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RESEARCH ARTICLE

Environmental Awareness in Action: The Effect of the 'Guardians of the Planet' Program on Primary Students in Lima

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ABSTRACT

This study examines the effectiveness of the "Guardians of the Planet" educational program in fostering environmental awareness among fifth-cycle primary students in Lima, Peru. The research applied a quasi-experimental design, with a sample of 80 students divided into experimental and control groups. The program focused on the cognitive, affective, conative, and active dimensions of environmental awareness. Pre-tests and post-tests were administered to both groups, and results were analyzed using Student's t-test. The findings revealed a significant improvement in the environmental awareness of students in the experimental group, who progressed from low to high levels of awareness, in contrast to the control group, where minimal changes were observed. The program's success is attributed to its emphasis on procedural learning, which enabled students to not only understand environmental challenges but also adopt pro-environmental attitudes and behaviors. These findings suggest the need for educational models that go beyond traditional methods and prioritize hands-on, action-based learning.

INTRODUCTION

The development and evolution of human activities have taken a direction that is increasingly detrimental to environmental sustainability. Various studies, such as those by Panizzut et al. (2021) and Donmez-Turan and Kiliclar (2021), confirm the establishment of a consumerist culture focused on meeting the growing demands of society with little regard for the collateral effects of such behavior. Multiple researchers, including Lara and Collin (2007), Farias and Farias (2010), and Rodríguez (2012), had already warned about the dangers of excessive resource use and waste production, direct consequences of human interaction with the environment. Unfortunately, these warnings had little impact on societal awareness. When the United Nations Educational, Scientific, and Cultural Organization (UNESCO) introduced the concept of environmental education (UNESCO, 2003), numerous initiatives and movements aimed at improving the environmental situation emerged.

In this regard, it is crucial for educational efforts to focus on achieving increasingly significant and far-reaching environmental goals, ultimately instilling and consolidating environmental awareness in students. However, the current educational system's competency-based approach tends to prioritize declarative or conceptual content over procedural and attitudinal knowledge, leading to deficiencies in the acquisition of habits and in students' ability to respond to situations requiring quick, practical, and reflective actions (Montesdeoca et al., 2021; Juárez et al., 2022). In Peru, Bravo (2015), and De la Cruz and Medina (2022) highlight the need to cultivate environmental awareness from an early age to foster future generations committed to environmental care and preservation.

For some time, there has been growing concern about how schools address environmental issues and the limited awareness students acquire. In its 76th session, the United Nations confirmed that actions promoting a healthy and sustainable environment remain insufficient. Consequently, it is essential to intensify educational systems internationally, nationally, and organizationally to foster environmental preservation and sustainability in future generations (UN, 2022).

A study conducted by the United Nations Environment Programme (UNEP) for the 1970–2018 period shows a tripling in global resource consumption and a 45% increase in fossil fuel usage, with alarming side effects such as water and soil degradation and a 90% biodiversity loss (UNEP, 2019). In Peru, the 2020 edition of the National Institute of Statistics and Informatics (INEI) Environmental Statistics Yearbook explicitly stresses the importance of developing and consolidating environmental awareness as a means for humanity to coexist harmoniously with ecosystems in a shared environment (INEI, 2020). Reports by the Ministry of the Environment (2014) and the Ministry of Education (2016) also emphasize the need to establish educational actions aimed at transforming how citizens think and act regarding current environmental challenges.

In recent years, educational policies in Peru have focused on improving outcomes towards the ideal of quality education. However, the approach prioritizes conceptual content, seeking measurable results through national school assessments (UM). The results of the 2022 assessment reveal a significant decline in the Science and Technology area, which includes competencies for healthy living and sustainable environmental practices (MINEDU, 2023). It is evident that primary school students lack pro-environmental attitudes, with insufficient rationalization and awareness of current environmental issues. According to Tian and Liu (2022), this reflects a deficiency in environmental consciousness.

The "Guardians of the Planet" educational program was created in response to the lack of attention given to procedural learning in the development of environmental awareness, even though it can act as a facilitator of such awareness by addressing practical operations, methods, techniques, strategies, procedures, and skills (Silber-Varod et al., 2019). This program aims to foster integral environmental awareness through 14 structured learning sessions, during which students develop each dimension of environmental awareness: cognitive, affective, conative, and active (De la Cruz & Medina, 2021).

