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Environmental Education Strategies and the Adoption of Sustainable Attitudes and Behaviors in Students of an Educational Institution

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Abstract

The objective of the study was to demonstrate the effect of environmental education strategies on the adoption of sustainable attitudes and behaviors in students of the "Juan Marino Meza Rosales" Educational Institution of Huánuco. An experimental, prospective and longitudinal design was used with two groups: experimental and control, consisting of 49 students in each group. The environmental education strategy received the experimental group and the usual control information. The instruments used were: an interview guide, scales and questionnaire previously validated. The inferential analysis was performed with Student's t for paired samples; using SPSS V19. The results showed differences between the groups and moments of the study (before and after), observing sustainable behaviors with significantly higher averages in the experimental group (t = -2.67 and p-value = 0.010) with respect to the control (t = 0.52 and p-value = 0.606); they also significantly improved the averages in favorable attitudes towards the environment in this group, (t = -7.22 and p-value = 0.000) with respect to the control (t = 4.24 and p-value = 0.000). The same thing happened in beliefs about the environment (t = -20.42 and p-value = 0.000 and t = -0.68 and p-value = 0.499, respectively). It is concluded that environmental education strategies have an effect on improving sustainable attitudes and behaviors; in the experimental group (t = -13.06 and p-value = 0.000), with respect to the control (t = 2.64 and p-value = 0.011), and between the moments studied (before/after).

Keywords: *Environmental education, sustainable attitudes and behaviors, students, environment.*

INTRODUCTION

In recent decades, the serious environmental problems characterized by the pollution of water, air, soils; desertification, the deterioration of the ozone layer, climate change, among others, have become an issue of great importance for the majority of citizens of the world; they have also been addressed by different specialties and are part of the focus of social discussion throughout the planet not being only the object of study, reflection and exclusivity of the natural sciences1, but of most disciplines of knowledge, given their

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interdisciplinary nature. "Obviously, environmental conservation is the responsibility of all spheres of society."2

Environmental deterioration, in large part, is the result of a development model inspired by the belief in unlimited progress and intensive consumption of resources, based on a conception of nature as a source of raw material.

As a result, globally we can see that forest cover has been reduced between 20% and 50% of its original extension, wetlands have disappeared. About 70% of schools of commercial fish species have been preyed upon; Soil degradation has affected about 66% of the world's total agricultural land. The earth is experiencing the sixth most important species extinction in its history, which is associated with the expansion and development of human beings. Dams and other infrastructure have fragmented about 60% of the world's river systems3, in addition to rapid population growth .

In the case of Peru, environmental problems have estimated that the attitude of exploitation of wood resources in the Peruvian jungle is excessive, which in a few years will begin to cause problems throughout the region4. In the same way, although the National Education System focuses environmental education on all school activities throughout the six years in primary education (especially in the subject of Science and Environment and articulated with the contents of other subjects), behaviors, skills, attitudes and values towards tolerance have not yet been developed. respect, cooperation and responsibility in the face of environmental problems; Proof of this is the lack of a global development plan in environmental education that associates State policies with the development of capacities in environmental care.

In the region and city of Huánuco, environmental pollution is also related to environmental risk behaviors and attitudes, as evidenced by this can be observed an excessive growth of solid waste, water contamination with agrochemicals, solid waste and industrial discharges, soils contaminated with agrochemicals, among others; which merits changes towards sustainable behaviors of the entire population, mainly in students because they are considered potential agents of change5.

In this context, the need arises to apply lifelong learning processes in students of educational institutions; being the strategies of environmental education, which provide concepts and recognition of values to become aware, understand and appreciate the interrelationships between man and his environment, whose objective is to promote attitudes, behaviors, skills, make lifestyles and sustainable experiences, both individually and fundamentally collective, applying alternatives such as energy saving, waste reuse, responsible consumption, among others are relevant to prevent and solve present and future environmental problems6.

