Examination of Sustainable Development Awareness of Pre-Service Social Studies Teachers

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ABSTRACT

This study was conducted to examine pre-service social studies teachers' awareness of sustainable development. The study group of the research included 170 pre-service teachers studying at Gazi University, Gazi Faculty of Education, Department of Social Studies Education in 2022-2023 academic year. The survey model, one of the quantitative research methods, was used in the study. In the data collection phase of the study, a personal information form and the "Sustainable Development Awareness Scale" (SDAS) developed by Atmaca, Kiray and Pehlivan (2019) were used. Whether the data obtained for the purpose of the study were normally distributed was determined by Kolmogorov-Smirnov and Shapiro-Wilk tests in the categories of economic sustainability, social sustainability, environmental sustainability and total score. Since the data were not normally distributed, Mann-Whitney U test and Kruskal-Wallis H test, which are non-parametric tests, were used in the analysis. As a result of the research, it was determined that there was a significant difference in favor of female pre-service teachers in terms of awareness levels in economic, social and environmental sustainability sub-dimensions and total scores. In the analyses conducted according to the age variable, while there was no significant difference in the economic and environmental sustainability sub-dimensions and total scores, a significant difference was found in favor of pre-service teachers aged 24 and above in the social sustainability sub-dimension. In the analyses made according to the grade level variable, a significant difference was found in favor of sophomore pre-service teachers in economic sustainability, environmental sustainability sub-dimensions and total scores, and in favor of final year pre-service teachers in social sustainability sub-dimension. In the analyses conducted according to the variable of having received training on sustainable development, a significant difference was found in favor of pre-service teachers who received training on this subject in economic sustainability and social sustainability sub-dimensions and total scores. In line with these results, it is suggested to conduct studies involving different participant groups to further investigate the effects of variables on the level of awareness on sustainable development; conduct studies to determine the knowledge, attitudes and behaviors of students at different levels of education on sustainable development; further investigate the effects of sustainable development education on the awareness, attitude and behavior levels of pre-service teachers; use active learning methods such as project-based learning in the education process to raise students' awareness on sustainable development; organize activities to develop students' critical thinking skills on sustainable development issues and create projects to raise students' awareness about local and global issues related to sustainable development.

Keywords:
Sustainable development, awareness, social studies pre-service teachers

INTRODUCTION

Sustainability and development are frequently considered together in literature and represent a broad context. Sustainability refers to the preservation, maintenance, and continuation of vital forms, needs, and related entities. On the other hand, development is an economic term that primarily describes the economic progress of developing countries and communities. In the context of developed countries, this term is often highlighted as economic growth (Özgen, 2019).

According to reports from the United Nations (UN), the world population is expected to exceed 10 billion by 2050. A study conducted by the National Academy of Sciences of the United States predicts that if the current rate of population growth continues, the global population could reach 30 billion by 2075 (Çamurcu, 2005). This rapid population growth threatens the livability of cities and complicates the supply of essential resources. At the same time, increasing population, coupled with the rapid industrialization of the 21st century and dwindling natural resources, raises environmental concerns. Environmental issues have become not only regional problems but global concerns for all humanity. Consequently, it has become

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imperative to develop concrete proposals and find lasting solutions to these shared challenges (Baykal & Baykal, 2008).

Among the most important goals for all countries is ensuring their continuity in a sustainable manner and building more livable societies for the future. To achieve this goal, countries develop and implement various policies. These policies are not limited to defense and education but also encompass social and economic development. Every country has its own unique population policies tailored to historical periods. When determining population policies, social, economic, and various other factors are considered. Therefore, creating such policies is essential to support a sustainable development process (Şahin, 2020).

The journey of sustainable development began in 1972 at the United Nations Conference on the Human Environment in Stockholm. During this conference, countries from around the world gathered for the first time to discuss environmental issues. Later, in 1987, the "Brundtland Report" defined sustainable development as meeting the needs of the present without compromising the ability of future generations to meet their own needs. The "Rio Conference" in 1992 achieved significant progress in environmental and developmental discussions, leading to agreements among nations to act collectively. In 2000, the "United Nations Millennium Summit" established the "Millennium Development Goals" aimed at fostering cooperation between developed and developing countries in matters of environment and development. The "World Summit on Sustainable Development (WSSD)" in 2002 and the "Rio+20 Conference" in 2012 further strengthened international cooperation to achieve these goals. Finally, in 2015, "Agenda 2030: United Nations Sustainable Development Goals" positioned sustainable development at the core of global policy, redefining global objectives in this area. This process underscores the increasing global importance of environmental conservation and sustainability (Türkiye Cumhuriyeti Dışişleri Bakanlığı, 2022-Republic of Turkey Ministry of Foreign Affairs, 2022).

The three fundamental pillars of sustainability—social, economic, and environmental—are crucial for both individual nations and the world (Alhaddi, 2015). Ensuring that current needs are met without depleting resources essential for future generations can only be achieved through awareness. One of the most significant ways to instill this awareness and achieve sustainable development goals is through education (Haubrich, Reinfried & Schleicher, 2007).