Recent studies, such as those by Díaz (2021), Hurrell (2021), and Araya-Crisóstomo and Urrutia (2022), demonstrate that procedural learning positively impacts the educational process and that "knowing how" facilitates the acquisition of knowledge and positive habits in students. Accordingly, the "Guardians of the Planet" educational program uses pedagogical and didactic tools focused on procedural skills to ensure the flourishing, growth, and consolidation of environmental awareness among students, employing practical and reflective strategies that mirror their daily lives (Juárez et al., 2022).

Through practical learning and flexible, creative strategies, students acquire, internalize, and apply knowledge regarding various pro-environmental skills and tasks, ranging from simple everyday actions to more significant endeavors (Espinar & Vigueras, 2020). The potential of this type of learning lies in its ability to help students comprehend and navigate both theoretical and real-life contexts (Fontanilla & Mercado, 2021).

In this context, it is essential to implement these initiatives in Peru, particularly with primary school students, to ensure that they develop a proactive environmental awareness from an early age. This awareness should foster a commitment to incorporating environmental considerations into all decisions, no matter how small or routine (Martínez, 2023). Therefore, the main objective of this study is to determine the effect of implementing the "Guardians of the Planet" educational program on the environmental awareness of primary school students in an educational institution in Lima, Peru. This general objective is complemented by specific objectives, which include demonstrating the program's effect on the active, conative, affective, and cognitive dimensions of environmental awareness in these students.

METHODOLOGY

2.1 Research Design

2.1.1 Research Paradigm

This study is grounded in the positivist paradigm, which is appropriate for research that seeks objective, measurable outcomes (Villegas et al., 2021). The positivist approach focuses on collecting empirical data, allowing the researcher to analyze the effects of specific variables quantitatively.

2.1.2 Type of Study

The research is classified as applied, as it seeks to address a specific real-world problem—namely, the development of environmental awareness in students through the "Guardians of the Planet" educational program (Arias et al., 2022). Additionally, the quasi-experimental design was chosen because it allows for the evaluation of how manipulating an independent variable (the educational program) affects a dependent variable (students' environmental awareness) (Benmarhnia & Fuller, 2020).

2.2 Study Population

2.2.1 Population and Sample

The study involved 80 students enrolled in the fifth cycle of primary education at an urban school in Lima, Peru. The students were divided into two groups: an experimental group that received the intervention (the educational program) and a control group that did not. The groups were selected based on their similarity in terms of age, academic level, and socioeconomic background, ensuring comparability between the groups for accurate measurement of the program's effects (Gopalan et al., 2020).

2.2.2 Sampling Method

A non-probability convenience sampling method was employed to select the participants, as the study required specific access to students within a particular educational context (Banda et al., 2023). This method is appropriate for applied studies that seek to solve practical issues within a defined population.

2.3 Instrument

2.3.1 Validation of the Instrument

A 20-item questionnaire was used to measure the development of environmental awareness, structured on a Likert scale with four response options (0 = Never, 1 = Sometimes, 2 = Frequently, 3 = Always). The instrument was validated through expert judgment, as suggested by Pasman and Rogers (2020). Experts in environmental education reviewed the items for clarity, coherence, and relevance. The results of their evaluations were quantified using Aiken's V, ensuring that the instrument reliably measures the intended construct.

2.3.2 Reliability of the Instrument

The reliability of the questionnaire was assessed using Cronbach’s alpha. A pilot test was conducted in December 2023 with a group of 20 students from a different urban school in Lima. The pilot study results indicated a high internal consistency, with a Cronbach’s alpha coefficient of 0.921, ensuring that the instrument is reliable and consistently measures environmental awareness (Amirrudin et al., 2021).

2.4 Data Collection Procedure

2.4.1 Ethical Considerations

Prior to data collection, permission was obtained from the educational institution, and informed consent was secured from the parents of all participating students. Ethical guidelines were followed to ensure confidentiality and voluntary participation. These considerations align with the recommendations of the Declaration of Helsinki for educational research (Villaruel, 2021).

2.4.2 Data Collection Process

The data collection process began with administering a pre-test to both the control and experimental groups to establish baseline levels of environmental awareness. Over the course of several weeks, the experimental group participated in the "Guardians of the Planet" educational program, while the control group continued with their standard curriculum. After the intervention, a post-test was administered to both groups to assess any changes in environmental awareness.

2.5 Data Analysis

2.5.1 Descriptive Statistics

Descriptive statistics were used to summarize the data collected from the pre-test and post-test. Measures of central tendency (mean, median) and variability (standard deviation) were calculated for each group to provide a general overview of the environmental awareness levels before and after the intervention (Banda et al., 2023).

