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Ecological Citizenship and Environmental Participation among Pre-Service Teachers: An Explanatory Sequential Mixed Methods Study

Dilan Kuruyer[1] | | dilankuruyer1@gmail.com
Fırat University, Faculty of Education, Department of Social Sciences Education, Elazığ, Türkiye
Esen Durmuş | | esendurmus@firat.edu.tr
Fırat University, Faculty of Education, Department of Social Sciences Education, Elazığ, Türkiye

Abstract
The growing environmental challenges have increased the importance of environmental responsibility and active participation in addressing environmental issues. Therefore, it is crucial to determine the levels of ecological citizenship among pre-service teachers, who play a significant role in shaping future generations' environmental awareness and behaviors. The purpose of this study is to determine the levels of ecological citizenship among pre-service teachers and to examine the factors influencing these levels. The study was conducted using a mixed-methods approach following an explanatory sequential design. The quantitative component drew on data from 978 pre-service teachers enrolled in science, primary school, and social studies teacher education programs in the 2022–2023 academic year, while the qualitative component was based on interviews with 13 pre-service teachers. Descriptive statistics were employed to analyze the quantitative data, whereas the qualitative data were examined through content analysis. The results of the study revealed that the pre-service teachers' levels of ecological citizenship were moderate. Upon examining the sub-dimensions, it was observed that the participation dimension was at a lower level compared to the other dimensions. Furthermore, no significant differences were found in the overall ecological citizenship levels of the pre-service teachers according to gender, department, or university. However, statistically significant differences with small effect sizes were identified in some sub-dimensions according to gender and department, while no significant differences were observed in the sub-dimensions according to the university variable. Qualitative findings provided further explanations for the relatively low participation dimension, revealing that although pre-service teachers possessed environmental awareness and a sense of responsibility, they struggled to translate this awareness into action. In particular, an inability to break habits and a consumption-oriented lifestyle emerged as key factors limiting ecological citizenship behaviors. Furthermore, a lack of environmental awareness and insufficient interest in environmental issues were among the primary factors negatively affecting the pre-service teachers' levels of environmental participation.

Keywords: Ecological Citizenship, Environmental Participation, Pre-Service Teachers, Sustainability

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[1] Corresponding Author
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Introduction

Since the dawn of humanity, people have been in constant interaction with nature to sustain their lives and have utilized natural resources to meet their basic needs (Yüksel and Barut, 2023). While this interaction largely remained in balance until the Industrial Revolution, the Industrial Revolution brought about an increase in humanity's desire to dominate nature and a tendency to use natural resources as if they were unlimited (Görmez, 1991). Initially viewed as a natural consequence of development, this situation eventually transcended local impacts and led to the emergence of environmental problems on a global scale (Tıraş, 2012). As environmental problems have steadily increased and reached a scale affecting all of humanity, leading actors in the worlds of politics, education, and science have begun to place greater emphasis on the impacts of these issues. This issue, initially addressed at the local and national levels, has gradually taken on an international dimension (Ünal and Dımışkı, 1999). Efforts to find common solutions to environmental problems have been translated into concrete action through international conferences and signed agreements.

The United Nations Conference on the Human Environment, held in Stockholm, Sweden, in 1972, is recognized as the first event to address environmental issues on a global scale (United Nations, 1972). Following this conference, the role of environmental education in resolving environmental problems and ensuring sustainable development began to be emphasized more strongly at the international level (Teksöz, 2014). Following the Stockholm Conference, the International Environmental Education Program (IEEP) was launched in 1975 through a collaboration between UNESCO and the United Nations Environment Program (UNEP) to address gaps in the field of environmental education. Following regional meetings and seminars held under the program, a ministerial-level Conference on Environmental Education was organized in Tbilisi in 1977 through the collaboration of UNESCO and UNEP (Ünal and Dımışkı, 1999). At this conference, which defined the scope, objectives, and fundamental principles of environmental education, it was emphasized that environmental education should be provided to individuals of all ages and educational levels through both formal and non-formal education and should be sustained within the framework of lifelong learning (UNESCO, 1977). The 1987 Brundtland Report (Our Common Future), published later, made significant contributions to linking environmental education with the concept of sustainable development and highlighted the importance of raising environmentally conscious individuals in addressing environmental issues (Özdemir, 2022). At the 1992 Rio Summit, which followed this process, it was emphasized that people are at the center of sustainable development; attention was drawn to the necessity of all citizens' participation in solving environmental problems; and it was stated that environmental and sustainability issues must be integrated into educational programs (UN, 1992). An examination of international conferences and reports reveals that environmental education has evolved from an approach aimed solely at imparting knowledge about environmental issues to a framework that encourages individuals to participate in solving these problems. Along with this transformation, the concept of ecological citizenship has gained prominence as it emphasizes responsibility for environmental issues and participation in solution processes.

Ecological citizenship is frequently associated in the literature with concepts such as green citizenship, environmental citizenship, and sustainable citizenship, and is sometimes used interchangeably with these terms. However, while these concepts share similarities in some respects, they differ in others and carry distinct meanings (Karatekin and Uysal, 2018). According to Dobson (2003), environmental citizenship and ecological citizenship are politically complementary concepts. Although they are organized in different spheres, the common goal of both approaches is to contribute to the creation of a sustainable society. Ecological citizenship challenges traditional conceptions of political citizenship by transcending the relatively homogeneous frameworks of the nation-state and national community that have historically defined formal citizenship (Christoff, 1996). According to Horton (2005), citizenship represents a universal understanding in which all individuals living in the world unite around shared rights and responsibilities, transcending geographical boundaries and national identities. Ecological citizenship, on the other hand, extends the scope of rights and responsibilities beyond human relationships to include moral and political obligations between humans and nature. This concept emphasizes that individuals bear responsibilities not only toward one another but also toward the environment, and it demonstrates that no distinction can be made between duties toward the environment and responsibilities toward society (Light, 2006). Furthermore, these responsibilities extend beyond the current society to include future generations and diverse communities, thereby resting on a broader understanding of justice and sustainability. In this regard, ecological citizenship constitutes an important dimension of being a citizen in a global and interconnected world (Dobson, 2003). Therefore, citizenship in an ecological society means upholding responsibilities aimed at ensuring both human and ecological justice (Curtin, 1999).