Education plays a key role in raising awareness of sustainability and fostering knowledge, attitudes, and behaviors. In this regard, education serves an important function in disseminating the concept of sustainability to the masses and increasing public awareness (Gökmen, Solak & Ekici, 2019). Global awareness of the environmental damage caused by human activities has increased, necessitating urgent and significant measures. Recently, the importance of sustainability has been emphasized across all fields. Sustainable development, sustainable development strategies, and education on these topics have become priorities for international organizations (Kaya & Tomal, 2011).

In addition to technological, innovative, and scientific advancements, global pandemics, environmental issues, harmful gas emissions, hunger, water scarcity, security concerns, income inequality, moral erosion, and digital crimes necessitate revisions and improvements in curricula. To address these challenges, it is essential to educate responsible, knowledgeable, and skilled individuals. Updating curricula to address current issues and meet local, national, and global needs has become imperative. In this context, the Turkish Ministry of National Education (MEB/MoNE) restructured curricula in 2018. These innovations align with sustainable development goals and share common characteristics. Particularly in Turkey, the social studies curriculum includes content that aligns with these goals (Yalçın, 2022). This curriculum plays a critical role in sustainability education by helping individuals develop a deeper understanding of social, environmental, and economic issues (Buchanan & Crawford, 2015).

The social studies course encompasses goals related to the social, economic, and environmental dimensions of sustainable development, thus helping students think from a broader perspective. The social studies curriculum integrates topics such as environmental awareness, civic consciousness, awareness of national and global issues, economic literacy, and natural resource conservation, making it directly relevant to sustainable development goals (MEB, 2018). This underscores the importance of training teachers who can effectively convey these goals.

A review of the literature reveals that social studies education plays a crucial role in raising awareness of sustainable development and that it is critical for prospective teachers to acquire this awareness during their undergraduate education. In this regard, social studies courses serve a key function in fostering awareness of

sustainable development. To achieve this objective, it is necessary to train knowledgeable and competent teachers in the field of sustainable development. Teaching sustainable development comprehensively to prospective teachers in faculties of education is essential for passing on this awareness to future generations (Gökmen, Solak & Ekici, 2017). Aligning university education programs with current issues and sustainable development goals plays a vital role in equipping future teachers with the necessary awareness and skills. This highlights the need for a multidimensional and comprehensive approach to education to achieve sustainable development goals. In this context, this study aims to examine the awareness levels of social studies teacher candidates regarding sustainable development.

METHOD

AIM AND METHODOLOGY OF THE RESEARCH

Ensuring sustainable development is a critical element for today's world, impacting the well-being of both current and future generations. Therefore, embracing and implementing sustainable development principles is essential for societies to build a sustainable future. This concept adopts a holistic approach that encompasses economic, social, and environmental dimensions, incorporating vital goals such as the efficient use of resources, reducing inequalities, and preserving the natural environment (Kardaş İşler, 2023).

Social studies teachers play a crucial role in instilling this awareness in students. While teaching subjects such as history, geography, economics, and politics, these teachers also integrate sustainable development principles. This approach not only imparts knowledge but also helps students become advocates of sustainable development. Consequently, assessing the awareness of social studies teacher candidates regarding sustainable development is crucial in evaluating their potential to fulfill this vital role effectively (Çobanoğlu & Türer, 2015). Therefore, this study aims to investigate the awareness levels of social studies teacher candidates concerning sustainable development.

The study seeks to answer the following research questions regarding social studies teacher candidates.

Does their awareness of sustainable development significantly differ based on their:

- gender?
- age?
- class level?
- whether they have received education on the concept of sustainability?

DATA COLLECTION PROCESS

RESEARCH MODEL

In this study, designed to measure the awareness of sustainable development among pre-service social studies teachers, a quantitative research method was employed, specifically the survey model. Since the research aims to reveal the current situation and determine the relationships between multiple variables, it was structured in accordance with the correlational survey model, which is a subcategory of general survey models. Correlational survey models are research designs used to determine the presence and degree of co-variation between two or more variables (Karasar, 2019).

RESEARCH GROUP

The research group consisted of 170 pre-service teachers enrolled in the Department of Social Studies Education, Faculty of Education, Gazi University, during the 2022-2023 academic year. These students were in their first, second, third, and fourth years of study. The study group was determined using the convenient sampling method. This method was chosen due to its practicality, ease of access to participants, and cost-effectiveness (Yıldırım & Şimşek, 2018).

The demographic distribution of the participating pre-service social studies teachers is presented in Table 1.

Table 1

Demographic Information of Pre-Service Social Studies Teachers

Personal Information	Variables	N	%
Gender	Female	121	71.2
	Male	49	28.8
Grade Level	Freshman	29	17.1
	Sophomore	54	31.8
	Sophister	39	22.9
	Final year	48	28.2
Age	18-20 year	51	30.0
	21-23 year	100	58.8
	24 years and above	19	11.2
Having received training on sustainable education	I received training.	60	35.3
	I didn't receive training.	110	64.7

Analysis of Table 1 reveals that 71.2% of the participants are female, while 28.8% are male. Regarding grade level, the distribution shows that 17.1% are freshman (1st grade), 31.8% are sophomore (2nd grade), 22.9% sophister (3rd grade), and 28.2% final year (4th grade).

