DOKUZ EYLÜL ÜNİVERSİTESİ
EĞİTİM BİLİMLERİ ENSTİTÜSÜ

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Exploring Ecological Literacy and Environmental Attitudes in Preservice Teachers for Sustainable Education[1]

Sürdürülebilir Eğitim için Hizmet Öncesi Öğretmenlerde Ekolojik Okuryazarlık ve Çevresel Tutumların Araştırılması

Esat KUZU, Araştırma Görevlisi, Dokuz Eylül Üniversitesi, esattkuzu@gmail.com

Mert KARAOĞLU, Yüksek Lisans Öğrencisi, Dokuz Eylül Üniversitesi, karaoglumert97@gmail.com

Nurettin TÜREMİŞ, Yüksek Lisans Öğrencisi, Dokuz Eylül Üniversitesi, selen.nurettin66@gmail.com,

Geliş tarihi - *Received:* 13 November 2024
Kabul tarihi - *Accepted*: 28 December 2024
Yayın tarihi - *Published*: 28 December 2024

[1] This article was produced from the Tübitak 2209A project titled "Öğretmen Adaylarının Ekolojik Okuryazarlık Düzeylerinin Belirlenmesi ve Karşılaştırılması".

Kuzu, E., Karaoglu, M. ve Turemis, N. (2024). Exploring ecological literacy and environmental attitudes in preservice teachers for sustainable education. *Western Anatolia Journal of Educational Sciences, 15*(3), 3502-3518.
DOI. 10.51460/baebd.1585039

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Öz. Kirlilik ve küresel ısınma gibi çevresel zorluklar, tüm canlı organizmalar için önemli tehditler oluşturmaktadır ve insanlar hem birincil neden hem de ana kurban konumundadır. Eğitim, bu zorlukların ele alınması için olmazsa olmaz olan ekolojik okuryazarlığı geliştirmede önemli bir rol oynamaktadır. Bu çalışma, farklı akademik disiplinlerdeki hizmet öncesi öğretmenler arasında ekolojik okuryazarlık ve çevresel tutum düzeylerini değerlendirmeyi amaçlamaktadır. Çalışma iki farklı ölçek kullanılarak yürütülmüştür. Sonuçlar hem cinsiyetin hem de sınıf düzeyinin ekolojik okuryazarlık ve çevresel tutumlar üzerinde istatistiksel olarak anlamlı bir etkiye sahip olduğunu ortaya koymuştur. Özellikle, kadın hizmet öncesi öğretmenler ve daha yüksek sınıflardakiler, erkek meslektaşlarına ve daha düşük sınıflardakilere kıyasla daha yüksek ekolojik okuryazarlık düzeyleri ve daha olumlu çevresel tutumlar göstermiştir. Ancak, katılımcıların bölümleri ve yaşları ile ilgili anlamlı bir fark bulunamamıştır. Bulgular, hizmet öncesi öğretmenler arasında ekolojik okuryazarlığı ve çevresel tutumları geliştirmede eğitim uygulamalarının önemini vurgulamaktadır. Akademik disiplinlerinden bağımsız olarak tüm hizmet öncesi öğretmenlerin, bu konuları gelecekteki öğretimlerine etkili bir şekilde dahil etmelerini ve daha sürdürülebilir bir geleceğe katkıda bulunmalarını sağlayacak şekilde çevre sorunları hakkında kapsamlı bir eğitim almaları şiddetle tavsiye edilmektedir.
Anahtar Sözcükler: Ekolojik okuryazarlık, çevresel tutumlar, öğretmen adayları, öğretmen eğitimi.

Abstract. Environmental challenges, such as pollution and global warming, present significant threats to all living organisms, with humans being both the primary cause and main victims. Education plays a crucial role in fostering ecological literacy, which is essential for addressing these challenges. This study aimed to evaluate the levels of ecological literacy and environmental attitudes among preservice teachers across different academic disciplines. The study was conducted using two different scales. The results revealed that both gender and grade level had a statistically significant impact on ecological literacy and environmental attitudes. Specifically, female preservice teachers and those in higher grades showed higher levels of ecological literacy and more positive environmental attitudes compared to their male counterparts and those in lower grades. However, no significant differences were found regarding the participants' departments and ages. The findings highlight the importance of educational implementations in enhancing ecological literacy and environmental attitudes among preservice teachers. It is strongly recommended that all preservice teachers, regardless of their academic disciplines, receive comprehensive education on environmental issues, which can enable them to effectively incorporate these topics into their future teaching and contribute to a more sustainable future.
Keywords: Ecological literacy, environmental attitudes, preservice teachers, teacher education.

Kuzu, E., Karaoglu, M. ve Turemis, N. (2024). Exploring ecological literacy and environmental attitudes in preservice teachers for sustainable education. *Western Anatolia Journal of Educational Sciences, 15*(3), 3502-3518.
DOI. 10.51460/baebd.1585039

