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Examining the Relationship between Environmental Education and Pro-Environmental Behavior in Regular Basic Education Students: A Cross-Sectional Study

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Abstract: In recent decades, a series of environmental problems such as pollution, climate change and the loss of biodiversity are being perceived. Given this context, the need to implement strategies arises, such as environmental education, to mitigate the mentioned problems. Therefore, the objective of this research was to determine if environmental education is related to the pro-environmental behavior of regular basic education students in the Peruvian Amazon. The research approach was quantitative, the design was non-experimental, and the scope was cross-sectional correlational. The sample was obtained of 293 students of the seventh cycle of regular basic education who were administered the Environmental Education Questionnaire and the Environmental Behavior Questionnaire, instruments with adequate metric properties. According to the results, the students were characterized by perceiving that the environmental education that was implemented in the educational institutions was partially adequate. Similarly, pro-environmental behavior was found to be unusual. On the other hand, it was found that the Pearson correlation coefficient between both variables was 0.877, and the p -value was below the significance level ($p < 0.05$). It was concluded that there is a direct and significant relationship between environmental education and the pro-environmental behavior of regular basic education students in the Peruvian Amazon.

Keywords: environmental education; pro-environmental behavior; students; sustainable development; regular basic education; environmental problems



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1. Introduction

In recent years, society has disproportionately exploited existing natural resources, causing serious repercussions on the environment such as environmental pollution, deforestation, climate change, extinction of species and the greenhouse effect, among others (Palavecinos et al. 2016; Espejel Rodríguez et al. 2014).

In the Peruvian region of Madre de Dios, the geographical space where this research was carried out, the environmental situation is just worrisome and seems to be getting worse every day. Despite being classified as the “Capital of Biodiversity of Peru” for its megadiversity of flora and fauna and having protected natural areas, there are social and environmental problems that characterize the aforementioned Amazon region, such as alluvial gold mining, indiscriminate logging, poaching, commercialization of endangered species and inadequate management of solid waste, a situation that affects the quality of life and well-being of the population (Brack et al. 2011).

One of the first attempts made to make the world population aware of the environmental problems described was the development of the Earth Summit, managed by the

United Nations and held in Sweden in 1972, where the initiative was taken to promote sustainable development through the implementation of environmental education at different educational levels (Márquez et al. 2021). Later, in 1992, the United Nations Conference for Environment and Development was held, where the member organizations and countries established commitments that materialized in the 2021 Agenda, whose purpose was to adopt strategies and activities to achieve sustainable development (Al-Nuaimi and Al-Ghamdi 2022). Subsequently, in 2015, the 2030 Agenda for Sustainable Development was implemented, which sought to contribute significantly to the different sectors of society and had global implications, since socio-environmental and economic problems are global in nature (Yangali et al. 2021). Then, through the leadership of the United Nations, the 17 Sustainable Development Goals (SDGs) were formulated to concretize sustainability in all countries, both developed and developing (Pernía et al. 2022). Thus, through the SDGs, an attempt was made to articulate environmental, social and economic challenges (Severino et al. 2021; Guillén et al. 2020). In this order of ideas, it can be affirmed that environmental education becomes an essential strategy to raise awareness in society and achieve the long-awaited sustainable development.

1.1. Environmental Education

Environmental education aims to guide people to build comprehensive learning about the environment and allows the development of environmental awareness that is expressed in positive, supportive and equitable behaviors with the environment (Cantú 2014). Likewise, it responds to the country's sustainable development needs for the conservation and use of natural and cultural megadiversity, adaptation to global climate change, prevention and management of environmental risks, integration and land-use planning (Ministry of the Environment 2012). Therefore, it is necessary that the educational community (teachers, students, managers, parents and society in general) get involved in this process to obtain favorable results (Al-Naqbi and Alshannag 2018; Pulido and Olivera 2018).

As observed, the educational space is an alternative for promoting social changes through awareness and learning of environmental content aimed at the behavior change required for sustainable development (Pérez et al. 2019; Quiva and Vera 2010). In this sense, educational institutions have the responsibility to provide quality education, to prepare competitive, productive citizens and, above all, committed to the environment and sustainable development (Polo 2013).