Based on what was analyzed, research was developed on the effect of environmental education strategies and the adoption of sustainable attitudes and behaviors in students of the educational institution "Juan Marino Meza Rosales" of Huánuco 2011, which started from the premise established by the United Nations Educational, Scientific and Cultural Organization (UNESCO). which points out that education for sustainable development has the capacity to transmit technical or concrete knowledge on the physical, chemical and biological interrelationships of complex natural systems and on how they react with feedback effects to human interventions at local, regional and global scales, in order to minimize the risk of environmental pollution in a comprehensive manner.

MATERIAL AND METHODS

The study was experimental with two groups: experimental and control with pre and posttest, prospective, and longitudinal so the variables were studied in two periods of time. The research design was as follows:

Group	Intervention after		
RG1	Or_1	I	Or_3
RG2	Or_2	-	O4

Where:

RG1 and RG2: Study group

I: Intervention (environmental education strategies)

-: No intervention (usual activities)

O1 and O2: Pre-intervention observation in the experimental and control groups.

O3 and O4: Post-intervention observation in the experimental and control groups.

The population was made up of all the students of the chosen educational institution, whose sample was made up of 49 students for each study group, which was probabilistic in the simple random modality, assigned according to the inclusion and exclusion criteria. The data collection instruments applied were: a sociodemographic interview guide and environmental aspects, the scales of sustainable environmental behavior and environmental beliefs, and a questionnaire of sustainable environmental attitudes; after validation through the opinion of 14 experts. Reliability was determined by test replication and Kuder Richardson's KR - 20 index. The environmental education strategies applied to the experimental group were a set of activities planned and organized in 6 sessions, whose theme was: introduction to the environment (interrelations man and his environment), global problems of environmental pollution (climate change, loss of biodiversity, overpopulation), strengthening of an ecological bio-garden and realization of hydroponic crops, proper management of solid waste, environmental care based on action based on sustainable behaviors and attitudes, and finally field visit to the garden of the National University Hermilio Valdizán (UNHEVAL) of Huánuco.

Descriptive and inferential statistics were used in data analysis; in the latter, Student's t-test statistic was used for paired samples. The requirements of homogeneity of the baseline characteristics of the study groups were met. Whose contrast was by means of the Chi Square statistical test of homogeneity and the other dimensions by the Kolmogorov - Smirnov statistic with normality contrast; considering the significance of the test (p – value) to discriminate them.

RESULTS

The ages of both groups were located in the early and middle adolescent stage; in the experimental group, ages 13 to 14 years prevailed (with a mean of 13.4 years and SD +/- 0.9 years), and 13 to 15 years in the control group (with a mean of 13.8 years and SD +/- 1.1 years).

In relation to previous knowledge on environmental protection issues, 61.2% of the experimental group and 49.0% of the control group claimed to have received it, the subject of the last training received being "education in environmental care".

Regarding the opinions of prioritization of environmental problems of national, regional and local character, both groups considered as very important desertification, indifference or irresponsible behavior of citizens, pollution, the devastation of forests and mangroves and the indifference of the authorities. Also in this category, the experimental group considered the scarcity and inefficient management of water and the loss of bio-diversity, while the control group considered it of regular importance. Poverty, injustice and social and economic inequality were considered as a problem of regular importance by the experimental group, while for the control these aspects were considered very important.

Consequently, both groups denote sensitivity to environmental problems at the national, regional and local levels with minimal differences.

Both study groups were correct regarding the phrases that point out the current environmental problems, which suggest reflection towards pro-environmental action, with little difference, for the disagreement of the same. On the other hand, the phrases with negative meaning that reflect aggression to the environment, were in conformity for both study groups, a fact that worries considerably for confronting contradiction, with the aforementioned.

When identifying the type of sustainable environmental behavior, before the intervention more than half of the students of the experimental group (55.1%) and above 67% of the control group showed selfless behavior. After the intervention, almost all students in the experimental group and less than half of the control group expressed favorable sustainable behavior.

