Pedagogical Perspective

2024, Vol 3, No 2, 148-171
ISSN: 2822-4841
https://doi.org/10.29329/pedper.2024.61

Examination of the ecological citizenship levels of teacher candidates according to various variables

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Article Info

Keywords

Social studies
Social studies education
Ecological citizenship
Teacher candidates

Article History

Received 18.06.2024
Received in revised form 23.07.2024
Accepted 23.07.2024

Article Type

Research Article

Abstract

The aim of this study is to uncover the impact of various variables on the ecological citizenship levels of prospective social studies and science teachers. The research utilized a survey model, a quantitative research method, and was conducted with 278 teacher candidates in the 1st, 2nd, 3rd, and 4th grades during the 2023-2024 academic year. To assess the ecological citizenship levels of the teacher candidates, a personal information form and the Ecological Citizenship Scale (ECS) developed by Karatekin and Uysal (2018) were employed. The study examined the effects of 14 variables on ecological citizenship levels across four dimensions. Data analysis was carried out using the SPSS 22 statistical program, employing descriptive statistics, t-tests for independent samples, and one-way analysis of variance (ANOVA). The findings revealed that the ecological citizenship levels of teacher candidates were moderate. Significant differences were observed based on gender, social media sharing, and academic grade point average. Additionally, significant differences were identified in the responsibility dimension, related to visiting national parks, and in the participation dimension based on the source of information. No significant differences were found for other variables in the ecological citizenship scores of the teacher candidate.

1 Introduction

With the process of industrialization, cities characterized by a heterogeneous structure encompassing multifaceted and diverse elements such as political, cultural, industrial, and socioeconomic components have become focal points in the distribution of the population. This focal point has increased the demand for cities, leading to the emergence of urban ecosystems shaped by human intervention. The industrialization process, monopolized by humans, has instrumentalized the environment and nature, leading to unplanned urbanization, inadequate socio-technical infrastructure, automotive emissions, concretization, and the dispersion of industrial and radioactive waste into the environment. Additionally, residential urban settlements have damaged urban climates and functions, resulting in global environmental problems such as

Cite: Karaman, B., Gülersoy, A., E., & Damarseçkin, Ş. (2024). Examination of the ecological citizenship levels of teacher candidates according to various variables. *Pedagogical Perspective, 3*(2), 148-171. https://doi.org/10.29329/pedper.2024.61

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air, water, soil, noise, light, and solid waste pollution. Today, environmental problems have become a threat to the future of humanity. Global warming, melting glaciers, the extinction of many species, desertification, and air and water pollution are some of these issues. As environmental problems are both local and global based, efforts have been made at both national and international levels, and these issues were first brought to attention at the Stockholm Conference in 1972 (Kayhan, 2013). At the end of the conference, it was clearly stated that people who have the right to live in a healthy/environmentally suitable environment and lead a good and dignified life have responsibilities to protect the environment for both present and future generations (Bilir & Hamdemir, 2011). Many topics related to environmental problems and the common use of natural areas have been discussed, and agreements have been made. These agreements, along with the new structure created for cooperation within the United Nations (UN), led to the establishment of the United Nations Environment Programme (UNEP), which has played a role in the formation of international environmental policies and drawn a new framework. In 1977, the Intergovernmental Conference on Environmental Education was held in Tbilisi, and the Tbilisi Declaration was published, which defined the principles, roles, and objectives of environmental education. The declaration divided the objectives of environmental education into five dimensions: knowledge, attitudes, skills, awareness, and participation (Dere & Çinikaya, 2023; Sönmez & Yerlikaya, 2017; United Nations Educational, Scientific and Cultural Organization [UNESCO], 1978). Subsequently, in 1987, the report of the World Commission on Environment and Development, also known as the Brundtland Commission, defined the concept of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Basiago, 1999; Redclif, 2005) This statement emphasizes the importance of preserving natural resources and passing them on to future generations.

All these policy studies and decisions lay the groundwork for sustainable individual behaviors and constitute the basis for ecological citizenship. In the 1990s, the Talloires Declaration highlighted environmental concerns globally (Uysal & Karatekin, 2022), the 1992 United Nations Conference on Environment and Development discussed precautionary principles in societal policies (Çamur & Vaizoğlu, 2007), and the 1996 Habitat II Conference addressed "sustainable human settlements" on a global scale. These conferences were followed by the United Nations World Summit on Sustainable Development in 2001 and 2002. These efforts demonstrate the need to assess the risks and dangers posed by environmental problems caused by human activities from a holistic perspective. To evaluate human activities from a holistic perspective, the concept of ecological citizenship must also be given due importance. Since the mid-1990s, ecological citizenship has emerged as a concept aiming to contribute to the methodology of the ecological project, taking into account environmental elements, the transformation of the inheritance concept, and future generations (Valencia Sáiz, 2005). The close relationship between ecology and humans increases human-nature interaction. Ecological citizenship, a type of citizenship characterized by this awareness, involves individuals who consider the integrity of nature, are aware of their boundaries, and act as guides on sustainability, renewable energy, environmental, and ecological issues. These individuals also possess and can convey knowledge and sensitivity to the sociological, biological, and psychological impacts of ecological problems. Additionally, ecological citizenship aims for the fair distribution of ecological resources (Flynn et al., 2008). With the increased visibility of environmental problems, existing systems' attitudes and approaches to environmental justice have been reconsidered. Environmental justice addresses the sources and

solutions of global inequalities caused by industrialization and development processes (Kılıç & Tok, 2014). Compliance with fair environmental laws, preference for sustainable personal behaviors, participation in environmental policy-making, and the promotion of sustainable regulations (Jørgensen & Jørgensen, 2020), as well as recycling, reuse, and conservation, are among the responsibilities of ecological citizens (Dobson, 2007). Individuals who are aware of their responsibilities towards the environment and possess environmental consciousness are also individuals with ecological citizenship awareness. Ecological citizens are sensitive to the environment, aware of the limitations of existing natural resources, know-how and to what extent to use them, and exhibit attitudes and behaviors based on responsibility, rights, and justice. Teachers and future teacher candidates have significant roles in raising such citizens. "To protect the environment, raising individuals with high environmental awareness and sensitivity is necessary. Developing environmental awareness in society and instilling the necessary environmental sensitivity and responsibility in individuals can only be achieved through effective environmental education" (Gülersoy et al., 2020).

