

Article

Students' Environmental Care Attitude: A Study at Adiwiyata Public High School Based on the New Ecological Paradigm (NEP)

Novika Adi Wibowo ^{1,*} , Sumarmi Sumarmi ¹ , Sugeng Utaya ¹, Syamsul Bachri ¹  and Yayoi Kodama ²

¹ Department of Geography Education, Faculty of Social Sciences, Universitas Negeri Malang, Malang 65145, Indonesia; sumarmi.fis@um.ac.id (S.S.); sugeng.utaya.fis@um.ac.id (S.U.); syamsul.bachri.fis@um.ac.id (S.B.)

² Social Studies, Faculty of Humanities, The University of Kitakyushu, Kitakyushu 802-8577, Japan; kodama@kitakyu-u.ac.jp

* Correspondence: novika.adi.2107219@students.um.ac.id

Abstract: Environmental care attitude is an important factor in protecting the environment. The Adiwiyata Award is presented as the highest recognition for implementing an environmental care attitude. The aims of this study are to (1) evaluate the execution of the environmental curriculum in Adiwiyata schools; (2) to analyze the students' environmental care attitudes in Adiwiyata schools in the Pati Regency using the new ecological paradigm (NEP) scale; and (3) to examine the students' environmental care attitudes in Adiwiyata schools in the Pati Regency related to gender differences. Based on the criteria of Adiwiyata schools, they were used as research subjects. The research subjects were chosen using a purposive sampling technique. A questionnaire was utilized as a data collection instrument. The new ecological paradigm (NEP) scale was used to assess environmental care attitudes. This study used a Likert scale to assess environmental care attitudes. The Mann-Whitney test was used to identify gender differences in environmental care attitudes. The results found that (1) Adiwiyata schools in the Pati Regency supported the implementation of environmental education in the curriculum, as well as participation in environmental activity programs and the use of greenhouses; (2) the environmental care attitudes of students from the SMA Negeri Pati Regency were in the moderate category; and (3) there was a gender difference based on environmental care attitudes, which found that female students have a higher environmental care attitude than the male students. Environmental education plays an important role in gender differences because the Adiwiyata school has integrated learning activities with the environmental education curriculum, and participatory-based environmental activities can improve students' environmental care attitudes. The potential implication for policy and practice in the field is that humans will consciously prevent environmental problems from occurring.

Keywords: environmental care attitude; Adiwiyata; new ecological paradigm; environmental education



Citation: Wibowo, N.A.; Sumarmi, S.; Utaya, S.; Bachri, S.; Kodama, Y. Students' Environmental Care Attitude: A Study at Adiwiyata Public High School Based on the New Ecological Paradigm (NEP). *Sustainability* **2023**, *15*, 8651. <https://doi.org/10.3390/su15118651>

Academic Editors: Sandro Serpa and Maria José Sá

Received: 9 March 2023

Revised: 10 April 2023

Accepted: 21 May 2023

Published: 26 May 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Environmental problems caused by human behavior—that is, those less concerned with the environment—cause environmental pollution [1,2]. One cause of environmental problems that can contribute to environmental damage is humans who do not feel responsible for the environment, whether it be because they do not care about the environment or because they do not want to take part in protecting and preserving it. Environmental problems might occur because individuals still have a low level of environmental ethics and environmental care attitudes [3], resulting in environmental problems such as river pollution [4], waste pollution [5], floods [6–8], industrial waste pollution [9–11], forest degradation [12], seawater pollution [13], and drought [14]. All environmental problems have the potential to impact environmental quality [15] and even climate change [16].

The community's participation in environmental maintenance and management in the Pati Regency is still ineffective, resulting in pollution. Based on data and information from the Environment Agency in the Pati Regency, it has been discovered that 95 tons of inorganic waste were produced, which were stockpiled in the landfill (Tempat Pembuangan Akhir Sampah–TPA) in Sukohajo Village, Margorejo District, Pati Regency [17]. This inefficient environmental management results in waste pollution [11]. Environmental pollution can be prevented by reducing the quantity of waste produced (reduce), reusing it for the same purpose (reuse), and recycling it (recycle) [18,19]. For instance, reducing materials that are difficult to decompose, or that degrade quickly, and instead using unused waste can help reduce waste pollution. Meanwhile, recycling allows waste, which is frequently perceived as being useless, to be put to new use.

Through environmental education, it is also possible to influence human behavior that is less careful with the environment [20–22]. The Adiwiyata school curriculum includes environmental education with the aim of establishing a school that is cultured and cares about the environment [23,24]. This is supported by the Minister of Environment's Regulation No. 5 of 2013 regarding the Guidelines for the Implementation of the Adiwiyata Program, where the Adiwiyata School is a program that engages all stakeholders in schools and the community to increase students' environmental care attitudes. Environmental sensitivity is a fundamental mindset that must be developed in all school members [25,26]. Environmental care attitudes can be found in communities that share the same goals and values. School members who want to preserve the school environment are expected to be leaders in establishing a clean and comfortable environment, as well as promoting environmental care attitudes on a larger scale, particularly in the community. Individuals with a high environmental care attitude are able to anticipate global environmental issues that have emerged in recent years [27,28].

Environmental care attitudes must be implemented early on in future generations in order to establish positive habits for the younger generation [29,30]. Various studies have been conducted to investigate the importance of environmental care attitudes in education, such as the students' environmental care attitudes at the Ar-Rohmah Islamic Boarding School in Malang, which are still considered low [31]. Furthermore, in Pekanbaru, some students are found to be littering trash in the schoolyard [32]. It was also discovered that students in the Pati Regency littered, as evidenced by the scattered trash in the schoolyard [33].

Environmental care attitudes are necessary for resolving environmental issues and promoting a nice and clean environment [34]. Environmental care attitude is measured using the new ecological paradigm (NEP) scale, which has five components: (1) limits to growth; (2) anti-anthropocentrism; (3) balance of nature; (4) anti-exemptionalism; and (5) eco-crisis [35,36]. The new ecological paradigm (NEP) scale is used to measure environmental care attitudes due to its advantages, such as being viewed as a credible data collection tool to determine environmental care attitudes, and it is frequently used as a measurement instrument in different countries [35,37,38]. According to research conducted in Greece, the new ecological paradigm (NEP) scale has the consistency to assess gender differences based on environmental care attitudes [39,40]. Moreover, research conducted in Brazil revealed that the new ecological paradigm (NEP) scale has been demonstrated to be a valid instrument for measuring environmental care attitudes [41].

Indicators in the new ecological paradigm (NEP) are suitable for assessing environmental care attitudes. Indicators of limits to growth can be used to determine human environmental knowledge and attitudes. Furthermore, indicators of anti-anthropocentrism can be used to identify humans' roles in using natural resources and the environment. Indicators of the balance of nature can determine behavior in balancing environmental sustainability. An indicator of anti-exemptionalism is a sense of responsibility for regulating and using the environment. Indicators of eco-crisis can determine behavior in preventing environmental damage.

Gender differences in the perception of environmental care attitudes are one of the issues that are emerging [42,43]. Moreover, gender socialization theory demonstrates that environmental care attitudes are determined by the socialization process shaped by a particular gender's cultural norms [44]. According to these findings, there are differences between men and women. Women are more empathetic, cooperative, and willing to assist than men [45]. Men have courageous personalities, enjoy challenges and competition, and are communicative, so they enjoy discussing ideas in online forums [46].

Therefore, the following objectives are investigated in this study: (1) to evaluate the implementation of the environmental curriculum in Adiwiyata schools; (2) to analyze students' environmental care attitudes in Adiwiyata schools in the Pati Regency using the new ecological paradigm (NEP) scale; and (3) to examine students' environmental care attitudes in Adiwiyata schools in the Pati Regency related to gender differences. Research on students' environmental care attitudes in the Pati Regency is expected to be one of the references for implementing environmental education in schools.

2. Materials and Methods

The aims of this research are: (1) to evaluate the implementation of the environmental curriculum in Adiwiyata schools; (2) to analyze students' environmental care attitudes in Adiwiyata schools in the Pati Regency using the new ecological paradigm (NEP) scale; and (3) to examine students' environmental care attitudes related to gender differences in Adiwiyata schools in the Pati Regency. Students' environmental care attitudes are assessed using survey techniques and questionnaires as data collecting instruments. Research subjects were selected using a purposive sampling technique (Table 1). Three Adiwiyata Public High Schools in the Pati Regency were chosen as research subjects: SMA Negeri 1 Pati, SMA Negeri 2 Pati, and SMA Negeri 3 Pati. Research references are used to determine research locations based on the frequency of environmental issues in the school environment. In addition, the research location was determined based on the focus or topic of the Adiwiyata school. The research subjects were selected using a purposive sampling technique and divided into two groups based on the average score of student learning outcomes. Research locations with two or more classes will make it easier for researchers to choose research subjects. The criteria were used to determine research subjects in terms of the average value of high and low learning outcomes. Of the two research classes that were selected, it was determined that the first class was the class that had the highest average learning outcomes, and the second class was the class that had the low average learning outcomes. The sample in terms of gender was determined by gender status within two classes that were selected as research subjects.

