

Article

Environmental Consciousness of High School Teachers and Their Opinion about the Importance of Environmental Education for Sustainability: Differences on Sociodemographic Factors

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ABSTRACT

The 2030 Agenda for Sustainable Development delineates the world that humanity aspires to inhabit in the present and in the future. To achieve this, it is necessary to demonstrate a profound commitment to sustainability. This can only be accomplished through environmental education that fosters a high level of environmental consciousness in students. In addition, it is of paramount importance that school teachers are aware of environmental conservation and sustainability. Consequently, the first step is to assess the level of environmental consciousness among high school teachers in order to understand their actual commitment to the environment. The second step is to examine their opinion of whether environmental education for sustainability is pivotal in fostering environmental commitment among the new generations of students. A questionnaire was administered anonymously, with consideration given to sociodemographic factors such as age, gender, and level of education. Two key findings emerge from the data. Firstly, the teachers exhibited a high level of environmental consciousness. Secondly, they considered environmental education for sustainability to be of supreme importance in fostering the development and enhancement of students' values and attitudes towards the environment. In both topics, no statistically significant differences were found among high school teachers based on sociodemographic factors. Finally, we put forth recommendations for enhancing the environmental consciousness of high school teachers.

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KEYWORDS: environmental consciousness; environmental education;
sustainable development; sociodemographic factors

INTRODUCTION

The technological advancements that have occurred from the Industrial Revolution to the present have not only significantly altered the conceptualisation of the relationship between humans and the environment, but have also contributed to the development of a deeply entrenched societal belief that the natural environment is an inexhaustible source of resources. This has led to an acceleration in the possibilities of transforming nature by humans, resulting in significant degradation of the environment. However, in the latter half of the 20th century, this perspective underwent a significant shift. As Macionis and Plummer [1] observe, one of the defining characteristics of post-industrial societies is the growing concern for environmental quality.

This new environmental paradigm was encapsulated in the concept of “sustainable development”, which was introduced in the report of the World Commission on Environment and Development of 1987 entitled “Our Common Future” [2]. The concept of sustainable development was defined as that which ensures the satisfaction of present needs without compromising the ability of future generations to meet their own needs. Castaño [3] posits that three fundamental pillars support the concept of sustainable development: the economy, society, and the environment. With regard to the economy, it is essential that economic development be compatible with environmental aspects in order to avoid ecological damage and, at the same time, satisfy social demand, thereby avoiding the depletion of finite resources. With regard to the concept of intergenerational equity, it is necessary to consider the costs of present economic development and the demands of future generations. Finally, the environmental aspect encompasses all those natural resources that, within a relatively short term, determine the productive capacity of society and, therefore, require special preservation. In 2015, the United Nations launched the “2030 Agenda for Sustainable Development” [4], which represents a new framework for international cooperation aimed at achieving 17 Sustainable Development Goals while ensuring that no one is left behind.

In order to enhance environmental awareness and commitment to sustainable development, it is essential for individuals to internalise the values and ideas that constitute the new environmental culture, while simultaneously developing the capacity for critical thinking and informed decision-making. Consequently, it is of the utmost importance that governments accord significant relevance and prominence to those social action domains that have the capacity to alter the environmental situation for the better and thus be able to achieve the Sustainable Development Goals. The key factor in achieving these goals is education, which, as stated by Sanjuán [5], is a process of knowledge exchange and enrichment between educators and learners. In particular, environmental education is of great importance, as it serves as the cultural foundation and strategy for sustainable development, as noted by Severiche et al. [6]. In this vein,

González [7] posits that one of the recommendations emanating from the Tbilisi Intergovernmental Conference on Environmental Education in 1977 was for countries to endeavour to ensure that environmental education training is accessible to all teachers and that it is sustained.

Consequently, educational institutions are of leading importance in fostering greater awareness and environmental consciousness from an early age. Therefore, it is of paramount importance that teachers are fully committed to environmental education for sustainability, as it serves as a pivotal means of fostering environmental commitment among the younger generations of students. In order to enhance our understanding of this subject, this article will examine the environmental consciousness of high school teachers, with a particular focus on the potential influence of sociodemographic factors.

Literature Review

The term ‘environmental consciousness’ refers to a specific set of psychological factors that influence individuals’ inclination to engage in pro-environmental behaviours [8]. Furthermore, as previously stated by Conde et al. [9], environmental education is regarded as the most efficacious instrument for cultivating environmental consciousness. This assertion is supported by the findings of Zhonguo [10], who examined the implementation of the “green school” initiative in China in 1997 as part of the Program for Action on National Environmental Publicity and Education. The objective of this initiative was to educate all teachers and students at the school about environmental science and to promote standardised environmental protection behaviours. He concluded that the “green school” programme had achieved remarkable results in enhancing the environmental skills and consciousness of both teachers and students. Subsequently, in 2004, Tilbury and Wortman [11] advocated for an innovative model of education for sustainability that would modify the scale of values in a constructive way to ensure and guide the necessary social and scientific transformation required by the challenges that we will face because of the global change in which the entire Earth system is immersed. These implications were demonstrated in Spain by Bonil et al. [12] in 2012, who developed a training model addressed to primary and secondary school teachers that demonstrated an improvement in the curriculum through environmental education. Finally, the aforementioned findings have been recently corroborated by Zilli et al. [13] in their study conducted in Brazil. Their findings demonstrate that the implementation of environmental education programs by educational authorities led to increased ecological consciousness in the areas surrounding schools.