The age distribution indicates that 30.0% of the participants are between 18-20 years old, 58.8% are between 21-23 years old, and 11.2% are 24 years or older. Additionally, the analysis regarding having received training on sustainable development reveals that 35.3% of participants have received training on this topic, while 64.7% have not.

These findings provide an overall profile of the pre-service social studies teachers participating in the study. The results indicate a higher number of female participants, with the highest representation from sophomore students. Most participants fall within the 21-23 age range. Furthermore, the data suggests that a significant number of participants have not received training on sustainable development.

DATA COLLECTION TOOLS

To obtain the demographic data in the study, a "Personal Information Form" was used, while the "Sustainable Development Awareness Scale" developed by Atmaca, Kiray, and Pehlivan (2019) was employed to measure the sustainable development awareness of pre-service teachers.

PERSONAL INFORMATION FORM

The "Personal Information Form" prepared by the researcher, was used to collect demographic data about the pre-service social studies teachers. This form included questions regarding gender, grade level, age, and whether the participants have received training on sustainable development.

SUSTAINABLE DEVELOPMENT AWARENESS SCALE

The "Sustainable Development Awareness Scale" developed by Atmaca, Kiray, and Pehlivan (2019) measures the awareness levels of teachers and students enrolled in faculties of education. The scale consists of 37 items and is structured on a five-point Likert scale. It comprises three dimensions: environmental sustainability, social sustainability, and economic sustainability.

The items in the scale are categorized into three sub-dimensions: items 1-13 measure economic sustainability, items 14-22 measure social sustainability, and items 23-37 measure environmental sustainability. The scale includes six negatively worded items (1, 8, 10, 24, 31, and 35) and one control item (26). The total scores on the scale range from 36 to 180 points (Atmaca, Kiray, & Pehlivan, 2019).

Table 2 presents details regarding the sub-dimensions and item numbers of the Sustainable Development Awareness Scale (SDAS).

Table 2

Sub-Dimensions and Item Numbers of the SDAS

Sub Dimensions	Item Numbers	Number of Items
1.Economic sustainability	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,12,13	13
2.Social sustainability	14, 15, 16, 17, 18, 19, 20, 21, 22	9
3.Environmental sustainability	23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37	15
4.Total number of items		37

VALIDITY AND RELIABILTY ANALYSIS OF THE SCALE

The content validity of the Sustainable Development Awareness Scale was established through expert opinions, while construct validity was confirmed via confirmatory factor analysis (CFA). Initially, a literature review informed the creation of 54 items, which were refined to 36 after eliminating redundancies. These items covered three sub-dimensions of sustainable development: economy, society, and environment. The draft scale was reviewed by four experts from science education departments at three universities in Turkey, leading to necessary revisions. For construct validity, CFA was conducted using AMOS software, employing the Maximum Likelihood (MLR) estimation method due to the fulfillment of multivariate normality assumptions. Model fit was assessed using fit indices, including x^2/df, RMSEA, S-RMR, AGFI, GFI, IFI, and TLI. The results ($x^2/df = 1.677$, RMSEA = 0.040, S-RMR = 0.044, AGFI = 0.871, GFI = 0.889, IFI = 0.931, TLI = 0.923) indicated a valid construct, with key indices meeting acceptable or excellent fit thresholds. Reliability analysis was conducted using SPSS 15, with Cronbach's alpha coefficient calculated for the overall scale (α = 0.91) and its sub-dimensions: economy (α = 0.77), society (α = 0.87), and environment (α = 0.82). These values exceed the generally accepted threshold of 0.70, indicating high internal consistency. Following validity and reliability assessments, the finalized scale comprises 36 items, categorized into economic (13 items), social (9 items), and environmental (14 items) sustainability sub-dimensions (Atmaca, Kiray, & Pehlivan, 2019).

COLLECTION OF THE DATA

At the beginning of the study, ethical approval was obtained from the Ethics Committee of Gazi University, along with permission to use the scale from the scale owners. Upon receiving the necessary approvals, faculty members in the Social Studies Teaching Department at Gazi University were contacted, and class visits were arranged in coordination with their academic schedules.

During these visits, pre-service teachers were informed about the study's purpose and the scales used. Following this briefing, students who voluntarily agreed to participate were provided with the Personal Information Form and the Sustainable Development Awareness Scale developed by Atmaca, Kiray, and Pehlivan (2019). After ensuring voluntary participation, the completed surveys were collected, marking the completion of the data collection process. The data obtained served as the primary source for the study's analysis phase.

DATA ANALYSIS

The data collected through the Sustainable Development Awareness Scale and the Personal Information Form were analyzed using SPSS software. To determine whether the data obtained from the study group exhibited a normal distribution, Kolmogorov-Smirnov and Shapiro-Wilk tests were conducted on the categories of economic sustainability, social sustainability, environmental sustainability, and total score. According to the results of these normality tests, the significance level (Sig.) was found to be 0.000 for all categories, indicating that the data had a significance level lower than $p<0.05$ and did not conform to a normal

distribution. Since the data did not exhibit a normal distribution, non-parametric tests, namely the Mann-Whitney U test and the Kruskal-Wallis H test, were employed for data analysis.

