful everyday items. Products and sample books can be shared. A documentary film on nature can be watched at this stage.

- To write the environment – The use of texts and documentation may be taught through essays written during the workshop and gathered in a booklet in order to improve the understanding of written texts and their

impact. What the students thinks and is capable of will be discussed. This will be the green paper of the workshop. A training document including session notes and participants' presentations should also be prepared as a guide for teachers.

These basic activities will be supported through:

- Evaluation activities: The participants' evaluations at the end of the workshop will reflect the real value of the workshop. Besides the workshop evaluation form, a quiz on competences should be given to the participants.

- Dissemination: A teacher's guide will need to be prepared from the reading instructions on the five basic modules listed above, including the green paper. And, this will need to be disseminated to the participants. Sample books, souvenirs such as pine trees, and certificates also need to be produced. The results should also be posted to the participants and shared with the related agencies.

The workshop has been planned as a five-day event based on the recent teacher guides available (such as the National Geographic EL teacher guides [Url-20]). To support the participants, the workshop is programmed to include a wide range of literacy-specific and critical environmental topics (climate change, freshwater, energy), including digital issues, basic vocabulary, the role of trainers, responsible actors and NGOs, trainers' relations to their students (adult learners), the relations of students to their close surroundings, potential tools for raising environmental literacy, methods for figuring problems in teaching, and the reading and writing of the environment [Url-9] (Table 1).

Table 1. Workshop Proposal – Activities

Date	Activities
Day 1	**Welcome Meeting** Introduction / The Aim of the Workshop **Environmental Literacy I: Principles of Adult Learning** Why Environment? Knowledge of environmental and related problems Exploring the language and vocabulary of the environment
	Testing of literacy – quiz Presentations by participants on environmental literacy teaching experiences: case studies
Day 2	**Environmental Literacy II: Environmental Protection** How should the trainer **speak** about the environment? How should the trainer **read** the environment and the city? Teaching tips, case studies and student thinking Tools, methods, and topics Discussion of methods of teaching to raise awareness for environmental protection
	International environmental policies, problems, strategies and actors Methods of teaching Environmental organizations The power of the digital and the virtual world Cooperation mechanisms Discussion
Day 3	**Environmental Literacy III: The Human Being, Nature and Habitats** How to **learn** environmental literacy topics How should the trainer connect the content to classroom practice? How should the trainer set the relation of the student to the environment? How can the trainer develop environmentally responsible behavior? Climate change Protection of natural resources and resource management Monitoring of resource pollution (Air, Water) Wild life monitoring
	Cities and Urbanization Urban patterns Green architecture

	Citta slow – smart cities – resilient cities - sustainable cities Minimization of solid waste (the city / the neighborhood / the building) Recycling of waste (the city / the building) Efficient daily fresh water use Discussion
Day 4	**Environmental Literacy IV: Site Study** How can the trainer direct the students to **feel** the environment and develop cognitive skills? Field visit: A pollutant facility
	Field visit: nature reserve (conservation area)
Day 5	**Environmental Literacy V: Writing and Reading the Environment** Presentation – a nature documentary The environment and the arts - possible ways of transforming waste Sample books on the environment (exhibition) Essay writing on the environment
	Evaluation of the Workshop-Discussion Environmental literacy quiz Closing ceremony (farewell) - pine trees and certificates for participants
	Evaluation meeting among the organizers

CONCLUSION:

Our development and sustainability is closely linked to our relation to social and natural systems we live today. The actions we take for or against the environment determine development and sustainability levels which we have achieved. Creating scientifically informed and conscious individuals requires application of a systematic approach to environmental education. Commitment of public authorities is another ingredient to achieve environmental literacy. Some national and local government authorities and civil society organizations around the World have grasped the importance of this issue, developed programs and institutional structures, and begun to carry out activities and events. However, these efforts cannot be said to constitute an integrated approach or to have succeeded in preventing, limiting or reversing the damage which humans are doing to the world.