The literature highlights four fundamental dimensions of ecological citizenship: responsibility, sustainability, rights and justice, and participation. Individuals possessing these qualities are defined as those who fulfill their responsibilities toward the environment and possess an awareness of ecological citizenship (Karatekin and Uysal,

2018). Ecological citizens are individuals who take an active role in solving environmental problems and consider the environmental impacts of their behaviors in their daily lives. In this regard, ecological citizens have a lifestyle that differs from that of the average citizen (Bell, 2005). The key characteristics that distinguish an ecological citizen from others are a strong sense of justice, awareness of their ecological footprint, and the adoption of environmentally friendly behaviors (Jagers et al., 2014). Furthermore, ecological citizens hold the belief that their own lives are not superior to those of other living beings (Dobson, 2003). This understanding can also be associated with the concept of environmental identity, which emphasizes the place of individuals' relationship with the natural environment in their sense of self. Clayton et al. (2021) state that individuals with a strong environmental identity experience a sense of connection and interdependence with nature; this influences how they think about both nature and themselves and makes nature emotionally significant to them. These characteristics suggest that ecological citizenship extends beyond pro-environmental behaviors and constitutes a way of life that emphasizes responsibility toward the environment and all living beings. The widespread adoption of the concept of ecological citizenship in society depends on raising individuals who embrace this concept.

Education plays a key role in the transition from unsustainable to sustainable practices (Šulc et al., 2020). Promoting environmental citizenship and pro-environmental behaviors has become a key objective of environmental policies, particularly in Western countries. Since the 1980s, this concept has been closely linked to sustainable development policies and emerged in the 1990s as a central element of efforts to promote pro-environmental behavior (Pallett, 2017). Ecological citizenship education aims to foster awareness and responsibility regarding environmental sustainability among individuals (Kınacı and Durmuş, 2025). Through this education, the goal is for individuals to acquire the knowledge, skills, values, attitudes, and competencies necessary to contribute to solving environmental problems at the local, national, and global levels (ENEC, 2018). In this way, students will fulfill their environmental responsibilities while developing social awareness and playing an active role in shaping a sustainable future (Parra et al., 2020). Teachers play a crucial role in achieving the goals of ecological citizenship education. Teachers are not merely individuals who impart knowledge; they are also actors who guide students in developing environmental awareness and contribute to raising public awareness (Tunç and Yücedağlar, 2024). For this reason, it is of great importance to train teachers who have embraced the concept of sustainable development, possess a high level of environmental awareness, and share a vision of protecting the world (Acar, 2021).

However, Kollmuss and Agyeman (2002) note that although knowledge about environmental issues tends to become more extensive with increasing levels of education, more education does not necessarily translate into more pro-environmental behavior. This gap between knowledge and behavior can be understood through theoretical approaches that explain the factors involved in the emergence of behavior. According to the Theory of Planned Behavior (TPB), behavioral intention plays a central role in the performance of behavior; however, behavioral performance also depends on the availability of the necessary opportunities and resources (Ajzen, 1991). In the context of environmental behavior, the Responsible Environmental Behavior Model similarly emphasizes that awareness of an environmental problem and knowledge about the problem are prerequisites for action but are not sufficient on their own. Individuals also need to know appropriate action strategies, possess the skills to apply this knowledge, and have a desire to act. Moreover, situational factors such as economic constraints, social pressures, and opportunities for action may either facilitate or hinder the pathway to action (Hines et al., 1987). The Value-Belief-Norm (VBN) Theory provides a complementary perspective by focusing on the role of values, beliefs, and personal norms in pro-environmental action. The theory proposes a process in which an ecological worldview shapes awareness of the consequences of environmental problems, this awareness shapes the ascription of responsibility, and the ascription of responsibility, in turn, shapes personal norms toward environmental protection. In this process, personal norms create a predisposition toward pro-environmental action (Stern et al., 1999). Taken together, these theoretical approaches suggest that the translation of environmental knowledge and awareness into behavior depends not only on individuals' knowledge of environmental issues but also on behavioral intention, personal norms, action skills, and contextual conditions that may facilitate or constrain behavior.

A review of the relevant literature reveals various studies on ecological citizenship (Akdeniz and Durmaz, 2024; Aksüt, 2026; Altın and Akcanca, 2023; Anantharaman, 2014; Dallı, 2024; Durgun, 2022; Erşan and Öner, 2022; Green et al., 2016; Karaman et al., 2024; Karatekin, 2019; Karatekin et al., 2019; Kaya Aydın, 2022; Koca and Çobanoğlu, 2024; Lummis et al., 2017; Uysal, 2018; Ünal, 2019; Yılmaz et al., 2019; Yurttaş et al., 2021). A significant portion of the existing research focuses on determining the levels of ecological citizenship among different sample groups. These studies have generally found that ecological citizenship levels are moderate and that the participation dimension tends to be lower than the other dimensions. However, existing research has paid

limited attention to explaining the factors underlying this lower participation. Therefore, this study aims not only to determine the levels of ecological citizenship among pre-service teachers but also to examine the factors influencing ecological citizenship and, particularly, to provide in-depth explanations for the lower participation dimension through qualitative findings. The sub-objectives of the study are as follows:

- What are the levels of ecological citizenship among pre-service teachers?
- Do pre-service teachers' levels of ecological citizenship show significant differences based on gender, department, and university?
- What are the factors influencing pre-service teachers' levels of ecological citizenship?

Method

Research Design

The study was designed using an explanatory sequential mixed-methods approach. This design begins with the collection and analysis of quantitative data, which is subsequently followed by a qualitative phase aimed at providing a more detailed explanation of the quantitative results. The results of the quantitative and qualitative data, analyzed separately, are brought together at a specific stage of the research process and interpreted holistically (Creswell and Plano Clark, 2018).

In this study, following the explanatory sequential design, the levels of ecological citizenship among pre-service teachers were first determined and examined in terms of various variables. Based on the findings from the quantitative phase, the qualitative research process was planned; the aim of this phase was to examine in detail the factors influencing the pre-service teachers' levels of ecological citizenship. In the results section of the study, the quantitative and qualitative findings were combined and interpreted.