During middle school, science, and social studies classes play an important role in environmental education. Social studies and science are pivotal courses in terms of associating knowledge with real life, ensuring the permanence of knowledge in individuals (Korkmaz & Ataç, 2021), and encouraging them to take active roles and continue to demonstrate environmentally focused behaviors (Yılmaz et al., 2019). The Social Studies course is one of the most important subjects within the educational curriculum, aimed at fostering responsible and effective individuals who acquire knowledge about themselves, their immediate surroundings, their region, their country, and the planet they live on (Hanaylı et al., 2020). Social studies teachers are of particular importance in terms of ecological citizenship. This importance stems from social studies being a course that instills environmental awareness, awareness of rights and responsibilities, and active citizenship skills (Karatekin et al., 2019). Additionally, the Science Education Curriculum (MoNE, 2024a) includes specific objectives such as being sensitive to environmental issues, taking action, using natural resources efficiently, and possessing environmental ethics. In summary, teachers who are aware of ecological citizenship will be role models to their students during the learning process. Therefore, it is important to determine the ecological citizenship levels of teacher candidates. This study aims to examine the ecological citizenship levels of teacher candidates studying in the departments of science education and social studies education, who play a significant role in preparing individuals for life as core courses in terms of various variables. The study seeks to answer the following questions:

1. Do the ecological citizenship levels of teacher candidates show significant differences according to the gender variable?
2. Do the ecological citizenship levels of teacher candidates show significant differences according to the department variable?
3. Do the ecological citizenship levels of teacher candidates show significant differences according to the grade level variable?
4. Do the ecological citizenship levels of teacher candidates show significant differences according to the place where they lived before starting university?
5. Do the ecological citizenship levels of teacher candidates show significant differences according to the monthly income status of their families?
6. Do the ecological citizenship levels of teacher candidates show significant differences according to the education level of their fathers?
7. Do the ecological citizenship levels of teacher candidates show significant differences according to the education level of their mothers?

8. Do the ecological citizenship levels of teacher candidates show significant differences according to the frequency of sharing environmental issues on social media?
9. Do the ecological citizenship levels of teacher candidates show significant differences according to the status of receiving preschool education?
10. Do the ecological citizenship levels of teacher candidates show significant differences according to the status of being a member of an environmental non-governmental organization?
11. Do the ecological citizenship levels of teacher candidates show significant differences according to the status of taking an environmental education course?
12. Do the ecological citizenship levels of teacher candidates show significant differences according to the frequency of visiting national parks?
13. Do the ecological citizenship levels of teacher candidates show significant differences according to their overall academic averages at the university?
14. Do the ecological citizenship levels of teacher candidates show significant differences according to their sources of information?

2 Method

2.1 Design

This study is descriptive research aimed at revealing the ecological citizenship status of teacher candidates. The survey model, one of the quantitative research methods, was used in this study. Survey models describe the existing situations in the past and present as they are (Karasar, 2012). In this research, the ecological citizenship levels of teacher candidates were determined, and the impact of various variables (gender, department, grade level, place of residence before starting university, family's monthly income status, father's and mother's education level, frequency of sharing environmental issues on social media, receiving preschool education, being a member of a non-governmental organization, taking an environmental education course, visiting national parks, academic averages, and sources of information) on ecological citizenship levels was examined.

2.2 Study Group

The study group consists of 278 teacher candidates studying in the Social Studies Education and Science Education Departments at a state university's Faculty of Education. Descriptive data related to the study group are presented in the following tables.

Table 1 Distribution of the study group by gen

	Kategori	n	%
Gender	Female	182	65.5
	Male	96	34.5
Department	Social Studies	130	46.8
	Sciences Education	148	53.2
Grade	1st grade	53	19.11
	2nd grade	73	26.3
	3rd grade	62	22.3
	4th grade	90	32.4
Place of Residence	Village and Town	47	16.9
	City	117	42.1
	Metropolitan	114	41.0
Family's Monthly Income	Low	109	39.2
	Middle	131	47.1
	High	38	13.7
Father’s Education Level	Illiterate	9	3.2
	Literate	8	2.9

	Primary school	100	36.0
	Middle school	46	16.5
	High school	64	23.0
	University	51	18.3
Mother's Education Level	Illiterate	32	11.5
	Literate	19	6.8
	Primary school	109	39.2
	Middle school	41	14.7
	High school	46	16.5
	University	31	11.2
Social Media	Never	91	32.7
	Rarely	98	35.3
	Sometimes	83	29.9
	Very frequently	6	2.2
Preschool Education Status	No	126	45.3
	Yes	152	54.7
NGO Membership Status	No	230	8.7
	Yes	48	17.3
Environmental Education Course	No	139	50
	Yes	139	50
Visiting National Parks	Never visited	55	19.8
	Visited 1-2 times	112	40.3
	Visited 3-5 times	63	22.7
	Visited more than 7 times	48	17.3
Academic Grade Point Average	Less than 2.00	4	1.4
	2.01-3.00	149	53.6
	3.01-3.50	98	35.3
	3.51-4.00	27	9.7
Information Sources	Parents	3	1.1
	School	10	3.6
	Internet	106	38.1
	Social media	143	51.4
	Books-newspapers	4	1.4
	Conferences-seminars	2	.7
	Television	10	3.6

2.3 Data collection and data analysis

In this study, the "Ecological Citizenship Scale" developed by Karatekin and Uysal (2018) was used. The scale consists of four sub-dimensions: responsibility, sustainability, participation, and rights and justice. The scale includes a total of 24 items. In the research conducted by Karatekin and Uysal, the Cronbach's alpha coefficient of the scale was 0.90. In this study, the Cronbach's alpha coefficient of the scale was found to be 0.91. The SPSS 24 software package was used for data analysis. The skewness and kurtosis values of the data obtained from the study were examined. Skewness and kurtosis values between ±1.5 indicate that the distribution is normal (Tabachnick and Fidell, 2013). Since these values are between -1.5 and +1.5, it is seen that the data exhibit a normal distribution. Descriptive statistics, t-test, ANOVA, and multiple comparison tests were used in the analysis of the data.

3 Findings

This section presents the findings obtained in relation to the sub-problems of the study. The research sought to answer the question, "What is the ecological citizenship level of teacher candidates?" The results related to the data obtained are presented in Table 2.

Table 2 Ecological citizenship levels of teacher candidates

	n	$\bar{X}$	S
Participation	278	2.26	.84

Sustainability	278	3.21	.83
Rights and Justice	278	4.02	.82
Responsibility	278	3.19	.83
Total	278	2.99	.68

When examining the results presented in Table 2, it can be seen that the average score of the 278 teacher candidates who participated in the study and responded to the Ecological Citizenship Scale (ECS) is $\bar{X} = 2.99$. Based on these results, it can be said that the teacher candidates are moderately ecological citizens.

3.1 The relationship between teacher candidates' ecological citizenship levels and the gender variable

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to the gender variable?" The results related to the data obtained are presented in Table 3.