The biophilia theory posits that there is a natural and innate bond between humans and nature, which gives rise to an empathic response and interest in living beings. However, the capacity to connect with nature is contingent upon the ability to experience it directly [14,15]. Those who

have limited contact with nature or reside in environments lacking in natural resources may be deprived of the emotional benefits that contact with nature entails. This could result in a lack of interest in nature and even a decline in environmental attitudes and behaviours [16–19].

These circumstances frequently culminate in what Louv [20] termed a nature-deficit disorder. This disorder is associated with a reduction in the utilisation of the senses, difficulties in attention, and a high prevalence of physical and emotional illnesses. As the phenomenon of nature-deficit continues to gain traction in our society, a growing body of evidence is emerging to demonstrate the pivotal role that direct contact with the outdoors plays in the healthy development of humans [21–23]. It is recommended that early-aged children be taken to natural environments and participate in outdoor activities in order to gain knowledge, attitudes, and responsible environmental behaviour [24,25].

A number of studies have examined the environmental consciousness of teachers across different educational levels, demonstrating its significance for environmental education.

Some studies have focused on the importance of increasing environmental consciousness among pre-service teachers (i.e., individuals undergoing training in preparation for becoming qualified teachers) in different countries with the aim of improving environmental education. In Israel, Tal [26] observed in 2010 that the environmental knowledge of pre-service teachers was initially limited but significantly enhanced following completion of an introductory environmental education course. It was therefore proposed that further environmental education would be beneficial in order to facilitate the ongoing transformation process. In South Korea, Ryu et al. [27] conducted a study in 2012 to analyse the characteristics of environmental awareness among pre-service biology teachers. The results indicated that it is necessary to develop pre-service educational programmes related to environmental worldview formation. Additionally, in this country, Choi [28] found in 2017 that pre-service teachers considered it important for them to understand the environmental culture of rural and remote areas in order to empower them to draw near to various environmental cultures aesthetically. In Russia, Nazarenko and Kolesnik [29] conducted a study in 2018 to assess the theoretical knowledge and environmental skills of students at a pedagogical university. Their findings demonstrated that the implementation of environmental training modes and methods, coupled with the acquisition of practical experience, could effectively facilitate the pedagogical process, thereby promoting the development of environmental awareness and attitudes. In Nigeria, Eze [30] in 2019 found that teachers of secondary schools had a significantly higher awareness of climate change than their students had. This led to the conclusion that there was a high positive and significant relationship between the level of environmental awareness and the level of willingness to adopt pro-environmental behaviour. In Turkey, Turkoglu [31] inquired in 2019

whether pre-service teachers are sensitive towards environmental problems, interested in environmental education, willing and open to development. Tekin and Aslan [32] in 2022 concluded that pre-service science teachers have a high level of sustainable environmental awareness. In Spain, Martínez-Borreguero et al. [33] in 2020 demonstrated the necessity to enhance the attitude towards specific environmental actions among future teachers, and that education plays a pivotal role in sustainability. They proposed that the importance and inclusion of environmental education in the curricula of the different educational stages be recognised, and that initial and continuing training in education for the sustainability of teachers be improved. In Slovenia, Orbanic and Kovač [34] in 2021 emphasised the significance of environmental education in early childhood and the necessity for an enhanced curriculum on environmental education within the teacher-training programme. Finally, in India, Zeeshan and Qureshi (2020) [35] found that pre-service teachers perceived the inclusion of environmental education in the curriculum and an active role in environmental protection as the most effective means of improving environmental consciousness. It was recommended that policy makers should focus on including environmental education as an essential part of the curriculum of teacher education programmes.

The concept of environmental consciousness is influenced by a number of factors, as outlined by Hines et al. [36]. These include sociodemographic factors (age, gender and level of education), cognitive factors (knowledge of the state of the environment), environmental intervention factors (such as access to information on how to change behaviour) and psychosocial factors (including individuals' sense of personal responsibility for their actions).

Some research has been conducted which has identified differences in environmental consciousness among different groups of teachers based on certain sociodemographic characteristics.

In terms of gender, three studies have indicated that female teachers in various countries tend to exhibit greater environmental consciousness and are more engaged in environmental education. In Turkey, the findings of Ozden [37] in 2008 indicated that female elementary student teachers exhibited more positive attitudes towards the four dimensions of environmental attitude than their male counterparts. In Nigeria, Eze [30] found in 2019 that providing female teachers with more environmental information led to a greater understanding of environmental issues among their students. Furthermore, in India, Zeeshan and Qureshi [35] concluded that female teachers were more involved in ensuring a clean environment. Nevertheless, in Turkey, Koklukaya et al. [38] found that there was no significant difference in the consciousness of preservice science teachers regarding the gender variable.

A review of the literature revealed some studies that had analysed the influence of teachers' age on their environmental consciousness. In Kuwait, Badr [39] in 2003 found that 60% of high school teachers demonstrated a high level of environmental awareness, with this increasing with age. In Spain, Risco and Cebrián [40] conducted in 2018 a study on the perceptions of high school teachers regarding education for sustainability and their findings indicated that teachers, despite not having expertise in this discipline, with less age and experience exhibited attitudes that were more favourable.