2.5.2 Inferential Statistics

To test the study's hypotheses, inferential statistics were employed. Specifically, the t-test for paired samples was used to compare the pre-test and post-test results within each group, assessing whether there was a statistically significant change in environmental awareness. Additionally, an independent t-test was applied to compare the post-test results between the control and experimental groups, determining whether the program had a significant effect on the experimental group's awareness compared to the control group (Shahnazi et al., 2021).

2.5.3 Normality Test

The Shapiro-Wilk test was used to assess the normality of the data distribution before conducting the t-test. This test was chosen because it is recognized as one of the most reliable for small sample sizes (Gandica de Roa, 2020). The results indicated that the data followed a normal distribution, validating the use of parametric tests like the t-test.

2.5.4 Hypothesis Testing

The analysis aimed to determine if the "Guardians of the Planet" program had a significant impact on students' environmental awareness. The null hypothesis stated that there would be no difference in awareness levels between the experimental and control groups. If the t-test results showed a significant difference at the 0.05 significance level, the null hypothesis was rejected, confirming the program's effectiveness in enhancing environmental awareness (Benmarhnia & Fuller, 2020).

Table 1. Items included in the test to measure the level of environmental awareness development

Ítem	Statement
1	I can recognize the different factors in my environment that contribute to environmental degradation.
2	When observing the current environmental situation, I believe I have enough knowledge to address it.
3	I use digital media to stay informed about different ways to preserve the environment.
4	I am interested in knowing the existing environmental policies in my surroundings and their application.
5	When the teacher introduces a new environmental topic in class, it encourages me to investigate further.
6	I perceive planet Earth as my home.
7	I think that if we are not careful with our daily actions, we can end up harming the planet.

8	I feel that environmental degradation is one of the world's main problems.
9	I believe I should think carefully about my actions to avoid disturbing the balance of nature.
10	When I see an environmental problem, I look for practical solutions.
11	I evaluate my daily actions to ensure I do not harm the environment.
12	I feel it is important for the school to provide us with environmental education.
13	I perceive that my teachers' level of environmental commitment influences us as students.
14	I believe the school should include more practical activities to help us understand environmental dynamics.
15	I think that as students, we could propose initiatives to protect the environment.
16	I volunteer in school environmental preservation campaigns.
17	I only use artificial light when there is not enough natural light.
18	I use water rationally, avoiding waste.
19	I reuse paper whenever possible.
20	I give a second use to materials already employed at school and/or home.

Source: Own elaboration

2.6. Data Collection and Analysis Procedure

To obtain the necessary data for this study, which aimed to determine whether the "Guardians of the Planet" educational program developed environmental awareness among primary school students, several initial steps were followed. These included obtaining authorization from the educational institution to conduct the research and securing informed consent from the parents of the participating students. After completing these preliminary steps, the control and experimental groups were initially assessed using the instrument.

Next, the learning sessions that make up the "Guardians of the Planet" program were conducted with the experimental group. Upon completion of these sessions, the post-test was administered to both groups. The pre-test and post-test results were statistically compared to accept or reject the research hypotheses and draw conclusions.

Given the applied and quasi-experimental nature of the study, which allows for intervention in a problematic reality to correct it (Banda et al., 2023), a combination of descriptive and inferential statistical analysis was employed. The goal was to determine the influence of the independent variable on the dependent variable. Data were collected from the final sample and consolidated into a database for statistical analysis. Inferential statistics were used for both the pre-test and post-test, with the Shapiro-Wilk normality test employed to avoid biases in the research. As Gandica de Roa (2020) states, the Shapiro-Wilk test is considered the most reliable and robust for small sample sizes. Consequently, Student's t-test was applied to compare the results.

RESULTS

Table 2. Description of the environmental awareness variable in fifth cycle primary education students

		Control Group				**Experimental Group**			
		Pre test		Post test		Pre test		Post test	
Level of E.A.	**Ptjes.**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**
Very Good	48 – 60	-	-	-	-	-	-	28	70
Good	36 – 47	-	-	-	-	-	-	12	30
Moderate	24 – 35	-	-	-	-	-	-	-	-
Weak	12 – 23	27	67,5	32	80	19	47,5	-	-
Scarce or None	0 – 11	13	32,5	8	20	21	52,5	-	-
Total		**40**	**100**	**40**	**100**	**40**	**100**	**40**	**100**

In Table 2, we can observe that although there are variations in the control group regarding the level of environmental awareness, their responses remain within the scarce and weak levels when comparing the pre-test and post-test. In contrast, the experimental group shows clear improvements in environmental awareness. Comparing the pre-test and post-test results, it is evident that all students now demonstrate good and very good levels of environmental awareness, at 30% and 70%, respectively.