Study Group

The study sample comprised 978 prospective teachers enrolled in science education, primary school teacher education, and social studies teacher education programs at public universities in Turkey during the 2022–2023 academic year. The prospective teachers were selected using a stratified sampling method. This method aims to identify subgroups within the population and include them in the sampling process in proportion to their representation in the population (Büyüköztürk et al., 2018).

The universities included in the study were divided into 12 (Level I) strata based on the Statistical Regional Unit Classification, taking into account Turkey's regional differences. After the universities in each stratum were identified, their names were written on slips of paper and placed into 12 bags, and one university was selected for each stratum using a simple random sampling method. This approach was preferred to increase sample representativeness and support the generalizability of the study findings. Since the data collection process coincided with the earthquakes centered in Kahramanmaraş that occurred on February 6, 2023, data could not be collected from the university located in the TRC region. Information regarding the demographic characteristics of the pre-service teachers is presented in Table 1.

Table 1. Demographic characteristics of participants

			n	%
Gender	Male		264	27.0
	Female		714	73.0
Department	Science Teacher Education		140	14.3
	Primary School Teacher Education		390	39.9
	Social Studies Teacher Education		448	45.8
University	TR1	University 1	118	12.1
	TR2	University 2	89	9.1
	TR3	University 3	71	7.3
	TR4	University 4	83	8.5
	TR5	University 5	95	9.7
	TR6	University 6	91	9.3
	TR7	University 7	84	8.6
	TR8	University 8	78	8.0
	TR9	University 9	81	8.3

	TRA	University 10	82	8.4
	TRB	University 11	106	10.8
	TRC	University 12	0	0
Total			978	100

As shown in Table 1, 978 pre-service teachers participated in the quantitative phase of the study. Interviews were carried out with 13 volunteer pre-service teachers recruited from the participants in the quantitative phase.

Data Collection Tools

Data for the study were collected using the Ecological Citizenship Scale and a semi-structured interview form.

Ecological Citizenship Scale: The quantitative data for this study were collected using the Ecological Citizenship Scale developed by Karatekin and Uysal (2018), which consists of four subscales and a total of 24 items. The scale's overall Cronbach's alpha coefficient was calculated as .901. The internal consistency coefficients for the subscales were found to be .865, .762, .745 and .636, respectively. These results indicate that the scale is generally reliable. A five-level classification (1–1.80 very low, 1.81–2.60 low, 2.61–3.40 moderate, 3.41–4.20 high, and 4.21–5.00 very high) was used to determine the levels of ecological citizenship among pre-service teachers (Karatekin, Salman, and Uysal, 2019).

Semi-Structured Interview Form**:** The semi-structured interview form used in the qualitative phase of the study was developed by the researchers. The interview questions were developed in line with the objectives of the explanatory sequential mixed-methods design, with particular attention given to the findings of the quantitative phase and the areas that required deeper exploration. Prior to finalizing the interview questions, feedback was obtained from two faculty members specializing in social studies education and science education. The interview form was then revised in line with their recommendations and finalized accordingly. The questions included in the interview form are as follows:

- Do you consider yourself an ecological citizen?
- What factors influence your status as an ecological citizen?
- How would you assess your environmental participation?
- What factors influence your environmental participation?

Data Collection Procedure

This study was approved by the Social and Human Sciences Research Ethics Committee of Fırat University (Decision No. 12172, November 15, 2022). Quantitative data were collected via Google Forms. Before completing the questionnaire, participants were informed about the purpose of the study, the voluntary nature of participation, and the confidentiality of their responses. At the end of the questionnaire, participants who wished to participate in the qualitative phase were asked to provide their contact information voluntarily. The pre-service teachers who voluntarily provided their contact information were grouped according to their universities to ensure diversity in the qualitative sample. One participant was randomly selected from each university group. If the selected volunteer could not be reached or declined to participate in the interview, another volunteer from the same university group was contacted. The number of participants was determined based on the principle of data saturation (Guest et al., 2006). Accordingly, interviews were initially conducted with one participant from each of the 11 universities included in the study. Subsequently, two additional interviews were conducted to assess data saturation. As the data began to repeat and no substantially new information emerged, data collection was concluded after 13 interviews. Before the interviews, participants were informed about the purpose of the study, the confidentiality of their identities and responses, and the audio recording of the interviews, after which their informed consent for participation and audio recording was obtained. The quantitative findings informed the focus of the qualitative phase but were not used as a criterion for participant selection.

Data Analysis

Quantitative data were analyzed using SPSS 27. To determine the suitability of the data for parametric tests, the dataset was examined to see if it followed a normal distribution. In this context, the Kolmogorov-Smirnov test was conducted, and the skewness and kurtosis coefficients were examined. To determine the reliability of the

measurement instrument, Cronbach's Alpha coefficients were calculated for the scale and its subscales. The results of the normality and reliability analyses are presented in Table 2.

Table 2. Normality and reliability analysis results for the scale

Scale	n	Kolmogorov-Smirnov (p)	Skewness	Kurtosis	Cronbach's Alpha
Participation	978	.000	.347	-.528	.907
Sustainability	978	.000	-.347	-.181	.815
Responsibility	978	.000	-.258	-.456	.827
Rights and Justice	978	.000	-.990	.635	.678
Ecological Citizenship Scale	978	.071*	.107	-.232	.922

*p > .05

An examination of Table 2 reveals that, according to the Kolmogorov-Smirnov test, the scale as a whole exhibits a normal distribution, whereas the subscales do not. However, the fact that the skewness and kurtosis values fall within the range of -2 to +2 indicates that the data conform to a normal distribution (George and Mallery, 2010). Furthermore, Cronbach's alpha coefficients were examined, and the scale was determined to be reliable (Nunnally, 1967). Since the data met the assumption of normal distribution, parametric tests were used in the analyses. The independent samples t-test was applied for comparisons between two groups, while one-way analysis of variance was used for variables with three or more groups. When significant differences were detected, appropriate Post Hoc tests were used, taking into account the homogeneity of variances. Furthermore, Cohen's d and eta-squared (η^2) effect size values were calculated to determine the magnitude of the differences. In interpreting effect sizes, the following thresholds were used: for Cohen's d, 0.20 was considered a small effect, 0.50 a moderate effect, and 0.80 or higher a large effect; for eta-squared, 0.01–0.06 was considered a small effect, 0.06–0.14 a moderate effect, and ≥0.14 a large effect (Cohen, 1988; Field, 2013).