LIMITATIONS OF THE STUDY

This study is limited to 170 pre-service teachers enrolled in the Department of Social Studies Education at Gazi University, Faculty of Education, during the 2022-2023 academic year.

FINDINGS and DISCUSSION

This section presents data obtained from personal information form and SDAS.

Table 3 shows the results of the Mann-Whitney U test for the economic sustainability sub-dimension scores of pre-service social studies teachers based on gender.

Table 3

Mann-Whitney U Test Results for Economic Sustainability Sub-Dimension Scores of Pre-Service Social Studies Teachers Based on Gender

Sub Dimension	Gender	N	Mean Rank	Rank Sum	U	Z	p	Significant Difference
Economic Sustainability	a.Female	121	92.62	11207.50	2102.500	-2.976	.003	a-b
	b. Male	49	67.91	3327.50				

According to Table 3, the mean rank of female prospective teachers in the economic sustainability sub-dimension is 92.62, while that of males is 67.91. Considering the mean ranks, a significant difference is observed in favor of female prospective teachers. The analysis results indicate that the difference between participants' economic sustainability awareness and gender is statistically significant (U=2102.500, Z=-2.976, p=.003, p<.05). This finding suggests that female prospective teachers have a higher level of sustainable development awareness in the economic sustainability sub-dimension compared to male participants.

Özsoy (2021) found similar results in their study examining prospective teachers' sustainable development awareness, where female prospective teachers had a higher mean rank in the economic sustainability sub-dimension than their male counterparts.

Table 4 presents the Mann-Whitney U test results for the SDAS social sustainability sub-dimension scores of prospective social studies teachers based on gender.

Table 4

Mann- Whitney U Test Results for the SDAS Social Sustainability Sub-Dimension Scores of Social Studies Pre-Service Teachers by Gender

Sub Dimension	Gender	N	Mean Rank	Rank Sum	U	Z	p	Significant Difference
Social Sustainability	a.Female	121	94.14	11391.00	1919.000	-3.703	.000	a-b
	b. Male	49	64.16	3144.00				

As shown in Table 4, the mean rank of female participants in the social sustainability sub-dimension is 94.14, while that of males is 64.16. Based on mean ranks, a significant difference is observed in favor of female prospective teachers. The results indicate that the difference between participants' social sustainability scores and gender is statistically significant (U=1919.000, Z=-3.703, p=.000, p<.05). This suggests that male prospective teachers have lower scores in the social sustainability sub-dimension compared to female prospective teachers.

Atmaca (2018) conducted a study with pre-service science teachers and found that female prospective teachers had a higher level of awareness in the social sustainability sub-dimension compared to their male counterparts.

Table 5 presents the Mann-Whitney U test results for the SDAS environmental sustainability sub-dimension scores of prospective social studies teachers based on gender.

Table 5

Mann- Whitney U Test Results for the SDAS Environmental Sustainability Sub-Dimension Scores of Social Studies Pre-Service Teachers by Gender

Sub Dimension	Gender	N	Mean Rank	Rank Sum	U	Z	p	Significant Difference
Environmental Sustainability	a.Female	121	93.24	11281.50	2028.500	-3.230	.001	a-b
	b. Male	49	66.40	3253.50				

As seen in Table 5, the mean rank of female prospective teachers in the environmental sustainability sub-dimension is 93.24, while that of male participants is 66.40. According to the Mann-Whitney U test results, a significant difference exists between female and male pre-service teachers in terms of environmental sustainability awareness. The analysis results indicate that the difference between participants' environmental sustainability scores and gender is statistically significant (U=2028.500, Z=-3.230, p=.001, p<.05). This finding suggests that female pre-service teachers have a higher level of awareness in the environmental sustainability sub-dimension than their male counterparts.

Türer (2010) found similar results in their study with pre-service science and social studies teachers, where female pre-service teachers had a higher awareness level in the environmental sustainability sub-dimension compared to male prospective teachers.

Table 6 presents the Mann-Whitney U test results for the total SDAS scores of pre-service social studies teachers based on gender.

Table 6

Mann- Whitney U Test Results for the SDAS Total Scores of Social Studies Pre-Service Teachers by Gender

Sub Dimension	Gender	N	Mean Rank	Rank Sum	U	Z	p	Significant Difference
Total	a.Female	121	94.24	11403.00	1907.000	-3.640	.000	a-b
	b. Male	49	63.92	3132.00				

As shown in Table 6, the Mann-Whitney U test results indicate a significant difference between SDAS total scores and gender (U=1907.000, Z=-3.640, p=.000, p<.05). When the mean ranks are examined, female prospective teachers scored 94.24, while male prospective teachers scored 63.92. The analysis results suggest a significant difference in favor of female prospective teachers. This finding indicates that female prospective teachers have a higher level of sustainable development awareness than male prospective teachers.

Özsoy (2021) conducted a study with pre-service teachers in faculties of education and found that female primary school teacher candidates had higher sustainable development awareness levels than their male counterparts.