Table 3 T-test results of the scores obtained by teacher candidates from the ecological citizenship scale according to the gender variable

	Gender	n	$\bar{X}$	S	sd	t	p
Participation	Female	182	2.31	.87	276	1.29	0.19
	Male	96	2.17	.78			
Sustainability	Female	182	3.33	.83	276	3.4	0.00
	Male	96	2.98	.78			
Right and Justice	Female	182	4.16	.70	150.28	4.22	0.00
	Male	96	3.74	.95			
Responsibility	Female	182	3.29	.83	276	2.74	0.01
	Male	96	3.00	.80			
Total	Female	182	3.08	.68	276	3.18	0.00
	Male	96	2.81	.65			

When Table 3 is examined, it is seen that the ecological citizenship levels of teacher candidates do not show a significant difference in the participation dimension. However, sustainability, rights and justice, responsibility, and overall average scores show significant differences in terms of the gender variable. When the table is examined, it is seen that the overall average ecological citizenship level of female students ($\bar{X} = 3.08$) is higher than that of male students ($\bar{X} = 2.81$). When the scores for the overall average of ecological citizenship are examined, it is seen that the average scores of female teacher candidates are higher than those of male teacher candidates [$t(276) = 3.18$, $p < 0.05$].

3.2 The relationship between teacher candidates' ecological citizenship levels and the department variable

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to the department variable?" The results related to the data obtained are presented in Table 4.

Table 4 T-test results of the scores obtained by teacher candidates from the ecological citizenship scale according to the department variable

	Department	n	$\bar{X}$	S	sd	t	p
Participation	Social studies	130	2.27	.86	276	0.18	0.85
	Sciences education	148	2.25	.83			
Sustainability	Social studies	130	3.19	.91	276	-0.27	0.78
	Sciences	148	3.22	.75			

	education						
Right and Justice	Social studies	130	4.08	.88	276	1.19	0.23
	Sciences education	148	3.96	.76			
Responsibility	Social studies	130	3.15	.93	276	-0.80	0.42
	Sciences education	148	3.23	.73			
Total	Social studies	130	2.98	.76	276	-0.08	0.93
	Sciences education	148	2.99	.62			

When Table 4 is examined, it is seen that the overall average ecological citizenship level is ($\bar{X}$ = 2.98) for the social studies department and ($\bar{X}$ = 2.99) for the science education department. When the scores for the overall average of ecological citizenship are examined, it is seen that there is no significant difference according to the department variable [t(276) = -0.08, p > 0.05]. This finding can be interpreted as the department in which teacher candidates study does not have an effect on their ecological citizenship levels.

3.3 The relationship between teacher candidates' ecological citizenship levels and grade levels

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to the grade level variable?" The results related to the data obtained are presented in Tables 5 and 6.

Table 5 Data on the grade variable

		n	$\bar{X}$	S
Participation	1st grade	53	2.23	0.85
	2nd grade	73	2.26	0.92
	3rd grade	62	2.07	0.71
	4th grade	90	2.42	0.85
	Total	278	2.27	0.85
Sustainability	1st grade	53	3.14	0.81
	2nd grade	73	3.10	0.89
	3rd grade	62	3.13	0.89
	4th grade	90	3.40	0.74
	Total	278	3.21	0.83
Rights and Justice	1st grade	53	4.10	0.73
	2nd grade	73	3.89	0.82
	3rd grade	62	3.94	0.96
	4th grade	90	4.14	0.76
	Total	278	4.02	0.82
Responsibility	1st grade	53	3.16	0.93
	2nd grade	73	312	0.82
	3rd grade	62	3.21	0.84
	4th grade	90	3.26	0.79
	Total	278	3.20	0.83
Total	1st grade	53	2.96	0.69
	2nd grade	73	2.93	0.74
	3rd grade	62	2.90	0.68
	4th grade	90	3.13	0.64
	Total	278	2.99	0.69

Table 6 One-way ANOVA results of the scores obtained by teacher candidates from the ecological citizenship scale according to the grade variable

		KT	sd	KO	F	p
Participation	Between groups	4.57	3	1.52	2.16	0.09
	Within groups	193.50	274	0.71		
	Total	198.08	277			

Sustainability	Between groups	4.77	3	1.59	2.33	0.09
	Within groups	186.81	274	0.68		
	Total	191.58	277			
Right and Justice	Between groups	3.32	3	1.11	1.65	0.18
	Within groups	183.88	274	0.67		
	Total	187.20	277			
Responsibility	Between groups	0.88	3	0.29	0.42	0.74
	Within groups	191.39	274	0.70		
	Total	192.27	277			
Total	Between groups	2.70	3	0.90	1,92	0.13
	Within groups	128.81	274	0.47		
	Total	131.51	277			

When Table 6 is examined, it is seen that the overall average ecological citizenship level does not show a significant difference according to the grade level variable [F(3-274) = 1.92, p > 0.05]. This finding can be interpreted as the teacher candidates' grade level variable does not affect their ecological citizenship levels.

3.4 The relationship between teacher candidates' ecological citizenship levels and the place of residence before starting university

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to the place of residence before starting university?" The results related to the data obtained are presented in Tables 7 and 8.

Table 7 Data on the place of residence variable

		n	X̄	S
Participation	Village and Town	47	2.40	0.88
	City	117	2.28	0.84
	Metropolitan	114	2.20	0.84
	Total	278	2.27	0.85
Sustainability	Village and Town	47	3.38	0.67
	City	117	3.16	0.82
	Metropolitan	114	3.19	0.89
	Total	278	3.21	0.83
Rights and Justice	Village and Town	47	4.19	0.71
	City	117	3.94	0.82
	Metropolitan	114	4.03	0.86
	Total	278	4.02	0.82
Responsibility	Village and Town	47	3.28	0.79
	City	117	3.20	0.81
	Metropolitan	114	3.15	0.87
	Total	278	3.20	0.83
Total	Village and Town	47	3.13	0.63
	City	117	2.97	0.69
	Metropolitan	114	2.96	0.71
	Total	278	2.99	0.69

Table 8 One-way ANOVA results of the scores obtained by teacher candidates from the ecological citizenship scale according to the place of residence variable

		KT	sd	KO	F	p
Participation	Between groups	1.25	2	0.62	0.87	0.42
	Within groups	196.83	275	0.72		
	Total	198.08	277			
Sustainability	Between groups	1.62	2	0.81	1.17	0.31
	Within groups	189.96	275	0.69		
	Total	191.58	277			
Right and Justice	Between groups	2.09	2	1.05	1.55	0.21
	Within groups	185.11	275	0.67		

	Total	187.20	277			
Responsibility	Between groups	0.55	2	0.28	0.40	0.67
	Within groups	191.72	275	0.70		
	Total	192.27	277			
Total	Between groups	1.05	2	0.52	1.10	0.33
	Within groups	130.47	275	0.47		
	Total	131.51	277			

When Table 8 is examined, it is seen that the overall average ecological citizenship level does not show a significant difference according to the place of residence before starting university [$F_{(2-275)} = 1.10, p > 0.05$]. This finding can be interpreted as the place of residence before starting university does not have an effect on the ecological citizenship levels of the teacher candidates.