Content analysis was used to analyze the qualitative data. Content analysis is a systematic process consisting of the stages of coding, categorization, comparison, and drawing conclusions (Cohen et al., 2021). The interviews, which were conducted via an online meeting platform and recorded, were transcribed and then coded as P1 (Participant 1) … P13. The data were subsequently imported into the MAXQDA 2022 software and analyzed using an open coding method with an inductive approach. During this process, the interview transcripts were examined to transform meaningful statements into codes, and similar and related codes were grouped under common subthemes. Prominent themes were identified by determining the frequency of code recurrence, and the findings were visualized in the form of a model. The coding process was carried out collaboratively, with the researchers jointly reviewing coding decisions, discussing differences, and refining the coding scheme. Such iterative review and discussion of coding decisions contribute to the consistency of the coding framework in qualitative content analysis (Schreier, 2012). Accordingly, rather than reporting an intercoder agreement coefficient, differences in coding were resolved through discussion, and final coding decisions were made by consensus.

Various strategies were employed to ensure the validity and reliability of the research. According to Miles et al. (2023), the effective use of strategies for verifiability, auditability, credibility, and transferability enhances the reliability of the research. Accordingly, as part of verifiability, the coding and analysis process was documented and reviewed by another researcher. To ensure auditability, the data collection and analysis processes were defined in a detailed and transparent manner. To enhance credibility, both researchers were involved in the coding process, and consensus was reached. Regarding transferability, participant characteristics were described in detail in accordance with the principle of confidentiality, with the aim of ensuring that the findings contribute to similar studies.

Findings

Pre-service Teachers' Levels of Ecological Citizenship

The levels of ecological citizenship among pre-service teachers are presented in Table 3.

Table 3. Pre-service teachers' levels of ecological citizenship

Scale	n	M	SS
Participation	978	2.68	1,018
Sustainability	978	3.64	.786
Responsibility	978	3.49	.868

Rights and Justice	978	4.27	.722
Ecological Citizenship Scale	978	3.36	.710

According to Table 3, the level of ecological citizenship among pre-service teachers is moderate. Upon examining the sub-dimensions, it was determined that they exhibit a very high level of ecological citizenship in the "Rights and Justice" dimension, a high level in the "Sustainability" and "Responsibility" dimensions, and a moderate level in the "Participation" dimension.

Pre-service Teachers' Levels of Ecological Citizenship by Gender

The results of the independent samples t-test showing whether pre-service teachers' levels of ecological citizenship differ according to the gender variable are presented in Table 4.

Table 4. Independent samples t-test results according to the gender variable

Scale	Group	n	M	SS	t	Sd	p	Cohen's d
Participation	Male	264	2.71	1.110	.455	976	.649	
	Women	714	2.67	.983				
Sustainability	Male	264	3.53	.886	-2.458	976	.014*	-.192
	Women	714	3.68	.742				
Responsibility	Male	264	3.40	.931	-1.901	976	.058	
	Women	714	3.52	.842				
Rights and Justice	Male	264	4.14	.787	-3.287	976	.001*	-.251
	Women	714	4.32	.691				
Ecological Citizenship Scale	Male	264	3.30	.794	-1.558	976	.120	
	Women	714	3.39	.676				

*p<.05

Upon examining Table 4, it is observed that there is no statistically significant difference in pre-service teachers' overall ecological citizenship scores based on the gender variable. When evaluated in terms of sub-dimensions, statistically significant differences in favor of female pre-service teachers were identified in the dimensions of sustainability and rights and justice. However, upon examining the calculated effect size values, it is seen that these differences are small. In the participation and responsibility dimensions, however, no statistically significant difference was found based on the gender variable.

Pre-service Teachers' Levels of Ecological Citizenship by Department

The results of the one-way analysis of variance showing whether pre-service teachers' levels of ecological citizenship differ according to the department variable are presented in Table 5.

Table 5. Results of the one-way analysis of variance according to the department variable

Scale	Group	n	M	SS	SD	F	p	Post Hoc/Eta Squared (η^2)
Participation	A) Science	140	2.70	1.086	2	1,450	.235	
	B) Primary	390	2.62	1.003				
	C) Social Studies	448	2.74	1.008				
	Total	978	2.68	1,018				
Sustainability	A) Science	140	3.79	.745	2	3.310	.037 *	a>b (Scheffe)
	B) Primary	390	3.60	.734				
	C) Social Studies	448	3.64	.836				.007
	Total	978	3.64	.786				
Responsibility	A) Science	140	3.56	.883	2	1,460	.233	
	B) Primary	390	3.43	.852				
	C) Social Studies	448	3.51	.876				
	Total	978	3.49	.868				
Rights and Justice	A) Science	140	4.28	.633	2	.974	.378	
	B) Primary	390	4.23	.737				

	C) Social Studies	448	4.30	.735			
	Total	978	4.27	.722			
Ecological Citizenship Scale	A) Science	140	3.43	.740	2	2,104	.123
	B) Primary	390	3.31	.684			
	C) Social Studies	448	3.39	.722			
	Total	978	3.36	.710			

*p<.05

Upon examining Table 5, it is observed that there is no statistically significant difference in pre-service teachers' overall ecological citizenship scores based on the department variable. When evaluated in terms of sub-dimensions, however, a statistically significant difference based on the department variable was determined only in the sustainability dimension. According to the Scheffe test results, a statistically significant difference was observed between science pre-service teachers and primary school pre-service teachers, favoring the science pre-service teachers. However, the calculated effect size indicates that this difference is small. No statistically significant differences were found based on the department variable in the participation, responsibility, and rights and justice dimensions.

Pre-service Teachers' Levels of Ecological Citizenship by University

The results of the one-way analysis of variance showing whether pre-service teachers' levels of ecological citizenship differ according to the university variable are presented in Table 6.