In Peru, there are educational policies and plans that promote environmental education, from the initial level to the higher level, such as the National Environmental Policy, the National Environmental Education Policy (NEEP) and the National Environmental Education Plan (NNEPL), whose purpose is to create environmental awareness and encourage the practice of pro-environmental behaviors (Estrada et al. 2020a). From the aforementioned educational plans and policies emerges the environmental approach, a transversal strategy that seeks to promote environmental education and culture to train environmentally responsible people who contribute to sustainable development at the local, regional and national levels (Ministry of Education 2016).

Likewise, thematic components have been established to face environmental problems, strengthen the implementation of good practices on a context of climate change and promote a critical attitude and the exercise of responsible environmental citizenship (Ministry of Education 2016). These components are detailed below:

- Climate change education component: increases awareness and adaptive capacity for action against climate change.
- Health education component: achieves healthy and sustainable lifestyles in the educational community and projects them to the whole society.
- Eco-efficiency education component: develops skills on research, entrepreneurship, participation and applicability to live sustainably, progressively controlling environmental impacts and the intensity of resources consumed by educational institutions and the educational community.

- Disaster risk management education component: seeks to strengthen the culture of prevention, reduction and permanent control of disaster risk factors in educational institutions, as well as adequate preparation and response to disaster situations.
- Biodiversity education component: allows guiding the development of skills for the care and conservation of ecosystems and the ecosystem services they provide. It also allows guiding the development of protected natural areas, natural spaces, as well as valuing biodiversity for its sustainable use.

According to the theoretical proposal of [Santacruz \(2018\)](#), environmental education has three dimensions: cognitive, affective and behavioral aspects. The cognitive aspect is aimed at knowing to what extent teachers provide information and knowledge to students on issues related to current and latent environmental problems that society is experiencing. Regarding the affective aspect, it is associated with students' feelings of concern, respect and appreciation for environmental issues. In regard to the behavioral aspect, it refers to the willingness of students to act sustainably and promote solutions to environmental problems in their environment that could well be carried out through environmental practices. This disposition is consistent with the level of learning and awareness that they have previously acquired.

1.2. Pro-Environmental Behavior

According to [Cortes et al. \(2017\)](#), pro-environmental behavior refers to that way of acting that people consciously carry out to protect, preserve or minimize the negative impacts on the natural environment. Thus, it promotes environmental conservation and actions to significantly reduce the impact that people cause through daily activities ([Rincón 2020](#)).

According to [Balundé et al. \(2019\)](#), four types of values are particularly important to explain pro-environmental behavior: biospheric values (concern for nature and the protection of the environment), altruistic values (focusing on the well-being of others), egoistic values (safeguarding and promoting personal well-being) and hedonic values (focusing on the pursuit of pleasure and the reduction of effort). In this sense, pro-environmental behaviors often imply personal costs, while the benefits are mainly for the environment and society in general. This explains why, compared to other values, people's biospheric values are positively and strongly related to pro-environmental behavior.

In the present investigation, three dimensions of pro-environmental behavior were considered, which were based on the arguments of [Álvarez et al. \(2018\)](#) and [Amérigo et al. \(2012\)](#): recycling and reuse, saving resources, and environmental purchasing. Recycling and reuse are associated with the activity of recovering solid waste with the purpose of reintegrating it into the economic cycle, reusing it or taking advantage of it as raw material for new products, with which various economic, ecological and social benefits can be achieved. Regarding the saving of resources, it refers to the conscious use of the resources available in society to be used in the best possible way and avoiding its unnecessary use. This is the case of the use of electricity and water, among others. Finally, environmental purchasing is focused on the acquisition of a product or service in which elements that come from recycling have been used during its preparation, which follow processes that cause the least possible contamination or that generate the least use of energy.

The sensitivity of individuals to protect the environment is closely related to their level of environmental knowledge. If a person does not know what results will be produced by not showing pro-environmental behaviors, they cannot be expected to carry out these types of actions. Therefore, the most essential prerequisite for pro-environmental behavior is environmental knowledge or awareness ([Donmez and Erdem 2021](#)). In the same way, [De Groot and Steg \(2009\)](#) explained that pro-environmental behaviors are the product of awareness of the consequences, assumption of responsibility, efficacy of the result and personal norms. In this order of ideas, people do not manifest pro-environmental behaviors and realize that this will create problems for them, then accept responsibility for their actions, leading them to believe that pro-environmental behavior will lead them to reduce

environmental pollution and problems, creating individual norms. All of these appear in their behavior. Then, the normative action model holds that environmental knowledge and awareness of the environment affect a person's behavior towards the environment (Velasquez et al. 2022).