Table 7 presents the Kruskal-Wallis H test results for the SDAS economic sustainability sub-dimension scores of social studies pre-service teachers based on age.

Tablo 7

Kruskal- Wallis H Test Results for the SDAS Economic Sustainability Sub-Dimension Scores of Social Studies Pre-Service Teachers by Age

Sub Dimension	Age	N	Mean Rank	sd	Chi-square	p	Significant Difference
Economic Sustainability	a.18-20 age	51	79.81	2	1.643	.440	-
	b.21-23 age	100	86.34				
	c.24 and above	19	96.34				

According to Table 7, it was observed that teacher candidates aged 18-20 had a mean rank of 79.81, those aged 21-23 had 86.34, and those aged 24 and older had 96.34. This suggests that pre-service teachers aged 24 and older have a higher level of economic sustainability awareness compared to other age groups. However, when the Kruskal-Wallis H test results were examined, this difference was found to be statistically insignificant. According to the analysis results, no statistically significant difference was detected in participants' economic sustainability awareness based on age. These findings indicate that the ages of social studies pre-service teachers do not influence their level of economic awareness ($\chi^2(2) = 1.643$, $p = .440$, $p > .05$).

Table 8 presents the Kruskal-Wallis H test results for the SDAS social sustainability sub-dimension scores of social studies pre-service teachers based on age.

Table 8

Kruskal- Wallis H Test Results for the SDAS Social Sustainability Sub-Dimension Scores of Social Studies Pre-Service Teachers by Age

Sub Dimension	Age	N	Mean Rank	sd	Chi-square	p	Significant Difference
Economic Sustainability	a.18-20 age	51	71.43	2	7.271	.026	a-c
	b.21-23 age	100	89.66				
	c.24 and above	19	101.39				

In Table 8, teacher candidates aged 18-20 had a mean rank of 71.43, those aged 21-23 had 89.66, and those aged 24 and older had 101.39. These findings indicate that teacher candidates aged 24 and older have a higher level of social sustainability awareness than other age groups. The Kruskal-Wallis H test results indicate that this difference is statistically significant. The analysis of the findings revealed a statistically significant difference between participants' social sustainability awareness and age groups. These findings suggest that the age of social studies pre-service teachers affects their awareness levels in the social dimension ($\chi^2(2) = 7.271$, $p = .026$, $p < .05$).

Table 9 presents the Kruskal-Wallis H test results for the SDAS environmental sustainability sub-dimension scores of social studies pre-service teachers based on age.

Table 9

Kruskal- Wallis H Test Results for the SDAS Environmental Sustainability Sub-Dimension Scores of Social Studies Pre-Service Teachers by Age

Sub Dimension	Age	N	Mean Rank	sd	Chi-square	p	Significant Difference
Environmental Sustainability	a.18-20 age	51	81.27	2	3.426	.180	-
	b.21-23 age	100	83.98				
	c.24 and above	19	104.84				

Upon examining Table 9, it was found that the mean rank for teacher candidates aged 18-20 was 81.27, for those aged 21-23 it was 83.98, and for those aged 24 and older it was 104.84. This suggests that participants aged 24 and older scored higher in the environmental sustainability sub-dimension compared to other age groups. However, the Kruskal-Wallis H test results indicate that this difference is not statistically significant ($\chi^2(2) = 3.426$, $p = .180$, $p > .05$). Thus, although pre-service teachers aged 24 and older had higher mean ranks, this difference was not found to be statistically significant.

Table 10 presents the Kruskal-Wallis H test results for the SDAS total scores of social studies teacher candidates based on age.

Table 10

Kruskal- Wallis H Test Results for the SDAS Total Scores of Social Studies Pre-Service Teachers by Age

Sub Dimension	Age	N	Mean Rank	sd	Chi-square	p	Significant Difference
Total	a.18-20 age	51	77.31	2	4.399	.111	-
	b.21-23 age	100	85.98				
	c.24 and above	19	104.97				

When examining the results of the Kruskal-Wallis H test in Table 10, it is observed that the mean rank of pre-service teachers aged 24 and above (104.97) is higher than that of pre-service teachers aged 18-20 (77.31) and those aged 21-23 (85.98). In this case, it can be stated that pre-service teachers aged 24 and above have higher total scores related to sustainable development compared to other age groups. However, according to the analysis results, no statistically significant difference was found between pre-service teachers and their total awareness scores ($\chi 2\ (2) = 4.399$, $p = .111$, $p > .05$).

Koçulu (2018) conducted a study with science pre-service teachers and determined that those in the older age group had a higher level of awareness of sustainable development compared to participants in other groups.

The Kruskal-Wallis H test results for the economic sustainability sub-dimension scores of social studies pre-service teachers according to class level are presented in Table 11.