The sustainable beliefs expressed, according to groups and moments of the study, we noted that before the intervention, the experimental group, expressed beliefs of an "indifferent" type (71.4%), afterwards, there was a significant change towards the "adequate" ones in all students (100.0%). On the other hand, in the control group, no substantial changes were evidenced, because before and after the intervention they continued to assume beliefs of an "indifferent" type.

In reference to the sustainable pro-environmental attitudes revealed by the groups during the moments of the study, it was appreciated before the intervention, that the vast majority of the students of the experimental group (83.7%) manifested "positive" attitudes, and after the intervention it increased by 100.0% (49). Meanwhile, the control group presented "positive" attitudes in approximately half of them, with no increase observed between pre and posttest, even decreasing the percentage of students with positive attitudes.

Prior to the inferential analysis, the independence test found that the two study groups were homogeneous in most of the baseline characteristics: age, gender, religion, schooling and training background, with the exception of the characteristic educational theme. Using Kolmogorov Smirnov's Z test with normality contrast, it was found that the measured distributions of the variables behavior, attitudes and sustainable beliefs were normal.

The differences between the study groups (experimental and control) and during the two moments (before and after) with respect to the variable sustainable behaviors showed different average values, which was contrasted by the t test for paired samples [(t = -2.67 and p-value = 0.010) very significant, with respect (t = 0.52 and p-value = 0.606) not significant]. In this way, the null hypothesis is rejected and the existence of significant variability is admitted, affirming that in the experimental group, the behaviors, sustainable, improved considerably as a result of the application of environmental education strategies. (See Figure 01).

When comparing the groups and the moments of study of the variable sustainable attitudes shows an average value between the pre and posttest, and between the groups (of -2.0 Vs 0.4 points respectively), corroborated by Student' s t for paired samples, the difference of these means [(t = -7.22 and p-value = 0.000 very significant in the experimental group and (t = 4.24 and p-value = 0.000) in the control group was also significant but in sense inverse]; In this way, the null hypothesis is rejected and the existence of significant variability in sustainable attitudes is assumed, improving substantially as a result of the environmental education strategies applied (See table 01).

Table 1. Student's t test for the variable sustainable attitudes, according to moments and groups of the study – Juan Marino Meza Rosales Educational Institution - Huánuco.

Groups	Moments	Mean difference	t for Student	p-value
Experimental	Before After	-2,0	-7,22	0,000
Control	Before After	0,4	4,24	0,000

Source: Environmental Attitudes Questionnaire (Annex 04).

Comparatively in the averages of the groups and moments of study of the variable sustainable beliefs, an average value of -30.5 Vs - 0.4 respectively was evidenced, and a value t = -20.42 and p-value = 0.000 very significant for the experimental group and t = -0.68 and p-value = 0.499 in the control group. It follows that in the experimental group sustainable beliefs improved consistently. (See Figure 02).

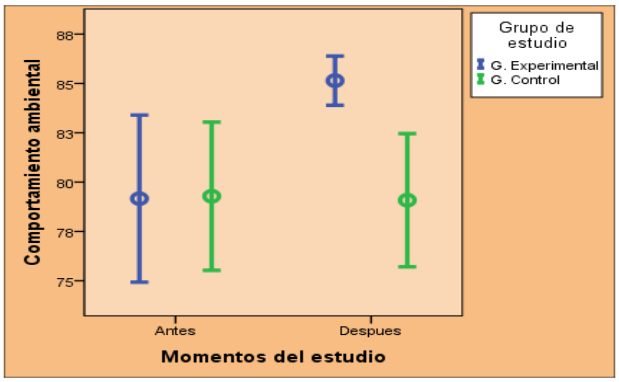

Figure 01. Means in the distributions of the variable sustainable behaviors, according to moments and group under study – Juan Marino Meza Rosales Educational Institution - Huánuco.