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Genişletilmiş özet

Giriş. Kirlilik ve küresel ısınma, dünya genelinde canlılar için ciddi tehditler oluşturan başlıca çevresel sorunlardır. Kirlilik; hava, su ve toprak kirliliği şeklinde ekosistemlerin dengesini bozarken; küresel ısınma, sera gazları nedeniyle sıcaklık artışı, iklim değişikliği ve aşırı hava olayları gibi sonuçlar doğurur. İnsan faaliyetleri hem sorunların nedeni hem de mağduru olduğundan, çevresel farkındalık büyük önem taşır. Bu noktada, bireylerin çevre bilinci kazanmasını hedefleyen ekolojik okuryazarlık öne çıkar. Ekolojik okuryazarlık, bireylerin çevreyle ilişkilerini anlayarak bilinçli ve sürdürülebilir kararlar almasını sağlar. Çevresel bilgiyi kullanarak sorunları çözme kapasitesini geliştirmeyi amaçlayan bu kavram, çevreye duyarlı bir tutum ve sürdürülebilir yaşam tarzı geliştirmeyi hedefler. Eğitim; ekolojik okuryazarlığın artırılmasında kritik bir öneme sahiptir ve öğrencilere erken yaşta çevre bilinci kazandırmak, daha sürdürülebilir bir toplumun ve sağlıklı bir doğanın temelini oluşturur. Bu amaç uğruna öğretmenlerin ve öğretmen adaylarının doğru duyarlılıklara sahip olmaları ve gerekli bilgilerle donanmış olmaları önem arz etmektedir.

Yöntem. Bu çalışmanın temel amacı, bir devlet üniversitesinde öğrenim gören öğretmen adaylarının ekolojik okuryazarlık düzeylerini ve çevresel tutumlarını incelemektir. Bu inceleme, cinsiyet, yaş, sınıf düzeyi ve akademik bölüm gibi demografik faktörler açısından yapılmıştır. Öğretmen adaylarının ekolojik okuryazarlık ve çevresel tutum düzeylerinin, bu demografik faktörlere göre nasıl farklılık gösterdiği araştırılmıştır. Araştırma kapsamında ilgili devlet üniversitesinde öğrenim gören 177 öğretmen adayı üzerinde bir anket çalışması yapılmıştır. Katılımcılar, İngilizce Öğretmenliği, Resim-İş Öğretmenliği, Rehberlik ve Psikolojik Danışmanlık Eğitimi ve Matematik Öğretmenliği bölümlerinden seçilmiştir. Bu farklı bölümler, çalışmanın örneklemini oluşturan öğretmen adaylarının çeşitli disiplinlerden geldiğini gösterir. Çalışmanın amacına uygun olarak öğretmen adaylarının ekolojik okuryazarlık ve çevresel tutumlarının değerlendirilmesi için yapılmıştır. Bu değerlendirme iki farklı ölçek kullanılarak gerçekleştirilmiştir. "Ekolojik Okuryazarlık Ölçeği" katılımcıların çevreye yönelik bilgi ve becerilerini değerlendirmeyi amaçlamaktadır. Katılımcıların ekolojik okuryazarlık düzeyleri bu ölçekle ölçülmüştür. "Ekolojik Okuryazarlık ve Çevresel Tutum Ölçeği" ise, katılımcıların çevresel konulara yönelik tutumlarını ölçmek için kullanılmıştır. Anket verileri SPSS programı kullanılarak analiz edilmiştir.

Bulgular. Çalışma sonuçları, öğretmen adaylarının ekolojik okuryazarlık ve çevresel tutumlar üzerinde çeşitli faktörlerin etkisini detaylı bir şekilde ortaya koymuştur. Analizler, katılımcıların sınıf düzeylerinin ve cinsiyetlerinin ekolojik okuryazarlık ve çevresel tutumlar üzerindeki etkisinin istatistiksel olarak anlamlı olduğunu göstermiştir. Bu bulgular, cinsiyet, sınıf, bölüm ve yaş olarak analiz edilmiştir. Ekolojik okuryazarlık puanı katılımcıların ekolojik sorunlar ve ilgili terimlerle alakalı farkındalık seviyelerini sıralarken kullanılan ölçütken, Çevresel tutum puanı katılımcıların çevresel sorunlarla olan farkındalıkları ve kendi hayatlarındaki çevresel sorunlara verdikleri pozitif tepkileri puanlamak için kullanılan ölçüttür. Cinsiyet, sınıf, bölüm ve yaş faktörlerini kıyaslayacak şekilde sırasıyla: Cinsiyet faktöründe kadın katılımcıların ortalama ekolojik okuryazarlık puanı 83.95, çevresel tutum puanı 85.76; erkek katılımcıların ekolojik okuryazarlık puanı ise 77.42 ve çevresel tutum puanı 85.76 olarak belirlenmiştir. Sınıf faktöründe birinci sınıf öğrencilerinin ortalama ekolojik okuryazarlık puanı 79.84, çevresel tutum puanı 78.10; ikinci sınıf öğrencileri ortalama ekolojik okuryazarlık puanı

Kuzu, E., Karaoglu, M. ve Turemis, N. (2024). Exploring ecological literacy and environmental attitudes in preservice teachers for sustainable education. *Western Anatolia Journal of Educational Sciences, 15*(3), 3502-3518.
DOI. 10.51460/baebd.1585039