It is therefore important to provide more non-formal learning courses on the environment and ensure that they have the right content. In the context of environment education, environmental literacy training is a form of education with a prominent part to play in preventing the damage in question as well as raising awareness about mitigation. In other words, environmental literacy education is beyond environmental education. It has been implemented in various ways. This form of education has been provided quite extensively in formal education. Another goal would be to ensure maximum access to such education for adults and to increase their levels of knowledge as well.

Environmental literacy is a topic studied by the education community. However, a glance at existing educational practices and content from the perspective of the discipline of urban planning highlights the need to provide large numbers of adults with an education that incorporates the latest developments and thinking about the city, and about the relationships between the environment and urbanization, and the city and the individual. Achieving literacy requires comprehensive, innovative and easily implemented methods. Moreover, it is essential to achieve operational environmental literacy.

This paper aimed at providing knowledge on the *status quo* of environmental literacy issue in order to better understand the notion, the education activities, to determine the possible method of intervention for sustainability and to direct nations' environmental education needs and actions. With this objective, this article proposes a lifelong learning environmental literacy workshop as a method of disseminating awareness for the protection of the environment and the development of sustainable environment and urbanization. This will constitute the long-term academic value of environmental literacy. As is the case with smart and sustainable cities, preference should go to environmental literacy education which must also be smart (i.e., simple/specific, measurable, accessible/attainable, reasonable/relevant and time-based).

A workshop should be one of the methods of achieving environmental literacy. As a means of education, a workshop is collection of knowledge, practices, teaching methodology and values. The workshop has the potential to gather different people who are willing to raise their awareness of environmental literacy. It is thought to become a part of educational activities. Therefore; it should be planned, strategies and policies should be developed with restructured theoretical choices and practices.

It must be noted that any program or activity aimed at environmental literacy have academic gains just like environmental education. This workshop is believed to help developing critical thinking and creativity and to take environmental literacy a step further. For the public to understanding the language of the environment and develop consciousness and have knowledge about its grammar and literature, an alternative method is needed.

The workshop of training of trainers in lifelong education designed and proposed here also aims to reshape the way in which the environment is taught, presented and protected. It is believed to contribute to the achievement of standardization and common consensus on environmental principles and concepts, and to the dissemination of these to the general public. The workshop constitutes a recommendation for trainers, leaders of civil society organizations, funding bodies, decision makers and professionals concerned with environmental education and decision making and administration in environmental and urbanization issues.

The environmental literacy workshop will need to be conducted with trainers first. Then the trainers will become workers for, and defenders of, the preservation and protection of the environment. The proposed workshop constitutes a solid method, although should be stressed that it isn't the only method for the teaching of environmental literacy. And, the ways in which the content of the workshop might be used independently of or in conjunction with other forms and methods of education and instructional materials, or how it might be integrated into these, must be the subject of another article.

When the workshop is widely implemented, it will attract the interest of the media. The influence of the media will attract the attention of larger masses and will create a demand for environmental awareness and environmental literacy. This will highlight and redefine the relationship between the human-being, the society, the human habitat and the environment.

Compliance with Ethical Standard

Conflict of Interests: The authors declare that for this article they have no actual, potential or perceived conflict of interests.

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BIBLIOGRAPHY:

Amirshokoohi, A. (2010). "Elementary preservice teachers' environmental literacy and views towards science, technology, and society (STS) issues". Science Educator, 19 (1), 56–63.

Asteria, D. (2019). "Women's Environmental Literacy in Managing Waste for Environmental Sustainability of the City". Development, 62:178–185.

Asteria, D., Herdiansyah, H. & Apriana, I. W. A.. (2016). "Women's Environmental Literacy as Social Capital in Environmental Management for Environmental Security of Urban Area". AeroEarth. IOP Conference Series: Earth and Environmental Science, 30. doi:10.1088/1755-1315/30/1/012014.

Bajd, B. & Leščanec, T. (2011). "The influence of the eco-school and healthy school projects on environmentally responsible behavior of primary school pupils". Education and Health Care, 21, 79-85.

Brennan, A. (1994). "Environmental Literacy and Educational Ideal". Environmental Values, 3 (1): 3-16. http://www.environmentandsociety.org/node/5504.