Table 6. Results of the one-way analysis of variance according to the university variable

Scale	Group	n	M	SS	SD	F	p
Participation	a) University 1	118	2.69	1.087	10	1.562	.113
	b) University 2	89	2.72	.980			
	c) University 3	71	2.51	1.060			
	d) University 4	83	2.60	1.070			
	e) University 5	95	2.51	.862			
	f) University 6	91	2.85	1.127			
	g) University 7	84	2.68	.891			
	h) University 8	78	2.65	.951			
	i) University 9	81	2.85	1.032			
	j) University 10	82	2.53	.929			
	k) University 11	106	2.86	1.097			
	Total	978	2.68	1.018			
Sustainability	a) University 1	118	3.72	.824	10	1.192	.292
	b) University 2	89	3.52	.771			
	c) University 3	71	3.54	.806			
	d) University 4	83	3.69	.828			
	e) University 5	95	3.66	.688			
	f) University 6	91	3.65	.889			
	g) University 7	84	3.67	.705			
	h) University 8	78	3.62	.772			
	i) University 9	81	3.74	.713			
	j) University 10	82	3.46	.814			
	k) University 11	106	3.73	.789			
	Total	978	3.64	.786			
Responsibility	a) University 1	118	3.45	.952	10	1.005	.437
	b) University 2	89	3.64	.769			
	c) University 3	71	3.45	.866			
	d) University 4	83	3.49	.889			
	e) University 5	95	3.47	.771			
	f) University 6	91	3.47	.978			
	g) University 7	84	3.52	.801			
	h) University 8	78	3.46	.811			
	i) University 9	81	3.58	.822			
	j) University 10	82	3.27	.913			

	k) University 11	106	3.55	.902			
	Total	978	3.49	.868			
Rights and Justice	a) University 1	118	4.21	.747	10	1.508	.131
	b) University 2	89	4.27	.775			
	c) University 3	71	4.37	.639			
	d) University 4	83	4.37	.614			
	e) University 5	95	4.21	.721			
	f) University 6	91	4.22	.861			
	g) University 7	84	4.21	.722			
	h) University 8	78	4.13	.745			
	i) University 9	81	4.43	.646			
	j) University 10	82	4.20	.733			
	k) University 11	106	4.37	.657			
	Total	978	4.27	.722			
Ecological Citizenship Scale	a) University 1	118	3.37	.769	10	1.245	.258
	b) University 2	89	3.38	.656			
	c) University 3	71	3.28	.741			
	d) University 4	83	3.36	.722			
	e) University 5	95	3.30	.591			
	f) University 6	91	3.41	.832			
	g) University 7	84	3.37	.647			
	h) University 8	78	3.32	.672			
	i) University 9	81	3.49	.686			
	j) University 10	82	3.19	.709			
	k) University 11	106	3.48	.728			
	Total	978	3.36	.710			

*p<.05

Table 6 shows that there is no statistically significant difference in pre-service teachers' overall ecological citizenship scores based on the university variable. An analysis of the subdimensions also revealed no statistically significant differences based on the university variable in the dimensions of participation, sustainability, responsibility, and rights and justice.

Factors Affecting Pre-service Teachers' Levels of Ecological Citizenship

Quantitative analyses revealed that pre-service teachers' levels of ecological citizenship were moderate and that the participation dimension was lower compared to the other dimensions. Therefore, in the qualitative phase of the study, the factors influencing pre-service teachers' levels of ecological citizenship and the factors influencing the participation dimension were examined.

Based on their responses, pre-service teachers' self-identification as ecological citizens was classified into three categories: "yes," "partially," and "no." The results of this classification are presented in Table 7.

Table 7. Distribution of pre-service teachers' self-identification as ecological citizens

Categories	Participant Codes	f
Yes	P2, P13	2
Partially	P1, P3, P4, P8, P10, P11, P12	7
No	P5, P6, P7, P9	4

Table 7 indicates that the majority of the interviewed pre-service teachers identified themselves as partially ecological citizens. In addition, four pre-service teachers do not identify as ecological citizens, whereas only two identify themselves as ecological citizens.

The model depicting the factors affecting pre-service teachers' levels of ecological citizenship is presented in Figure 1.

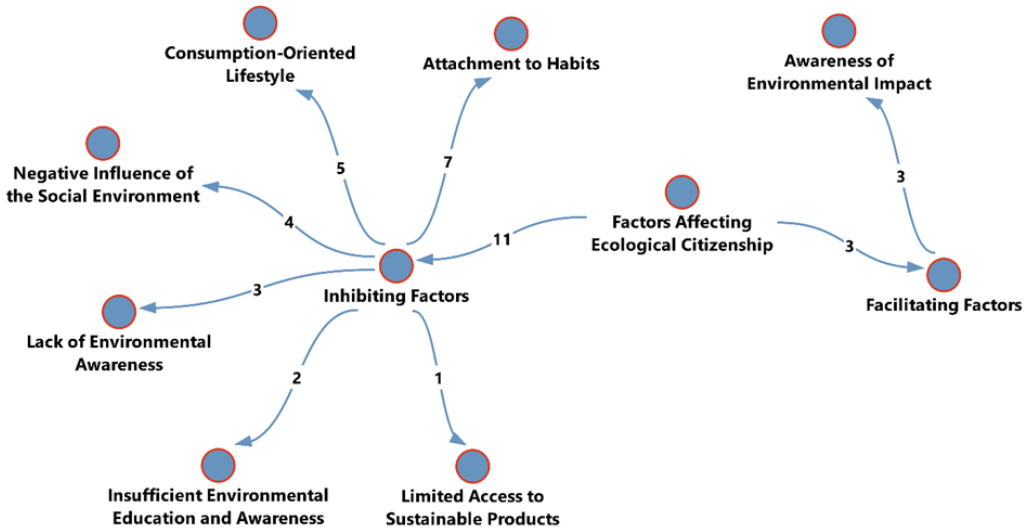

Figure1 . Model of factors affecting pre-service teachers' levels of ecological citizenship

As shown in Figure 1, based on pre-service teachers' views, the factors influencing ecological citizenship were categorized into two groups: inhibiting and facilitating factors. The findings indicate that inhibiting factors are more prominent. In particular, attachment to existing habits was identified as a key barrier to adopting ecological citizenship behaviors. A consumption-oriented lifestyle was also reported as another factor hindering the adoption of such behaviors. Some pre-service teachers stated that they struggled to maintain ecological citizenship practices due to the influence of their social environment. Others indicated that insufficient environmental awareness, along with a lack of adequate education and awareness-raising, negatively affected the development of ecological citizenship behaviors. In addition, difficulties in accessing sustainable products were also identified as a barrier. On the other hand, awareness of the environmental impacts of non-ecological behaviors was found to encourage the adoption of ecological citizenship behaviors. Sample quotations from pre-service teachers are presented below.