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

78.54, çevresel tutum puanı 81.85; üçüncü sınıf öğrencilerinin ortalama ekolojik okuryazarlık puanı 83.54, çevresel tutum puanı 86.03, ve dördüncü sınıf öğrencilerinin ortalama ekolojik okuryazarlık puanı 84.68, çevresel tutum puanı 88.31'dir. Bölüm faktörüne göre İngilizce Öğretmenliği öğrencilerinin ortalama ekolojik okuryazarlık puanı 82.52, çevresel tutum puanı 86.38; Resim-İş Öğretmenliği öğrencilerinin ortalama ekolojik okuryazarlık puanı 81.85, çevresel tutum puanı 86.46; Rehberlik ve Psikolojik Danışmanlık öğrencilerinin ortalama ekolojik okuryazarlık puanı 81.33, çevresel tutum puanı 83.11 ve Matematik Öğretmenliği öğrencilerinin ortalama ekolojik okuryazarlık puanı 81.70, çevresel tutum puanı ise 82.19'dur. Yaş faktöründe 18-20 yaş grubu öğrencilerin ortalama ekolojik okuryazarlık puanı 80.54, çevresel tutum puanı 82.31; 21 yaş grubu öğrencilerinin ortalama ekolojik okuryazarlık puanı 80.44, çevresel tutum puanı 85.12; 22 yaş grubu öğrencilerinin ortalama ekolojik okuryazarlık puanı 85.33, çevresel tutum puanı 85.96; 23 yaş grubu öğrencilerinin ortalama ekolojik okuryazarlık puanı 81.86, çevresel tutum puanı 85.26 ve 24 yaş grubu öğrencilerinin ortalama ekolojik okuryazarlık puanı 82.56, çevresel tutum puanı ise 84.86'dır. Bu bulgular doğrultusunda yaş ve bölüm olarak öğretmen adaylarının ekolojik okuryazarlık seviyelerinin ve çevresel tutumlarının değişmediği ve olası bir değişikliğin istatistiksel olarak önem arz etmediği söz konusudur. Ancak bu alanlarda cinsiyet ve sınıf faktörleri doğrultusunda istatistiksel önem arz eden farklılıklar olduğu gözlenebilir. Kadın öğretmen adayları, erkeklere kıyasla iki sıralamada da daha yüksek puanlar almış ve bu alanlardaki duyarlılıklarını göz önüne sermişlerdir. Sınıf olarak da öğrencilerin daha yüksek sınıflarda bulunuyor oluşlarının iki puan türünde de pozitif korelasyon gösterdiği gözlemlenmektedir ve bu bulgu öğretmenlik bölümlerinin bu önemli alanda zamanla öğretmen adaylarına gerekli bilgilerle donatabildiklerini göstermektedir.

Tartışma. Araştırma bulguları, ekolojik okuryazarlık ve çevresel tutumlar üzerinde cinsiyet ve sınıf düzeyinin önemli bir etkisi olduğunu ortaya koymaktadır. Kadın öğretmen adaylarının çevresel konulara karşı daha duyarlı olmaları ve üst sınıflarda okuyan öğrencilerin daha fazla çevre bilgisine sahip olmaları, çevre eğitiminin bireylerin farkındalık düzeylerini geliştirdiğini göstermektedir. Bu bulgular, çevre eğitiminin öğretmen adaylarının eğitim süreçlerinde önemli bir yer tutması gerektiğini vurgulamaktadır. Öğretmen adaylarının ekolojik okuryazarlık düzeylerinin eğitim uygulamaları vasıtasıyla artırılması, onların gelecekte öğrencilere çevre bilinci kazandırma kapasitelerini de artıracaktır. Araştırmada elde edilen sonuçlar, öğretmen adaylarının akademik bölümlerine göre ekolojik okuryazarlık düzeylerinde önemli bir farklılık olmadığını göstermektedir. Bu da çevre bilincinin disiplinler arası bir konu olduğunu ve tüm öğretmen adaylarının, akademik disiplinlerinden bağımsız olarak bu konuda kapsamlı ve derinlemesine eğitim alması gerektiğini göstermektedir.

Sonuç. Bu araştırma, öğretmen adaylarının ekolojik okuryazarlık seviyeleri ile ilgili önemli bulgular öne koymuştur ve ortaya çıkan veri öğretmen adaylarının bu alandaki bilgilerini merak eden ve geliştirmek isteyen akademisyenler ve yetkililer için aydınlatıcı olacaktır. Gelecek araştırmalar, daha geniş örneklem gruplarıyla cinsiyet, yaş ve sınıf düzeyi gibi değişkenlerin ekolojik okuryazarlık ve çevresel tutumlar üzerindeki etkilerini inceleyebilir. Ayrıca, öğretmen adaylarına yönelik çevre eğitimi programlarının uzun vadeli etkileri araştırılabilir ve bu programların öğretmen adaylarının çevreye yönelik davranışlarını nasıl şekillendirdiği değerlendirilebilir.

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Introduction

The environment is one of the fundamental components of all kinds of life on Earth, including humans (Prastiwi et al., 2019). Such a vital asset is defined as a physical setting by which all living beings are surrounded. Furthermore, it encompasses water, air, land, natural resources, animals, and plants, all of which encircle human beings (Chopra, 2016). Contrary to the indisputable importance of it, the environment has been deteriorated by people with countless harmful actions. Environmental problems such as environmental pollution and global warming threaten life in the world, and the most important cause and one of the primary victims of these problems are humans themselves.

In recent decades, human-related damage to the environment has directly caused the balance of Earth to change in a negative direction, which accounts for some abiding concerns. In addition, by causing environmental detriment, people jeopardize not only the environment but also their own lives. Concerns related to the environment result primarily from the intertwined relationship between the living styles of people and the worsening condition of the environment. As a result, people's awareness of the environment and their behaviours towards it play a crucial role in protecting the environment, nature, and the Earth (Kuzu & Çubukçu, 2023).