In relation to the influence of teachers' educational studies on their environmental consciousness, two studies in Korea found positive correlations. In 2019, Chung and Na [41] demonstrated that the educational background of teachers influenced their awareness of and engagement with environmental education. Deoh-Yeon [42] concluded in 2019 that there were significant differences in the perception of the seriousness of environmental problems and the necessity of environmental preservation education according to teachers' careers. Nevertheless, in Turkey, Gunduz et al. [43] in 2016 discovered that the level of environmental awareness among teachers did not vary according to their educational status.

Research Objective

The article has two principal objectives. The first objective is to assess the level of environmental consciousness among high school teachers in order to gain insight into their actual commitment to the environment. Secondly, the article examines the opinion of teachers as to whether environmental education for sustainability is pivotal in fostering environmental commitment among the new generations of students. In order to achieve these objectives, it is necessary to explore potential differences between groups of teachers based on sociodemographic factors such as sex, age, and level of education. Given that the target population of this study is high school teachers, it is particularly intriguing to analyse two factors that are closely associated with their level of education. The aforementioned factors include the orientation of students that teachers instruct (professional or university) and the subject area of the teachers (arts or science).

MATERIALS AND METHODS

The study was conducted in educational institutions located in the city of Alicante, Spain, employing the research model depicted in Figure 1.

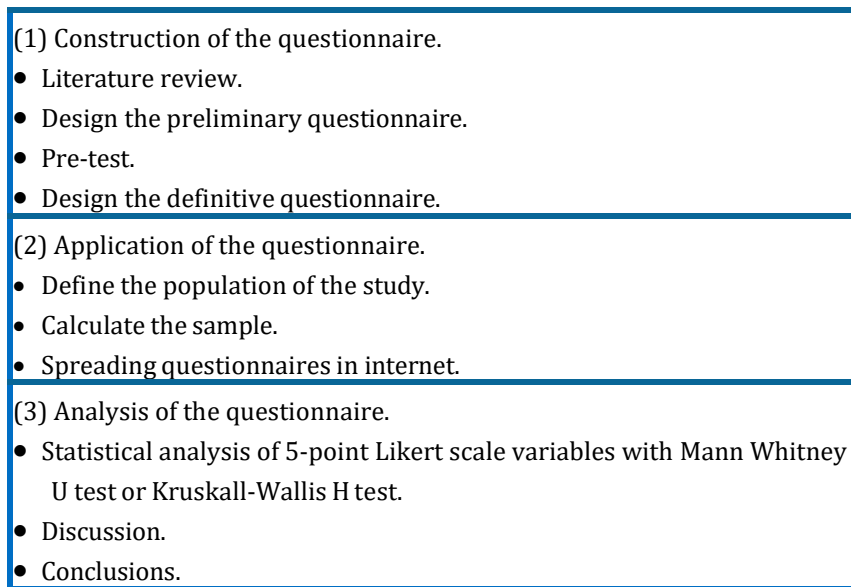


Figure 1. Research model.

With regard to the first objective, no previous study in the literature has comprehensively analysed all sociodemographic factors that can influence the environmental consciousness of high school teachers. However, some studies have addressed certain aspects of this topic. Consequently, we initiated our investigation by examining the potential for equality in environmental consciousness among different groups. In order to achieve this, the following four null hypotheses were established:

- H1: There is no difference in environmental consciousness between female (F) and male (M) teachers.
- H2: There is no difference in environmental consciousness among teachers of different age groups. These groups are defined as follows: 25–35, 36–45, 46–55 or over 55.
- H3: There is no significant difference in environmental consciousness between teachers based on the orientation of their students they teach: professional (P) or university (U).
- H4: There is no difference in environmental consciousness between teachers based on their area of knowledge, whether art (A), humanities (H), social science (SS) or science & technology (ST).

With regard to the second objective, the existing research literature indicates a positive perception among educators regarding the potential of environmental education as a means of fostering environmental commitment among future generations. However, no studies have been conducted to date to examine whether there are any differences in the effectiveness of environmental education based on sociodemographic factors. In order to conduct this analysis, the following four null hypotheses are proposed:

- H5: There is no significant difference in the perceived importance of environmental education as a tool to improve the commitment of new

generations to the environment between female (F) and male (M) teachers.

- H6: The importance of environmental education as a tool to improve the commitment of new generations to the environment does not differ among teachers' age. Four teacher groups are defined: 25–35, 36–45, 46–55, and +55.
- H7: The importance of environmental education as a tool to improve the commitment of new generations to the environment does not differ between teachers according to the orientation of the students they teach: professional (P) or university (U).
- H8: The perceived importance of environmental education as a tool to improve the commitment of new generations to the environment does not differ between teachers based on their area of knowledge, whether art (A), humanities (H), social science (SS) or science & technology (ST).

In order to achieve these objectives, an anonymous questionnaire was employed, which Jiménez and Lafuente [44] consider to be an effective instrument for the assessment of environmental consciousness as a constructor of four dimensions. The environmental consciousness will be evaluated with four questions, one for each dimension, as follows. The first dimension, affective, concerns the degree of importance individuals ascribe to environmental issues and their attitudes towards environmental preservation. Secondly, the cognitive dimension concerns the degree of importance attached to environmental news and knowledge on the subject. Thirdly, the conative dimension concerns the willingness to act in favour of the environment and the perception of one's role as a solution provider. The fourth dimension is the behaviour carried out both at home and at the educational establishment. Finally, one question was posed to assess the perceived value of environmental education as a means of fostering environmental commitment among future generations.