There are some investigations that analyzed the relationship between environmental education and pro-environmental behavior in students. In Mexico, they reported that there was a direct and significant relationship between the teaching practice in environmental education and the pro-environmental skills of the students, which means that adequate environmental education is related to adequate practices in water care, the correct disposal of garbage and saving electricity (Díaz et al. 2019). On the other hand, in Hungary, they found that environmental policies implemented in educational institutions were associated with pro-environmental attitudes and behaviors in secondary school students (Mónus 2022).

The present investigation is relevant because it will allow us to know how environmental education has been implemented in educational institutions, it will be possible to assess how the pro-environmental behaviors of students are, and it will determine if both variables are related. In this sense, the findings will allow an objective diagnosis that in turn will serve as an input for the implementation of curricular modifications, teaching-learning strategies and improvement plans to implement a more comprehensive environmental education, articulating theoretical and practical aspects for the solution of environmental problems of the environment.

The objective of this research was to determine if environmental education is related to the pro-environmental behavior of regular basic education students in the Peruvian Amazon.

2. Materials and Methods

The research approach was quantitative, since it was based on numerical measurement, as well as the use of statistics to determine behavior patterns of the participants. Regarding the design, it was not experimental, since the variables environmental education and pro-environmental behavior were not intentionally manipulated, they were only observed. Regarding the scope, it was cross-sectional correlational, since the analysis of the characteristics of the variables was developed, it was determined if both were significantly correlated and because the data collection process was carried out in a single moment, respectively (Hernández and Mendoza 2018).

The population was made up of 1240 students who were in the seventh cycle of regular basic education in 5 public educational institutions in the city of Puerto Maldonado (Peru), while the sample consisted of 293 students, an amount that was determined by simple random probabilistic sampling with a confidence level of 95% and a significance level of 5%. As seen in Table 1, of the total number of participants, 52.6% were men and 47.4% were women. Regarding age, 43.3% were between 15 and 16 years old, 38.3% between 13 and 14 years old and 18.4% between 17 and 18 years old. Regarding the level of studies, 44.4% were in fourth grade, 35.2% in third grade and 20.4% in fifth grade.

Table 1. Sociodemographic characteristics of the sample.

Variables	Sociodemographic Characteristics	N = 293	%
Gender	Man	154	52.6
	Female	139	47.4
Age	From 13 to 14 years old	112	38.3
	From 15 to 16 years old	127	43.3
	From 17 to 18 years old	54	18.4
Grade	Third	103	35.2
	Fourth	130	44.4
	Fifth	60	20.4

Data collection took place through the use of a virtual survey structured in Google Forms, which consisted of two sections.

In the first section, the Environmental Education Questionnaire was administered, an instrument originally designed by Cueto (2017) and later adapted by Estrada et al. (2020b). It consists of 20 Likert-type items with 5 points ranging from 1 (never) to 5 (always) and evaluates 3 dimensions: cognitive aspect (items 1 to 9), affective aspect (items 10 to 15) and behavioral aspect (items from 16 to 20). In a previous investigation carried out in Peru, they found that the questionnaire had adequate content validity (Aiken's $V = 0.892$) and reliability ($\alpha = 0.787$).

In the second section, the Environmental Behavior Questionnaire was administered, an instrument originally designed by Álvarez et al. (2018) and later adapted by Estrada et al. (2020c). It consists of 11 Likert-type items with 5 points ranging from 1 (never) to 5 (always) and evaluates 3 dimensions: recycling and reuse (items 1 to 4), saving resources (items 5 to 8) and purchasing environmental (items 9 to 11). In a previous investigation carried out in Peru, they found that the questionnaire had adequate content validity (Aiken's $V = 0.829$) and reliability ($\alpha = 0.816$).

For data collection, authorizations were obtained from the management teams of the educational institutions focused on this research. Afterwards, the parents were contacted via WhatsApp to specify the purpose of the research and request their consent for their children to participate. Subsequently, the instruments were applied virtually during the month of December of the year 2022, an activity that lasted approximately 15 min. Finally, a database was created with the responses of the students.