Table 1. Research Subject.

No	School Name	Class	Total Student
1	SMA Negeri 1 Pati	XI IPS 1	30
		XI IPS 2	30
2	SMA Negeri 2 Pati	XI IPS 4	30
		XI IPS 2	30
3	SMA Negeri 3 Pati	XI IPS 3	30
		XI IPS 1	30
Total			180

Source: (Primary Data).

A questionnaire was used to collect data for this research. For this research, students were given several written statements. The assessment of environmental care attitudes is based on a Likert scale with four response options: strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD) (Table 2). Questionnaires were used to identify students' environmental care attitudes and were constructed with statements related to environmen-

tal care attitudes toward their school environment. Respondents were instructed to write a checkmark (✓) next to one of the four alternative answers.

Table 2. Likert scale and knowledge score for environmental care attitude.

No	Category	Score
1	Strongly agree	4
2	Agree	3
3	Disagree	2
4	Strongly disagree	1

Source: (Sugiyono, 2013 [47]).

This study measures environmental care attitudes based on the new ecological paradigm (NEP) scale, which consists of five aspects: (1) limits to growth to determine human knowledge of environmental care attitudes; (2) anti-anthropocentrism to determine the role of humans in the utilization of natural resources and the environment; (3) balance of nature to determine behavior in balancing environmental sustainability; (4) anti-exemptionalism to determine the sense of responsibility for managing the environment and utilizing the environment; and (5) eco-crisis to determine behavior in preventing environmental damage [35,36].

The research instrument was tested on 40 students to determine the validity and reliability of the environmental care attitude questionnaire. To ensure the new ecological paradigm (NEP) questionnaire has valid and reliable values, the researchers took the Pearson correlation validity test and Cronbach's alpha reliability test with the Windows version of SPSS 22. The validity of the new ecological paradigm (NEP) questionnaire is determined based on the validity value of the r count $>$ r table. The determination of the r table is based on the number of respondents, namely 40 students, which means that the r table has a value of 0.312 [48]. Table 3 shows that the new ecological paradigm (NEP) questionnaire has a value of r count $>$ r table = 0.312. The Pearson correlation validity test results show that the new ecological paradigm (NEP) instrument is proven valid and can be used to obtain data on environmental care attitudes. The results of the validity and reliability tests of the environmental care attitudes questionnaire are shown in the following Table 3.

Table 3. Results of validity and reliability test of the environmental care attitude.

Indicator	Statement	P (2-Tails)	r	Cronbach's Alpha
Limits to growth	NEP 1: The number of humans that exist today exceeds the earth's carrying capacity.	0.000	0.688	0.724
	NEP 6: Earth has a lot of natural resources if humans are able to figure out how to use them.	0.000	0.875	
	NEP 11: Earth has limited space and natural resources.	0.000	0.854	
Anti-anthropocentrism	NEP 2: Humans have the right to manage the natural environment according to their needs.	0.000	0.816	0.746
	NEP 7: Plants and animals have the same rights as humans to survive.	0.000	0.767	
	NEP 12: Humans have overused natural resources.	0.000	0.500	
Balance of nature	NEP 3: Human actions can sometimes lead to natural disasters.	0.000	0.739	0.739
	NEP 8: The natural environment will not be disturbed by industry activities.	0.000	0.757	
	NEP 13: The environment is very vulnerable and easily disturbed.	0.000	0.734	

Table 3. Cont.

Indicator	Statement	P (2-Tails)	r	Cronbach's Alpha
Anti-exemptionalism	NEP 4: For individuals who have knowledge about the environment, it can be determined that they can protect it properly.	0.000	0.658	0.779
	NEP 9: Even though humans have special abilities, they will not be separated from the laws of nature.	0.000	0.794	
	NEP 14: By studying environmental science, we can preserve nature.	0.000	0.688	
Eco-crisis	NEP 5: Many humans take harmful actions against the environment.	0.000	0.734	0.756
	NEP 10: The current environmental crisis is exaggerated.	0.000	0.861	
	NEP 15: If this environmental problem continues, we will soon experience a major natural disaster.	0.000	0.778	

The reliability of the new ecological paradigm (NEP) questionnaire was determined based on Cronbach's alpha > r table [48]. Decision-making on reliability using Cronbach's alpha reliability coefficient criteria (1) very high (0.80–1.00), (2) high (0.60–0.79), (3) sufficient (0.40–0.59), (4) low (0.20–0.39), and (5) very low (0.00–0.19) [49]. The questionnaire is declared reliable if the reliability coefficient of Cronbach's alpha is > 0.60. Table 3 shows that each indicator from the new ecological paradigm (NEP) has a Cronbach's alpha m and has a Cronbach's alpha reliability coefficient value > 0.60. This analysis shows that the environmental care attitude instrument is reliable, and each new ecological paradigm (NEP) indicator includes a high Cronbach's alpha reliability coefficient. The data analysis step is carried out after the environmental care attitudes instrument has been proven to be valid and reliable. The measurement uses a variety of scores to determine environmental care attitudes, which are then analyzed using the percentage formula [50,51] (Table 4).

$$\text{Range} : \frac{\text{The highest score} - \text{lowest score}}{\text{The number of values}}$$

$$\text{Percentage} : \text{NP} = \frac{n}{sm} \times 100\%$$

where:

- NP = percentage
- n = observation results
- sm = maximum score

Source: [50].

Table 4. Criteria of environmental care attitude.

Score	Percentage	Description
50–60	81.68–100%	High EC
38–49	61.68–81.67%	Moderate EC
27–37	43.34–61.67%	Low EC
15–26	25.00–43.33%	Very Low EC

Source: (Arikunto, 2010 [49]).

The Mann-Whitney test was used to identify gender differences because the data was not normal (p 0.000 < p 0.05). The Mann-Whitney test is one of the most effective non-

parametric tests, with high probability and statistically significant results [52]. Quantitative data analysis was performed using the SPSS application version 22 for Windows.

3. Results

3.1. Implementation of the Environmental Curriculum at the Adiwiyata School

Education is one of the most influential factors in an individual's environmental care attitude [53,54]. It is expected that individuals who have a high environmental care attitude will respect more about the environment. According to research, knowledge has a long-term impact on human neural function [55]. Integrating environmental education into Adiwiyata schools is a strategy for fostering environmental care attitudes [56]. The Adiwiyata program aims to establish in all school members, especially students, a commitment to environmental protection and sustainable development. The implementation of Adiwiyata schools is founded on three principles: educative, collaborative, and sustainable.

According to the findings of this research, the curriculum used by public high schools in Pati Regency is usually integrated with environmental education. The curriculum integrated with environmental education has activity points or educational vision and mission linked to concern for the environment. The Education Office has a policy that gives schools with Adiwiyata achievements the responsibility of implementing an environmental education curriculum. The implementation of the educational curriculum has also been discovered in India [57]; in Germany, it is related to the implementation of the environmental education curriculum to solve environmental problems [58]; and in Sweden which implements the educational curriculum to overcome the development trend of environmental culture and environmental education [59]. The preparation of an environmental education curriculum is not significantly different from other curricula; however, it must be adapted to content that can be integrated with the environment. The implementation of an environmental education curriculum has been incorporated into all subjects at Adiwiyata schools in the Pati Regency, but only a few materials can be integrated within this curriculum.

Adiwiyata Public High Schools in the Pati Regency have greenhouses for plant cultivation and student study materials. Having a greenhouse in a school is a great way to foster student interest and involvement in the environment. Cultivating plants in the school environment can be the first step in indirectly teaching students the significance of environmental protection. A school greenhouse can provide a platform for students to share their unique perspectives on vegetation within the classroom. Greenhouses are used at Adiwiyata Senior High School in the Pati Regency as a means of controlling the balance of climatic conditions and the intensity of temperature in the school environment.

Figure 1 shows the unique features of the greenhouse at Adiwiyata High School in the Pati Regency. It was found that (a) the greenhouse at SMA Negeri 1 Pati contains ornamental plants, horticultural plants, and medicinal plants, and there is a daily schedule for students to carry out plant cultivation and maintenance; (b) the greenhouse at SMA Negeri 2 Pati has a garden that is named "Learning Park", where students can carry out activities that can support environmental care attitudes, such as planting various types of plants and studying plant characteristics related to environmental protection and restoration; (c) the greenhouse at SMA Negeri 3 Pati focuses on cultivating horticultural crops. Horticultural crops that are cultivated in a greenhouse system can be an area for students who want to learn about cultivation. The greenhouse owned by SMA Negeri 3 Pati is known as the "horticultural area", and its purpose is to educate school members, particularly students, on plant cultivation, recreation, and research.

Adiwiyata Public High School in the Pati Regency engages in environmental protection and problem resolution. Participation of all school members, particularly students, in environmental activities, is based on participation aimed at improving students' environmental care attitudes [30]. Environmental participation can be in the form of habituation, example, and guidance that is integrated into learning or through routine activities. This

is similar to previous research indicating that students' environmental care attitude will increase when faced with actual environmental problems [60,61].