The study population consisted of 5020 teachers from the 42 registered high schools in Alicante [45]. Alicante is a city situated on the southeastern coast of Spain, with a population of 337,304 inhabitants residing in an area of 201.27 km² [46]. A probability study was designed through a random selection using the population sample formula proposed by Cochran [47], with the objective of calculating the sample size. This was calculated using the following formula: $n = (N \times Z^2 \times p \times q) / ((N-1) \times e^2 + Z^2 \times p \times q)$. The initial objective was to achieve a margin of error (e) of 5% with a confidence level (Z value) of 95% and heterogeneity (p = q) of 50%. This resulted in a sample size of $n = 357$ high school teachers. Subsequently, the survey was disseminated online via a Google form between 25 April and 31 May 2022. Finally, a total of 171 teachers responded to the survey, resulting in a margin of error of 7.5% with a confidence level (Z value) of 95% and heterogeneity (p = q) of 50%. This implies a limitation of the statistical analysis due to the relatively small sample size. The participation of the teachers was entirely voluntary and in accordance with the ethical research requirements set out in Spain.

The teachers who responded were predominantly female (59.1%), with a smaller proportion of male teachers (49.1%). With regard to the age of teachers, 15.2% were between 25 and 35 years old, 27.5% between 36 and 45 years old, 36.8% between 46 and 55 years old, and 20.5% were over 55 years old. With regard to the orientation of the students they taught, 36.3% were engaged in professional training, while 63.7% were responsible for students preparing for university. Finally, with regard to the subject area, 49.1% of respondents indicated that they taught subjects within the arts, while 50.1% indicated that they taught subjects within the sciences.

The surveys were analysed using the open-source software R [48]. To identify statistically significant differences ($p < 0.05$) in variables by gender, educational level, age and area of knowledge of arts or science, we employed the non-parametric Mann-Whitney U test (with two groups) and the Kruskal-Wallis H test (with two or more groups) for 5-point Likert scale questions. The Kolmogorov-Smirnov test carried out to assess the normality of the variables gave a p -value 0.00 in all cases, which means that the distribution was not normal as it was less than 0.05, and therefore all the non-parametric tests used were appropriate for the statistical analysis.

RESULTS

Analysis of the Environmental Consciousness of High School Teachers

The initial four questions of the questionnaire were designed to assess the first objective presented in this study, which is to examine the level of environmental consciousness among high school teachers in a Spanish city (Alicante). The fifth question evaluates the importance that teachers place on environmental education as a tool to improve the commitment of new generations to the environment (Table 1).

Tables 2, 3, 4, and 5 identify potential variations based on sociodemographic factors, including teachers' gender, teachers' age, students' orientation (whether they are in a professional or university programme), and teachers' area of knowledge.

Table 1. Results for all teachers.

Likert scale from 1 = not at all to 5 = very much	Mean
1. How important is the preservation and conservation of the environment for you?	4.87
2. How serious is the environmental crisis for you?	4.50
3. How serious is the urgency of the environmental crisis for you?	4.42
4. Of the following environmentally friendly actions, how often do you usually carry them out in your day-to-day?	
• Separate household waste in their respective containers.	4.53
• Use public or shared transport.	2.44
• Buy ecological products.	2.72
• Reduce the consumption of water and electricity.	3.99
• Practice ecotourism.	2.68
5. Do you consider that environmental education for sustainability is the key to change to develop and enhance the values and attitudes of students?	4.41

Table 2. Results for teachers' gender: Female (F) and Male (M).

Likert scale from 1 = not at all to 5 = very much	F Mean	M Mean	U Mann-Whitney	p-value
1. How important is the preservation and conservation of the environment for you?	4.87	4.86	2959	0.901
2. How serious is the environmental crisis for you?	4.45	4.57	2438	0.027*
3. How serious is the urgency of the environmental crisis for you?	4.39	4.37	2766	0.377
4. Of the following environmentally friendly actions, how often do you usually carry them out in your day-to-day?				
• Separate household waste in their respective containers.	4.46	4.63	2712	0.251
• Use public or shared transport.	2.48	2.40	2868	0.685
• Buy ecological products.	2.90	2.46	2481	0.068
• Reduce the consumption of water and electricity.	4.07	3.87	2915	0.841
• Practice ecotourism.	2.75	2.59	2907	0.792
5. Do you consider that environmental education for sustainability is the key to change to develop and enhance the values and attitudes of students?	4.63	4.09	405	0.013*

*p value < 0.05 statistically significant differences.

Table 3. Results for teachers' age (range of years old).

Likert scale from 1 = not at all to 5 = very much	25–35 Mean	36–45 Mean	46–55 Mean	+55 Mean	H Kruskal-Wallis	p-value
1. How important is the preservation and conservation of the environment for you?	4.77	4.94	4.83	4.91	5.639	0.131
2. How serious is the environmental crisis for you?	4.42	4.55	4.57	4.34	5.850	0.119
3. How serious is the urgency of the environmental crisis for you?	4.50	4.43	4.44	4.31	2.432	0.488
4. Of the following environmentally friendly actions, how often do you usually carry them out in your day-to-day?						
• Separate household waste in their respective containers.	4.46	4.43	4.67	4.46	2.379	0.498
• Use public or shared transport.	2.27	2.49	2.53	2.37	1.255	0.740
• Buy ecological products.	2.62	2.87	2.87	2.31	6.994	0.072
• Reduce the consumption of water and electricity.	3.65	3.94	4.19	3.94	4.458	0.216
• Practice ecotourism.	2.35	2.72	2.97	2.37	7.078	0.069
5. Do you consider that environmental education for sustainability is the key to change to develop and enhance the values and attitudes of students?	4.21	4.21	4.28	4.10	1.376	0.711

*p value < 0.05 statistically significant differences.