Regarding the statistical analysis, it was given in a descriptive and inferential way. The descriptive analysis was carried out through the use of figures that were obtained through the use of the SPSS V.25 Software. In the same way, the chi-squared test (X^2) was used to find out if the variables were associated with the gender, age and educational grade of the students. On the other hand, the inferential results were obtained by using Pearson correlation coefficient (r). This statistic was important to determine if the variables and dimensions were significantly related ($p < 0.05$). Finally, a multiple linear regression analysis was performed to determine if the environmental education variable and the cognitive, affective and behavioral dimensions predicted pro-environmental behavior.

Regarding ethical aspects, it was endorsed by the institutional ethics committee. Likewise, it should be specified that the students were informed about the purpose and nature of the research and provided their informed consent, guaranteeing the anonymous and voluntary nature of their participation at all times.

3. Results

Figure 1 shows that 44.7% of the students perceived that the way in which environmental education was being implemented in the institutions was partially adequate, 36.9% considered that it was adequate and 18.4% indicated that it was inadequate. When analyzing the dimensions of cognitive, affective and behavioral aspects, it is observed that all of them were also valued as partially adequate.

According to Figure 2, the pro-environmental behavior of 42% of the students was unusual, 34.5% was habitual and 23.5% was not habitual. When analyzing the recycling and reuse, resource saving and environmental purchasing dimensions, it can be seen that all of them were also valued as unusual.

Table 2 shows that the perception of environmental education was not associated with any sociodemographic variable ($p > 0.05$). In this sense, it is observed that all the groups analyzed presented a similar perception, which was partially adequate.

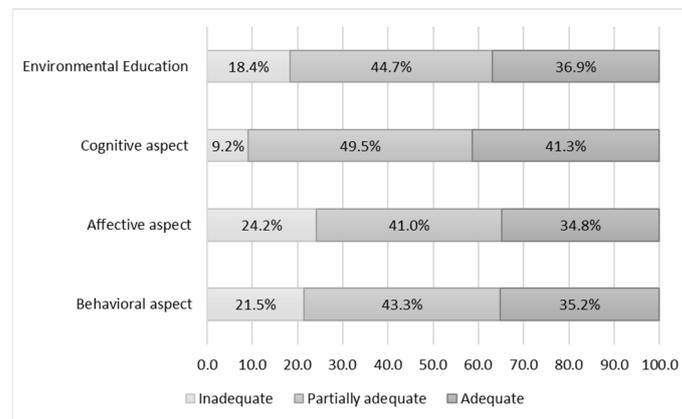


Figure 1. Descriptive results of the environmental education variable.

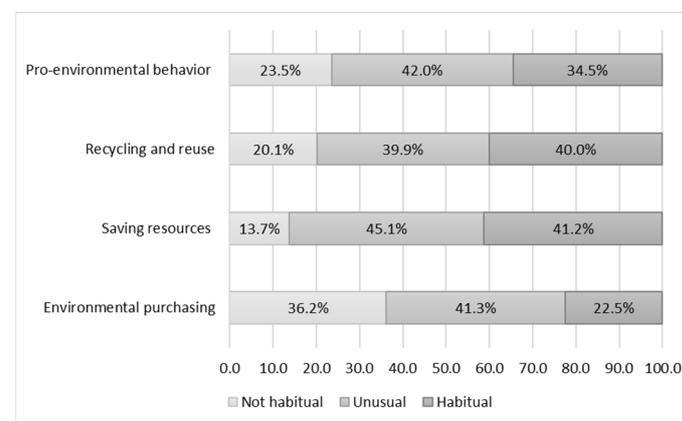


Figure 2. Descriptive results of the pro-environmental behavior variable.

Table 2. Association between environmental education and sociodemographic variables.

Sociodemographic Variables		Environmental Education			p
		Inadequate	Partially Adequate	Adequate	
Gender	Man	28 (18.2%)	71 (46.1%)	55 (35.7%)	0.060
	Female	26 (18.7%)	60 (43.2%)	53 (38.1%)	
Age	From 13 to 14 years old	21 (18.8%)	48 (42.9%)	43 (38.3%)	0.092
	From 15 to 16 years old	23 (18.1%)	56 (44.1%)	48 (37.8%)	
	From 17 to 18 years old	10 (18.5%)	23 (42.6%)	21 (38.9%)	
Grade	Third	19 (18.4%)	47 (45.6%)	37 (35.9%)	0.055
	Fourth	24 (18.5%)	61 (46.9%)	45 (34.6%)	
	Fifth	11 (18.3%)	29 (48.4%)	20 (33.3%)	

Table 3 shows that pro-environmental behavior was only significantly associated with the gender of the participants ($p < 0.05$). In this sense, it is observed that women put pro-environmental behaviors into practice more regularly than men.