Table 11

Kruskal-Wallis H Test Results for the Economic Sustainability Sub-Dimension Scores of Social Studies Pre-Service Teachers by Grade Level

Sub Dimension	Grade Level	N	Mean Rank	sd	Chi-square	p	Significant Difference
Economic Sustainability	a.Freshman	29	59.00	3	14.08	.003	a-b
	b.Sophomore	54	100.16				
	c.Sophister	39	80.05				
	d.Final Year	48	89.45				

In Table 11, the awareness levels of participants in different class levels regarding the economic sustainability sub-dimension were examined. According to the results of the Kruskal-Wallis H test, it was observed that freshman pre-service teachers had a mean rank of 59.00, sophomore pre-service teachers had 100.16, sophister pre-service teachers had 80.05, and final year pre-service teachers had 89.45. Based on this, it can be stated that sophomore students have a higher level of awareness regarding economic sustainability compared to other grade levels. The analysis results show that this difference is statistically significant. Consequently, participants' awareness in this dimension varies depending on their class level ($\chi 2$ (3) = 14.08, p = .003, p < .05).

The Kruskal-Wallis H test results for the SDAS social sustainability sub-dimension scores of social studies pre-service teachers according to class level are presented in Table 12.

Table 12

Kruskal-Wallis H Test Results for the SDAS Social Sustainability Sub-Dimension Scores of Social Studies Pre-Service Teachers by Grade Level

Sub Dimension	Grade Level	N	Mean Rank	sd	Chi-square	p	Significant Difference
Social Sustainability	a.Freshman	29	52.88	3	17.095	.001	a-b, a-c, a-d
	b.Sophomore	54	92.59				
	c.Sophister	39	86.85				
	d.Final Year	48	96.14				

According to Table 12, the mean ranks of freshman pre-service teachers were 52.88, sophomore pre-service teachers 92.59, sophister pre-service teachers 86.85, and final year pre-service teachers 96.14. The findings indicate that final-year pre-service teachers have a higher level of awareness regarding social sustainability compared to other grade levels. The analysis of the findings revealed a statistically significant difference between the social sustainability awareness of pre-service teachers and their grade levels ($\chi 2$ (3) = 17.095, p = .001, p < .05). These findings suggest that grade levels influence participants' awareness levels in the social dimension.

The Kruskal-Wallis H test results for the SDAS environmental sustainability sub-dimension scores of social studies pre-service teachers according to grade level are presented in Table 13.

Table 13

Kruskal-Wallis H Test Results for the SDAS Environmental Sustainability Sub-Dimension Scores of Social Studies Pre-Service Teachers by Grade Level

Sub Dimension	Grade Level	N	Mean Rank	sd	Chi-square	p	Significant Difference
Environmental Sustainability	a.Freshman	29	68.24	3	8.325	.040	a-b
	b.Sophomore	54	98.60				
	c.Sophister	39	78.29				
	d.Final Year	48	87.04				

In Table 13, the mean ranks of freshman participants were 68.24, sophomore participants 98.60, sophister participants 78.29, and final-year participants 87.04. Based on this, it was observed that sophomore participants had a higher level of awareness regarding environmental sustainability compared to other grade levels. The results of the Kruskal-Wallis H test indicated that the difference in participants' environmental sustainability sub-dimension scores according to class level was statistically significant ($\chi 2$ (3) = 8.325, p = .040, p < .05). Thus, it can be stated that participants' awareness of the environmental sustainability sub-dimension varies depending on their grade level.

Özsoy (2021) conducted a study with pre-service teachers and determined that sophomore science pre-service teachers had the highest mean rank in the environmental sustainability sub-dimension according to the grade level variable.

Table 14

Kruskal-Wallis H Test Results for the Total SDAS Scores of Social Studies Pre-Service Teachers by Grade

Sub Dimension	Grade Level	N	Mean Rank	sd	Chi-square	p	Significant Difference
Total	a.Freshman	29	58.26	3	14.853	.002	a-b
	b.Sophomore	54	99.56				
	c.Sophister	39	78.58				
	d.Final Year	48	91.77				

According to Table 14, the results of the Kruskal-Wallis H test indicate a significant difference in the total sustainable awareness scores across different grade levels. Based on the analysis of the findings, it is observed that the mean rank scores are as follows: 58.26 for freshman participants, 99.56 for sophomore participants, 78.58 for sophister participants, and 91.77 for final-year participants. This significant difference is in favor of sophomore pre-service teachers. The findings suggest that sophomore participants have higher total scores in sustainable development awareness compared to other grade levels ($\chi^2(3) = 14.853$, p = .002, p < .05).

Similarly, Türk (2022), in a study conducted with pre-service early childhood pre-service teachers, found that sophomore pre-service teachers had the highest mean rank according to the grade level variable.

The results of the Mann-Whitney U test examining the SDAS economic sustainability sub-dimension scores of pre-service social studies teachers in relation to their education on sustainable development are presented in Table 15.

Table 15

Mann-Whitney U Test Results for the SDAS Economic Sustainability Sub-Dimension Scores of Pre-Service Social Studies Teachers Based on Their Training on Sustainable Development

Sub Dimension	Training on Sustainable Development	N	Mean Rank	Rank Sum	U	Z	p	Significant Difference
Economic Sustainability	a.I received training.	60	95.91	5754.50	2675.500	-2.043	.041	a-b
	b. I did not receive training.	110	79.82	8780.50				

As shown in Table 15, the mean rank for economic sustainability in pre-service social studies teachers who received training on sustainable development was 95.91, while it was 79.82 for those who did not receive such training. Examining the mean ranks, a significant difference is observed in favor of those who received training. The results of the analysis indicate that there is a statistically significant difference between participants' economic sustainability awareness levels and their training on sustainable development ($U = 2675.500$, $Z = -2.043$, $p = .041$, $p < .05$). These findings suggest that participants who received training on sustainable development scored higher in the economic sustainability sub-dimension compared to those who did not.