3.5 The relationship between teacher candidates' ecological citizenship levels and their families' monthly income status

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to their families' monthly income status?" The results related to the data obtained are presented in Tables 9 and 10.

Table 9 Data on the families' monthly income status variable

		n	$\bar{X}$	S
Participation	Low	109	2.29	0.89
	Middle	131	2.21	0.80
	High	38	2.39	0.88
	Total	278	2.27	0.85
Sustainability	Low	109	3.23	0.84
	Middle	131	3.20	0.81
	High	38	3.19	0.89
	Total	278	3.21	0.83
Rights and Justice	Low	109	3.98	0.85
	Middle	131	4.08	0.80
	High	38	3.96	0.81
	Total	278	4.02	0.82
Responsibility	Low	109	3.18	0.86
	Middle	131	3.13	0.82
	High	38	3.46	0.80
	Total	278	3.20	0.83
Total	Low	109	3.00	0.71
	Middle	131	2.96	0.66
	High	38	3.09	0.72
	Total	278	2.99	0.69

Table 10 One-way ANOVA results of the scores obtained by teacher candidates from the ecological citizenship scale according to the families' monthly income status variable

		KT	sd	KO	F	p
Participation	Between groups	1.05	2	0.53	0.73	0.48
	Within groups	197.02	275	0.72		
	Total	198.08	277			
Sustainability	Between groups	0.05	2	0.03	0.04	0.96
	Within groups	191.52	275	0.70		
	Total	191.58	277			
Right and Justice	Between groups	0.82	2	0.41	0.61	0.55
	Within groups	186.38	275	0.68		
	Total	187.20	277			
Responsibility	Between groups	3.32	2	1.66	2.41	0.09
	Within groups	188.95	275	0.69		
	Total	192.27	277			
Total	Between groups	0.46	2	0.23	0.49	0.61

	Within groups	131.05	275	0.48	
	Total	131.51	277		

When Table 10 is examined, it is seen that the overall average ecological citizenship level does not show a significant difference according to the families' monthly income status variable [$F_{(2-275)} = 0.49$, $p > 0.05$]. This finding can be interpreted as the families' monthly income status variable does not have an effect on the ecological citizenship levels of the teacher candidates.

3.6 The relationship between teacher candidates' ecological citizenship levels and their father's education level

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to their father's education level?" The results related to the data obtained are presented in Table 11.

Table 11 Data on the father's education level variable

		n	X̄	S
Participation	Illiterate	9	2.19	1.26
	Literate	8	2.42	1.07
	Primary school	100	2.25	0.83
	Middle school	46	2.31	0.83
	High school	64	2.24	0.71
	University	51	2.29	0.96
	Total	278	2.27	0.85
Sustainability	Illiterate	9	3.00	1.39
	Literate	8	2.79	0.84
	Primary school	100	3.19	0.72
	Middle school	46	3.31	0.78
	High school	64	3.27	0.72
	University	51	3.19	1.07
	Total	278	3.21	0.83
Rights and Justice	Illiterate	9	3.81	0.94
	Literate	8	3.63	1.20
	Primary school	100	4.11	0.77
	Middle school	46	4.02	0.81
	High school	64	3.95	0.78
	University	51	4.05	0.91
	Total	278	4.02	0.82
Responsibility	Illiterate	9	3.17	1.39
	Literate	8	2.90	0.96
	Primary school	100	3.13	0.80
	Middle school	46	3.29	0.83
	High school	64	3.12	0.74
	University	51	3.40	0.87
	Total	278	3.20	0.83
Total	Illiterate	9	288	1.15
	Literate	8	2.80	0.89
	Primary school	100	2.97	0.63
	Middle school	46	3.06	0.66
	High school	64	2.97	0.58
	University	51	3.05	0.83
	Total	278	2.99	0.69

Table 12 One-way ANOVA results of the scores obtained by teacher candidates from the ecological citizenship scale according to the father's education level variable

		KT	sd	KO	F	p
Participation	Between groups	0.46	5	0.09	0.13	0.99
	Within groups	197.62	272	0.73		
	Total	198.08	277			
Sustainability	Between groups	2.58	5	0.52	0.74	

	Within groups	189.00	272	0.69		0.59
	Total	191.58	277			
Right and Justice	Between groups	2.74	5	0.55	0.81	0.54
	Within groups	184.46	272	0.68		
	Total	187.20	277			
Responsibility	Between groups	3.98	5	0.80	1.15	0.33
	Within groups	188.29	272	0.69		
	Total	192.27	277			
Total	Between groups	0.87	5	0.17	0.36	0.87
	Within groups	130.64	272	0.48		
	Total	131.51	277			

When Table 12 is examined, it is seen that the overall average ecological citizenship level does not show a significant difference according to the father's education level variable [$F_{(5-272)} = 0.36$, $p > 0.05$]. This finding can be interpreted as the father's education level variable does not have an effect on the ecological citizenship levels of the teacher candidates.

3.7 The relationship between teacher candidates' ecological citizenship levels and their mother's education level

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to their mother's education level?" The results related to the data obtained are presented in Tables 13 and 14.

Table 13 Data on the mother's education level variables

		n	$\bar{X}$	S
Participation	Illiterate	32	2.16	0.85
	Literate	19	2.07	0.74
	Primary school	109	2.37	0.85
	Middle school	41	2.14	0.77
	High school	46	2.30	1.02
	University	31	2.25	0.69
	Total	278	2.27	0.85
Sustainability	Illiterate	32	2.96	0.84
	Literate	19	2.94	0.78
	Primary school	109	3.31	0.80
	Middle school	41	3.24	0.83
	High school	46	3.30	0.83
	University	31	3.12	0.91
	Total	278	3.21	0.83
Rights and Justice	Illiterate	32	3.88	1.01
	Literate	19	3.91	0.62
	Primary school	109	4.19	0.74
	Middle school	41	3.86	0.87
	High school	46	3.95	0.85
	University	31	3.98	0.87
	Total	278	4.02	0.82
Responsibility	Illiterate	32	2.86	0.86
	Literate	19	2.90	0.73
	Primary school	109	3.27	0.85
	Middle school	41	3.21	0.90
	High school	46	3.21	0.73
	University	31	3.43	0.75
	Total	278	3.20	0.83
Total	Illiterate	32	2.78	0.72
	Literate	19	2.76	0.56
	Primary school	109	3.09	0.68
	Middle school	41	2.95	0.69
	High school	46	3.03	0.72
	University	31	3.01	0.65

	Total	278	2.99	0.69	

Table 14 One-way ANOVA results of the scores obtained by teacher candidates from the ecological citizenship scale according to the mother's education level variable