Ecological literacy is the capacity to utilize ecological knowledge, thought processes, and mindset when interacting with, appreciating, and/or researching the natural environment (Berkowitz et al., 2005). It requires an in-depth understanding and awareness of the complex mechanisms and processes by which the Earth operates and sustains life (Pitman & Daniels, 2016). Ecological literacy aims to establish a mindset that acknowledges connections and mutual dependence on the environment and encourages the growth of new abilities to foster sustainable lifestyles (Boehnert, 2015). Ecological literacy not only fosters but also enhances the comprehension of the interdependence of Earth's systems and nature. Moreover, it enables people to become aware of biotic and abiotic assets on Earth and how those assets mutually relate to and rely on each other. In addition, human beings can develop an awareness of how habitats and inhabitants are interdependent with the help of ecological literacy, including their own connection to other living beings. Most importantly, ecological literacy helps individuals recognize that their existence on this planet is not the pièce de résistance. Therefore, they can develop a sense of responsibility for nature and feel obliged to conserve the environment.

Ecological literacy suggests that an ecologically literate person is expected to comprehend the interconnected nature of the Earth and its systems, understand and respond to the ecological relationships between places and their inhabitants, and make informed decisions in a sustainable manner (Pitman et al., 2018). Moreover, education is the primary means of raising ecologically literate people. If we want to raise ecologically literate people, a full-fletched interdisciplinary ecological education must be designed and applied at schools.

Moreover, in order for teachers to teach ecological issues, they need to be ecologically literate to a sufficient degree. Therefore, it is crucial to enhance teachers' ecological literacy through their teacher education training programs. Based on this, understanding preservice teachers'

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

ecological literacy levels and environmental attitudes can be a starting point. In this way, it can be possible to understand how and to what extent ecological literacy should be included in teacher education programs. Although studies on ecological literacy have mainly been conducted in the field of science, ecological literacy concerns all disciplines because the environment is not a subject-specific issue. As a result, conducting this study among preservice teachers from different departments can allow us to comprehensively assess the current levels of ecological literacy and environmental attitudes of future educators, providing valuable insights into their understanding of ecological concepts, their attitudes towards the environment, and their preparedness to integrate ecological principles into their teaching practices.

Several recent studies have been carried out to understand the levels of ecological literacy and environmental attitudes among students, preservice teachers, and/or teachers. For instance, Akçay and Şengül (2023) found that middle school students' ecological literacy levels were moderate and female students had a higher degree of ecological literacy. Şahin and Gül (2020) found that younger students were more motivated to take action on environmental issues compared to older students, who, while less motivated, were better informed about these problems. Moreover, Şahin (2015) found a positive correlation between the time spent in natural environments and the level of ecological literacy. Kablan (2019) evaluated high school students' ecological awareness and found that the socioeconomic and cultural statuses of their families affected the student's ecological literacy. Duman and Yurtseven (2022) conducted another study with sports sciences students and found that participants had a high level of ecological literacy. Moreover, Somashekara and Praveena (2021) found that science postgraduate students' environmental attitudes were higher, and they were more ecologically literate than arts-postgraduate students. Erkol and Erbasan (2018) conducted a study with primary school teachers and found that their ecological literacy and environmental behaviours were moderate, while their attitudes towards environmental problems were even more favourable. Kahyaoğlu (2011) conducted a study with science and technology teachers and concluded that the majority of the teachers showed an adequate level of ecological literacy. Şahin et al. (2016) found that fourth-grade university students possessed more ecological literacy skills than students from lower grades. Yılmaz (2021) also carried out another study with preservice teachers and observed that there were not any significant differences among the participants regarding ecological literacy levels in terms of grade and gender. Altınöz (2010) found that science teacher candidates had a limited degree of ecological literacy.

It is also important to point out the significant role of teachers in developing not only knowledge in ecological concepts but also fostering positive attitudes toward the environment in their students. Their contribution in the classroom is, therefore, very vital for the development of a society that will be concerned about sustainability, interconnectedness in ecosystems, and empowered towards contributing to environmental sustainability. All these can only be realized if all teachers, regardless of their field of specialization, have deep concepts and principles of ecology. This can enable them to rise to the challenge of teaching about the environment. The more they go on to develop their ecological competencies, the more they will be in a position to devise ways through which to embed environmental awareness and living sustainably into their practice in pursuit of quality improvement of teaching and fostering ecological citizenship among students. In this regard,

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

the present research study intends to explore the level of ecological literacy and environmental attitudes among the preservice teachers from various departments with regard to different variables. In this way, it is aimed to reveal preservice teachers' current levels of ecological literacy and environmental attitudes. The following research questions were formulated to guide the study:

1. What are the ecological literacy and environmental attitude levels of preservice teachers?
2. Is there a significant difference in the levels of ecological literacy and environmental attitudes among preservice teachers based on their department?
3. Is there a significant difference in the levels of ecological literacy and environmental attitudes among preservice teachers based on their gender?
4. Is there a significant difference in the levels of ecological literacy and environmental attitudes among preservice teachers based on their age?
5. Is there a significant difference in the levels of ecological literacy and environmental attitudes among preservice teachers based on their grade level?

Methodology

Participants

In this study, 177 preservice teachers from a public university acted as participants. The participants were selected according to convenience sampling techniques. Therefore, preservice teachers who were available and volunteered to participate in the study were selected as participants. As indicated in Table 1, there were 44 (24.9%) participants from the English Language Teaching Program, 41 (23.2%) from the Fine Arts Education Department, 45 (25.4%) from the Guidance and Psychological Counselling Education Department, and 47 (26.6%) from the Mathematics Teaching Department.