McBride, B. B., Brewer, C. A., Berkowitz, A. R. & Borrie, W. T. (2013). "Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get here?" ECOSPHERE, May, 4 (5). 1-20.

Biswas, A. (2020). "A nexus between environmental literacy, environmental attitude and healthy living", Environmental Science and Pollution Research, 27, 5922–5931

Clayton, S., Bexellb, S. M., Xuc, P., Tangc, Y. F., Lic, W. J. & Chenc, L. (2019). "Environmental literacy and nature experience in Chengdu, China". Environmental Education Research, 25 (7), 1105–1118 https://doi.org/10.1080/13504622.2019.1569207

Cole, A. G. (2007). "Expanding the Field: Revisiting Environmental Education Principles Through Multidisciplinary Frameworks", The Journal of Environmental Education, 38:2, 35-45, DOI: 10.3200/JOEE.38.1.35-46

Coppola, N. W. (1999). Greening the technology curriculum: A model for environmental literacy. The Journal of Technology Studies, 25 (2), 39-46.

Coyle, K. (2005). *Environmental Literacy in America*. The National Environmental Education and Training Foundation. Washington DC. September.

Daudi, S. S. (1999). "Environmental Education as a vehicle to promote environmental literacy in low literate communities of the world" (pp. 85-92) International Workshop on Environmental Education in Asia and Beyond, October, 11-15, Korea.

Daudi, S. S. & Heimlich, J. E. (1997). *Environmental literacy: what does it really mean?* EETAP Resource Library, http://eelink.net/eetap/info23.pdf Access date 14.08.2008.

Disinger, J. F., & Roth, C.E. (1992). *Environmental literacy*. Columbus, Ohio: ERIC/SMEAC Information Reference Center. ED 351201.

Disigner, J. F. & Roth, C.E. (2000). "Environmental Literacy". Journal of Wildlife Rehabilitation, Fall, 23 (3), 25-26.

Erdoğan, M. (2009). *Fifth Grade Students' Environmental Literacy and the Factors Affecting Students' Environmentally Responsible Behaviors*. METU, The Department of Educational Sciences, Unpublished Ph.D. Thesis. January.

Erdoğan, M., Kostova, Z. & Marcinkowski, T. (2009). Components of Environmental Literacy in Elementary Science Education Curriculum in Bulgaria and Turkey. Eurasia Journal of Mathematics, Science and Technology Education, 5 (1), 15-26. https://doi.org/10.12973/ejmste/75253

Erdoğan, M. & Ok, A. (2011). "An Assessment of Turkish Young Pupils' Environmental Literacy: A nationwide Survey". International Journal of Science Education, 33 (17), 2375-2406.

Goldman, D., Yavetz, B., & Pe'er, S. (2006). "Environmental literacy in teacher training in Israel: Environmental behavior of new students". Journal of Environmental Education, 38 (1), 3-22.

Görmüş, S. (2019). "Environmental Literacy: An Assessment and Evaluation on the Students of Landscape Architecture in Turkey". Journal of Education and Future, January. 15, 105-117.

Graham, P. (2000). "Building education for the next industrial revolution: teaching and learning environmental literacy for the building professions". Construction Management and Economics, 18, 917–925.

Hens, L,, Wiedemann, T., Raath, S., Stone, R., Renders, P., Craenhals, E. & Richter, B. (2010). "Monitoring environmental management at primary schools in South Africa". Journal of Cleaner Production, 18 (7), 666–677.

Hares, M., Eskonheimo, A., Myllyntaus, T. & Luukkanen, O. (2006). "Environmental literacy in interpreting endangered sustainability case studies from Thailand and the Sudan". Geo forum, 37, 128–144.

Harvey, G. (1977). A conceptualization of environmental education. In J. Aldrich, A. Balckburn, and G. Abel (Eds.), A Report on the North American Regional Seminar on Environmental Education (pp. 66-77). Columbus, OH: ERIC / SMEAC.