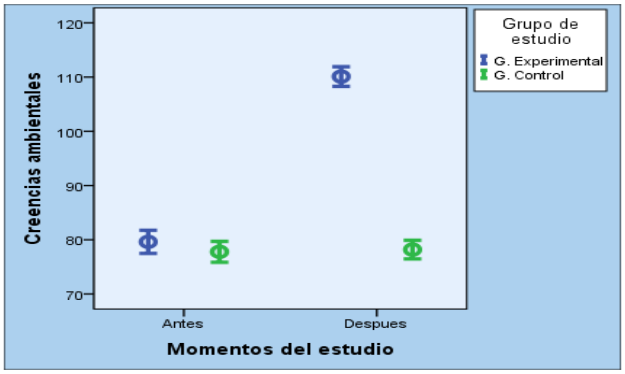

Figure 02. Means in the distributions of the variable sustainable beliefs, according to moments and group under study – Juan Marino Meza Rosales Educational Institution - Huánuco.

In the analysis of the difference between the two moments and study groups for the variables: behaviors, attitudes and beliefs sustainable globally, we obtained a value t = -13.06 and p-value = 0.000 very significant in the experimental group and in the control t = 2.64 and p-value = 0.011. For this reason we reject the general null hypothesis and assume that there is significant variability between the two moments (before and after) and between the study groups (experimental and control). It is concluded that the experimental group responded satisfactorily to the intervention, showing a significant change towards the adoption of sustainable attitudes and behaviors regarding the environment; On the other hand, the control group manifested increasingly unfavorable

changes, in the absence of educational programs such as the one proposed to the other group. (See table 02).

Table 2. Student's t test for the variables behaviors, attitudes and sustainable beliefs, according to moments and study groups – Juan Marino Meza Rosales Educational Institution - Huánuco.

Groups	Moments	Mean difference	t for Student	p-value
Experimental	Before After	-13,8	-13,06	0,000
Control	Before After	0,8	2,64	0,011

Source: Questionnaire on environmental behaviours, attitudes and beliefs (Annex 04).

DISCUSSION OF THE RESULTS

The research developed started from the premise that pro-environmental and sustainable behaviors are of importance in the priorities of psycho-environmental research, to acquire a way of life in the face of the needs of the present, without compromising future generations. In line with this priority, the present research was carried out and is reported on the basis that educational interventions, through environmental education strategies, generate significant transformations in the attitudes and behaviors of the student, towards the care of the environment8. This fact started from the model of sustainable behavior, (attitudes, beliefs and sustainable environmental behaviors), which promotes the care of the environment and human well-being throughout the Planet9. At the same time, it is in line with the model of responsible ecological conduct, which demands to carry out all those deliberate and effective activities towards the protection of the environment of natural resources or at least the reduction of environmental deterioration10.

The results of the research expressed significant differences between the means of the groups and during the moments of the study, the experimental group reached the highest averages and a linear upward trend, very significant [(t = -13.06) and a p-value = 0.000] which confirms the increase in attitudes, beliefs and sustainable behaviors in merit of the application of environmental education strategies. On the contrary, the means of the control group showed lower values during the moments of the study (t = 2.64 and p-value = 0.011), denoting attitudes, beliefs and environmental risk behaviors. These results are attributed to the positive effect of environmental education for sustainable development, with a holistic perspective, considering the integration between theory and practice, whose construction is carried out from complexity, that is, obtaining a whole from the parts, but with a great sense of the interactions between the parts11.

The teaching process carefully administered through weekly educational sessions over a period of two months, including activities such as: reading texts for the analysis of the interrelationships of man and his environment, video forums on global problems of environmental pollution (climate change, loss of biodiversity, overpopulation), strengthening of an ecological biogarden and hydroponic crops; actions demonstrating the proper management of solid waste and recyclable material [collection of solid waste (aluminum cans, glass, paper, branches and others)] and field visit to the garden of the UNHEVAL of Huánuco, constituted a means for the participants to acquire an environmental awareness and a change of attitudes, based on sustainability. The theory of reasoned action cited by Fishbein, Ajzen12; also supports the results obtained, in the sense that the individual acts reasonably based on the information (beliefs, ideas, opinions and information) that at that moment has and according to it manifests his behavior, that is, that between beliefs (information) and human behavior a close dependence is established. Therefore, the change of behavior achieved in the students of the experimental group, is attributed to the information received through environmental

education sessions, relating beliefs (information) in human behavior; expressing new forms of behaviors and attitudes.