		KT	sd	KO	F	p
Participation	Between groups	2.92	5	0.58	0.81	0.54
	Within groups	195.15	272	0.72		
	Total	198.08	277			
Sustainability	Between groups	5.12	5	1.02	1.49	0.19
	Within groups	186.46	272	0.69		
	Total	191.58	277			
Right and Justice	Between groups	5.23	5	1.05	1.56	0.17
	Within groups	181.98	272	0.67		
	Total	187.20	277			
Responsibility	Between groups	7.52	5	1.50	2.22	0.06
	Within groups	184.75	272	0.68		
	Total	192.27	277			
Total	Between groups	3.70	5	0.74	1.58	0.17
	Within groups	127.81	272	0.47		
	Total	131.51	277			

When Table 14 is examined, it is seen that the overall average ecological citizenship level does not show a significant difference according to the mother's education level variable [$F(5\text{-}272) = 1.58$, $p > 0.05$]. This finding can be interpreted as the mother's education level variable does not have an effect on the ecological citizenship levels of the teacher candidates.

3.8 The relationship between teacher candidates' ecological citizenship levels and the frequency of sharing environmental issues on social media

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to the frequency of sharing environmental issues on social media?" The results related to the data obtained are presented in Tables 16 and 16.

Table 15 Data on the frequency of sharing environmental issues on social media variable

		n	$\bar{X}$	S
Participation	Never (1)	91	2.03	0.79
	Rarely (2)	98	2.26	0.83
	Sometimes (3)	83	2.45	0.83
	Very frequently (4)	6	3.31	0.81
	Total	278	2.27	0.85
Sustainability	Never (1)	91	3.07	0.86
	Rarely (2)	98	3.27	0.76
	Sometimes (3)	83	3.26	0.86
	Very frequently (4)	6	3.62	1.01
	Total	278	3.21	0.83
Rights and Justice	Never (1)	91	3.82	0.80
	Rarely (2)	98	4.11	0.81
	Sometimes (3)	83	4.13	0.83
	Very frequently (4)	6	4.17	0.91
	Total	278	4.02	0.82
Responsibility	Never (1)	91	2.92	0.88
	Rarely (2)	98	3.30	0.74
	Sometimes (3)	83	3.34	0.80
	Very frequently (4)	6	3.67	1.14
	Total	278	3.20	0.83
Total	Never (1)	91	2.78	0.67
	Rarely (2)	98	3.05	0.62
	Sometimes (3)	83	3.12	0.71

	Very frequently (4)	6	3.60	0.94
	Total	278	2.99	0.69

Table 16 One-way ANOVA results of the scores obtained by teacher candidates from the ecological citizenship scale according to the frequency of sharing on social media

		KT	sd	KO	F	p	Scheffe
Participation	Between groups	14.38	3	4.79	0.81	0.54	1-3
	Within groups	183.70	274	0.67			1-4
	Total	198.08	277				2-4
Sustainability	Between groups	3.24	3	1.08	1.49	0.19	
	Within groups	188.33	274	0,69			
	Total	191.58	277				
Right and Justice	Between groups	5.71	3	1.90	1.56	0.17	
	Within groups	181.50	274	0.66			
	Total	187.20	277				
Responsibility	Between groups	11.08	3	3.69	2.22	0.06	1-2
	Within groups	181.19	274	0.66			1-3
	Total	192.27	277				
Total	Between groups	7.90	3	2.63	1.58	0.17	1-3
	Within groups	123.61	274	0.45			1-4
	Total	131.51	277				

When Table 16 is examined, it is seen that the ecological citizenship levels of teacher candidates do not show a significant difference in the dimensions of sustainability and rights and justice ($p > 0.05$). However, the ecological citizenship levels of teacher candidates show significant differences in the dimensions of participation, responsibility, and overall average scores according to the frequency of sharing on social media about environmental issues [$F(3\text{-}274) = 5.84$, $p < 0.05$]. Multiple comparison tests were conducted to determine the significant differences between groups. In the dimension of participation, the multiple comparison test results showed that the average scores of teacher candidates who never shared on social media ($\bar{X} = 2.03$) compared to those who sometimes shared ($\bar{X} = 2.45$) were in favor of those who sometimes shared. When comparing the average scores of those who never shared ($\bar{X} = 2.03$) with those who very frequently shared ($\bar{X} = 3.31$), it was in favor of those who very frequently shared. Additionally, comparing the average scores of those who rarely shared ($\bar{X} = 2.26$) with those who very frequently shared ($\bar{X} = 3.31$), the results were in favor of those who very frequently shared.

In the dimension of responsibility, the multiple comparison test results showed that the average scores of those who never shared on social media ($\bar{X} = 2.92$) compared to those who rarely shared ($\bar{X} = 3.30$) were in favor of those who rarely shared. Comparing the average scores of those who never shared ($\bar{X} = 2.92$) with those who sometimes shared ($\bar{X} = 3.34$) were in favor of those who sometimes shared.

For the overall scale, the multiple comparison test results showed that the average scores of those who never shared on social media ($\bar{X} = 2.78$) compared to those who sometimes shared ($\bar{X} = 3.12$) were in favor of those who sometimes shared. Comparing the average scores of those who never shared ($\bar{X} = 2.78$) with those who very frequently shared ($\bar{X} = 3.60$) were in favor of those who very frequently shared.

3.9 The relationship between teacher candidates' ecological citizenship levels and receiving preschool education

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to receiving preschool education?" The results related to the data obtained are presented in Table 17.

Table 17 T-test results of the scores obtained by teacher candidates from the ecological citizenship scale according to the variable of receiving preschool education

		n	$\bar{X}$	S	sd	t	p
Participation	No	126	2.23	0.80	276.00	-0.72	0.47
	Yes	152	2.30	0.88			
Sustainability	No	126	3.20	0.84	276.00	-0.21	0.83
	Yes	152	3.22	0.83			
Right and Justice	No	126	4.08	0.74	276.00	1.02	0.31
	Yes	152	3.98	0.88			
Responsibility	No	126	3.09	0.83	276.00	-1.86	0.06
	Yes	152	3.28	0.83			
Total	No	126	2.23	0.80	276.00	-0.78	0.44
	Yes	152	2.30	0.88			

When Table 17 is examined, it is seen that the overall average ecological citizenship level does not show a significant difference according to the variable of receiving preschool education [$t(276) = -0.78$, $p > 0.05$]. This finding can be interpreted as the status of receiving preschool education does not have an effect on the ecological citizenship levels of the teacher candidates.

3.10 The relationship between teacher candidates' ecological citizenship levels and membership in an environmental non-governmental organization

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to the variable of membership in an environmental non-governmental organization?" The results related to the data obtained are presented in Table 18.