Figure 1. Green House at Adiwiyata High School, Pati Regency. (a) Green House at SMA Negeri 1 Pati; (b) Green House at SMA Negeri 2 Pati; (c) Green House at SMA Negeri 3 Pati.

The Adiwiyata school program can be implemented through environmental activities based on participation, namely by creating programs or activities that focus on environmental management, implementing policies that are based on environmental care values, and implementing ideas that are suitable for school conditions and innovating to support the government's efforts to preserve the environment [62]. Environmental activities based on participation involve all parties, internally (principals, teachers, and school staff) and externally (students, parents, local community, government, and school partners). The Adiwiyata School formed a special team to conduct environmental activities based on participation by including teachers in the working group. The special team then creates a structured plan to organize an environmental activities schedule based on participation. The teacher serves as a facilitator and provides students with the motivation to present themselves [63]. Environmental activities based on participation can involve external parties (students, parents, surrounding communities, government, and school partners) by building partnership activities so that environmental action activities can be carried out to initiate the development of environmental education in schools following the times and following sustainable development principles [64]. Environmental activities based on participation are carried out through mutually beneficial cooperation of all parties—the school community, the surrounding community, and the environment—to achieve the common goals that have been planned.

Figure 2 shows the various activities planned by Adiwiyata schools, Pati Regency. It was found that (a) SMA Negeri 1 Pati has an activity program named “planting trees, planting kindness”, which is carried out at the beginning of each new school year. The program aims to introduce and educate students on the importance of environmental preservation; (b) SMA Negeri 2 Pati has a program called the “plastic waste reduction movement”. The program aims to reduce the use of plastic in schools by requiring students to bring their own drink bottles and by prohibiting the use of plastic in school canteens; (c) SMA Negeri 3 Pati has unused land that has been converted into a mini forest where teachers can teach students about biodiversity. In addition, the mini forest serves an important role in enhancing the school's air, allowing it to regulate the school's climate balance.



Figure 2. Environmental activities based on participation. (a) Planting trees program; (b) Plastic waste reduction movement; (c) Mini Forest.

3.2. Student's Environmental Care Attitudes Based on New Ecological Paradigm (NEP) Scale

This study analyzed students' environmental care attitudes at SMA Negeri 1 Pati, SMA Negeri 2 Pati, and SMA Negeri 3 Pati. The selection of the three research subjects was based on the criteria of an Adiwiyata school, where an Adiwiyata school is a type of school that prioritizes environmental protection and is cultured towards the environment. The research location is determined based on the level of environmental problems [11,65,66]. The research results related to students' environmental care attitudes at SMA Negeri Pati Regency can be seen in Table 5.

Table 5. Data of environmental care attitude of Adiwiyata Public High School in Pati Regency.

No	Indicator	Frequency				Total	Index of Environmental Care Attitudes	Category
		High	Middle	Low	Very Low			
1	Limits to growth	47	76	34	23	180	68.10	Moderate
2	Anti anthropocentrism	16	101	62	1		65.87	Moderate
3	Balance of nature	51	96	25	8		72.77	Moderate
4	Anti-exemptionalism	37	109	25	9		69.95	Moderate
5	Eco-crisis	56	79	34	11		71.66	Moderate
Index of Environmental Care Attitudes							69.67	Moderate

Based on the results of the study, it was found that all indicators of environmental care attitudes were included in the moderate category with a total percentage of 69.67%. The average value on the indicators of limits to growth, anti-anthropocentrism, anti-exemptionalism, and eco-crisis is included in the moderate category and receives the lowest score compared to other indicators. Further, it can be seen that the indicator of the balance of nature is higher than the other indicators.

In the indicator of limits to growth, there are beliefs that natural resources on Earth have limited volumes [35]. Some students do not understand how to use natural resources properly and are not able to understand the concept of natural resources on Earth or give examples of the proper use of natural resources. Research conducted in Indonesia found that increasing knowledge about the use of natural resources can be accomplished with several activities, namely planning, organizing, actuating, and controlling [67].

In the indicator of anti-anthropocentrism, there is a belief that humans have a role in utilizing natural resources and the environment [35]. Some students lack knowledge in natural resource management, environmental conservation, and environmental ethics. Some students were unable to provide examples of environmental issues and the practical

implementation of environmental management. Following previous research on enhancing environmental ethics through conservation efforts, it was demonstrated that humans can respect the environment through tree cultivation [53].

In the indicator of anti-exemptionalism, there is a belief that humans have a responsibility to protect and manage the environment [35]. Some students lack a clear understanding of the concept of environmental preservation and are unable to provide concrete examples of how to preserve nature in their respective environments. Findings on anti-exemptionism indicators are supported by research from Thomas F. Homer-Dixon that scarcity and changes in renewable resources are the results of the irresponsibility of human beings in carrying the environment [68]. According to the Homer-Dixon theory, the importance of human responsibility is to preserve and manage the environment appropriately, because environmental damage will increase social unrest [69]. This theory states that social conflicts are influenced by environmental conditions [69].

In the indicator of eco-crisis, there are beliefs about attitudes to avoid environmental damage [35]. Some students lack information about the environmental issues that have arisen and do not understand the concept of environmental protection, which has been extensively utilized by humans. Environmental damage can be avoided by implementing the 4R + C (refuse, reduce, reuse, recycle, and composting) principles [70]. It has been demonstrated that 4R + C activities can prevent damage and environmental problems in Canada [71].

Furthermore, through the indicator of the balance of nature, there is a belief that the role of human behavior is balancing environmental sustainability. Some students understand environmental preservation and the causes of environmental damage [35]. In addition, students can provide examples of implementing environmental preservation to achieve sustainable development. The balance of environmental sustainability can be achieved through environmental education programs that foster logical intelligence and the ability to reason rationally in order to contribute to the balance of natural sustainability [57].

3.3. Student's Environmental Care Attitudes Based on Gender Differences

The study of environmental care attitudes can be viewed as an interesting approach if an analysis of gender differences in environmental care attitudes or gender equality is conducted. The following is the analysis of gender differences in high school students in the Pati Regency based on environmental care attitudes.

The results of the Mann-Whitney test indicated that there is a significant difference between men and women, as shown in Table 6. The indicator of anti-exemptionalism has an Asymp-Sig (2-tailed) value of $0.005 < 0.05$, whereas the indicator of eco-crisis has a value of $0.000 < 0.05$. Per the Mann-Whitney test, there is no significant difference between men and women regarding the remaining three indicators, namely limits to growth, anti-anthropocentrism, and balance of nature. The indicator of limits to growth has an Asymp-Sig (2-tailed) value of $0.015 < 0.05$, the indicator of anti-anthropocentrism has an Asymp-Sig (2-tailed) value of $0.670 > 0.05$, and the indicator of balance of nature has an Asymp-Sig (2-tailed) value of $0.692 > 0.05$. Thus, it can be concluded that gender differences can affect environmental care attitudes as seen from the indicators of anti-exemptionalism and eco-crisis.

Table 6. Results of the Mann-Whitney Test of gender on environmental care attitudes.

	Test Statistics ^a				
	Limits to Growth	Anti Anthropocentrism	Balance of Nature	Anti Exemptionalism	Eco Crisis
Mann-Whitney U	3051.500	3729.500	3737.500	2943.500	2672.000
Wilcoxon W	5607.500	6285.500	9732.500	5499.500	5228.000
Z	−2.437	−0.426	−0.396	−2.797	−3.561
Asymp. Sig. (2-tailed)	0.015	0.670	0.692	0.005	0.000

^a Grouping Variable: Gender.

In the indicator of the balance of nature, male students have a slightly higher average score than female students. The indicator of the balance of nature demonstrates that individuals have the capacity to preserve the balance of nature [72]. According to the Multiple Intelligences theory, men have a more rational nature, allowing them to later contribute to restoring natural damage [73,74]. This study found that the average environmental care attitudes of female students differed from male students in terms of indicators of limits to growth, anti-anthropocentrism, anti-exemptionalism, and eco-crisis [35,36,75]. More details are provided in Figure 3.

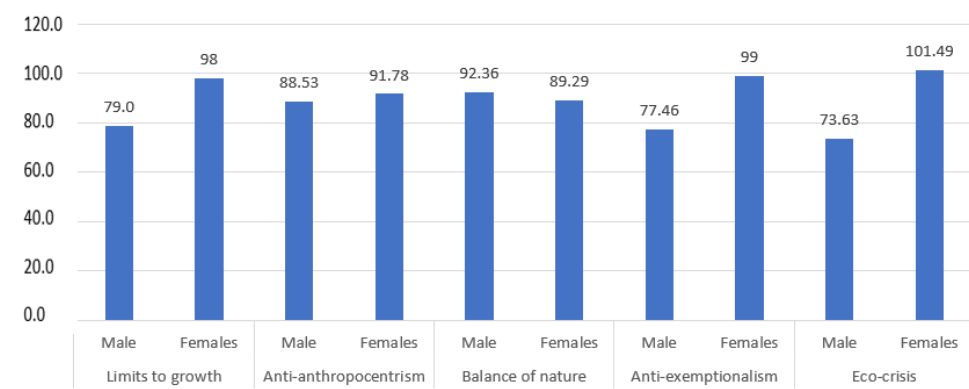


Figure 3. Analysis of the average score of environmental care attitudes based on gender.