Table 4. Results for students' orientation that teachers teach: Professional (P) or University (U).

Likert scale from 1 = not at all to 5 = very much	P Mean	U Mean	U Mann-Whitney	p-value
1. How important is the preservation and conservation of the environment for you?	4.94	4.83	3008	0.044*
2. How serious is the environmental crisis for you?	4.52	4.49	3278	0.708
3. How serious is the urgency of the environmental crisis for you?	4.52	4.37	2875	0.058
4. Of the following environmentally friendly actions, how often do you usually carry them out in your day-to-day?				
• Separate household waste in their respective containers.	4.66	4.45	2832	0.032*
• Use public or shared transport.	2.45	2.44	3282	0.748
• Buy ecological products.	2.76	2.70	3304	0.803
• Reduce the consumption of water and electricity.	4.18	3.88	2833	0.065
• Practice ecotourism.	2.61	2.72	3187	0.525
5. Do you consider that environmental education for sustainability is the key to change to develop and enhance the values and attitudes of students?	4.56	4.32	2796	0.039

*p value < 0.05 statistically significant differences.

Table 5. Results for: Art (A), Humanities (H), Social Science (SS) or Science & Technology (ST).

Likert scale from 1 = not at all to 5 = very much	A Mean	H Mean	SS Mean	ST Mean	H Kruskal-Wallis	p-value
1. How important is the preservation and conservation of the environment for you?	4.86	4.76	4.87	4.91	5.173	0.160
2. How serious is the environmental crisis for you?	4.38	4.51	4.50	4.51	0.563	0.905
3. How serious is the urgency of the environmental crisis for you?	4.75	4.78	4.53	4.50	9.952	0.019*
4. Of the following environmentally friendly actions, how often do you usually carry them out in your day-to-day?						
• Separate household waste in their respective containers.	4.62	4.38	4.26	4.69	2.690	0.005*
• Use public or shared transport.	3.00	2.57	2.55	2.30	4.209	0.240
• Buy ecological products.	3.25	2.62	2.84	2.66	2.421	0.490
• Reduce the consumption of water and electricity.	4.63	3.81	4.16	3.93	5.633	0.131
• Practice ecotourism.	2.88	2.68	2.55	2.73	0.669	0.081
5. Do you consider that environmental education for sustainability is the key to change to develop and enhance the values and attitudes of students?	4.48	4.30	4.50	4.23	3.502	0.320

*p value < 0.05 statistically significant differences.

As demonstrated in question 1, teachers perceive the preservation and conservation of the environment as a highly significant commitment, with an average rating of 4.87 on our Likert scale. Statistically significant differences were observed in favour of teachers who teach professional training students (4.94) compared to those who teach students preparing for university (4.83), as well as in favour of science teachers (4.92) compared to arts teachers (4.81). These differences can be attributed to the additional training that these teachers receive on environmental matters.

In response to question 2, teachers indicated a high level of concern regarding the environmental crisis, with an average rating of 4.50. Statistically significant differences were observed, with men rating the crisis as more serious (4.57) than women (4.45).

In question 3, teachers perceive the environmental crisis as highly urgent (with an average rating of 4.42), with statistically significant differences observed among groups of teachers' area of knowledge.

In question 4, two environmentally friendly actions which teachers commonly practice in their everyday lives were identified. Firstly, the practice of separating household waste into appropriate receptacles was rated at 4.53. Secondly, their efforts to reduce water and electricity consumption were rated at 3.99. Nevertheless, teachers engage in the other three actions (Table 1) less frequently: purchasing ecological products (2.72), practising ecotourism (2.68), and utilising public or shared transportation (2.44).

In regard to the separate household waste action, statistically significant differences were observed in favour of teachers instructing professional students (4.66) in comparison to teachers teaching future university students (4.45), as well as in favour of art (4.62) and science & technology (4.69) teachers in comparison to humanities (4.38) and social science (4.26) teachers. This situation is analogous to the findings of question 2, indicating that it is also influenced by their greater environmental training. Nevertheless, a statistically significant difference was observed among in favour of arts teachers (2.62) compared to science teachers (2.28) with regard to the use of public and shared transportation.

Analysis of the Importance of Environmental Education as a Tool to Improve the Commitment of New Generations to the Environment

In question 5, teachers rated the role of environmental education for sustainability in promoting the development and enhancement of students' values and attitudes towards the environment as highly important (with an average rating of 4.41). The results revealed statistically significant differences in the ratings of gender. Women expressed higher ratings (4.63) compared to men (4.09).

DISCUSSION

Environmental Consciousness of High School Teachers

The set of questions 1, 2, 3, and 4 evaluates the level of environmental consciousness among high school teachers in the four dimensions of it (affective, cognitive, conative and active), as this concept cannot be measured exclusively by a numerical value. With four answers scoring above 4.41 in, we can conclude that high school teachers possess a strong environmental consciousness and are committed to the environment.