In Table 4, it was determined that the Pearson correlation coefficient between environmental education and pro-environmental behavior was 0.877 ($p < 0.05$). Significant correlations were also reported between environmental education and the dimensions recycling and reuse ($r = 0.863$; $p < 0.05$), saving resources ($r = 0.889$; $p < 0.05$) and environmental purchasing ($r = 0.894$; $p < 0.05$). In the same way, significant correlations were found between pro-environmental behavior and the dimensions cognitive aspect ($r = 0.799$; $p < 0.05$), affective aspect ($r = 0.798$; $p < 0.05$) and environmental purchase ($r = 0.737$; $p < 0.05$).

Table 3. Association between pro-environmental behavior and sociodemographic variables.

Sociodemographic Variables		Pro-Environmental Behavior			<i>p</i>
		Not Habitual	Unusual	Habitual	
Gender	Man	44 (28.6%)	63 (40.9%)	47 (30.5%)	0.012 *
	Female	25 (18.0%)	60 (43.2%)	54 (38.8%)	
Age	From 13 to 14 years old	26 (23.2%)	48 (42.9%)	38 (33.9%)	0.081
	From 15 to 16 years old	28 (22.0%)	55 (43.3%)	44 (34.7%)	
	From 17 to 18 years old	14 (25.9%)	21 (38.9%)	19 (35.2%)	
Grade	Third	25 (24.3%)	43 (41.7%)	35 (34.0%)	0.059
	Fourth	29 (22.3%)	57 (43.9%)	44 (33.8%)	
	Fifth	15 (25.0%)	23 (38.3%)	22 (36.7%)	

* Statistically significant association.

Table 4. Correlation matrix between variables and dimensions.

Variables and Dimensions	1	2	3	4	5	6	7	8
1. Environmental education	1							
2. Cognitive aspect	0.893 *	1						
3. Affective aspect	0.892 *	0.835 *	1					
4. Behavioral aspect	0.879 *	0.812 *	0.803 *	1				
5. Pro-environmental behavior	0.877 *	0.799 *	0.798 *	0.737 *	1			
6. Recycling and reuse	0.863 *	0.811 *	0.760 *	0.762 *	0.915 *	1		
7. Resource saving	0.889 *	0.764 *	0.773 *	0.740 *	0.920 *	0.879 *	1	
8. Environmental purchasing	0.894 *	0.752 *	0.763 *	0.768 *	0.900 *	0.855 *	0.894 *	1

* The correlation is significant at the 0.01 level (bilateral).

Table 5 shows the multiple correlation coefficient (*R*), the coefficient of determination (R^2), the adjusted coefficient of determination, the standard error of estimate (*SE*), and the *F*-value from the ANOVA statistical test. It can be observed that the adjusted coefficient of determination R^2 was 0.470, which means that the environmental education variable and the cognitive, affective, and behavioral dimensions explain 47% of the total variance in the pro-environmental behavior variable. As is known, when the coefficient of determination is higher, its explanatory power of the regression equation is greater and has a greater predictive power on the dependent variable. On the other hand, the *F*-value was 72.942 and was significant ($p < 0.05$), indicating a linear relationship between the environmental education, cognitive, affective, and behavioral aspects (predictor variables) and the pro-environmental behavior (dependent variable).

Table 5. Multiple correlation coefficient *R*, R^2 , adjusted R^2 , standard error, and *F*-value.

Model	<i>R</i>	R^2	Adjusted R^2	<i>SE</i>	<i>F</i>	<i>Sig.</i>
1	0.689 ^a	0.475	0.470	0.191	72.942	0.000 ^b

^a Predictors: (Constant), Environmental education, cognitive aspect, affective aspect, behavioral aspect. ^b Dependent variable: Pro-environmental behavior.

In Table 6, multiple linear regression analysis was performed using the stepwise method. Pro-environmental behavior was included as the dependent variable, and environmental education, cognitive, affective and behavioral aspects were included as independent or predictor variables. Likewise, the Table 6 shows the non-standardized regression coefficients (*B*), standardized regression coefficients (β), and statistical coefficients related to the predictive variables. The β coefficients show that environmental education ($\beta = 0.298$), cognitive aspect ($\beta = 0.202$), affective aspect ($\beta = 0.309$) and behavioral aspect ($\beta = 0.376$) significantly predict students' pro-environmental behavior. Additionally, the *t*-value of the

beta regression coefficients for all predictor variables was found to be statistically significant ($p < 0.05$).