In summary, when contrasting the results obtained regarding the development of environmental awareness in fifth-cycle primary students at an educational institution, significant improvements were observed in the experimental group. The students progressed from scarce and weak levels to good and very good levels. Based on this information, we proceeded to test the hypothesis that the application of the "Guardians of the Planet" educational program significantly develops environmental awareness in primary school students at an educational institution, using the t-test for Student. The results are shown in Table 3.

Table 3. Student's t-test to test the hypothesis

STUDENT'S T-TEST						
	Test Value = 90					
	t	**Gl**	**Sig. (2-tailed)**	**Mean Difference**	**95% Confidence Interval of the Difference**	
					Lower	**Upper**
Guardians of the Planet Educational Program	-9,57	112,34	0,000	1,00	-9,84	-1,56
Students' Environmental Awareness	-9,57	112,345	0,000	1,00	-9,84	-1,56

Source: Data obtained from SPSS ver. 29.0

Based on the results shown in Table 3, which are lower than 0.05, it is concluded that the application of the "Guardians of the Planet" educational program significantly develops the environmental awareness of primary school students at an educational institution.

Regarding the results obtained in the four dimensions representing environmental awareness, a similar process was carried out, with the results detailed in Tables 4, 5, 6, and 7.

Table 4. Description of the cognitive dimension of environmental awareness in fifth-cycle primary education students

		Control Group				**Experimental Group**			
		Pre test		Post test		Pre test		Post test	
Cognitive Dimension	**Scores**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**
Very Good	12 – 15	-	-	-	-	-	-	30	75
Good	9 – 11	-	-	-	-	-	-	10	25
Moderate	6 – 8	-	-	-	-	-	-	-	-
Weak	3 – 5	32	80	33	82,5	20	50	-	-
Scarce or None	0 – 2	8	20	7	17,5	20	50	-	-
Total		**40**	**100**	**40**	**100**	**40**	**100**	**40**	**100**

Source: Own elaboration

Table 5. Description of the affective dimension of environmental awareness in fifth-cycle primary education students

	Control Group		**Experimental Group**	
	Pre test	Post test	Pre test	Post test

Affective Dimension	**Scores**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**
Very Good	12 – 15	-	-	-	-	-	-	28	70
Good	9 – 11	-	-	-	-	-	-	12	30
Moderate	6 – 8	-	-	-	-	-	-	-	-
Weak	3 – 5	29	72,5	31	77,5	18	45	-	-
Scarce or None	0 – 2	11	27,5	9	22,5	22	55	-	-
Total		**40**	**100**	**40**	**100**	**40**	**100**	**40**	**100**

Source: Own elaboration

Table 6. Description of the conative dimension of environmental awareness in fifth-cycle primary education students

		Control Group				**Experimental Group**			
		Pre test		Post test		Pre test		Post test	
Conative Dimension	**Ptjes.**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**
Very Good	12 – 15	-	-	-	-	-	-	30	75
Good	9 – 11	-	-	-	-	-	-	10	25
Moderate	6 – 8	-	-	-	-	-	-	-	-
Weak	3 – 5	26	65	30	75	18	45	-	-
Scarce or None	0 – 2	14	35	10	25	22	55	-	-
Total		**40**	**100**	**40**	**100**	**40**	**100**	**40**	**100**

Source: Own elaboration

Table 7. Description of the active dimension of environmental awareness in fifth-cycle primary education students

		Grupo Control				**Grupo Experimental**			
		Pre test		Post test		Pre test		Post test	
Active Dimension	**Ptjes.**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**	**Fi**	**%**
Very Good	12 – 15	-	-	-	-	-	-	28	70
Good	9 – 11	-	-	-	-	-	-	12	30
Moderate	6 – 8	-	-	-	-	-	-	-	-
Weak	3 – 5	27	67,5	31	77,5	19	47,5	-	-
Scarce or None	0 – 2	13	32,5	9	22,5	21	52,5	-	-
Total		**40**	**100**	**40**	**100**	**40**	**100**	**40**	**100**

Source: Own elaboration

With these data, derived from each dimension of environmental awareness, the specific hypotheses were contrasted to verify that the application of the "Guardians of the Planet" educational program significantly develops the cognitive, affective, conative, and active dimensions of environmental awareness in fifth-cycle primary school students at an educational institution. Since all results were lower than 0.05, it was confirmed that the program significantly develops all dimensions of environmental awareness in primary school students.