Hashimoto-Martell, E. A., McNeill, K. L. & Hoffman, E. M. (2012). "Connecting Urban Youth with their Environment: The Impact of an Urban Ecology Course on Student Content Knowledge, Environmental Attitudes and Responsible Behaviors". Research in Science Education, 42:1007–1026 DOI 10.1007/s11165-011-9233-6

Hernández, B., Suárez, E., Corral-Verdugo, V. & Hees, S. (2012). "The Relationship between Social and Environmental Interdependence as an Explanation of Proenvironmental Behavior". Human Ecology Review, July, 19 (1), 1-9.

Hsu, S. J. (1997). *An assessment of environmental literacy and analysis of predictors of responsible environmental behavior held by secondary teachers in Hualien country of Taiwan*. Unpublished doctoral dissertation. (Ohio State University) (UMI Number: 9731641).

Hsu, C., Chang, Y. & Liu, C. (2019). "Can Short-Term Citizen Science Training Increase Knowledge, Improve Attitudes, and Change Behavior to Protect Land Crabs?", Sustainability 2019, 11, 3918; doi:10.3390/su11143918

Hungerford, H. R. & Peyton, R. B. (1976). *Teaching Environmental Education*. Weston Walch, Portland, ME.

Ibitz, A. (2017). "The Promotion of Environmental Literacy under an Attention Economy Perspective", Interface, Spring, 2, 51-73. doi: 10.6667/interface.2.2017.27

Joseph, B. (2009). *Environmental Studies*, 2nd Ed. New Delhi: Tata McGraw-Hill.

Kasperiuniene, J. & Daukilas, S. (2017). "Smart Educational technology in the learning process at a rural vocational training institution: a case study", Conference: Rural development. Bio economy challenges. DOI:10.15544/RD.2017.128.

Kaya, V. H. & Elster, D. (2019). "A Critical Consideration of Environmental Literacy: Concepts, Contexts, and Competencies". Sustainability, 11, 1581; doi:10.3390/su11061581

Kellert, S.R. & Derr, V. (1998). *A national study of the wilderness experience*. New Haven, CT: Yale University.

Kışoğlu, M., Gürbüz, H., Sülün, A., Alaş, A. & Erkol, M. (2010). "Environmental Literacy and Evaluation of Studies Conducted On Environmental Literacy in Turkey". International Online Journal of Educational Sciences. January, 2 (3), 772-791.

Lapa, T. & Cardoso, G. (2013). "What "Digital Divide" between Generations? A Cross-National Analysis Using Data from the World Internet Project", Conference: Proceedings of the 7th International conference on Universal Access in Human-Computer Interaction: user and context diversity - Volume 2.

Lo, C. P., Affolter, J. M. & Reeves, T. C. (2002). "Building Environmental Literacy through Participation in GIS and Multimedia Assisted Field Research", Journal of Geography, 101 (1), 10-19, DOI: 10.1080/00221340208978462

Maulaa, I., Hamidah, I. & Permanasari, A. (2020). "Environmental literacy profile of 7th grade junior high school students in science learning on global warming subject". International Conference on Mathematics and Science Education 2019 (ICMScE 2019) Journal of Physics: Conference Series 1521 042122 IOP Publishing doi:10.1088/1742-6596/1521/4/042122

Maurer, M. & Bogner, F. X. (2020) "Modelling environmental literacy with environmental knowledge, values and (reported) behavior". Studies in Educational Evaluation, 65, 100863

Maurer, M., Koulouris, P. & Bogner, F. X. (2020). "Green Awareness in Action— How Energy Conservation Action Forces on Environmental Knowledge, Values and Behaviour in Adolescents' School Life". Sustainability, 12, 955; doi:10.3390/su12030955

Michalopoulou, A. (2014). "Inquiry-based learning through the creative thinking and expression in early years education", Creative Education. 5 (6), 377-385.

National Staff Development Council (2001). National Staff Development Council's standards for staff development (Revised ed.). Oxford: OH: Author. Available at: http://www.nsdc.org/library/standards2001.html.

Norris, S. (2012). Reading for Evidence and Interpreting Visualizations in Mathematics and Science Education. Springer Science & Business Media. September.

Orr, D.W. (1990). "Environmental education and ecological literacy". The Education Digest, 55 (9), 49-53.