Other important aspect of the research is to evaluate if there are differences of environmental consciousness among the different groups. For it, we have established four hypotheses that we analyse next:

- H1: There is no difference in environmental consciousness between female (F) and male (M) teachers.

Only in question two there is a statistically significant difference between the responses of male and female teachers. It can therefore be concluded that the hypothesis H1 is accepted. The results of our study align with those of Koklukaya et al. [38] in Turkey, but diverge from those of Ozden [37] in Turkey, Eze [30] in Nigeria and Zeeshan and Qureshi [35] in India, which indicated that female teachers exhibited greater environmental commitment than male teachers.

- H2: There is no difference in environmental consciousness among teachers of different age groups. These groups are defined as follows: 25–35, 36–45, 46–55 or over 55.

The results of the statistical analysis indicate that there are no statistically significant differences between teachers' age in any of the four questions. It can therefore be concluded that hypothesis 2 is valid. The results obtained in this study concur with those reported by Badr [39] in Kuwait, which indicated that teachers exhibited a high level of environmental awareness. However, the current findings differ in that the level of awareness increased with age, whereas in the aforementioned study, it was found to increase until the age of 55, after which it decreased. In contrast, our findings diverge from those of Risco and Cebrián [40], who observed that younger and less experienced high school teachers exhibited more favourable attitudes.

- H3: There is no significant difference in environmental consciousness between teachers based on the orientation of their students they teach: professional (P) or university (U).

Statistically significant differences were observed in question 1 and in one of the five environmentally friendly actions of the question 4, between teachers in relation to their orientation towards students: professional (P) or university (U). This leads to the conclusion that the hypothesis H3 can be accepted. These results align with those obtained by Gunduz et al. [43]

in Turkey, who found that the level of environmental awareness of teachers did not vary according to their educational status.

- H4: There is no difference in environmental consciousness between teachers based on their area of knowledge, whether art (A), humanities (H), social science (SS) or science & technology (ST).

Only in the question 3 and in one of the five environmentally friendly actions of the question 4 there are statistically significant between teachers' areas of knowledge. Then, we can admit this H4 hypothesis. The results of this study do not align with those reported by Chung and Na [41], who concluded that the educational background of teachers influences their environmental awareness. Similarly, Deoh-Yeon [42] observed significant differences in environmental education according to teachers' careers.

Upon acceptance of the four hypotheses, it can be concluded that there are no statistically significant differences in environmental consciousness among high school teachers based on sociodemographic factors.

Importance of Environmental Education as a Tool to Improve the Commitment of New Generations to the Environment

The findings of 4.41 in question 5 indicated that educators consider environmental education for sustainability to be a vital component in fostering the growth and advancement of students' values and attitudes towards the environment. As in the previous section we are going to analyse whether there are statistically significant differences among different groups of teachers. In order to achieve this objective, four hypotheses have been formulated, which are subjected to examination in the following sections:

- H5: There is no significant difference in the perceived importance of environmental education as a tool to improve the commitment of new generations to the environment between female (F) and male (M) teachers.

We reject hypothesis H5 on the grounds that there are statistically significant differences in question 5 between teachers' gender in favour of female.

- H6: The importance of environmental education as a tool to improve the commitment of new generations to the environment does not differ among teachers' age. Four teacher groups are defined: 25–35, 36–45, 46–55, and +55.

Hypothesis H6 is confirmed on the grounds that there are no statistically significant differences in question 5 among teachers' age groups.

- H7: The importance of environmental education as a tool to improve the commitment of new generations to the environment does not differ

between teachers according to the orientation of the students they teach: professional (P) or university (U).

Hypothesis H7 is admitted on the grounds that there are no statistically significant differences in question 5 among teachers in relation to the orientation of the students they teach.

- H8: The perceived importance of environmental education as a tool to improve the commitment of new generations to the environment does not differ between teachers based on their area of knowledge, whether art (A), humanities (H), social science (SS) or science & technology (ST).

Hypothesis H8 is adopted on the grounds that there are no statistically significant differences in question 5 between teachers' areas of knowledge.

Having accepted three of the four hypotheses, it can be concluded that there are no statistically significant differences in the perceived importance of environmental education for sustainability as a means of fostering and enhancing students' values and attitudes towards the environment, with regard to sociodemographic factors.

CONCLUSIONS

The achievement of the Sustainable Development Goals necessitates an unwavering commitment to sustainability and can be achieved through the provision of environmental education that trains and cultivates a heightened environmental consciousness in future generations. In order to achieve this, it is of the utmost importance that high school teachers themselves possess an awareness of environmental conservation and sustainability, as this will enable them to generate intergenerational commitment to sustainability.

This research shows that, in the case analysed in Alicante, secondary school teachers are very aware of the importance of education for sustainability as can be seen from the following two findings. Firstly, the teachers exhibited a high level of environmental consciousness. Secondly, the teachers consider environmental education for sustainability to be of the utmost importance in fostering the development and enhancement of students' values and attitudes towards the environment. With regard to these two aspects, no statistically significant differences were observed among teachers based on sociodemographic factors. Furthermore, it can be inferred that high school teachers in Alicante are actively engaged in daily recycling practices at home and demonstrate a considerable commitment to reducing water and electricity consumption.