Table 18 T-test results of the scores obtained by teacher candidates from the ecological citizenship scale according to the variable of NGO membership

		n	$\bar{X}$	S	sd	t	p
Participation	No	230	2.21	0.82	276	-2.47	0.01
	Yes	48	2.54	0.93			
Sustainability	No	230	3.21	0.81	276	0.04	0.96
	Yes	48	3.21	0.92			
Right and Justice	No	230	4.02	0.78	276	-0.25	0.80
	Yes	48	4.05	1.02			
Responsibility	No	230	3.15	0.81	276	-2.03	0.04
	Yes	48	3.42	0.93			
Total	No	230	2.96	0.66	276	-1.64	0.10
	Yes	48	3.14	0.80			

When Table 18 is examined, it is seen that the ecological citizenship levels of teacher candidates do not show a significant difference in the dimensions of rights and justice, sustainability, and overall scale according to the variable of NGO membership, while significant differences are seen in the dimensions of participation and responsibility ($p > 0.05$). When the average scores are examined, it is seen that in the dimension of participation, the teacher candidates who are not members of an NGO have an average score of ($\bar{X} = 2.21$), while those who are members have an

average score of ($\bar{X}$ = 2.54). In the dimension of responsibility, the teacher candidates who are not members of an NGO have an average score of ($\bar{X}$ = 3.15), while those who are members have an average score of ($\bar{X}$ = 3.42). This finding can be interpreted as the teacher candidates who are members of an NGO have higher average scores in the dimensions of participation and responsibility compared to those who are not members of an NGO.

3.11 The relationship between teacher candidates' ecological citizenship levels and taking an environmental education course

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to the variable of taking an environmental education course?" The results related to the data obtained are presented in Table 19.

Table 19 T-test results of the scores obtained by teacher candidates from the ecological citizenship scale according to the variable of taking an environmental education course

		n	$\bar{X}$	S	sd	t	p
Participation	No	139	2.20	0.82	276	-1.30	0.20
	Yes	139	2.33	0.87			
Sustainability	No	139	3.13	0.78	276	-1.58	0.12
	Yes	139	3.29	0.87			
Right and Justice	No	139	4.06	0.73	276	0.78	0.44
	Yes	139	3.98	0.90			
Responsibility	No	139	3.16	0.82	276	-0.77	0.44
	Yes	139	3.23	0.85			
Total	No	139	2.94	0.65	276	-1.20	0.23
	Yes	139	3.04	0.73			

When Table 19 is examined, it is seen that the overall average ecological citizenship level does not show a significant difference according to the variable of taking an environmental education course [$t(276) = -1.20$, $p > 0.05$]. This finding can be interpreted as the status of taking an environmental education course does not have an effect on the ecological citizenship levels of the teacher candidates.

3.12 The relationship between teacher candidates' ecological citizenship levels and the frequency of visiting national parks

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to the variable of frequency of visiting national parks?" The results related to the data obtained are presented in Tables 20 and 21.

Table 20 Data on the frequency of visiting national parks variable

		n	$\bar{X}$	S
Participation	Never visited	55	2.15	0.87
	Visited 1-2 times	112	2.24	0.80
	Visited 3-4 times	63	2.33	0.91
	Visited more than 7 times	48	2.38	0.83
	Total	278	2.27	0.85
Sustainability	Never visited	55	3.07	0.92
	Visited 1-2 times	112	3.23	0.75
	Visited 3-4 times	63	3.24	0.79
	Visited more than 7 times	48	3.29	0.95
	Total	278	3.21	0.83
Rights and Justice	Never visited	55	3.95	0.81
	Visited 1-2 times	112	4.07	0.79
	Visited 3-4 times	63	3.94	0.88

	Visited more than 7 times	48	4.11	0.83
	Total	278	4.02	0.82
Responsibility	Never visited (1)	55	2.81	0.88
	Visited 1-2 times (2)	112	3.16	0.74
	Visited 3-4 times (3)	63	3.33	0.80
	Visited more than 7 times (4)	48	3.56	0.86
	Total	278	3.20	0.83
Total	Never visited	55	2.81	0.73
	Visited 1-2 times	112	2.98	0.62
	Visited 3-4 times	63	3.05	0.71
	Visited more than 7 times	48	3.16	0.75
	Total	278	2.99	0.69

Table 21 One-way ANOVA results of the scores obtained by teacher candidates from the ecological citizenship scale according to the variable of frequency of visiting national parks

		KT	sd	KO	F	p	Scheffe
Participation	Between groups	1.70	3	0.57	0.79	0.50	
	Within groups	196.37	274	0.72			
	Total	198.08	277				
Sustainability	Between groups	1.54	3	0.51	0.79	0.50	
	Within groups	190.04	274	0.69			
	Total	191.58	277				
Right and Justice	Between groups	1.33	3	0.44	0.65	0.58	
	Within groups	185.88	274	0.68			
	Total	187.20	277				
Responsibility	Between groups	15.96	3	5.32	8.27	0.00	1-3
	Within groups	176.31	274	0.64			
	Total	192.27	277				1-4
							2-4
Total	Between groups	3.38	3	1.13	2.41	0.07	
	Within groups	128.13	274	0.47			
	Total	131.51	277				

When Table 21 is examined, it is seen that the ecological citizenship levels of teacher candidates do not show a significant difference in the dimensions of participation, sustainability, rights and justice, and overall scale. However, a significant difference is detected in the dimension of responsibility. Multiple comparison tests were conducted to determine between which groups the significant differences existed. In the dimension of responsibility, the multiple comparison test results showed that the average scores of teacher candidates who never visited national parks ($\bar{X}$ = 2.81) compared to those who visited 3-5 times ($\bar{X}$ = 3.33) were in favor of those who visited 3-5 times. Comparing the average scores of those who never visited national parks ($\bar{X}$ = 2.81) with those who visited more than 7 times ($\bar{X}$ = 3.86), the results were in favor of those who visited more than 7 times.

3.13 The relationship between teacher candidates' ecological citizenship levels and their overall academic grade point averages

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to their overall academic grade point averages?" The results related to the data obtained are presented in Table 22.