Orr, D. W. (1992). *Ecological literacy: education and transition to a postmodern world. S*UNY Press, Albany, New York, USA.

Ozsoy, S., Ertepinar, H. & Saglam, N. (2012). "Can eco-schools improve elementary school students' environmental literacy levels?". Asia-Pacific Forum on Science Learning and Teaching, 13 (2), (Dec.) Article 3, 1.

Pan,C. & Hsu, S. (2020). "Effects of a One-day Environmental Education Program on Sixth-Graders' Environmental Literacy at a Nature Center in Eastern Taiwan". Sustainability, 12, 5043; doi:10.3390/su12125043

Potter, G. (2010). "Environmental Education for the 21st Century: Where Do We Go Now?". The Journal of Environmental Education, 41 (1), 22-33, doi: 10.1080/00958960903209975

Rahayu, M. (2020). "Environmental literacy discourse represented in local portal "Nggalek.co"", IOP Conf. Series: Earth and Environmental Science, 456, 01206, doi:10.1088/1755-1315/456/1/012064

Roth, C. E. (1968). *On the road to conservation*. Massachusetts Audubon, 38–41.

Roth, C.E. (1992). *Environmental literacy: Its roots, evolution and directions in the 1990s*. ERIC Reproduction Service No. ED348 235.

Schatz, C. (1996). "When Bambi meets Godzilla: Bringing environmental education and outdoor recreation together". ERIC Digest No. ED404088.

Schneider, S. H. (1997). "Defining Environmental Literacy." Trends in Ecology and Evolution, 12 (11), 457.

Scholz, R. W. & Binder, C. R. (2011). *Environmental Literacy in Science and Society: From Knowledge to Decision.* 1st Edition. Cambridge University Press.

Simmons, D. (1995). Working paper # 2: Developing a framework for national environmental education standards. In papers on the Development of Environmental Education Standards (pp. 53-58). Troy, OH: NAAEE.

Singh, M. (2013). "Educational practice in India and its foundations in Indian heritage: a synthesis of the East and West?", Comparative Education. 49 (1), 88-106, DOI: 10.1080/03050068.2012.740222

Surmeli, H. (2013). "Relationship between pre-school preservice teachers' environmental literacy and science and technology literacy self-efficacy beliefs". Educational Research and Reviews, 8 (24), 2281–2285.

Teksoz, G., Sahin, E. & Ertepinar, H. (2010). "A new vision for chemistry education students: Environmental education". International Journal of Environmental and Science Education, 5 (2), 131–149.

Topaloğlu, Y., Demirhan, M., Atabek E. & Yiğit, E. (2019). "Is nuclear power acceptance related to environmental literacy in Turkey?" [Article@Türkiye'de nükleer enerji taraftarlığı ve çevre okuryazarlığı İlişkili mi?], International Electronic Journal of Environmental Education, 9 (2), 157-173.

Tuncer, G., Tekkaya, C., Sungur, S., Cakiroglu, J. Ertepinar, H. & Kaplowitz, M. (2000). "Assessing pre-service teachers' environmental literacy in Turkey, as a mean to develop teacher education programs", International Journal of Educational Development, 29, 426-436.

Tuncer Teksoz, G., Boone, J. W., Yilmaz Tuzun, O. & Oztekin C. (2014). "An evaluation of the environmental literacy of preservice teachers in Turkey through Rasch analysis", Environmental Education Research, 20 (2), 202-227, DOI: 10.1080/13504622.2013.768604

UNESCO (1977), In; International Conference on Environmental Education, Tbilisi, USSR.

UNESCO (2004). UN decade for education for sustainable development (2005-2014). available at: http://portal.unesco.org/ education/en/ev.php

Uyar, Y. & Ensar, F. (2016). "Does mother tongue education support development of environmental literacy in Turkey? An analysis of Turkish course books". International Journal of Environmental and Science Education, 11 (1), 1-8.

Volk, T. & McBeth, W. (1997). *Environmental literacy in the Unites States: What should be… What is…Getting from here to there*. A report funded by the U.S. Environmental Protection Agency and submitted to the Environmental Education and Training Partnership, NAAEE. Washington, DC: U.S. EPA.