Following Figure 3, research indicates that women in India are more likely to practice environmental protection than men [76]. It is supported by Sahin and Tekzoz's research that women are more engaged in pro-environmental activities and conservation behavior than men [77,78]. This is similar to research conducted by Tikka, Kuitunen, and Tynys that indicates women have a greater environmental responsibility than men [79]. Therefore, a program of environmental education involving male students is required to enhance environmental care attitudes.

Based on Figure 3, the limits to growth indicator, which has a value of 79.0 for males and 98 for females, proves that the graph shows a significant increase, but it is proven that, based on the Mann-Whitney test, the limits to growth indicator does not show that there is a significant difference. It differs from the anti-exemptionalism and eco-crisis indicators, which show a significant increase in the chart. In addition, the values obtained by the anti-exemptionalism, and eco-crisis indicators, have been proven in the Mann-Whitney test.

4. Discussion

Environmental problems are problems caused by environmental degradation and are affected by human attitudes and caring for the environment [34]. Environmental care is associated with the mutual connection between humans and environmental attitudes [80]. In order to maintain life and conduct daily activities, humans are closely attached to their environments [81,82]. The relationship between humans and the environment can become problematic when humans exploit the environment for their personal benefit and disregard the sustainability of nature. Therefore, environmental care must be taught to children from an early age to change attitudes toward environmental issues [83–85]. Environmental care attitudes are so essential that they must be taught in educational programs [86,87].

This study examined the implementation of the environmental curriculum in Adiwiyata schools, students' environmental care attitudes at Adiwiyata High School in the Pati Regency were based on the new ecological paradigm (NEP) scale, and gender differences in students' environmental care attitudes were based on the new ecological paradigm (NEP) scale. This study indicated that the main objective of Adiwiyata schools is to educate students about environmental care, with an emphasis on fostering environmental literacy so that each student develops environmental care attitudes. Using an environmental educa-

tion curriculum with environmental care values, Adiwiyata schools have a strategic role in increasing environmental care attitudes [88]. The teacher plays an important role as a facilitator in developing student behavior patterns and forming environmental care attitudes by implementing an integrated environmental education curriculum in all subjects. This is similar to previous research demonstrating the significance of an environmental education curriculum for students' educational development [89,90]. This argument is supported by studies from various countries. Environmental care attitudes in Canada explain the importance of environmental education in enhancing environmental care attitudes among students [91]. It is different in India, which explains that environmental education is included in the curriculum and manifests itself in numerous student practices or exercises to protect the environment [92].

The Adiwiyata program carried out various activities, including the use of greenhouses and environmental activities based on participation, such as using mini-forests, tree planting, and the campaign to reduce plastic waste. The purpose of this activity is to promote environmental literacy and facilitate student learning. Students can become more environmentally aware through interaction with the environment [93]. According to research conducted in France, greenhouses can enhance students' environmental awareness [94]. This differs from research conducted in England, which indicates that the use of greenhouses can reduce gas emissions and stabilize school climate [95]. In addition, the Adiwiyata program includes environmental activities based on participation that emphasize teaching students to care for the environment. According to behaviorism theory, a routine and self-habitation that is repeated on a daily basis will be instilled and remembered by students, so that the routine that has been carried out will occur subconsciously and immediately [96,97]. Behaviorism is considered one of the most effective methods of education for achieving learning objectives, as students tend to think, conduct, and act following environmental norms [98,99].

Furthermore, the analysis of students' environmental care attitudes at Pati Regency high schools is included in the moderate category. The indicator of the balance of nature has the highest environmental care attitude index value when compared to the indicators of limits to growth, anti-anthropocentrism, anti-exemptionalism, and eco-crisis, as shown in Table 5. The indicator of the balance of nature described how human behavior can balance the environmental sustainability [35]. This study determined that some students no longer have the potential to cause environmental damage in the future. According to research by [100], students understand the concepts of reduce, reuse, and recycle and contribute to preventing environmental damage and restoring environmental balance.

In addition, an analysis of gender differences based on the new ecological paradigm (NEP) scale demonstrated that women are more concerned with environmental issues than males. This is similar to previous research on environmental care attitudes in China, which revealed that women scored higher [76]. Figure 3 indicates that women have the highest average scores for the indicators of limits to growth, anti-anthropocentrism, anti-exemptionalism, and eco-crisis.

The indicator of limit to growth showed that women have high knowledge of environmental care attitudes. Several studies, comparatively, indicate that males are more knowledgeable about environmental issues because they have greater access to higher education [101,102]. This is influenced by the development of social norms in society. In the past, parents believed that only boys could pursue higher education, but today, many parents believe that girls have the same right to pursue the highest level of education [103]; following the feminism theory that believes women have the same rights as males in education, the economy, and social life [104]. In addition, ecological feminism hypothesizes that because women are concerned with environmental issues, they can prevent environmental problems [105,106]. Therefore, women have a higher degree of knowledge than men. The roles held by women are empathic and emotional, whereas males are better at regulating their emotions [107]. The limit to growth indicator has an appeal because there is a finding that the average value obtained from the limit to growth indicator shows a high value.

However, based on the Mann-Whitney test shows that the limit to growth indicator has no significant difference between men with women.

The indicator of Anti-anthropocentrism described the role of women in natural resource utilization and environmental preservation. Sociological theory explains that gender differences are not only biological but also cultural and social [108]. In a society's social structure, women and males have distinct roles. In terms of the family, it is the responsibility of women to nurture children, provide affection, and teach environmental awareness to the next generation [79,109]. Men, however, prioritize the role of economic providers and market activities, which encourages them to be more skilled, rational, and competitive than women [110]. Therefore, men score lower than women on the anti-anthropocentrism indicator. The findings in this study have an interest or something unique in that the anti-anthropocentrism indicator has a high average value, but as seen from the Mann-Whitney test, the anti-anthropocentrism indicator shows no significant difference between men and women.

Then, the indicator of anti-exemptionalism indicated that women have a sense of responsibility to regulate and protect the environment. The findings on the exemptionism indicator show that there is a significant difference based on the Mann-Whitney test. Based on previous research it was found that women have more pro-environmental behavior than men [111]. Theoretically, gender differences assume a connection between processes and social values. Therefore, women are better able to respect the needs of others and demonstrate altruism in everyday life than men. Altruism is a human attitude that seeks to enhance the well-being of others; however, this altruism appears to be closely linked to environmental management and environmental protection [44].

In addition, the indicator of eco-crisis demonstrated that women engage in practices that prevent or restore environmental damage and it is proven that women have significant differences compared to men based on the results of the Mann-Whitney test; following prior research indicating that women care about environmental preservation [42,112,113]. This is also in line with the socialization theory statement that women have a stronger and more sensitive "caring ethic" [114]. The research conducted by Dagher and Singh stated that the environmental care attitudes of female students were higher than those of male students [42,115]. Educational activities related to environmental management and utilization are needed for both male and female students. Educational activities consisting of the implementation of environmental education for both male and female students are one of the most effective methods for improving environmental care attitudes. The purpose of environmental education is to establish an awareness of environmental issues in students' attitudes [116]. Implementing environmental education in teaching and learning activities creates students with the responsibility to manage and preserve the environment and support sustainable development so that they can later actively participate in addressing environmental problems [117,118].

Furthermore, based on the results of the Mann-Whitney test that the anti-exemptionism indicator and the eco-crisis indicator have a significant gender difference between men and women towards environmental care attitudes. First, the anti-exemptionism indicator explains that women have more responsibility towards the environment than men. There are findings in the research that women have a sensitive character and have more feelings than men [119,120]. Based on these characters, it is evident that women own environmental awareness behavior. In addition, there are previous research findings that women can have a bond with nature [121].

Second, the eco-crisis indicator states that women are more pro-environmental in preventing environmental damage than men. This is supported by previous research findings that women participate in pro-environmental activities and adopt more sustainable lifestyles than men [78,122]. In line with this statement that research has been conducted in China, by applying sustainable style principles, women show less use of plastic bags and prefer to use reusable bags when shopping [123].