The results of the Mann-Whitney U test for the SDAS social sustainability sub-dimension scores of pre-service social studies teachers based on their training on sustainable development are presented in Table 16.

Table 16

Mann-Whitney U Test Results for the SDAS Social Sustainability Sub-Dimension Scores of Pre-Service Social Studies Teachers Based on Their Training on Sustainable Development

Sub Dimension	Training on Sustainable Development	N	Mean Rank	Rank Sum	U	Z	p	Significant Difference
Social Sustainability	a.I receieved training.	60	98.68	5920.50	2509.500	-2.654	.008	a-b
	b. I did not receive training.	110	78.31	8614.50				

According to Table 16, the mean rank for the social sustainability sub-dimension was 98.68 for social studies pre-service teachers who received training on sustainable development, while it was 78.31 for those who did not. Considering the mean ranks, the significant difference observed is in favor of those who received training. The results of the analysis indicate that the social sustainability awareness levels of pre-service teachers significantly differ based on their training on sustainable development ($U = 2509.500$, $Z = -2.654$, $p = .008$, $p < .05$). This suggests that participants who received training scored higher in the social sustainability sub-dimension than those who did not.

The results of the Mann-Whitney U test for the SDAS environmental sustainability sub-dimension scores of pre-service social studies teachers based on their training on sustainable development are presented in Table 17.

Table 17

Mann-Whitney U Test Results for the SDAS Environmental Sustainability Sub-Dimension Scores of Pre-Service Social Studies Teachers Based on Their Training on Sustainable Development

Sub Dimension	Training on Sustainable Development	N	Mean Rank	Rank Sum	U	Z	p	Significant Difference
Environmental Sustainability	a.I received training.	60	95.45	5727.00	2703.000	-1.953	.051	-
	b. I did not receive training.	110	80.07	8808.00				

As shown in Table 17, the mean rank for the environmental sustainability sub-dimension was 95.45 for pre-service teachers who received training on sustainable development, while it was 80.07 for those who did not. A significant difference was observed in favor of those who received training. However, according to the Mann-Whitney U test results, the difference in scores between participants who received training and those who did not was not statistically significant. The analysis indicates that the difference in participants' environmental sustainability awareness levels based on their training status is not statistically significant ($U = 2703.000$, $Z = -1.953$, $p = .051$, $p > .05$). These findings suggest that receiving training on sustainable development does not significantly impact participants' awareness in the environmental sustainability dimension.

Table 18 presents the Mann-Whitney U test results for the total SDAS scores of pre-service social studies teachers based on their training on sustainable development.

Table 18

Mann-Whitney U Test Results for the Total SDAS Scores of Pre-Service Social Studies Teachers Based on Their Training on Sustainable Development

Sub Dimension	Training on Sustainable Development	N	Mean Rank	Rank Sum	U	Z	p	Significant Difference
Total	a.I received training.	60	98.63	5918.00	2512.000	-2.571	.010	a-b
	b. I did not receive training.	110	78.34	8617.00				

According to Table 18, the results of the Mann-Whitney U test indicate a statistically significant difference in total SDAS scores between pre-service teachers who received training on sustainable development and those who did not ($U = 2512.000$, $Z = -2.571$, $p = .010$, $p < .05$). Examining the mean ranks, the significant difference observed is in favor of pre-service teachers who received training (98.63) compared to those who did not (78.34). The analysis results suggest that pre-service teachers who received training on this subject have higher total SDAS awareness scores compared to those who did not.

Similarly, Çelik (2019), in a study examining the sustainable development awareness and environmental problem-related behaviors of pre-service science teachers, found a statistically significant difference in favor of those who received training on the topic.

RESULTS and SUGGESTIONS

In this section, the results obtained from the research conducted to examine the sustainable development awareness levels of pre-service social studies teachers are presented, along with suggestions based on these findings.

RESULTS

This study was conducted during the 2022-2023 academic year at Gazi University, Gazi Faculty of Education, Department of Social Studies Education, to examine the sustainable development awareness levels of pre-service social studies teachers.

The research group consisted of 170 pre-service teachers, including 121 females and 49 males, who voluntarily participated in the research and were enrolled in the undergraduate program at the Department of Social Studies Education, Gazi Faculty of Education. The sustainable development awareness of the participants was assessed based on variables such as gender, age, grade level, and participation in sustainable development education.

The study employed a quantitative research method and was designed using a correlational survey model. As a data collection tool, the Sustainable Development Awareness Scale (SDAS) was used to determine the sustainable development awareness levels of pre-service social studies teachers, along with a demographic information form to obtain personal details.