Table 1.
The distribution of the participant preservice teachers by their departments

Department	Frequency	Percentage
English language teaching	44	24.9
Fine arts education	41	23.2
Guidance and psychological counselling education	45	25.4
Mathematics teaching	47	26.6
Total	177	100.0

Table 2 presents comprehensive data regarding the grades of the participants. The tabulated information indicates that there were 19 (10.7%) preservice teachers from the first grade, 57 (32.2%) from the second grade, 53 (29.9%) from the third grade, and 48 (27.1%) from the fourth grade.

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Table 2.
The distribution of the participant preservice teachers by their grades

Grade	Frequency	Percentage
First	19	10.7
Second	57	32.2
Third	53	29.9
Fourth	48	27.1
Total	177	100.0

Table 3 illustrates the distribution of the participants according to their gender. As shown in the table, out of the 177 preservice teachers who took part in the study, 120 (67.8%) were female, and 57 (32.2%) were male.

Table 3.
The distribution of the participant preservice teachers by their genders

Gender	Frequency	Percentage
Female	120	67.8
Male	57	32.2
Total	177	100.0

Table 4 presents detailed information about the age distribution among the participant preservice teachers. The data indicates that the largest group consisted of 51 participants, representing 28.8% of the total, who were within the age range of 18 to 20 years. Following this, there were 47 participants, accounting for 26.6%, who were 21 years old. Additionally, there were 23 participants (18.6%) who were 22 years old. Finally, 23 participants (13.0%) were 24 years old.

Table 4.
The distribution of the participant preservice teachers by their ages

Age	Frequency	Percentage
18-20	51	28.8
21	47	26.6
22	33	18.6
23	23	13.0
24	23	13.0
Total	177	100.0

Instrumentation

In the present study, the level of ecological literacy and the environmental attitude levels of the preservice teachers were assessed with two different scales. The first scale was the ecological literacy scale for adults developed by Atabek-Yiğit et al. (2014) to assess the skills of ecological literacy. The second scale was the environmental attitude scale, which was developed by Şama (2003) to evaluate the attitude of students toward the environment. These scales have been selected because they fit the purpose of the current study, which is to investigate the existing ecological

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

literacy and environmental attitude levels among preservice teachers originating from different departments. Also, the Cronbach's alpha value was suitable for both the scales because the values of 0.70 or above are considered as reliable (Nunnally, 1978). In this study, the scale for environmental attitude showed a score of. 868, and that of ecological literacy scale for adults had the value of.865. Lastly, a participant information form prepared particularly for this study was utilized to take overall demographic information from them.

Procedure

Data collection was carried out during the Spring semester of 2024. After obtaining the necessary ethical and administrative permissions, the questionnaire was personally delivered to the participants. The participants who were willing to participate in the study were asked to complete the questionnaire. The purpose of the research was explained to them before distribution and it was assured that their responses would be kept confidential, and they could withdraw from the study anytime without any penalties. The completed questionnaires collected from the participant preservice teachers concluded the data collection.

Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS). Firstly, Cronbach's Alpha value was checked to see the reliability scores of each scale. It was seen that the Cronbach's Alpha value of the environmental knowledge questionnaire was found to be .865, while the value for the environmental attitude questionnaire was found to be .868. Later, descriptive statistics were computed to obtain the participants' demographic information. Furthermore, ANOVA (analysis of variance) tests were performed to examine the levels of ecological literacy and environmental attitudes among preservice teachers in terms of the department of study, grade levels, and ages of the participants. LSD tests were also administered for further analysis when significant differences were observed. Finally, an independent sample t-test was employed to analyze the differences in terms of gender.

Results

The initial part of the study examined whether there was a difference in the ecological literacy levels among preservice teachers based on their departmental affiliations. The findings displayed in Table 5 indicate that there were no significant differences (p=.95) among the preservice teachers majoring in English language teaching (X=82.52), Fine arts education (X=81.85), Guidance and psychological counselling education (X=81.33), and Mathematics teaching (X=81.84).

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Table 5.
ANOVA results for the ecological literacy levels in terms of department

Department	N	X	SD	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
English language teaching	44	82.52	9.36	Between Groups	32.95	3	10.98	.10	.95*
Fine arts education	41	81.85	10.87	Within Groups	17665.92	173	102.11		
Guidance and psychological counselling education	45	81.33	11.77	Total	17698.88	176			
Mathematics teaching	47	81.70	8.16						
Total	177	81.84	10.02						

* p < .05.

Table 6 displays the results of the ANOVA test, which compares the levels of environmental attitudes among preservice teachers across different departments. The analysis did not yield any statistically significant differences (p=.21) among the preservice teachers from English language teaching (X=86.38), Fine arts education (X=86.46), Guidance and psychological counselling education (X=83.11), and Mathematics teaching (X=82.19).

Table 6.
ANOVA results for the environmental attitude levels in terms of department

Department	N	X	SD	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
English language teaching	44	86.38	11.87	Between Groups	651.58	3	217.19	1.51	.21*
Fine arts education	41	86.46	11.04	Within Groups	24874.34	173	143.78		
Guidance and psychological counselling education	45	83.11	13.23	Total	25525.93	176			
Mathematics teaching	47	82.19	11.62						
Total	177	84.45	12.04						

* p < .05.