This study has significant implications for educators, future researchers, and knowledge related to environmental care attitudes. First, in relation to the environmental care attitude of students in the moderate category, where female students have a higher level of environmental care attitude than male students, it is necessary to play the role of implementing environmental education regularly or repeatedly, with the teacher's encouragement, to significantly influence the strengthening of students' environmental care attitudes. Based on this study's findings, environmental education activities need to be focused on men. The first activity is providing knowledge about the environment and introducing the use of natural resources with the principles of sustainable development, introducing the application of environmental management, and providing knowledge of the impact of environmental problems. The second activity directs men to carry out participatory-based environmental activities, such as introducing ways to conserve the environment, manage natural resources and carry out activities to prevent environmental damage by activating the role of 4R + C (refusal, reduce, reuse, recycle, and composting). Then, the implementation of environmental education in learning activities that are integrated into the curriculum is anticipated to strengthen students' environmental care, allowing them to identify, evaluate, and find solutions to environmental issues and problems. Therefore, to implement environmental education, it must collaborate with school principals, teachers, and students to change students' environmental care attitudes.

According to the results, this research showed that gender differences play an important role in environmental education and managing the environment. It can be confirmed that women have a high potential for student environmental care attitudes.

Second, teachers must take an active role in enhancing students' environmental awareness by implementing environment-based teaching materials and directing students to participate in organizations or activities related to the environment. Regularly organize environmental activities, such as competitions about the environment, designing models made from recycled materials, planting trees, and environmental quizzes.

Third, it is expected that this study will contribute to future research. Future researchers can test this study's hypotheses regarding the implementation of Adiwiyata schools, the environmental care attitudes of Adiwiyata school students, and the analysis of students' environmental care attitudes using the new ecological paradigm (NEP) scale in terms of gender differences using samples from their own countries.

Fourth, this research is believed to have contributed to knowledge related to environmental care attitudes. The formation of an attitude of caring for the environment can be started from an early age in the future younger generation. Environmental knowledge is needed to form good habits and will impact human attitudes that care and prevent environmental damage. The potential implication for policies and practices in the field is that humans will consciously prevent environmental problems through tree planting, reducing plastic waste, and not disposing of waste in rivers.

This study has limited research subjects because the research subjects were class XI students of the Adiwiyata program in the Pati Regency. Thus, it is necessary to carry out further research with the same scope.

5. Conclusions

The study results show that Adiwiyata schools have a curriculum integrated with environmental education and implemented in the learning process at school. The environmental education curriculum can influence students' environmental care attitudes. In addition, greenhouses and environmental activities based on participation are required to better students' environmental care attitudes. Students' environmental care attitudes at Pati Regency high schools still need to be enhanced, as the analysis showed that students' environmental care attitudes were in the moderate category with a score of 69.67%. Gender differences on the new ecological paradigm (NEP) scale have a significant impact on environmental care attitudes, and women have higher environmental care attitudes than men. Based on the indicators of limits to growth, anti-anthropocentrism, anti-exemptionalism,

and eco-crisis, women have a high potential for student environmental care attitudes. This is because, according to the limits to development indicator, women are knowledgeable about human environmental exploitation. Indicators of anti-anthropocentrism suggest that women have pro-environmental attitudes and make effective use of natural resources. Then, based on the indicator of anti-exemptionalism, the individual has sensibilities and cares about the environment. Moreover, the indicator of eco-crisis demonstrates that women can prevent environmental damage; following the sociological theory that states women have better ethics based on the values of compassion and responsibility compared to men. This research implies that environmental education plays an important role in gender differences through the Adiwiyata School program, which has an environmental education curriculum and participatory-based environmental activities to increase students' environmental care attitudes. Environmental education implementation needs to focus on men through developing environmental knowledge and providing guidance on participatory-based environmental activities.

Author Contributions: Conceptualization, N.A.W.; methodology, N.A.W.; software, N.A.W.; validation, S.S., S.U., S.B. and Y.K.; formal analysis, N.A.W.; investigation, N.A.W.; resources, N.A.W.; data curation, N.A.W.; writing—original draft preparation, N.A.W.; writing—review and editing, S.S., S.U., S.B. and Y.K.; visualization, S.S., S.U., S.B. and Y.K.; supervision, S.S., S.U., S.B. and Y.K.; project administration, N.A.W.; funding acquisition, N.A.W. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Research and Community Services Department of the Ministry of Research, Technology, and Higher Education through the Doctoral Dissertation Research Scheme (PDD) with a contract 092/E5/PG.02.00PT/2022.

Institutional Review Board Statement: This research was checked by the Ethics Committee of Universitas Negeri Malang, and it was confirmed that this study is exempt from ethical approval.

Informed Consent Statement: Informed consent was obtained from all the subjects involved in this study who were students of Adiwiyata Public High School.

Data Availability Statement: Not applicable.

Acknowledgments: We would like to thank the Research and Community Services Department of the Ministry of Research, Technology, and Higher Education for their support of this study. We also thank the Social Science Faculty of Universitas Negeri Malang, Indonesia.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Sutoyo, S. Revolusi Paradigma Perlindungan dan Pengelolaan Lingkungan Hidup di Indonesia. *J. Pendidik. Pancasila Kewarganegaraan* **2015**, *28*, 56–66.
2. Wawo, V. Faktor-Faktor Yang Mempengaruhi Partisipasi Warga Sekolah Dalam Program Sekolah Berwawasan Lingkungan Dan Mitigasi Bencana Di SMA Negeri 5 Kupang. *J. Pendidik. Pembelajaran Univ. Negeri Malang* **2014**, *21*, 173–182.
3. Sumarmi. *Pengelolaan Lingkungan Berbasis Kearifan Lokal*; Aditya Media Publishing: Malang, Indonesia, 2014.
4. Widodo, T.; Budiastuti, M.T.S.; Komariah, K. Water Quality and Pollution Index in Grendeng River, Boyolali Regency, Indonesia. *Caraka Tani J. Sustain. Agric.* **2019**, *34*, 150. [[CrossRef](#)]
5. Novikova, O.; Vladimirov, I.; Bugaeva, T. Expansion of the fuel and energy balance structure in Russia through the development of a closed-loop recycling. *Sustainability* **2021**, *13*, 4965. [[CrossRef](#)]
6. Merten, J.; Nielsen, J.Ø.; Rosyani; Soetarto, E.; Faust, H. From rising water to floods: Disentangling the production of flooding as a hazard in Sumatra, Indonesia. *Geoforum* **2021**, *118*, 56–65. [[CrossRef](#)]
7. Mayahati, J.W. Analisis Tingkat Kerawanan Banjir di Kabupaten Pati Tahun 2018. Ph.D. Thesis, Universitas Muhammadiyah Surakarta, Kabupaten Sukoharjo, Indonesia, 2019.
8. Prayitno, H.T. Kajian Banjir Bandang Di Desa Sukolilo Melalui Tinjauan Peta Sungai. *J. Litbang Media Inf. Penelitian Pengemb. IPTEK* **2017**, *13*, 13–23. [[CrossRef](#)]
9. Hariyanto, B.; Larasati, D.A. Dampak Pembuangan Limbah Tapioka terhadap Kualitas Air Tambak di Kecamatan Margoyoso Kabupaten Pati. In *Prosiding Seminar Nasional Geografi UMS VII 2016*; Muhammadiyah University Press: Surakarta, Indonesia, 2016; ISBN 978-602-361-044-0.