The main findings of the study on the sustainable development awareness levels of pre-service social studies teachers are summarized below:

The analyses related to the gender variable revealed that female pre-service teachers had higher sustainable development awareness levels in the economic, social, and environmental sustainability sub-dimensions, as well as in total scores. These findings indicate that gender is an influential factor in sustainable development awareness levels. Similar studies have also found that gender plays a role in sustainable development awareness. Faiz and Bozdemir (2019) reported that female pre-service teachers had higher environmental-economic awareness scores than their male counterparts. Additionally, Çobanoğlu and Türer (2015) found that although they did not identify a statistically significant difference, female pre-service teachers had higher awareness levels than males. Furthermore, Uslu (2022) determined that female pre-service teachers had higher scale scores related to attitudes toward sustainable development and environmental education. However, some studies contradict these findings. Öztürk Demirbaş (2015) stated that the sustainable development awareness levels of pre-service teachers did not significantly differ by gender. Similarly, Eröz, Günay, and Diker Coşkun (2023) found no significant gender difference in sustainable development awareness levels among pre-service teachers.

The analyses related to the age variable indicated that pre-service teachers aged 24 and above had higher sustainable development awareness levels in all sub-dimensions and total scores than younger participants. These results suggest that age influences sustainable development awareness levels, indicating that as pre-service teachers grow older, their awareness of sustainable development increases. Similar findings were reported by Koçulu (2018), who found that pre-service teachers aged 21-24 had significantly higher sustainable development awareness levels than those aged 17-20. Kavaz and Öztoprak (2019) also determined that as participants' ages increased, their sustainability self-assessment scores improved. In contrast, Öner and Kadıoğlu Ateş (2020) found a significant difference favoring pre-service teachers aged 22-24 over those aged 28 and above in terms of sustainable development awareness levels.

The analysis of the grade level variable revealed that sophomore pre-service teachers had higher awareness levels in economic and environmental sustainability sub-dimensions and total scores, while final-year pre-service teachers had higher awareness levels in the social sustainability sub-dimension. These findings align with the study by Torun (2024), which identified higher awareness levels in the social sustainability sub-dimension among final-year pre-service teachers. Similarly, Çimen and Benzer (2019) found that sophomore pre-service teachers had the highest total scores in sustainable development awareness. However, other studies have reported differing results. Faiz and Bozdemir Yüzbaşıoğlu (2019) found that sophister pre-service teachers had the highest environmental-economic awareness scores, whereas final-year pre-service teachers had the lowest. Uslu (2022) determined that sophister and final-year pre-service teachers had higher scale scores for attitudes toward sustainable development and environmental education than freshman and sophomore pre-service teachers. Conversely, Karadağ and Acar (2020) found no statistically significant differences in awareness levels regarding environmental issues among different grade levels.

The analysis of the impact of receiving education on sustainable development showed that pre-service teachers who had received training in this field had higher awareness levels across all sub-dimensions and total scores compared to those who had not received such training. The literature presents studies that both support and contradict these findings. In agreement with this study, Dinçol Özgür (2020) found that pre-service teachers who had taken environmental courses had higher recycling awareness levels than those who had not. Similarly, Deniş and Genç (2007) determined that pre-service teachers who had received training on environmental issues had higher knowledge and attitude levels than those who had not. Keleş, Uzun, and Varnacı Uzun (2010) highlighted that nature education programs significantly contributed to participants' environmental awareness and attitudes, enhancing positive behaviors and ensuring their retention. However, some studies differ from these findings. Öksüzoğlu (2022) reported that taking the Contemporary World Issues course did not lead to a significant difference in pre-service social studies teachers' global citizenship, social responsibility, global competence, and global civic engagement levels. Similarly, Eşme, Yağcı, and Demir (2021) found no statistically significant differences in renewable energy awareness scores based on whether participants had taken a course on the topic.

SUGGESTIONS

Based on the results of the study examining the sustainable development awareness levels of pre-service social studies teachers, the following suggestions are presented.

Recommendations for Researchers:

- Future studies can include different participant groups to examine the effects of various variables on sustainable development awareness levels in more detail.
- Research can be conducted to determine students' knowledge, attitudes, and behaviors regarding sustainable development at different educational levels.
- The impact of sustainable development education on pre-service teachers' awareness, attitudes, and behavior levels can be explored in more depth.

Recommendations for Educators:

- Active learning methods such as project-based learning can be used in the education process to raise students' awareness of sustainable development.
- Activities that enhance students' critical thinking skills on sustainable development issues can be organized.
- Projects that raise awareness of local and global issues related to sustainable development can be developed.

Declarations

Conflict of Interest

No potential conflicts of interest were disclosed by the author(s) with respect to the research, authorship, or publication of this article.

Ethics Approval

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Research and Publication Ethics Statement

Hereby, we as the authors consciously assure that for the manuscript "Examination of Sustainable Development Awareness of Pre-Service Social Studies Teachers" the following is fulfilled:

- This material is the authors' own original work, which has not been previously published elsewhere.
- The paper reflects the authors' own research and analysis in a truthful and complete manner.
- The results are appropriately placed in the context of prior and existing research.
- All sources used are properly disclosed.

Contribution Rates of Authors to the Article

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