Table 22 Data on the overall academic grade point averages variable

		n	X̄	S
Participation	Less than 2.00 (1)	4	1.69	0.55
	2.01-3.00 (2)	149	2.24	0.84
	3.01-3.50 (3)	98	2.31	0.85
	3.51-4.00 (4)	27	2.34	0.89
	Total	278	2.27	0.85
Sustainability	Less than 2.00 (1)	4	2.86	1.15
	2.01-3.00 (2)	149	3.09	0.81
	3.01-3.50 (3)	98	3.30	0.85
	3.51-4.00 (4)	27	3.62	0.67
	Total	278	3.21	0.83
Rights and Justice	Less than 2.00 (1)	4	3.58	1.26
	2.01-3.00 (2)	149	3.93	0.85
	3.01-3.50 (3)	98	4.08	0.81
	3.51-4.00 (4)	27	4.38	0.52
	Total	278	4.02	0.82
Responsibility	Less than 2.00 (1)	4	2.63	0.70
	2.01-3.00 (2)	149	3.16	0.81
	3.01-3.50 (3)	98	3.16	0.88
	3.51-4.00 (4)	27	3.60	0.71
	Total	278	3.20	0.83
Total	Less than 2.00 (1)	4	2.50	0.82
	2.01-3.00 (2)	149	2.93	0.67
	3.01-3.50 (3)	98	3.03	0.70
	3.51-4.00 (4)	27	3.29	0.63
	Total	278	2.99	0.69

Table 23 One-way ANOVA results of the scores obtained by teacher candidates from the ecological citizenship scale according to the variable of overall academic grade point averages

		KT	sd	KO	F	p	Scheffe
Participation	Between groups	1.76	3	0.59	0.82	0.48	
	Within groups	196.31	274	0.72			
	Total	198.08	277				
Sustainability	Between groups	8.09	3	2.70	4.03	0.01	2-4
	Within groups	183.48	274	0.67			
	Total	191.58	277				
Right and Justice	Between groups	5.84	3	1.95	2.94	0.03	2-4
	Within groups	181.37	274	0.66			
	Total	187.20	277				
Responsibility	Between groups	6.14	3	2.05	3.01	0.03	2-4
	Within groups	186.13	274	0.68			
	Total	192.27	277				
Total	Between groups	4.05	3	1.35	2.90	0.04	
	Within groups	127.47	274	0.47			
	Total	131,51	277				

When Table 23 is examined, it is seen that the ecological citizenship levels of teacher candidates show significant differences in the dimensions of sustainability, rights and justice, responsibility, and overall scale according to their academic averages ($p<0.05$). Multiple comparison tests were conducted to determine between which groups the significant differences existed. In the dimensions of responsibility, rights and justice, and sustainability, the multiple comparison test results showed that the average scores of teacher candidates with higher academic averages were higher than those with lower academic averages.

3.14 The relationship between teacher candidates' ecological citizenship levels and sources of information

The research sought to answer the question, "Do the ecological citizenship levels of teacher candidates show a significant difference according to the variable of sources of information?" The results related to the data obtained are presented in Table 24.

Table 24 Data on the variable sources of information

		n	X̄	S
Participation	Parents	3	3.21	1.05
	School	10	1.83	0.54
	Internet	106	2.40	0.88
	Social media	143	2.14	0.76
	Books-Newspapers	4	2.81	0.69
	Conferences- seminars	2	4.25	1.06
	Television	10	2.26	0.97
	Total	278	2.27	0.85
Sustainability	Parents	3	3.00	1.68
	School	10	3.23	0.91
	Internet	106	3.32	0.87
	Social media	143	3.13	0.79
	Books-Newspapers	4	3.29	0.89
	Conferences- seminars	2	3.79	1.11
	Television	10	3.06	0.65
	Total	278	3.21	0.83
Rights and Justice	Parents	3	3.89	1.02
	School	10	4.23	0.57
	Internet	106	4.02	0.75
	Social media	143	4.02	0.90
	Books-Newspapers	4	3.58	0.57
	Conferences- seminars	2	4.67	0.47
	Television	10	3.90	0.75
	Total	278	4.02	0.82
Responsibility	Parents	3	3.83	0.44
	School	10	3.25	0.71
	Internet	106	3.18	0.84
	Social media	143	3.18	0.82
	Books-Newspapers	4	3.58	1.27
	Conferences- seminars	2	4.08	1.30
	Television	10	2.93	0.83
	Total	278	3.20	0.83
Total	Parents	3	3.39	1.01
	School	10	2.89	0.56
	Internet	106	3.07	0.73
	Social media	143	2.92	0.64
	Books-Newspapers	4	3.24	0.84
	Conferences- seminars	2	4,13	1,06
	Television	10	2,87	0,68
	Total	278	2,99	0,69

Table 25 One-way ANOVA results of the scores obtained by teacher candidates from the ecological citizenship scale according to the variable of sources of information

		KT	sd	KO	F	p	Scheffe
Participation	Between groups	18.08	6	3.01	4.54	0.00	2-6
	Within groups	180.00	271	0.66			3-6
	Total	198.08	277				4-6
							6-7

Sustainability	Between groups	3.34	6	0.56	0.80	0.57
	Within groups	188.24	271	0.69		
	Total	191.58	277			
Right and Justice	Between groups	2.25	6	0.37	0.55	0.77
	Within groups	184.95	271	0.68		
	Total	187.20	277			
Responsibility	Between groups	4.16	6	0.69	1.00	0.43
	Within groups	188.11	271	0.69		
	Total	192.27	277			
Total	Between groups	4.85	6	0.81	1.73	0.11
	Within groups	126.66	271	0.47		
	Total	131.51	277			

When Table 25 is examined, it is seen that the ecological citizenship levels of teacher candidates do not show significant differences in the dimensions of sustainability, rights and justice, responsibility, and overall scale according to their academic averages, while a significant difference is detected in the dimension of participation. Multiple comparison tests were conducted to determine between which groups the significant differences existed. When the average scores in the participation dimension are examined, it is seen that teacher candidates who cited school as their source of information ($\bar{X}$ = 3.21) compared to those who cited conferences ($\bar{X}$ = 4.25) were in favor of those who cited conferences. Comparing those who cited the internet ($\bar{X}$ = 2.40) with those who cited conferences ($\bar{X}$ = 4.25) were in favor of those who cited conferences. Comparing those who cited social media ($\bar{X}$ = 2.14) with those who cited conferences ($\bar{X}$ = 4.25) were in favor of those who cited conferences. Comparing those who cited television ($\bar{X}$ = 2.26) with those who cited conferences ($\bar{X}$ = 4.25) were in favor of those who cited conferences.

4 Discussion and conclusion

This study examined the ecological citizenship levels of teacher candidates studying in the departments of Science Education and Social Studies Education in terms of various variables. The results indicated that the teacher candidates can be considered moderately ecological citizens.