DISCUSSION AND CONCLUSIONS

The development and consolidation of environmental awareness in society has become a social necessity, as it is the fundamental pillar for acquiring pro-environmental attitudes that enable the sustainability and preservation of the environment (UNESCO, 2023; UN, 2022; MINAM, 2014; MINEDU, 2016). However, as noted in the research of Bravo (2015) and De la Cruz and Molina (2022), in the Latin American context, particularly in Peru, there is insufficient development of environmental awareness, leading to a lack of pro-environmental attitudes. This situation arises due to the absence of educational programs specifically designed to foster environmental awareness (Montesdeoca et al., 2021; Juarez et al., 2022). These conclusions align with observations from various European contexts, where the integration of environmental issues into educational systems has proven effective in fostering the acquisition of pro-environmental competencies, knowledge, capacities, and attitudes (Pont-Niclòs et al., 2024). Ultimately, this integration is a key factor in achieving sustainability, a goal that promotes planetary health (Bianchi et al., 2022).

Within this framework, the study focused on the pro-environmental attitudes of primary school students, which are derived from their level of awareness and sensitivity toward environmental issues (Tian & Liu, 2022). Although the study has certain limitations, such as the restricted sample size—indicating the need to expand the study to include more educational institutions in both rural and urban areas—and some limitations of the questionnaire used (Toma, 2021), the results are valid for the subjects studied. Additionally, the findings indicate that primary school students, in general, exhibit an incipient level of environmental awareness, which aligns with results reported in the literature by Silber-Varod et al. (2019) and Martínez (2023).

Considering the results of the "Guardians of the Planet" educational program, which focused on the cognitive, affective, conative, and active dimensions of environmental awareness in primary school students in Lima, Peru, it becomes clear that students were able to recognize the current state of the environment and potential future scenarios they may face. They perceived the surrounding environment as the place where they would grow and develop, developed efficient and effective response mechanisms to various environmental challenges, and adopted automatic and autonomous habits that facilitated the preservation and care of the environment. By prioritizing the procedural level of learning, the program enabled students to understand and internalize environmental issues, share their knowledge with peers, make informed decisions, and act independently and confidently when faced with a situation requiring a pro-environmental response. These findings are closely aligned with previous research by Fontanilla and Mercado (2021) and Espinar and Vigueras (2020).

As demonstrated, there is strong convergence with various prior studies that highlight the need to consolidate environmental awareness through structured educational models for children from an early age. The "Guardians of the Planet" educational program was structured to achieve the overarching goal of developing and consolidating environmental awareness, but in a more efficient and effective way. This aligns with the recommendations of Díaz (2021), Hurrell (2021), and Araya-Crisóstomo and Urrutia (2022), who suggested that to achieve better results in the teaching-learning process, it is necessary to move beyond traditional models that prioritize declarative knowledge and are still replicated today. Instead, there is a need to adopt a model that prioritizes procedural learning, transitioning from knowing what to knowing how. The success of the program is evidenced by the irrefutable post-test results, indicating a complete alignment with the criteria set by these authors.

5. **CONCLUSION**

The findings of this study demonstrate that the application of the "Guardians of the Planet" educational program significantly developed the environmental awareness of primary school students in Lima, Peru. The program effectively addressed the cognitive, affective, conative, and active dimensions of environmental awareness, resulting in students who are better equipped to identify and address environmental issues. They acquired critical knowledge about their surrounding environment, developed a sense of responsibility, and demonstrated improved problem-solving abilities related to environmental

challenges. Moreover, they internalized pro-environmental habits and attitudes, essential for ensuring long-term sustainability.

The success of this educational program lies in its emphasis on procedural learning, which empowered students not only to understand environmental issues but to act upon them. This shift from passive learning to active engagement is critical in fostering a deep, lasting awareness of environmental responsibilities. The study reinforces the idea that traditional declarative models of education are insufficient for fostering comprehensive environmental awareness and must be complemented by procedural, action-based learning strategies.

Although this study is limited by its sample size and scope, its findings have broad implications for educational policy and curriculum development. Expanding the reach of similar programs to a wider range of schools, both in urban and rural settings, could have significant positive effects on the environmental awareness of students at a national level. The implementation of structured, well-designed educational programs that focus on environmental issues from an early age will be essential in addressing the ongoing global environmental crisis.

The "Guardians of the Planet" program offers a valuable framework for the development of environmental awareness in students, providing a model that can be adapted and implemented in other educational contexts to foster a generation of environmentally conscious citizens. Future research should aim to expand the program's scope and explore its long-term impacts on students' environmental behaviors.

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