Table 6. Predictors of pro-environmental behavior.

Predictors	B	SE	β	T	Sig.
(Constant)	1.751	0.277		2.342	0.000
Environmental education	0.214	0.124	0.298	1.914	0.001
Cognitive aspect	0.198	0.034	0.202	5.127	0.000
Affective aspect	0.185	0.016	0.309	3.583	0.000
Behavioral aspect	0.168	0.052	0.376	7.740	0.000

Dependent variable: Pro-environmental behavior.

4. Discussion

In recent years, mankind is witnessing a series of environmental problems such as pollution, climate change and the loss of biodiversity. Given this adverse context, the need arises to implement environmental education through the development of attitudes, values, knowledge, dispositions and skills to undertake pro-environmental actions. In this sense, the present investigation sought to determine if environmental education is related to the pro-environmental behavior of regular basic education students in the Peruvian Amazon.

It was found that the students were characterized by perceiving that the way in which environmental education was being implemented in the institutions was partially adequate. The foregoing indicates that there are some limitations during the teaching–learning process that causes education to focus on theoretical domains, classes are not always active or participatory, teamwork is rarely encouraged for research to elicit creativity that students have. This would be hindering the development of environmental awareness and the search for sustainable development in them, since it contravenes the principles of effective environmental education, which must be focused on critical and reflective pedagogy and, above all, must be given in an active and experiential way, thus promoting the solution of environmental problems that affect the environment (Mamani et al. 2020).

The exposed result coincides with the findings of Estrada et al. (2020b), who analyzed the perception of Peruvian secondary school students about virtual education and found that it was moderately favorable. In other words, there were some deficiencies during its implementation, such as the prioritization of theoretical aspects and the little importance they gave it to the practical aspect. Likewise, it is related to what was reported by Pizango (2022), who determined that 47.7% of students perceived that the environmental education they received was regular, which meant that the educational institution was not working transversally on the environmental approach to cognitively, affectively and behaviorally develop actions that contribute to environmental conservation.

Nowadays, environmental education arises due to the urgent need for ecological awareness and responsibility to more effectively promote the recovery and regeneration of the natural environment, overcoming the adverse effects of human activities during the last few decades. Under this premise, it seeks to provide theoretical and practical activities to improve social commitment, minimize the environmental impacts of human actions, and increase civil responsibilities over nature and environmental policies (Ardoin et al. 2020). Consequently, a successful implementation could improve the quality of life and well-being of humans and other species, as well as the natural environment (Zilli et al. 2022).

On the other hand, it was found that the pro-environmental behavior of the students was unusual, a situation that indicates that the students rarely chose to recycle, classify the garbage and reuse products that they used daily to avoid environmental contamination. In the same way, they were not used to consciously using the resources available in society, such as electricity or water. Likewise, when they made their purchases, they seldom checked whether the products or services they were going to purchase came from recycling or followed processes that involved a lower level of pollution or energy consumption.

The previously described finding is consistent with that reported by [Mamani et al. \(2020\)](#), who determined that Peruvian students in regular basic education had behaviors of indifference towards the environment and its conservation, which translated into a lack of interest in promoting the preservation of natural and environmental resources, as well as promoting sustainable use of them and the reduction of environmental pollution. In the same way, also in Peru, they reported that pro-environmental behavior in students was located at the medium level, which indicated that on certain occasions they carried out actions to favor the care and conservation of the environment ([Olivera et al. 2021](#)).

Pro-environmental behavior is considered to be complex and is determined by various factors. Therefore, the theory of planned behavior and the theory of value-belief-norm are considered to predict said behavior ([Ahmat Zainuri et al. 2022](#)). According to the theory of planned behavior, intention is a prominent factor in predicting pro-environmental behavior ([Ajzen 2005](#)). Intention can be predicted from attitudes toward behavior, subjective norms and perceived behavioral control. On the other hand, the value-belief-norm theory holds that values influence pro-environmental behavior through pro-environmental beliefs and personal norms. This means that people engage in pro-environmental behaviors because they believe and are aware of the repercussions of environmental problems for themselves, other people and nature ([Stern 2000](#)).