It is essential for teacher candidates to have higher levels of ecological citizenship since they will teach the fundamental courses of Social Studies and Science in the coming years. This situation can be explained by the fact that extracurricular activities in environmental education are limited and confined to in-class activities (Anantharan, 2014) and by the consideration of citizenship education and environmental education as separate fields (Özdemir Özden, 2011). These findings are consistent with the results of studies conducted by Uysal (2018), Karatekin, Salman, and Uysal (2018), Sezer and Öner Armağan (2023), Altın (2022), and Durgun (2022). A review of the relevant literature reveals that similar results have been obtained in previous studies. For example, in Altın's (2022) study, the findings related to the impact of preschool teacher candidates' self-efficacy and environmental ethics awareness perceptions on their ecological citizenship levels are similar to our findings. Altın's study revealed that the ecological citizenship levels of preschool teacher candidates are at a moderate level. Similarly, studies conducted by Durgun (2022), Karatekin et al. (2019), and Uysal (2018) also found that the ecological citizenship levels of classroom teacher candidates were at a moderate level. Additionally, Karatekin et al.'s (2019) study obtained similar results regarding the ecological citizenship levels of teacher candidates from different branches; it was determined that the ecological citizenship levels of the classroom teacher, social studies teacher, science teacher, and preschool teacher candidates are at a moderate level. Furthermore, a study conducted by Yurttaş et al. (2021) concluded that preschool and classroom teachers are sufficiently ecological citizens.

Teachers, who hold a crucial role in shaping society, have significant responsibilities in increasing environmental awareness. It is imperative for teacher candidates to be more conscious of this issue and to elevate their levels of ecological citizenship. Education plays a key role in forming an environmentally aware society. Environmental education should be addressed not only within formal education but also within informal education, continuing throughout life, and environmental education should become compulsory (Gülersoy et al., 2021).

Within the context of the study, an examination of the ecological citizenship scores of teacher candidates revealed that female teacher candidates have higher average scores compared to their male counterparts. It can be inferred that gender is a variable influencing the ecological citizenship levels of teacher candidates. This finding is consistent with the results of studies conducted by Yurttaş et al. (2021), Özdemir Özden and Öztürk (2019), and Altın (2022). In these studies, significant differences were found in favor of female teacher candidates. The relevant literature includes research indicating significant differences in favor of women regarding environmental behavior, knowledge, and attitudes toward the environment among teacher candidates and teachers (Akçay et al., 2017; Alım, 2014; Çimen & Benzer, 2019; Gül et al., 2018; Ahi & Özsoy, 2015; Yılmaz & Aydoğdu, 2020). However, an examination of the relevant literature also reveals that gender does not influence the ecological citizenship status of male and female teacher candidates in all cases (Sezer & Öner Armağan, 2023; Yılmaz et al., 2019; Uysal, 2018). This indicates that while gender may influence environmental consciousness and actions, it is not a determining factor for ecological citizenship in all contexts.

According to the results of the research, it is seen that the department in which pre-service teachers study has no effect on their ecological citizenship levels. This finding is consistent with the results in the literature (Akçay & Pekel, 2017; Karatekin et al., 2018; Sönmez, 2019; Timur et al., 2013; Kışoğlu et al., 2016; Yıldırım et al., 2012). Environmental education is continued with life sciences from primary school, social studies and science from middle school, and elective courses such as environmental education and climate change. At the middle school level, environmental education is taught by science and social studies teachers. Social studies teachers have special importance in environmental education because it is a course where active citizenship skills such as rights, responsibilities, decision-making, and problem-solving related to environmental issues are aimed to be imparted (Karatekin et al., 2019). It is necessary for future social studies teachers, who bear the responsibility of fostering active citizenship, to have high levels of ecological citizenship. However, it is noteworthy that the ecological citizenship levels of science teacher candidates are higher than those of social studies teacher candidates. This finding is also consistent with the results of Karatekin et al. (2019).

The study found that the ecological citizenship levels of teacher candidates did not show significant differences in sustainability, rights, and justice dimensions. However, significant differences were obtained in the dimensions of participation, responsibility, and overall average scores according to the variable sharing environmental issues on social media. This difference was found to be in favor of teacher candidates who frequently shared on social media. This result is consistent with the findings of studies conducted by Yurttaş et al. (2021) and Uysal (2018). Ecological citizenship education goes far beyond political and environmental literacy (Dobson, 2003). It can be inferred that individuals with high levels of ecological citizenship are more conscious about participating in environmental actions, informing others, being concerned with environmental issues, and making related posts (Bülbül & Yılmaz, 2019).

The study revealed that while the ecological citizenship levels of teacher candidates did not show significant differences in the dimensions of rights and justice, sustainability, and the overall scale according to the variable of NGO membership, significant differences were observed in the dimensions of participation and responsibility. It was determined that teacher candidates who were members of an NGO had higher average scores in the dimensions of participation and responsibility compared to those who were not members. In the relevant literature, the study conducted by Yurttaş et al. (2021) found no significant differences in the sub-dimensions of rights and justice and sustainability, while significant differences were identified in the overall scale and in the sub-dimensions of responsibility and participation. These differences were in favor of those with NGO membership. The higher ecological citizenship levels of teacher candidates with NGO membership are consistent with the aim of raising societal awareness and fostering a sense of responsibility. It can be said that ecological citizens are more conscious about raising societal awareness and participating in activities related to environmental issues. The relevant literature suggests that NGOs significantly impact teacher candidates' environmental attitudes and behaviors (Çimen et al., 2011; Uysal, 2018).

The ecological citizenship levels of pre-service teachers showed significant differences only in the responsibility sub-dimension according to the variable of visiting national parks. It is observed that this significant difference is in favor of teacher candidates who have visited national parks more than seven times. It has been determined that the ecological citizenship levels of teacher candidates increase as their frequency of visiting national parks increases. The ecological citizenship levels of teacher candidates showed significant differences in the dimensions of sustainability, rights and justice, and responsibility, as well as in the overall scale according to their academic grade point averages. These significant differences are in favor of teacher candidates with higher academic averages. A study conducted by Uysal (2018) also found that classroom teacher candidates with higher academic averages scored significantly better in the dimensions of responsibility, sustainability, and rights and justice.

The other results of the research indicated that the variables of the grade level in which teacher candidates are studying, the family's monthly income, taking an environmental education course, and the educational status of the mother and father did not show significant differences in individuals' ecological citizenship levels.

Based on the results of the research, several recommendations can be made. Firstly, it is necessary to enrich the content of the education faculty curricula in terms of ecological citizenship. In this context, it would be appropriate to seek the opinions of academicians who conduct studies to increase teacher candidates' ecological citizenship levels. Another important point is to provide opportunities for teacher candidates to engage in ecological citizenship activities within the framework of the Teaching Practice course. From a holistic perspective, it is essential to address the topic of ecological citizenship in primary, secondary, and high school curricula. Indeed, when examining both the existing curricula and the curriculum of the Turkey Century Maarif Model proposed by the Ministry of National Education, it is observed that the topic of ecological citizenship is not included (MEB, 2024a; 2024b).

5 Statement of Researchers

5.1 Researchers contribution rate statement

The authorship contribution for this paper is as follows: the first author contributed 50%, the

second author contributed 30%, and the third author contributed 20%.

5.2 Conflict statement

The authors declare no conflicts of interest.

5.3 Support and thanks

No Support

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