10. Wulandari, D.P. Penegakan sanksi administrasi dalam kaitannya dengan pencemaran limbah pabrik tepung tapioka di kabupaten pati. *J. Univ. Semarang* **2020**, *1*, 15–38. [\[CrossRef\]](#)
11. Asma Luthfi, E.K. Partisipasi Masyarakat Dalam Sistem Pengelolaan Sampah Di Tpa Sukoharjo Kabupaten Pati. *J. Abdimas* **2013**, *17*, 13–20.
12. Supriatna, J.; Shekelle, M.; Fuad, H.A.H.; Winarni, N.L.; Dwiyaeheni, A.A.; Farid, M.; Mariati, S.; Margules, C.; Prakoso, B.; Zakaria, Z. Deforestation on the Indonesian island of Sulawesi and the loss of primate habitat. *Glob. Ecol. Conserv.* **2020**, *24*, e01205. [\[CrossRef\]](#)
13. Sahri, A.; Mustika, P.L.K.; Dewanto, H.Y.; Murk, A.J. A critical review of marine mammal governance and protection in Indonesia. *Mar. Policy* **2020**, *117*, 103893. [\[CrossRef\]](#)
14. Hatmoko, W.; Radhika; Raharja, B.; Tollenaar, D.; Vernimmen, R. Monitoring and Prediction of Hydrological Drought Using a Drought Early Warning System in Pemali-Comal River Basin, Indonesia. *Procedia Environ. Sci.* **2015**, *24*, 56–64. [\[CrossRef\]](#)
15. Suryani, A.S. Pengaruh Kualitas Lingkungan Terhadap Pemenuhan Kebutuhan Dasar di Provinsi Banten. *J. Aspir.* **2018**, *9*, 35–63. [\[CrossRef\]](#)
16. North, G.R. Global climate change. In *A World after Climate Change and Culture-Shift*; Springer Science Business Media: Dordrecht, The Netherlands; London, UK; New York, NY, USA, 2014; pp. 25–42. [\[CrossRef\]](#)
17. Triyanti, I.I. *Data dan Informasi Lingkungan Hidup Kabupaten Pati 2021*; Badan Pusat Statistik Kabupaten Pati: Pati, Indonesia, 2021; Available online: <https://patikab.bps.go.id/publication/2022/12/29/0b735dbbf26495dfa07b82d1/data-dan-informasi-lingkungan-hidup-kabupaten-pati-2021.html> (accessed on 1 March 2023).
18. Chowdhury, A.H.; Haque, M.R.U.; Hossain, T. Developing 3Rs (reduce, reuse & recycle) strategy for waste management for urban areas in Bangladesh: A socioeconomic and climate mitigation option. In Proceedings of the 2014 3rd International Conference on the Developments in Renewable Energy Technology (ICDRET), Dhaka, Bangladesh, 29–31 May 2014; Volume 8, pp. 9–18. [\[CrossRef\]](#)
19. Artha, I.P.S.S.; Vipriyanti, N.U.; Sujana, I.P. Community Based 3R Waste Management Strategy (Reduce, Reuse, Recycle) Bantas Village, Selemadeg Timur District, Tabanan Regency. *Int. J. Contemp. Res. Rev.* **2018**, *9*, 21041–21049. [\[CrossRef\]](#) [\[PubMed\]](#)
20. Phan Hoang, T.T.; Kato, T. Measuring the effect of environmental education for sustainable development at elementary schools: A case study in Da Nang city, Vietnam. *Sustain. Environ. Res.* **2016**, *26*, 274–286. [\[CrossRef\]](#)
21. Orr, D.W.; Niccolucci, V.; Bastianoni, S. *Ecological Systems Thinking*, 2nd ed.; Elsevier Inc.: Amsterdam, The Netherlands, 2008. [\[CrossRef\]](#)
22. Stapp, W.B. The concept of environmental education. *J. Environ. Educ.* **1969**, *1*, 30–31. [\[CrossRef\]](#)
23. Ali, A.R. Environmental Awareness Level amongst Secondary School Students in Terengganu, Malaysia Based on Different Variables. *Int. J. Educ. Res.* **2015**, *3*, 20–25.
24. Brabler, M.; Sprenger, S. Fostering sustainability knowledge, attitudes, and behaviours through a tutor-supported interdisciplinary course in education for sustainable development. *Sustainability* **2021**, *13*, 3494. [\[CrossRef\]](#)
25. De Dominicis, S.; Schultz, P.W.; Bonaiuto, M. Protecting the environment for self-interested reasons: Altruism is not the only pathway to sustainability. *Front. Psychol.* **2017**, *8*, 1065. [\[CrossRef\]](#)
26. Rolston, H. *A New Environmental Ethics: The Next Millennium for Life on Earth*; Routledge: New York, NY, USA, 2012; Volume 13, ISBN 9780415884839.
27. Sloot, D.; Kutlaca, M.; Medugorac, V.; Carman, P. Recycling alone or protesting together? Values as a basis for pro-environmental social change actions. *Front. Psychol.* **2018**, *9*, 1229. [\[CrossRef\]](#)
28. Angriani, P.; Sumarmi; Ruja, I.N.; Bachri, S. River management: The importance of the roles of the public sector and community in river preservation in Banjarmasin (A case study of the Kuin River, Banjarmasin, South Kalimantan—Indonesia). *Sustain. Cities Soc.* **2018**, *43*, 11–20. [\[CrossRef\]](#)
29. Palmer, J.; Neal, P. *The Handbook of Environmental Education*; Routledge: New York, NY, USA, 1994.
30. Sumarmi. Sekolah Hijau Sebagai Alternatif Pendidikan Lingkungan Hidup Dengan Menggunakan Pendekatan Kontekstual. *J. Ilmu Pendidik.* **2008**, *15*, 19–25. Available online: <http://journal.um.ac.id/index.php/jip/article/view/7/339> (accessed on 1 March 2023).
31. Hidayati, D.A.; Husamah, H.; Fatmawati, D.; Miharja, F.J.; Fauzi, A. Exploration of Environmental Care Attitudes in Students Ar-Rohmah Islamic Boarding School Malang Based on the New Ecological Paradigm Instrument. *J. Penelit. Pengkaj. Ilmu Pendidik. e-St.* **2020**, *4*, 319. [\[CrossRef\]](#)
32. Roswita, W. Keterlibatan warga sekolah dalam pengelolaan lingkungan hidup di sekolah adiwiyata tingkat propinsi. *Pros. Semin. Nas. Pelestarian Lingkung. Mitigasi Bencana* **2016**, *3*, 103–111.
33. Raharjo, A.S.; Indarjo, S. Hubungan antara Pengetahuan, Sikap, dan Ketersediaan Fasilitas di Sekolah dalam Penerapan PHBS Membuang Sampah pada Tempatnya. *Unnes J. Public Health* **2014**, *3*, 1–10.
34. Hák, T.; Janoušková, S.; Moldan, B. Sustainable Development Goals: A need for relevant indicators. *Ecol. Indic.* **2016**, *60*, 565–573. [\[CrossRef\]](#)
35. Dunlap, R.E.; Van Liere, K.D.; Mertig, A.G.; Jones, R.E. Measuring endorsement of the new ecological paradigm: A revised NEP scale. *J. Soc. Issues* **2000**, *56*, 425–442. [\[CrossRef\]](#)

36. Ndebele, T.; Marsh, D. Environmental attitude and the demand for green electricity in the context of supplier choice: A case study of the New Zealand retail electricity market. In Proceedings of the NZARES Conference, Nelson, New Zealand, 28–29 August 2014.
37. Patriana, W.R. New Environmental Paradigm (Nep) Dalam Mengukur Kesiapan Berperilaku Ramah Lingkungan Pada Sekolah Adiwiyata Di Ponorogo. *ASANKA J. Soc. Sci. Educ.* **2020**, *1*, 16–21. [CrossRef]
38. Kopnina, H. Applying the New Ecological Paradigm Scale in the Case of Environmental Education: Qualitative analysis of the Ecological Worldview of Dutch Children. *J. Peace Educ. Soc. Justice* **2011**, *5*, 374–388.
39. Ntanos, S.; Kyriakopoulos, G.; Skordoulis, M.; Chalikias, M.; Arabatzis, G. An application of the new environmental paradigm (NEP) scale in a Greek context. *Energies* **2019**, *12*, 239. [CrossRef]
40. Luo, Y.; Deng, J. The new environmental paradigm and nature-based tourism motivation. *J. Travel Res.* **2008**, *46*, 392–402. [CrossRef]
41. dos Reis Neto, J.F.; de Souza, C.C.; Bitencourt, T.D.A.; Cupertino, C.M.; de Melo Neto, P.L.; Soares, D.G.; de Rodrigues, I.O. Validating the Scale of the New Ecological Paradigm (NEP) in Brazilian University Students. *Res. Soc. Dev.* **2021**, *10*, e16410413947. [CrossRef]
42. Dagher, G.K.; Itani, O.; Kassar, A.N. The Impact of Environment Concern and Attitude on Green Purchasing Behavior: Gender as The Moderator. *Contemp. Manag. Res.* **2015**, *11*, 179–206. [CrossRef]
43. Lee, K. Gender differences in Hong Kong adolescent consumers' green purchasing behavior. *J. Consum. Mark.* **2009**, *26*, 87–96. [CrossRef]
44. Zelezny, L.C. Elaborating on Gender Differences in Environmentalism. *J. Soc. Issues* **2000**, *56*, 443–457. [CrossRef]
45. Suhardin, S. Pengaruh Perbedaan Jenis Kelamin Dan Pengetahuan Tentang Konsep Dasar Ekologi Terhadap Kepedulian Lingkungan. *EDUKASI J. Penelit. Pendidik. Agama Keagamaan* **2016**, *14*, 117–132. [CrossRef]
46. Amin, M.S. Perbedaan Struktur Otak dan Perilaku Belajar Antara Pria dan Wanita; Eksplanasi dalam Sudut Pandang Neuro Sains dan Filsafat. *J. Filsafat Indones.* **2018**, *1*, 38. [CrossRef]
47. Sugiyono. *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R & D)*; Alfabeta: Bandung, Indonesia, 2013.
48. Sujarweni, V.W. *Metode Penelitian: Lengkap, Praktis, dan Mudah Dipahami*; Pustaka Baru Press: Yogyakarta, Indonesia, 2014.
49. Arikunto, S. *Prosedur Penelitian: Suatu Pendekatan Praktik*, 4th ed.; Rineka Cipta: Jakarta, Indonesia, 2010.
50. Sudijono, A. *Pengantar Evaluasi Pendidikan*; PT Raja Grafindo Persada: Kota Depok, Indonesia, 2012.
51. Husein, U. *Metode Penelitian Untuk Skripsi dan Tesis Bisnis (Edisi ke-11)*; PT Raja Grafindo Persada: Kota Depok, Indonesia, 2011.
52. Nachar, N. The Mann-Whitney U: A Test for Assessing Whether Two Independent Samples Come from the Same Distribution. *Tutor. Quant. Methods Psychol.* **2008**, *4*, 13–20. [CrossRef]
53. Sumarmi, S.; Wahyuningtyas, N.; Sahrina, A.; Aliman, M. The Effect of Environmental Volunteer Integrated with Service Learning (EV_SL) to Improve Student's Environment Care Attitudes and Soft Skills. *Pegem Egit. Ogr. Derg.* **2022**, *12*, 168–176. [CrossRef]
54. Saltan, F.; Faruk, O. Using Blogs to Improve Elementary School Students' Environmental Literacy in Science Class. *Eur. J. Educ. Res.* **2017**, *6*, 347–355. [CrossRef]
55. Aksa, F.I.; Utaya, S.; Bachri, S.; Handoyo, B. Investigating the Role of Geography Education in Enhancing Earthquake Preparedness: Evidence from Aceh, Indonesia. *Int. J. GEOMATE* **2020**, *19*, 9–16. [CrossRef]
56. Utaya, S.; Wafaretta, V. The vision, mission, and implementation of environmental education of adiwiyata elementary school in Malang City. In Proceedings of the IOP Conference Series: Earth and Environmental Science, Kitakyushu, Japan, 25–26 April 2021; Volume 802. [CrossRef]
57. Jadhav, A.S.; Jadhav, V.V.; Raut, P. Role of Higher Education Institutions in Environmental Conservation and Sustainable Development: A case study of Shivaji University, Maharashtra, India. *J. Environ. Earth Sci.* **2014**, *4*, 30–34.
58. Libra, J.A. Environmental process engineering: Building capacity for sustainability. *J. Prof. Issues Eng. Educ. Pract.* **2007**, *133*, 308–319. [CrossRef]
59. Gooch, G.D. Environmental Beliefs and Attitudes in Sweden and the Baltic States. *Environ. Behav.* **1995**, *27*, 513–539. [CrossRef]
60. Saiful, A.M.; Utaya, S.; Bachri, S.; Sumarmi, S.; Susilo, S. Effect of problem-based learning on critical thinking skills and environmental attitude. *J. Educ. Gift. Young Sci.* **2020**, *8*, 743–755. [CrossRef]
61. Sumarmi; Bachri, S.; Baidowi, A.; Aliman, M. Problem-based service learning's effect on environmental concern and ability to write scientific papers. *Int. J. Instr.* **2020**, *13*, 161–176. [CrossRef]
62. Mulyasa, A. *Kurikulum Berbasis Kompetensi*; Remaja Rosda Karya: Bandung, Indonesia, 2003.
63. Yunus, M.; Setyosari, P.; Utaya, S.; Kuswandi, D. The influence of online project collaborative learning and achievement motivation on problem-solving ability. *Eur. J. Educ. Res.* **2021**, *10*, 813–823. [CrossRef]
64. Juraidd; Hamzah, B.; Mahpudz, A.; Khaldun, R.I. Implementation and development of Adiwiyata schools to realize character of students care for environment. *Int. J. Sci. Technol. Res.* **2019**, *8*, 1129–1226.
65. Saputro, D.A.; Hadiwidodo, M.; Oktawan, W. Perencanaan Sistem Pengelolaan Sampah Pada Satuan Wilayah Pembangunan (SWP) IV dan V Kabupaten Pati (Kecamatan Wedarijaksa, Juwana, Batangan, Jakenan, Winong, Jaken, dan Pucakwangi). *J. Tek. Lingkung.* **2017**, *6*, 1–23. Available online: <http://ejournal-s1.undip.ac.id/index.php/tlingkungan> (accessed on 1 March 2023).
66. Wibowo, N.A.; Sarwono, S.; Yusup, Y. Environmental Care Attitude of the Students in Senior High School at Pati Regency. *GeoEco* **2021**, *7*, 165–177. [CrossRef]