Finally, it is crucial to recognise that the primary means of instilling environmental consciousness in subsequent generations lies in ensuring that teachers receive training in environmental education that enables them to incorporate concepts related to environmental protection into their instructional practices.

LIMITATIONS OF STUDY

The limitation of the study is that the sample was only of teachers from Alicante city, although we could extend the analysis to larger population areas with similar education program.

FUTURE RESEARCH DIRECTIONS

An interesting line for future research would be to compare the changes in environmental consciousness of the teachers before and after an environmental educational training; analysing if that reflects on their educational program and in consequence if there is a progress to increasing their student environmental consciousness.

DATA AVAILABILITY

The dataset of the study is available from the authors upon reasonable request.

AUTHOR CONTRIBUTIONS

Conceptualization, PG and AA; methodology, PG, AA, and FD; formal analysis, AA, FD and IA; investigation, PG, AA, FD and IA; writing—original draft preparation, AA, FD and IA; writing—review and editing, AA, FD and IA.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

1. Macionis J, Plummer K. Sociología. London (UK): Pearson; 2011.
2. Brundtland G. Report of the World Commission on Environment and Development: Our Common Future. Available from: <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>. Accessed 2024 May 31.
3. Castaño CA. Los pilares del desarrollo sostenible: Sofisma o realidad [The pillars of sustainable development: Sophistry or reality]. Available from: <https://repository.usta.edu.co/bitstream/handle/11634/23249/Los%20pilares%20del%20desarrollo%20sostenible%20sofisma%20o%20realidad.pdf?sequence=1&isAllowed=y>. Accessed 2024 May 31. Spanish.
4. United Nations. Transforming our world: the 2030 Agenda for Sustainable Development. Available from: <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>. Accessed 2024 May 31.
5. Sanjuán M. Pedagogía fundamental [Fundamental pedagogy]. Available from: https://www.cultura.gob.es/webISBN/tituloDetalle.do?sidTitul=929858&accion=busquedaInicial&noValidating=true&POS=0&MAX=50&TOTAL=0&layout=busquedaisbn&language=es&prev_layout=busquedaisbn. Accessed 2024 May 31. Spanish.

6. Severiche C, Gómez E, Jaimes J. La educación ambiental como base cultural y estrategia para el desarrollo sostenible [Environmental education as a cultural basis and strategy for sustainable development]. *Telos*. 2016;18(2):266-81. Spanish.
7. González, M. La educación ambiental y formación del profesorado [Environmental education and teacher training]. *Rev Iberoam Educ*. 1998;16:13-22. Spanish.
8. Zelezny LC, Schultz PW. Promoting environmentalism. *J Soc Issues*. 2000;56:365-71.
9. Conde MC, De Pedro JM, Sánchez JS. Libro Blanco de la Educación Ambiental en España [White Paper on Environmental Education in Spain]. Madrid (Spain); Ministerio de Medio Ambiente de España; 1999. Spanish.
10. Zhongguo T. Establishing “Green Schools” and enhancing teachers and students’ environmental studies. *Chin Educ Soc*. 2004;37(3):94-6.
11. Tilbury D, Wortman D. Engaging People in Sustainability. Commission on Education and Communication. Gland (Switzerland): IUCN; 2004.
12. Bonil J, Calafell G, Granados Sánchez J, Junyent M, Tarin RM. Un Modelo formativo para avanzar en la ambientalización curricular = A training model for progress in curriculum greening. *Profesorado*. 2012;16(2):145-63.
13. Zilli C, Novello N, Gheler-Costa C, Toqueti F, Spazianni ML. Environmental education in urban cities: Planet regeneration through ecologically educating children and communities. *Int J Educ Res Open*. 2022;3:100208.
14. Wilson EO. *Biophilia*. Cambridge (US): Harvard University Press; 1984.
15. Zylstra MJ, Knight AT, Esler KJ. Connectedness as a Core Conservation Concern: An Interdisciplinary Review of Theory and a Call for Practice. *Springer Sci Rev*. 2014;2:119-43.
16. Soga M, Gaston K. Shifting baseline syndrome: causes, consequences and implications. *Front Ecol Environ*. 2018;16(4):222-30.
17. Gaston KJ, Soga M. Extinction of experience: the need to be more specific. *People Nat*. 2020;2(3):575-81.
18. Nadkarni NM, Hasbach PH, Thys T, Crockett EG, Schnacker L. Impacts of nature imagery on people in severely nature-deprived environments. *Front Ecol Environ*. 2017;15(7):395-403.
19. Soga M, Gaston K. Extinction of experience: The loss of human-nature interactions. *Front Ecol Environ*. 2016;14(2):94-101.
20. Louv R. Do our Children have Nature Deficit Disorder? *Educ Lead*. 2010;67(4):24-30.
21. Dankiw KA, Tsiros MD, Baldock KL, Kumar S. The impacts of unstructured nature play on health in early childhood development: A systematic review. *PLoS One*. 2020;15(2):e0229006.
22. Pouso S, Borja Á, Fleming LE, Gómez-Baggethun E, White MP, Uyarra MC. Contact with blue-green spaces during the COVID-19 pandemic lockdown beneficial for mental health. *Sci Total Environ*. 2021;756:143984.
23. Soga M, Evans MJ, Cox DT, Gaston KJ. Impacts of the COVID-19 pandemic on human-nature interactions: pathways, evidence and implications. *People Nat*. 2021;3(3):518-27.