Table 7 exhibits the results of the analysis of variance (ANOVA) for the ecological literacy levels of the participants based on their grade levels. The table shows that there were significant differences in the ecological literacy levels of preservice teachers based on their grade levels (F=4.34; p=.00). An LSD test was used to identify the grades in which the difference was statistically significant. The results showed that third-grade preservice teachers' ecological literacy skills (X=83.54) differed significantly from the ecological literacy levels of second-grade preservice teachers. Furthermore, there was a significant difference in ecological literacy levels between fourth-grade preservice teachers (X=84.68) and second-grade preservice teachers (X=78.54).

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Table 7.
ANOVA results for the ecological literacy levels in terms of grade

Grade	N	X	SD	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.	Significance
1	19	79.84	9.35	Between Groups	1238.77	3	412.92	4.34	.00*	3-2; 4-2
2	57	78.54	11.09	Within Groups	16460.11	173	95.14			
3	53	83.54	10.09	Total	17698.88	176				
4	48	84.68	7.56							
Total	177	81.84	10.02							

* p < .05.

The data illustrating the levels of environmental attitudes among preservice teachers in terms of grade can be found in Table 8. The analysis revealed significant differences in the participants' environmental attitudes based on their grades. That is, the analysis disclosed a significant effect of grade on environmental attitudes (F=4.89; p=.03). The results of the LSD test showed that the environmental attitudes of third-grade preservice teachers (X=86.3) were statistically different from those of first-grade preservice teachers (X=78.10). Additionally, the environmental attitudes of fourth-grade preservice teachers were significantly different from those of first and second-grade preservice teachers (X=78.10; X=81.85).

Table 8.
ANOVA results for the environmental attitude levels in terms of grade

Grade	N	X	SD	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.	Significance
1	19	78.10	13.33	Between Groups	1997.02	3	665.67	4.89	.03*	3-1; 4-1,2
2	57	81.85	12.27	Within Groups	23528.90	173	136.00			
3	53	86.03	11.66	Total	25525.93	176				
4	48	88.31	10.12							
Total	177	84.45	12.04							

* p < .05.

The results of the independent sample t-test examining ecological literacy levels based on gender are presented in Table 9. The analysis indicated a statistically significant difference in the ecological literacy levels of preservice teachers (p=.00), with female participants exhibiting a higher mean score (X=83.95) compared to male participants.

Table 9.
Independent Samples T-Test Results for the Ecological Literacy Levels in Terms of Gender

	Gender	N	X	SD	Sig.
Ecological literacy	female	120	83.95	8.24	.00*
	male	57	77.42	11.92	

* p < .05.

The independent sample t-test results for the environmental attitude with respect to the gender variable are presented in Table 10. The analysis revealed that the average environmental

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

attitude score for female preservice teachers was 85.76, which was found to be significantly higher than the average score of 81.70 for male preservice teachers, with a significance value of .03.

Table 10.
Independent samples t-test results for the environmental attitude levels in terms of gender

	Gender	N	X	SD	Sig.
Environmental attitude	female	120	85.76	12.23	.03*
	male	57	81.70	11.22	

* p < .05.

In Table 11, the ecological literacy levels of preservice teachers are presented with respect to age. The findings demonstrated that there was no statistically significant difference (p=.20) in the ecological literacy levels of the participants when their age was considered.

Table 11.
ANOVA results for the ecological literacy levels in terms of age

Age	N	X	SD	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
18-20	51	80.549	9.12	Between Groups	591.04	4	147.76	1.48	.20*
21	47	80.44	12.15	Within Groups	17107.83	172	99.46		
22	33	85.33	7.55	Total	17698.88	176			
23	23	81.86	8.01						
24	23	82.56	11.50						
Total	177	81.84	10.02						

* p < .05.

In Table 12, the environmental attitudes of preservice teachers are displayed in relation to their age. Upon analysis, the results revealed that there was no statistically significant difference (p=.66) in the environmental attitude levels of the participants based on their age.

Table 12.
ANOVA results for the environmental attitude levels in terms of age

Age	N	X	SD	Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
18-20	51	82.31	12.67	Between Groups	349.70	4	87.42	.59	.66*
21	47	85.12	11.71	Within Groups	25176.22	172	146.37		
22	33	85.96	12.48	Total	25525.93	176			
23	23	85.26	10.23						
24	23	84.86	12.65						
Total	177	84.45	12.04						

* p < .05.

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Discussion and Conclusion

This study explored ecological literacy and environmental attitude levels of preservice teachers in terms of department, grade, gender, and age variables. The results can help us understand preservice teachers' interests in the environment and environmental issues, which can provide implications about their tendency to incorporate environmental topics into their future practice.

It is assumed that if preservice teachers are adequately informed about the environment, they will probably reflect their knowledge in their future teaching practices because the knowledge a teacher possesses affects the content of the teaching (Grossman, 1995). Therefore, they can play active roles in enhancing ecological literacy among their students and establishing a sustainable society. The present study reached some noteworthy results in this context. To start with, the results of this study showed significant differences in ecological literacy levels and environmental attitudes of preservice teachers in terms of grade levels. The preservice teachers in the third and fourth grades had a greater degree of ecological literacy compared to first and second graders, suggesting that the preservice teachers' environmental awareness and attitudes increase as they progress in their training programs. The extant literature is dichotomous regarding the grade variable. For example, Şahin et al. (2016) reported that the senior students were more aware of the ecological problems, which supported the results of the current study. Similar to this study, Koc and Kuvac (2016) stated that senior students' ecological literacy levels were higher than those of minors. However, Yılmaz's (2021) study did not collaborate with this study in that the researcher could not find any impact of grade on ecological literacy levels.