Volk, T. & McBeth, W. (2005). *Environmental literacy in the Unites States*. In H. Hungerford, B. Bluhm, T. Volk and J. Ramsey (Eds.) Essential Readings in Environmental Education (pp.75-80). Campaign, IL: Stipes Publishing Company.

Wilke, R. (1995). Literacy model development and framework. In R. Wilke (ed.), Environmental Education Literacy/Needs Assessment Project: Assessing Environmental Literacy of Students and Environmental Education Needs of Teachers; Final Report for 1993-1995 (pp.5-6). (Report to NCEET/University of Michigan under U.S. EPA Grant NT901935-01-2). Stevens Point, WI: University of Wisconsin – Stevens Point.

Wu, E., Cheng, J. & Zhang, J. (2020). "Study on the Environmental Education Demand and Environmental Literacy Assessment of Citizens in Sustainable Urban Construction in Beijing". Sustainability, 12, 241; doi:10.3390/su12010241.

Yates, K., Reefer, A., Robertson, D., Hubbard-Sanchez, J., Huss, J. & Wilder, M. (2019)."Educators' perceptions of environmental education and professional development in teacher preparation programs". Applied Environmental Education & Communication. 18 (3), 207–218.

Yavetz, B., Goldman, D. & Pe'er, S. (2009). "Environmental Literacy of pre-service teachers in Israel: a comparison between students at the onset and end of their studies". Environmental Education Research. 15 (4), 393-415, DOI: 10.1080/13504620902928422

Internet sources:

Url-1: UN Environment (April 21, 2017) Earth Day: Environmental literacy more important than ever (https://www.unenvironment.org/es/node/528) (23.12.2019).
Url-2: Climate Change Agreement (http://newsroom.unfccc.int) (22.01.2020).
Url-3: Montreal-protocol (http://ozone.unep.org/en/treaties-anddexisions/montreal-protocol-substances-deplete-ozone -layer) Ozone-destroying substances (24.01.2020).
Url-4: The protection and use of biodiversity (https//www.cbd.int/), (23.12.2019).
Url-5: The prevention of desertification (http://www2.unccd.int/) (23.12.2019).
Url-6: UN Environment (April 21, 2017) Earth Day: Environmental literacy more important than ever (https://www.unenvironment.org/es/node/528) (23.12.2019).
Url-7: UN News (April 22, 2017) Mother Earth Day: Environmental and climate literacy vital for a cleaner, greener planet, says UN (https://news.un.org) (21.01.2020).
Url-8: Idaho Environment Education Association (idahoee.org), (20.02.2020).
Url-9: Universidade Católica Portuguesa Faculty of Human Sciences (icm.fch.lisboa.ucp.pt), (20.02.2020).
Url-10: European Commission (ec.europa.eu), (20.02.2020).

Url-11: Carnegie Mellon University (CMU (n.d.)) *What is Environmental Literacy?* Environment. Decision Making, Science, And Technology, Carnegie Mellon University, www.telstar.ote.cmu.edu/environ/m2/s1/envlit.shtml#ftn2 (20.02.2020).
Url-12: Environmental Information System (ENVIS) (mahenvis.nic.in) (20.02.2020).
Url-13: SCOPUS, Elsevier (26.06.2020).
Url-14: Envirolink Network (www.envirolink) (20.02.2020).
Url-15: ELC, 22.01.2020 (https://enviroliteracy.org) (22.01.2020).
Ulr-16: The Cape Fear River Assembly (CFRA) (cfra-nc.org) (20.02.2020).
Url-17: Eco Schools, ecoschools.global (29.06.2020).
Url-18: Consortium of Institutions for Development and Research in Education in Europe, www.cidree.org (20.02.2020).
Url-19: The EU Education and Training, (https://ec.europa.eu/education/policies/eu-policy-in-the-field-of-adult-learning_en) (20.12.2019).
Url-20: National Geographic, Changing Climate, Environmental Literacy Teacher Guide Series. https://www.national geographic.org/education/programs/environmental-literacy-guides/) (22.01.2020).