P1. *"To a moderate extent. No matter how much I think of myself as an ecological citizen, I still have shortcomings. It's partly because we're used to it, because we've fallen into a rut… We don't step outside our comfort zones. We don't dare to try something different, as if it were something entirely new. Actually, if we tried it, it wouldn't be that different. Using glass bottles instead of plastic ones isn't that different—in fact, they're healthier and of higher quality. But we still can't give them up because we're so used to them. This can be an obstacle. Some things can change, but there are still aspects that remain the same. For example, the madness of consumption… Everyone gets caught up in that madness. Some things can change, some can't, but a complete transformation isn't really possible."*

P8. *"Partially. I mean, compared to the general public, I think I'm more conscious, but compared to those who are really good at this, I'm still not doing well. Because while we're developing eco-friendly habits, we also have to step outside the habits we've been accustomed to for years. In a way, you're stepping outside your comfort zone. This inevitably challenges people. This is also why many people are aware of the issue but choose to ignore it—they don't want to step outside their comfort zone. That's why I struggle with these issues as well. Plus, I think the people around me are unaware of this issue, and as you try to raise awareness, there's a segment that says things like, "What's this about climate change? With so many other problems—economic issues, for instance—are you really going to worry about climate change? Should we be thinking about global warming? We already have enough resources." And then there's another segment that doesn't care at all. Another group looks at it this way: "Yes, they're aware and conscious, but they're not doing anything about it." So, when I say to people around me, "I'm paying attention to this," they might respond, "Are you really going to worry about that?" and actually make me feel like I'm being pushed to the margins of society.*

P13. *"Yes, I see myself as an eco-conscious citizen. Because, within my financial means, I try to incorporate environmental ethics into my decision-making process as much as I can. I try to take actions that contribute to ecological sustainability and make choices that are good for the environment. Do I ever struggle? Of course I do. For example, sometimes it's a problem because eco-friendly products are expensive or hard to find. But aside from that, I try to be mindful of issues like waste management, recycling, conservation, and avoiding waste."*

Factors Affecting Pre-service Teachers' Environmental Participation

Pre-service teachers' levels of environmental participation were classified into three categories based on their responses: "no participation," "symbolic participation," and "active participation." The results of this classification are presented in Table 8.

Table 8. Pre-service teachers' environmental participation status

Categories	Participant Codes	f
No Participation	P2, P3, P4, P5, P7, P9, P11	7
Symbolic Participation	P1, P6, P8, P10, P12, P13	6
Active Participation	-	0

All interviewed pre-service teachers reported either no participation in environmental issues or only symbolic participation, typically limited to activities such as recycling and sharing environmental content on social media. In contrast, none reported active and regular participation in environmental campaigns or civil society organizations.

The model depicting the factors affecting pre-service teachers' environmental participation is presented in Figure 2.

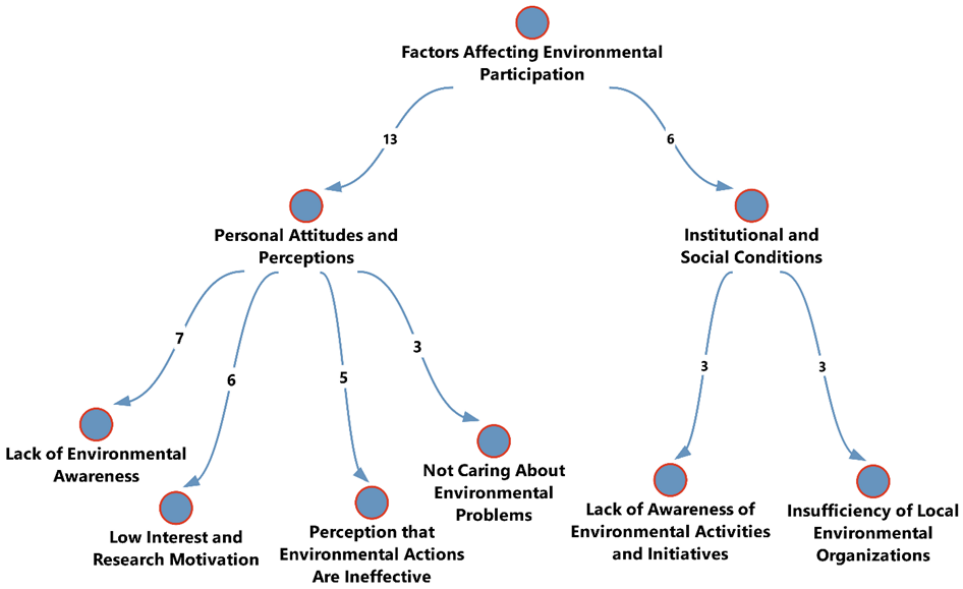

Figure2 . Model of factors affecting environmental participation

According to Figure 2, the factors influencing pre-service teachers' environmental participation within the context of ecological citizenship are categorized into two groups: personal attitudes and perceptions, and institutional and social conditions. The findings indicate that factors related to personal attitudes and perceptions are the most influential in shaping environmental participation. In particular, insufficient environmental awareness, along with a lack of interest in and motivation to explore environmental issues, were identified as major barriers. In addition, some pre-service teachers reported that they did not engage in environmental participation because they perceived environmental actions as ineffective and believed that environmental issues were not taken seriously enough. Beyond personal factors, others noted that limited awareness of available environmental activities and the inadequacy of local environmental organizations also hindered participation. Sample views of pre-service teachers are presented below.

P7. *"No. Because I've never come across any environmental events or organizations in my area. So I haven't participated. But if there were any, I would definitely participate. For example, when I see something like trash somewhere, it bothers me. But it just bothers me—I don't take action. Because there's nowhere for us to complain about it. Also, I don't think taking action would lead to any results."*

P10**.** *"I haven't participated in any campaigns or mass movements. However, on an individual basis, I took part in a tree-planting event organized when I was in first grade. To give another example, some of the animals living*

on our street had eye infections, while others were limping. I called the authorities and reported the situation. I told them, 'There's a problem here.' ... Other than that, I haven't been involved in anything else. Actually, there's no obstacle preventing me from doing so—it's entirely due to my own lack of motivation. Since I don't have a particular interest in this issue, I haven't done any further research on it either. Actually, I have the necessary information, but I believe I can only influence events within my own immediate circle. I don't think my own efforts will make a difference or bring about any change. That's why I don't participate in social movements."