Furthermore, the results demonstrated that ecological literacy and environmental attitude levels of preservice teachers did not significantly differ in terms of their departments. Contrary to the current study, Yiğit (2023) underlined that the department could be an important factor that gives clues about individuals' ecological literacy skills. Moreover, Somashekara and Praveena (2021) stated that students' ecological literacy levels differed based on their departments, which also opposed the present study. As a result, the results of the current study were not in line with the body of the literature regarding the department variable.

As to the age variable, it was determined that age has no influential effect on ecological literacy and environmental attitude for the preservice teachers. Similarly, Kahyaoğlu (2011) found that the impact of age in the level of ecological literacy and attitude to the environment was of less significance, therefore in harmony with this study. Additionally, Akçay and Şengül (2023) also suggested that age did not influence the level of ecological literacy and environmental attitude, thus collaborating with the present study. Besides, Duman and Yurtseven (2022) reached a similar conclusion, who did not find any significant relationship between the levels of ecological literacy and environmental attitude among preservice teachers in terms of age. Therefore, we can state that a number of studies have agreed in a harmonized way with respect to the role which may be played by age in relation to these variables. It is, therefore, proper to assume that the findings of this study about age are compatible with the extant literature.

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

On the other hand, the results indicated that gender might be a significant variable that gives clues about the ecological literacy and environmental attitude levels of the preservice teachers. In this term, the analysis showed that female preservice teachers had higher ecological literacy than males. Regarding environmental attitudes, the female participants outperformed the male participants, which was a statistically significant finding. In this regard, when the related literature was taken into consideration, Kahyaoğlu (2011) also found similar gender differences, supporting the current study. Additionally, Akçay and Şengül (2023) concluded that females had a higher level of ecological literacy compared to their male counterparts, also aligning with the current study. Moreover, Duman and Yurtseven (2022) suggested that female participants meaningfully had higher ecological literacy and environmental attitudes than male participants. Consequently, the results of other studies support the current study regarding the gender variable because a significant number of them also stressed that females generally outperformed their male counterparts regarding ecological literacy and environmental attitude skills. The current study, in this respect, collaborated with the existing literature. Based on this, it can be concluded that gender is a key factor in determining individuals' ecological literacy and environmental attitudes levels and should be considered while designing ecological education programs.

Consequently, the research findings indicated that department and age did not yield any significant differences in ecological literacy skills and environmental attitudes of the preservice teachers. On the other hand, grade and gender variables significantly affected the participants' ecological literacy and environmental attitudes. To be more specific, the study found that female participants showed a higher level of ecological literacy and more positive environmental attitudes toward the environment than male students. Also, there were significant differences in the ecological literacy and the environmental attitudes of the preservice teachers regarding the grade variable. That is, the participants from higher grades had a greater level of ecological literacy and environmental attitudes. Based on the overall findings, we can conclude that the participants' ecological literacy and environmental attitude levels were acceptable. However, we can state that there is still room for improvement. Seeing that the department is not a factor affecting environmental attitudes and ecological literacy, it can be assumed that ecological literacy and environmental attitudes of the preservice teachers can be empowered through the education offered in teacher training programs. In this respect, it is suggested that environmental topics should be integrated into teaching training programs of all departments. There seems to be an urgent need for teacher training programs to include special courses related to environmental issues and equip preservice teachers with the necessary skills and knowledge of how to integrate environmental topics into their teachings. The environment is an issue concerning all disciplines and can be incorporated into all of them, which offers great avenues for interdisciplinary learning and exploration. In this manner, it becomes possible for a teacher to focus on environmental issues within diversified teaching contents without deviating from the core curriculum. In the 21st century, conservation and protection of the environment have become vital for the survival of humanity. Therefore, the protection of the environment must be one of the primary responsibilities of teachers in every discipline. Teachers, as shapers of the future, have the power to shape the society because of their profession. Thus, they should take responsibility for teaching environmental subjects and contribute to a sustainable future.

Kuzu, E., Karaoglu, M. ve Turemis, N. (2024). Exploring ecological literacy and environmental attitudes in preservice teachers for sustainable education. *Western Anatolia Journal of Educational Sciences, 15*(3), 3502-3518.
DOI. 10.51460/baebd.1585039

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Suggestions for Further Research

This study was conducted with the participation of students from one university. Therefore, the sample was limited. In this respect, it is suggested that more research should be conducted in the future to investigate the ecological literacy and environmental attitudes of preservice teachers in academic departments. Future research can also focus on carrying out comprehensive studies on the ecological literacy and environmental attitudes of preservice teachers among various academic disciplines through the use of different methodologies. For example, longitudinal studies may help explain how ecological literacy and environmental attitudes tend to change over time. Intervention studies can also portray how environmental educational implementation can influence students' ecological literacy skills. Lastly, investigations with broader samples can provide deeper information about their existing levels of ecological literacy, their environmental attitudes, and the extent to which they are likely to include environmental concerns in their teaching approaches.

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

References

Akçay, S., & Şengül, H. (2023). A Study on Environmental Literacy of Middle School Students. *Ahmet Keleşoğlu Eğitim Fakültesi Dergisi*, *5*(1), 139-169. https://doi.org/10.38151/akef.2023.48

Altınöz, N. (2010). *Environmental Literacy Levels of Prospective Science Teachers.* [Doctoral Dissertation]. Sakarya University. https://doi.org/10.33200/ijcer.566198

Atabek-Yiğit, E., Köklükaya, N., Yavuz, M., & Demirhan, E. (2014). Development and validation of environmental literacy scale for adults (ELSA*). Journal of Baltic Science Education, 13*(3), 425–435. http://dx.doi.org/10.33225/jbse/14.13.425

Berkowitz, A. R., Ford, M. E., & Brewer, C. A. (2005). A framework for integrating ecological literacy, civics literacy and environmental citizenship in environmental education. In E. Johnson & M. Mappin (Eds.), *Environmental education and advocacy: Changing perspectives of ecology and education* (pp. 227–266). Cambridge University Press.