67. Putra, D.A. Pengelolaan Sumberdaya Alam Berbasis Masyarakat Dalam Upaya Konservasi Daerah Aliran Sungai Lubuk Langkap Desa Suka Maju Kecamatan Air Nipis Kabupaten Bengkulu Selatan. *Naturalis* **2019**, *8*, 1–4. [\[CrossRef\]](#)
68. Homer-Dixon, T.F. Environmental Scarcities and Violent Conflict: Evidence from Cases. *Int. Secur.* **1994**, *19*, 5–40. [\[CrossRef\]](#)
69. Homer-Dixon, T.F. *Environment, Scarcity, and Violence*; Princeton University Press: Princeton, NJ, USA, 2001; Available online: <https://search.proquest.com/docview/2131378126?accountid=17242> (accessed on 1 March 2023).
70. Aliman, M.; Budijanto; Sumarmi; Astina, I.K.; Arif, M. Challenges to anticipate climate change: An environmental awareness survey of high school students in Indonesia in waste management. *Ecol. Environ. Conserv.* **2020**, *26*, 886–892.
71. Galea, R.; Ross, C.; Wells, R.G. Reduce, reuse and recycle: A green solution to Canada's medical isotope shortage. *Appl. Radiat. Isot.* **2014**, *87*, 148–151. [\[CrossRef\]](#)
72. Hidayat, A. Pendidikan Islam dan Lingkungan Hidup. *J. Pendidik. Islam* **2015**, *4*, 373. [\[CrossRef\]](#)
73. Jeysankar, R. Gender differences in the multiple intelligence skills of Library and Information Science Professionals in Universities in Tamil Nadu, India. *Libr. Philos. Pract.* **2019**, *2019*, 1–23.
74. Irvaniyah, I.; Akbar, R.O. Analisis Kecerdasan Logis Matematis Dan Kecerdasan Linguistik Siswa Berdasarkan Jenis Kelamin (Studi Kasus Pada Siswa Kelas Xi Ipa Ma Mafatihul Huda). *Eduma Math. Educ. Learn. Teach.* **2014**, *3*, 138–159. [\[CrossRef\]](#)
75. Widodo, A.; Yusiana, R. The Impact of Environmental Concern on Green Purchase Behavior on Apple Inc.: Gender as a Moderated Variable. *J. Seybold Rep.* **2020**, *15*, 186–195. [\[CrossRef\]](#)
76. Li, Y.; Wang, B.; Saechang, O. Is Female a More Pro-Environmental Gender? Evidence from China. *Int. J. Environ. Res. Public Health* **2022**, *19*, 8002. [\[CrossRef\]](#) [\[PubMed\]](#)
77. Sahin, E.; Ertepinar, H.; Teksoz, G. University students' behaviors pertaining to sustainability: A structural equation model with sustainability-related attributes. *Int. J. Environ. Sci. Educ.* **2012**, *7*, 459–478.
78. Tindall, D.B.; Davies, S.; Mauboulès, C. Activism and conservation behavior in an environmental movement: The contradictory effects of gender. *Soc. Nat. Resour.* **2003**, *16*, 909–932. [\[CrossRef\]](#)
79. Tikka, P.M.; Kuitunen, M.T.; Tynys, S.M. Effects of educational background on students' attitudes, activity levels, and knowledge concerning the environment. *J. Environ. Educ.* **2000**, *31*, 12–19. [\[CrossRef\]](#)
80. Soekanto, S. *Sosiologi, Suatu Pengantar*; Rajawali Pers: Jakarta, Indonesia, 2013.
81. Seymour, V. The human-nature relationship and its impact on health: A critical review. *Front. Public Health* **2016**, *4*, 1–12. [\[CrossRef\]](#)
82. Valderrama-Hernández, R.; Alcántara, L.; Limón, D. The Complexity of Environmental Education: Teaching Ideas and Strategies from Teachers. *Procedia—Soc. Behav. Sci.* **2017**, *237*, 968–974. [\[CrossRef\]](#)
83. Palmer, J.A. Development of concern for the environment and formative experiences of educators. *J. Environ. Educ.* **1993**, *24*, 26–30. [\[CrossRef\]](#)
84. Palmer, J.A.; Suggate, J. Influences and experiences affecting the pro-environmental behaviour of educators. *Environ. Educ. Res.* **1996**, *2*, 109–121. [\[CrossRef\]](#)
85. Palmer, J.A.; Suggate, J.; Bajd, B.; Paul Hart, K.P.; Ho, R.K.P.; Ofwono-Orecho, J.K.W.; Peries, M.; Robottom, I.; Tsaliki, E.; Staden, C. Van An overview of significant influences and formative experiences on the development of adults' environmental awareness in nine countries. *Environ. Educ. Res.* **1998**, *4*, 445–464. [\[CrossRef\]](#)
86. Goodwin, T. Educating for Ecological Literacy. *Am. Biol. Teach.* **2016**, *78*, 287–290. [\[CrossRef\]](#)
87. El-Batri, B.; Alami, A.; Zaki, M.; Nafidi, Y. Extracurricular environmental activities in Moroccan middle schools: Opportunities and challenges to promoting effective environmental education. *Eur. J. Educ. Res.* **2019**, *8*, 1013–1028. [\[CrossRef\]](#)
88. Sumarmi; Aliman, M.; Mutia, T. The Effect of Digital Eco-Learning in Student Worksheet Flipbook to Environmental Project Literacy and Pedagogic Competency. *J. Technol. Sci. Educ.* **2021**, *11*, 357–370. [\[CrossRef\]](#)
89. Tran, H.U.; LePage, B.A.; Fang, W.T. Environmental literacy and teaching activities of preschool teachers in Vietnam. *Eur. J. Educ. Res.* **2022**, *11*, 2357–2371. [\[CrossRef\]](#)
90. Yalcin, F.A.; Yalcin, M.; Bozan, S.; Gecikli, E. Preschool teachers' views of environmental education. *Bayburt Eğitim Fakültesi Derg.* **2016**, *11*, 633–664.
91. Chan, K.M.A.; Balvanera, P.; Benessaiah, K.; Chapman, M.; Díaz, S.; Gómez-Baggethun, E.; Gould, R.; Hannahs, N.; Jax, K.; Klain, S.; et al. Why protect nature? Rethinking values and the environment. *Proc. Natl. Acad. Sci. USA* **2016**, *113*, 1462–1465. [\[CrossRef\]](#) [\[PubMed\]](#)
92. Sharma, N.K.; Kangra, D. A Study on Environmental Awareness of College Students in Relation to Sex, Rural- Urban Background and Academic Streams Wise. *Online J. N. Horizons Educ.* **2012**, *4*, 15–20.
93. Fathoni, N.; Muthi, M.A.; Nuraini, S.G. The Deep Ecology Persepective of Awig-Awig: Local Tribal Forest Preservation Laws in Tenganan Cultural Village, Indonesia. *J. Sustain. Sci. Manag.* **2020**, *15*, 102–113.
94. Dahmani, J.; Nicklaus, S.; Grenier, J.M.; Marty, L. Nutritional quality and greenhouse gas emissions of vegetarian and non-vegetarian primary school meals: A case study in Dijon, France. *Front. Nutr.* **2022**, *9*, 997144. [\[CrossRef\]](#)
95. Wickramasinghe, K.K.; Rayner, M.; Goldacre, M.; Townsend, N.; Scarborough, P. Contribution of healthy and unhealthy primary school meals to greenhouse gas emissions in England: Linking nutritional data and greenhouse gas emission data of diets. *Eur. J. Clin. Nutr.* **2016**, *70*, 1162–1167. [\[CrossRef\]](#)
96. Staddon, J. Theoretical behaviorism, economic theory, and choice. *Hist. Polit. Econ.* **2016**, *48*, 316–331. [\[CrossRef\]](#)