It was also found that women engaged in pro-environmental behaviors more regularly than men. In this regard, there are some positions that support the existence of a greater practice and sustainable behaviors in women compared to men. According to [Mamani et al. \(2020\)](#), there are certain prejudices adopted by men, who point out that environmental concern and care are actions of women. On the other hand, [Casaló and Escario \(2018\)](#) affirm that there are cultural differences in terms of socialization, roles and personality traits between men and women. In this sense, women naturally develop greater emotional empathy, caring for others, greater social and environmental responsibility, as well as altruism compared to men.

A relevant finding indicates that there is a direct and significant relationship between environmental education and the pro-environmental behavior of regular basic education students in the Peruvian Amazon. The Pearson correlation coefficient between both variables was 0.877 ($p < 0.05$). This implies that as soon as environmental education is implemented coherently and successfully in educational institutions, pro-environmental behaviors of students will be more common. However, if environmental education is based on theoretical aspects and is only addressed to comply with the curricular programming, it will not be possible to transmit knowledge, attitudes, nor will pro-environmental behaviors and practices be consolidated.

The exposed result converges with what was reported in Mexico, where they found that there was a direct and significant relationship between the teaching practice in environmental education and the pro-environmental skills of the students, which means that adequate environmental education is related to adequate care practices of water, the correct disposal of garbage and the saving of electrical energy ([Díaz et al. 2019](#)). Similarly, it is related to research carried out in Hungary, where they found that environmental policies implemented in educational institutions were associated with pro-environmental attitudes and behaviors in secondary school students ([Mónus 2022](#)).

Currently, it is imperative that educational institutions promote the willingness of students to act individually or collectively in favor of sustainability and promote solutions to environmental problems in their environment, which could well be achieved thanks to environmental education, either from their homes or in each of the educational spaces ([Franco et al. 2017](#)). On the other hand, [Torres and García \(2021\)](#) consider that in order to achieve the objectives of sustainable development, it is necessary to implement ecological actions, such as highlighting the complexity of different environmental problems, developing critical analytical thinking skills and abilities to solve different environmental problems, addressing the environmental aspect in a transversal way and promoting values related to environmental care, protection and sustainability at all levels.

On the other hand, teachers should promote the environmental and scientific literacy of students from an early age for a better understanding of environmental problems and guide the realization of alternative solutions. In addition, the Ministry of Education must promote the development of curricular and extracurricular activities to involve the educational community in the execution of environmental practices.

This research addresses topics that are currently of interest and, in the Peruvian context, have been little studied, which are aspects that increase its relevance. However, it is necessary to specify some limitations. Firstly, the sample size is relatively small, and it is also homogeneous, which implies caution when interpreting the results. Second, the findings are based entirely on data obtained from student self-administered instruments, which could have led to subjective judgments. In this order of ideas, it is expected that in future research the sample size will be increased, including students of diverse sociocultural characteristics, and that data collection instruments will be used to complement those applied to give greater objectivity to the aforementioned process.

5. Conclusions

Environmental education represents an approach that aims to create an environmentally literate citizenry to address the sustainability of the environment and resources. Through the development of attitudes, values, knowledge, dispositions and skills to undertake pro-environmental actions, environmental education encourages commitment to improve the sustainability of human–nature interactions over time.

In this sense, in the present investigation, it was identified that the students were characterized by perceiving that the way in which environmental education was implemented in educational institutions was partially adequate. Similarly, pro-environmental behavior was found to be unusual. On the other hand, it was determined that there is a direct and significant relationship between environmental education and the pro-environmental behavior of regular basic education students in the Peruvian Amazon.

Based on the above, suggestions are made from both teacher professional development and curriculum levels. From the perspective of teacher professional development, their pedagogical, didactic and methodological competencies should be strengthened to redirect activities and strategies that allow for improved implementation of environmental education within and outside educational institutions. Regarding the curriculum perspective, it is suggested that environmental education be implemented in the curriculum at all levels of education, from early childhood education to higher education. This way, environmental values will be promoted from an early age, which will help to form more responsible and committed citizens towards environmental conservation. Additionally, teachers need to develop environmental topics in a cross-cutting manner, meaning that it should not only involve theoretical aspects but also practical aspects to better understand environmental problems and seek solutions. Finally, environmental practices must be planned and executed, both within and outside educational institutions, which should be associated with the achievement of sustainable development goals, specifically those related to environmental conservation.

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