Boehnert, J. (2015). Ecological literacy in design education: A theoretical introduction. *FormAkademisk*, *8*(1), 1– 11. https://doi.org/10.7577/formakademisk.1405

Chopra, R. (2016). Environmental degradation in India: Causes and consequences. *International Journal of Applied Environmental Sciences, 11*(6), 1593–1601.

Duman, F. K., & Yurtseven, C. N. (2022). Üniversite öğrencilerinin çevre okuryazarlık düzeylerinin incelenmesi. *Journal of ROL Sport Sciences*, *3*(1), 52-62. https://doi.org/10.29228/roljournal.54994

Erkol, M. & Erbasan, Ö. (2018). Investigation of teachers' environmental literacy in terms of some variables. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, *20*(3), 810-825. https://doi.org/10.17556/erziefd.446125

Grossman, P. L. (1995). Teachers' knowledge. In L. W. Anderson (Ed.), *International encyclopedia of teaching and teacher education* (2nd ed., pp. 20–24). Elsevier Science & Technology Books. https://doi.org/10.1371/journal.pone.0150648

Kablan, S. (2019). *Investigation of environmental literacy levels of secondary school students in terms of various variables* [Master's Thesis]. Gazi University

Kahyaoğlu, E. (2011). *An assessment of environmental literacy of Turkish science and technology teachers.* [Doctoral Dissertation]. Middle East Technical University.

Koc, I., & Kuvac, M. (2016). Preservice science teachers' attitudes toward environment. *International Journal of Environmental and Science Education*, *11*(13), 5925–5941.

Kuzu, E., & Çubukçu, F. (2023). Preservice teachers' ecological literacy dispositions: Ideology and praxis. *Ecolinguística: Revista brasileira de ecologia e linguagem (ECO-REBEL)*, *9*(1), 04-19.

Nunnally, J.C. (1978). *Psychometric theory* (2nd ed.). McGraw Hill.

Pitman, S. D., & Daniels, C. B. (2016). *Quantifying ecological literacy in an adult western community: The development and application of a new assessment tool and community standard. PLOS ONE, 11(3), e0150648.*

Pitman, S. D., Daniels, C. B., & Sutton, P. C. (2018). Ecological literacy and socio-demographics: Who are the most eco-literate in our community, and why? *International Journal of Sustainable Development & World Ecology*, *25*(1), 9–22. https://doi.org/10.1080/13504509.2016.1263689

Prastiwi, L., Sigit, D. V., & Ristanto, R. H. (2019). Ecological literacy, environmental awareness, academic ability and environmental problem-solving skills at Adiwiyata School. *Indonesian Journal of Science and Education*, *3*(2), 82-92. https://doi.org/10.31002/ijose.v3i2.1114

Şahin, M. (2015). *Investigation of secondary school students' environmental literacy levels.* [Master's Thesis]. Aksaray University. https://doi.org/10.46827/EJES.V0I0.1014

Şahin, N. & Gül, A. (2020). *Investigation of environmental literacy of secondary school students according to various variables.* [Master's Thesis]. Gazi University.

Kuzu, E., Karaoglu, M. ve Turemis, N. (2024). Exploring ecological literacy and environmental attitudes in preservice teachers for sustainable education. *Western Anatolia Journal of Educational Sciences, 15*(3), 3502-3518.
DOI. 10.51460/baebd.1585039

Batı Anadolu Eğitim Bilimleri Dergisi, (2024), 15 (3), 3502-3518.
Western Anatolia Journal of Educational Sciences, (2024), 15 (3), 3502-3518.
Araştırma Makalesi / Research Paper

Şahin, S., Ünlü, E., & Ünlü, S. (2016). Öğretmen Adaylarinin Çevre Okuryazarlik Farkindalik Düzeylerinin İncelenmesi. *Education Sciences*, *11*(2), 82-95. http://dx.doi.org/10.12739/N#SA.2016.11.2.1C0655

Şama, E. (2003). Öğretmen adaylarının çevre sorunlarına yönelik tutumları [Teacher candidates' attitudes toward environmental Problems]. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, *23*(2), 99-110.

Somashekara, M., & Praveena, K. B. (2021). A Comparative study on the environmental attitude and ecological behaviour among the postgraduate students. *Journal of Emerging Technologies and Innovative Research (JETIR)*, *8*(12), e502-e508.

Yiğit, S. (2023). *Examination of the environmental literacy levels of teachers in terms of various variables* [Master's Thesis]. Adıyaman University.

Yılmaz, M. A. (2021). A study on environmental literacy levels of social studies teacher candidates. *Review of International Geographical Education Online*, *11*(1), 21-41. https://doi.org/10.33403/rigeo.840387

Kuzu, E., Karaoglu, M. ve Turemis, N. (2024). Exploring ecological literacy and environmental attitudes in preservice teachers for sustainable education. *Western Anatolia Journal of Educational Sciences, 15*(3), 3502-3518.
DOI. 10.51460/baebd.1585039