Joint Display of Quantitative and Qualitative Findings

To integrate the quantitative and qualitative findings, a joint display was developed to present the key quantitative results alongside the corresponding qualitative findings and their explanations (Fetters et al., 2013). The qualitative findings were used to elaborate on and explain the quantitative findings that required further interpretation, particularly the moderate level of overall ecological citizenship and the lower participation dimension. Table 9 presents the integration of the quantitative and qualitative findings.

Table 9. Joint display of quantitative and qualitative findings

Quantitative Findings	Qualitative Findings	Integration / Explanation
Pre-service teachers' overall ecological citizenship was at a moderate level.	Most of the pre-service teachers who participated in the interviews described themselves as partially ecological citizens. They emphasized that attachment to existing habits, a consumption-oriented lifestyle, and negative influences from their social environment limited their ecological citizenship.	The qualitative findings help explain the moderate level of ecological citizenship by showing how existing habits, a consumption-oriented lifestyle, and social influences may constrain the translation of ecological citizenship into daily practices.
The participation dimension had a lower mean score than the sustainability, responsibility, and rights and justice dimensions.	All interviewed pre-service teachers reported either no participation in environmental activities or only symbolic participation. They identified insufficient environmental awareness, a lack of interest in environmental issues and motivation to seek information about them, and the belief that environmental actions were ineffective as personal factors limiting their participation. They also highlighted contextual factors, including a lack of awareness of available environmental activities and the insufficiency of local environmental organizations.	The qualitative findings explain the lower participation score. The predominantly symbolic nature of environmental participation, together with personal and contextual barriers, helps explain why participation was lower than the other dimensions of ecological citizenship.

Discussion and Conclusion

This study examined pre-service teachers' levels of ecological citizenship and the factors influencing these levels. The findings revealed that pre-service teachers exhibit a moderate level of ecological citizenship. Consistent with much of the existing literature, similar studies conducted with university students and pre-service teachers have also reported moderate levels of ecological citizenship (Akdeniz and Durmaz, 2024; Altın and Akcanca, 2023; Çiçek et al., 2024; Durgun, 2022; Karaman et al., 2024; Karatekin, 2019; Karatekin et al., 2019; Uysal and Karatekin, 2022). In contrast, Yurttaş et al. (2021) found that primary and preschool teachers demonstrate high levels of ecological citizenship. With regard to the subdimensions, pre-service teachers were found to have very high levels of ecological citizenship in the rights and justice dimension, high levels in the responsibility and sustainability dimensions, and moderate levels in the participation dimension. Similar studies in the literature have also reported that the participation dimension is lower than the other subdimensions (Akdeniz and Durmaz, 2024; Altın and Akcanca, 2023; Çiçek et al., 2024; Durgun, 2022; Ercan and Palaz, 2025; Erşan and Öner, 2022; Karaman et al., 2024; Karatekin et al., 2019; Uysal and Karatekin, 2022; Yurttaş et al., 2021). These findings

suggest that, although pre-service teachers' ecological citizenship levels are generally moderate, they demonstrate higher awareness in the rights and justice, responsibility, and sustainability dimensions. However, the comparatively lower level of the participation dimension indicates a need for further development in the behavioral aspect of ecological citizenship.

The analysis conducted based on the gender variable revealed that there was no statistically significant difference in pre-service teachers' overall ecological citizenship scores. Similarly, other studies in the literature have also failed to identify a significant difference based on the gender variable (Akdeniz and Durmaz, 2024; Ercan and Palaz, 2025; Kaya Aydın, 2022; Uysal and Karatekin, 2022; Ünal, 2019; Yılmaz et al., 2019). When the sub-dimensions were examined, although female pre-service teachers were found to have higher levels than male pre-service teachers in the sustainability and rights and justice dimensions, the effect sizes of these differences were found to be small. Similarly, in the literature, studies by Çiçek et al. (2024) and Karaman et al. (2024) found that women scored higher on both the sustainability and rights and justice dimensions. Uysal and Karatekin (2022) and Yılmaz et al. (2019), on the other hand, identified statistically significant differences in favor of women in the rights and justice dimension. The study found no statistically significant gender-based differences in the participation and responsibility dimensions. In contrast, the literature includes studies showing significant differences in favor of female pre-service teachers in the responsibility dimension (Çiçek et al., 2024; Karaman et al., 2024; Kaya Aydın, 2022). When examining the findings related to the participation dimension, while some studies found no statistically significant gender-based differences (Çiçek et al., 2024; Karaman et al., 2024), others reported results favoring male pre-service teachers (Durgun, 2022; Erşan and Öner, 2022; Uysal and Karatekin, 2022). However, these studies did not report effect sizes. When the findings of the current study are evaluated in conjunction with the existing literature, it can be concluded that, although statistically significant gender-based differences were found in some subdimensions, no statistically significant difference was observed in the overall ecological citizenship score.

As a result of the analyses conducted in terms of the department variable, it was determined that pre-service teachers' overall ecological citizenship scores did not show a statistically significant difference based on the department variable. Similarly, studies in the literature also indicate that there is no significant difference based on the department variable (Karaman et al., 2024; Karatekin et al., 2019; Yurttaş et al., 2021). When the subdimensions were examined, no statistically significant differences were found in the dimensions of participation, responsibility, and rights and justice. Although it was determined that science pre-service teachers' levels were higher than those of primary school pre-service teachers in the sustainability dimension, the effect size was found to be small. In the study conducted by Karatekin et al. (2019), however, it was stated that primary school pre-service teachers' levels were higher than those of social studies pre-service teachers in the responsibility dimension. Although the number of studies in the literature examining the department variable is limited, when the findings of the current study are evaluated in conjunction with the relevant literature, it can be stated that although statistically significant department-based differences are observed in some subdimensions, there is no significant difference in overall ecological citizenship levels.