97. Quratulain; Basit, I.; Bakhsh, K.; Hafeez, M. Adult learning theories and their role in instructional design, curriculum development and educational technology. *WSEAS Trans. Environ. Dev.* **2021**, *17*, 1149–1159. [CrossRef]
98. Oktariska, B.; Toenlio, A.J.E. Susilarningsih Studi Kasus Penerapan Teori Belajar Behavioristik dalam Menumbuhkembangkan Perilaku Peduli Lingkungan Hidup Siswa di SMKN 6 Malang. *J. Jktp* **2018**, *1*, 159–168.
99. Katyeudo, K.K.; de Souza, R.A.C. Digital Transformation towards Education 4.0. *Inform. Educ.* **2022**, *21*, 283–309. [CrossRef]
100. Huang, C.C.; Chuang, H.F.; Chen, S.Y. Corporate Memory: Design to better reduce, reuse and recycle. *Comput. Ind. Eng.* **2016**, *91*, 48–65. [CrossRef]
101. Diamantopoulos, A.; Schlegelmilch, B.B.; Sinkovics, R.R.; Bohlen, G.M. Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. *J. Bus. Res.* **2003**, *56*, 465–480. [CrossRef]
102. Sundström, A.; McCright, A.M. Gender differences in environmental concern among Swedish citizens and politicians. *Env. Polit.* **2014**, *23*, 1082–1095. [CrossRef]
103. Sulistyowati, Y. Kesetaraan Gender Dalam Lingkup Pendidikan Dan Tata Sosial. *IJouGS Indones. J. Gend. Stud.* **2021**, *1*, 1–14. [CrossRef]
104. Valcaárcel, A. *The Collective Memory and Challenges of Feminism*; United Nation Publication: Santiago, Chile, 2002.
105. Warren, K.J.; Cheney, J. Ecological Feminism and Ecosystem Ecology. *Hypatia* **1991**, *6*, 179–197. [CrossRef]
106. Bangun, B.H. Ecofeminism and Environmental Protection: A Legal Perspective. *Jambe Law J.* **2020**, *3*, 1–18. [CrossRef]
107. Shadiqi, M.A.; Anward, H.H.; Erlyani, N. *Perilaku Pro-Lingkungan Serta Perbedaannya the Correlation between Emotional Intelligence and Pro-Environmental*; Jurnal Ecopsi: Kalimantan Selatan, Indonesia, 2013; pp. 1–6.
108. Sarkawi, D. Pengaruh Jenis Kelamin dan Pengetahuan Lingkungan Terhadap Penilaian Budaya Lingkungan (Studi Ex Post Facto di Akademi Manajemen Informatika dan Komputer Bina Sarana Informatika Jakarta). *J. Cakrawala* **2012**, *12*, 123–131. Available online: <http://ejournal.bsi.ac.id/ejurnal/index.php/cakrawala/article/view/3553> (accessed on 1 March 2023).
109. Hidayati, H. Kesetaraan Gender dalam Pelestarian Lingkungan Perspektif Al-Qur'an. *AFAKKUR J. Ilmu Al-Qur'an Tafsir* **2021**, *1*, 186–199. Available online: <http://e-jurnal.stiqarrahman.ac.id/index.php/tafakkur/article/view/40%0Ahttp://e-jurnal.stiqarrahman.ac.id/index.php/tafakkur/article/download/40/15> (accessed on 1 March 2023).
110. Hunter, L.M.; Hatch, A.; Johnson, A. Cross-national gender variation in environmental behaviors. *Soc. Sci. Q.* **2004**, *85*, 677–694. [CrossRef]
111. Eisler, A.D.; Eisler, H.; Yoshida, M. Perception of human ecology: Cross-cultural and gender comparisons. *J. Environ. Psychol.* **2003**, *23*, 89–101. [CrossRef]
112. Altin, A.; Tecer, S.; Tecer, L.; Altin, S.; Kahraman, B.F. Environmental Awareness Level of Secondary School Students: A Case Study in Balikesir (Türkiye). *Procedia—Soc. Behav. Sci.* **2014**, *141*, 1208–1214. [CrossRef]
113. Bhowmik, A. Environmental Awareness among Senior Secondary School Students: A Comparative Study. *Educ. India J. Q. Refereed J. Dialogues Educ.* **2019**, *8*, 54–67. Available online: <https://www.researchgate.net/publication/342152229> (accessed on 1 March 2023).
114. Beutel, A.M.; Mooney, M. Gender and Values. *Am. Sociol. Rev.* **1995**, *60*, 436–448. [CrossRef]
115. Singh, A.; Kumari, S.; Singh, J. A Comparative Study of Environmental Awareness among Secondary School Teachers in Bareilly District U.P. India. *Univers. J. Environ. Res. Technol.* **2014**, *4*, 60–64.
116. Ozsoy, S.; Ertepinar, H.; Saglam, N. Can eco-schools improve elementary school students' environmental literacy levels? *Asia-Pac. Forum Sci. Learn. Teach.* **2012**, *13*, 3.
117. Lynch, J. Outdoor Learning and Learning Cycles: Moving Forward. *Horizons* **2010**, *43*, 3–16.
118. Nurwidodo, N.; Amin, M.; Ibrohim, I.; Sueb, S. The role of eco-school program (Adiwiyata) towards environmental literacy of high school students. *Eur. J. Educ. Res.* **2020**, *9*, 1089–1103. [CrossRef]
119. Lippa, R.A. Sex differences in personality traits and gender-related occupational preferences across 53 nations: Testing evolutionary and social-environmental theories. *Arch. Sex. Behav.* **2010**, *39*, 619–636. [CrossRef]
120. Lippa, R.A. *Gender Differences in Personality and Interests: When, Where, and Why*; Blackwell Publishing: Davis, CA, USA, 2010.
121. Triantafyllidis, S.; Darwin, L. Mass-participant sport events and sustainable development: Gender, social bonding, and connectedness to nature as predictors of socially and environmentally responsible behavior intentions. *Sustain. Sci.* **2021**, *16*, 239–253. [CrossRef]
122. Vicente-Molina, M.A.; Fernández-Sainz, A.; Izagirre-Olaizola, J. Does gender make a difference in pro-environmental behavior? The case of the Basque Country University students. *J. Clean. Prod.* **2018**, *176*, 89–98. [CrossRef]
123. Wang, B.; Li, Y. Plastic bag usage and the policies: A case study of China. *Waste Manag.* **2021**, *126*, 163–169. [CrossRef] [PubMed]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.