24. Erdogan M. The effects of ecology-based summer nature education program for primary school students' environmental knowledge, environmental affect and responsible environmental behavior. *Educ Sci Theor Pract.* 2011;11(4):2223-7.
25. García-González E, Jiménez R., Azcárate P. Education for Sustainability and the Sustainable Development Goals: Pre-Service Teachers' Perceptions and Knowledge. *Sustainability.* 2020;12(18):7741.
26. Tal T. Pre-service teachers' reflections on awareness and knowledge following active learning in environmental education. *Int Res Geogr Environ Educ.* 2010;19(4):263-76.
27. Ryu H, Kew-Cheol S, Keum-Hyun S, Sung-Hee Y. Analysis of Environmental Awareness and Environmental Worldviews of Pre-service Biology Teachers Expressed on Environmental UCC. *Korean J Environ Educ.* 2012;25(1):77-88.
28. Choi MS. The meaning of the art education on the pre-service teachers' awareness toward the environmental culture of the rural and remote areas. *J Learn Cent Curric Instr.* 2017;17(20):919-38.
29. Nazarenko A, Kolesnik A. Raising Environmental Awareness of Future Teachers. *Int J Instr.* 2018;11(3):63-76.
30. Eze E. Sociographic analysis of climate change awareness and pro-environmental behaviour of secondary school teachers and students in Nsukka Local Government Area of Enugu State, Nigeria. *Int Res Geogr Environ Educ.* 2019;29(1):89-105.
31. Turkoglu B. Opinions of Preschool Teachers and Pre-Service Teachers on Environmental Education and Environmental Awareness for Sustainable Development in the Preschool Period. *Sustainability.* 2019;11(18):4925.
32. Tekin N, Aslan O. Analysis of Pre-Service Science Teachers' Biodiversity Images according to Sustainable Environmental Awareness. *Present Env Sust Dev.* 2022;16(1):63-78.
33. Martinez-Borreguero G, Maestre-Jiménez J, Mateos-Núñez M, Naranjo-Correa F. Analysis of Environmental Awareness, Emotions and Level of Self-Efficacy of Teachers in Training within the Framework of Waste for the Achievement of Sustainable Development. *Sustainability.* 2020;12(6):2563.
34. Orbanic ND, Kovac N. Environmental awareness, attitudes, and behavior of preservice preschool and primary school teachers. *J Balt Sci Educ.* 2021;20(3):373-88.
35. Zeeshan M, Qureshi N. Exploring the perceptions and practices of pre-service teachers for environmental consciousness in Punjab. *Risus.* 2020;13(2):124-34.
36. Hines JM, Hungerford HR, Tomera AN. Analysis and synthesis of research on responsible environmental behavior: a meta-analysis. *J Environ Educ.* 1987;18(2):1-8.
37. Ozden M. Environmental Awareness and Attitudes of Student Teachers: An Empirical Research. *Int Res Geogr Environ Educ.* 2008;17(1):40-55.
38. Koklukaya AN, Yildirim EG, Selvi M. The Relationship between Pre-service Teachers' Awareness Levels of Electromagnetic Pollution and other Environmental Problems. *Eurasian J Educ Res.* 2017;16(67):17-35.

39. Badr H. Environmental awareness and worry among high school teachers in Kuwait. *J Egypt Public Health Assoc.* 2003;78(3–4):319-39.
40. Risco M, Cebrián G. Análisis de la percepción de la educación para la sostenibilidad por parte del profesorado de Educación Secundaria y Bachillerato [Analysis of the perception of education for sustainability by secondary and high school teachers]. *Enseñ Cienc.* 2018;36(3):141-62. Spanish.
41. Chung M, Na C. Kindergarten Teachers' Awareness of Environmental Education: On the Basis of Kindergartens in Mokpo Area. *Korean J Environ Educ.* 2019;32(1):17-32.
42. Deoh-Yeon R. An Analysis of the Awareness and Needs of Environmental Preservation Education by Their Career for Early Childhood Teachers. *Korean J Child Educ.* 2019;28(3):93-108.
43. Gunduz S, Kocadal E, Bukuk A. Perception of Environmental Awareness by Administrators and Teachers in Secondary Schools in North Cyprus: The Case of Guzelyurt. *Anthropologist.* 2016;23(1–2):132-41.
44. Jiménez M, Lafuente R. Defining and measuring environmental consciousness. *Rev Int Soc.* 2010;68:731-55.
45. Ayuntamiento de Alicante. Población, Informes estadísticos anuales de Alicante [Population, annual statistical reports of Alicante]. Available from: <https://www.alicante.es/es/estructura-politica/concejalia-estadistica>. Accessed 2022 Mar 10. Spanish.
46. Ayuntamiento de Alicante. Datos de los centros educativos de Alicante [Data from the educational centers of Alicante]. Available from: <https://www.alicante.es/es/estructura-politica/concejalia-educacion>. Accessed 2022 Mar 15. Spanish.
47. Cochran WG. *Sampling Techniques*. New York (US): John Wiley & Sons; 1977.
48. R Core Team. *R: A language and environment for statistical computing*. Available from: <http://www.R-project.org/>. Accessed 2022 Jun 11.

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