As a result of analyses conducted based on the university variable, it was determined that pre-service teachers' overall ecological citizenship scores did not show a statistically significant difference based on the university they attended. Similarly, no significant differences were found among pre-service teachers based on the universities they attended in the subdimensions of participation, responsibility, sustainability, and rights and justice. A study conducted by Durgun (2022) also found that there was no statistically significant difference in pre-service teachers' levels of ecological citizenship based on where they lived. While a review of existing studies on the university variable suggests that this variable does not produce a significant difference in levels of ecological citizenship, a definitive generalization on this matter cannot be made due to the limited number of studies in the literature.

The qualitative findings of the study support the quantitative findings and provide explanations for the moderate level of ecological citizenship. Many of the interviewed pre-service teachers described themselves as either partially ecological citizens or not ecological citizens. Although the pre-service teachers stated that they had environmental awareness, they reported difficulties in translating this awareness into behavior in their daily lives. This finding is consistent with Bamberg and Möser (2007), who indicated that environmental problem awareness plays an important but indirect role in pro-environmental behavior. In particular, difficulty in changing long-established habits, the adoption of a consumption-oriented lifestyle, and negative influences from the social environment (being belittled or receiving no support) emerged as key factors limiting ecological citizenship behaviors. These findings are also consistent with Kollmuss and Agyeman (2002), who argue that pro-environmental behavior is shaped by the interaction of various internal and external factors. Kollmuss and

Agyeman (2002) particularly emphasize that established behavioral patterns can constitute a significant barrier to pro-environmental behavior. These findings can also be interpreted within the framework of the Responsible Environmental Behavior Model. Hines et al. (1987) emphasize that situational factors, such as economic constraints, social pressures, and opportunities for action, may either facilitate or hinder the pathway to responsible environmental behavior. In this context, the difficulties experienced by pre-service teachers in translating their environmental awareness into behavior highlight the role of established habits and other individual and contextual factors in the gap between environmental awareness and behavior.

The quantitative findings of the study showed that pre-service teachers' levels in the participation dimension were lower than those in the sustainability, responsibility, and rights and justice dimensions. The qualitative findings provide explanations for this difference. It was found that all interviewed pre-service teachers either did not engage in any environmental activities or participated only at a symbolic level, such as recycling or sharing environmental content on social media. According to the pre-service teachers, the reasons for this situation include individual attitudes and perceptions such as a lack of environmental awareness, low levels of interest and motivation, the perception that environmental actions are ineffective, and the failure to give sufficient importance to environmental issues. Among these factors, insufficient environmental awareness and low levels of interest and motivation to seek information about environmental issues were particularly prominent. Although environmental awareness alone may not be sufficient to encourage active environmental participation, it is positively associated with pro-environmental behavior; as environmental awareness increases, individuals tend to engage more in environmentally friendly behaviors (Mkumbachi et al., 2020). From this perspective, insufficient environmental awareness and low levels of interest and motivation to seek information about environmental issues among pre-service teachers may be considered among the reasons why their environmental participation remained lower than the other dimensions of ecological citizenship. According to the pre-service teachers, another reason for their limited environmental participation was the perception that environmental actions are ineffective. Individuals' beliefs that environmental actions are effective and that their own contributions can make a difference are important for environmental participation. Van Zomeren et al. (2013) demonstrated the importance of believing that one's own contribution can make a difference in collective efforts for participation in collective action, while Bamberg et al. (2015) showed the relevance of this relationship in the context of participation in collective environmental action. Accordingly, pre-service teachers' belief that environmental actions are ineffective may be considered one of the reasons for their limited environmental participation. In addition, contextual factors such as a lack of awareness of environmental activities and the inadequacy of local environmental organizations were identified as barriers to environmental participation. Green et al. (2016) found that participation in an environmental action project contributed to the development of pre-service teachers' environmental citizenship. Therefore, providing opportunities for active involvement in environmental activities may play an important role in strengthening environmental participation and ecological citizenship. Taken together, these findings suggest that the relatively lower level of environmental participation, despite higher levels in the other dimensions of ecological citizenship, may be explained by the combined influence of insufficient environmental awareness and motivation, perceptions of the ineffectiveness of environmental actions, and limited opportunities for active participation.

Recommendations

In this study, the researchers went beyond simply determining pre-service teachers' levels of ecological citizenship; instead, they employed a mixed-methods approach to evaluate both quantitative and qualitative data together. Thus, pre-service teachers' levels of ecological citizenship were not merely presented descriptively; the factors influencing these levels were also analyzed in depth. In particular, by explaining the effects of factors such as individual attitudes, lifestyle habits, and environmental awareness on ecological citizenship through qualitative data, a significant contribution has been made to the literature.

However, the study has some limitations. One university from the TRC region could not be included in the sample due to the Kahramanmaraş earthquakes that occurred on February 6, 2023. Consequently, not all geographical regions of Türkiye were represented in the study. In addition, the predominance of female participants in the sample should be taken into consideration when interpreting and generalizing the findings. The quantitative findings were based on self-report measures and may therefore be subject to social desirability bias. Moreover, the cross-sectional nature of the quantitative data limits the examination of changes in ecological citizenship over time and does not allow for causal inferences. The qualitative findings were based on interviews with 13 pre-service teachers; therefore, their transferability to different contexts and participant groups may be limited. Finally, due to the lack of studies in the literature comparing ecological citizenship across departments and universities, it was not possible to make generalizations based on these variables. Future studies with broader samples across different universities and departments may contribute to more comprehensive assessments of ecological citizenship.

The results of the study indicate that the main factors influencing ecological citizenship are individual habits and the tendency to maintain these habits rather than demographic variables. In particular, the prominence of difficulty in changing established habits highlights the importance of fostering environmental behaviors from an early age. Therefore, environmentally responsible behaviors should be supported through systematic and practice-based activities from an early age to promote their development into lasting behaviors. In addition, service-learning-based environmental projects, school-based environmental practices, and environmental action programs that enable pre-service teachers not only to acquire knowledge but also to participate actively should be expanded. Furthermore, universities could collaborate with local authorities and environmental organizations to provide pre-service teachers with opportunities to engage in practices addressing real-world environmental issues, thereby contributing to the development of ecological citizenship, particularly its participation dimension.

Author (s) Contribution Rate

The first author contributed 60%, the second author 40%.

Ethical Approval

For this study, approval was received from the Social and Human Sciences Research Ethics Committee of Fırat University with the decision number 12172 and dated 15/11/2022.

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