The result obtained is also in line with the constructivist theory supported by Pérez-Jiménez13, inasmuch as the student, by actively participating in the environmental educational sessions, builds their knowledge from a context of interrelation with nature and with the processes of interaction with other actors, acquiring knowledge, skills, abilities and attitudes towards a broader vision of the problems and a greater Environmental awareness and commitment to environmental protection, becoming agents of sustainable development.

Concordant with the present result, Del Olmo14 verified the effect of a systemic network program on changes in participants' environmental beliefs and attitudes, such as the proper handling of solid waste (classification, recycling, disposal), observing differences between the pretest (66.7%) and posttest (79%) in the experimental group, with respect to the control (which went from 31% to 25%) and during the moments of the study. For its part, Vega15, in the research developed, with students of compulsory secondary education who received different degrees of environmental training with a constructivist methodology, demonstrated with high significance, the modification of their beliefs, knowledge and environmental attitudes, developing competencies for action in favor of the environment. Similarly, Santisteban16 determined that the experimental group that participated in an environmental training education significantly improved their attitudes, conceptions and behaviors regarding environmental conservation.

One of the studies that contradict the effect of environmental education activities was regarding the environmental profile and behavior of students at the University of Talca-Chile, whose training in environmental matters, determined that the attitude and perception about the environment was positive, affirming that students have a neutral behavioral intention towards the environment. although the analysis of personal norms were positive; However, the analysis of the behavior carried out indicates negative results in the care of the environment; Therefore, future research should analyze the greater effectiveness of didactic strategies in environmental matters. Also Salavarría, Márquez17; In the research on the impact of environmental education, they show that high school students are still far from training students environmentally, even at the level of knowledge. Although the attitudinal component shows a relatively acceptable level of environmental awareness, it has not been possible to transform this attitude into concrete behaviours and actions for changes in lifestyles.

Finally, with the results of this research it is found that the students of the experimental group (beneficiaries of strategic activities of environmental education), reflect on the environmental problem, raising commitments and assuming responsibilities; In this way, a relationship is established between the environmental education strategy and the process of change towards sustainable behaviors and attitudes.

References

Bolzan de Campos C. Environmental management systems and pro-environmental behavior of workers outside the company: approximation of a Brazilian sample. [Doctoral thesis]. Brazil: University of Barcelona Faculty of Psychology; 2008.

Zelezny C, Schultz PW. Promoting Environmentalism. Journal of Social Issues; 2000, 56 (3), 365-371.

SEMARNAT in: Flores MA, Rodríguez Ortega. What about the environment? Problems in Mexico and the world; 2007.

Zeballos Velarde M. "Impact of an environmental education project on students of a school in a marginal area of Lima". [Master's Work in Social Management]. Lima: Pontifical Catholic University; 2005.

Bolzan de Campos C. Op.cit., p. 21

Espejel Rodríguez A, Castillo Ramos MI. Environmental Education for the upper secondary level: proposal and evaluation. [internet]. Mexico: Revista Iberoamericana de Educación; 2008. [Accessed 2011 Feb 16]. Available in: http://www.rieoei.org/expe/2299Espejelv2.pdf

Fishbein M, Ajzen I. Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Reading, MA: Addison-Wesley; 1975.

Schmuck P, Schultz PW. Sustainable development as a challenge for Psychology. In P. Schmuck & P.W. Schultz (Eds.), Psychology of Sustainable Develop; 2002.

Corral Verdugo V. Pro-environmental behavior. An Introduction to the Study of Environmental Protective Behaviors. Santa Cruz de Tenerife, Spain: RESMA; 2001.

Grob A. Meinungen im Umweltbereich und umwelgerechtes Verhalten. Ein psychologisches Ursachennetzmodell. Dissertation. University of Bern, Switzerland; 1990.

Puigi Vilaró E. Educating for sustainability. Towards a psychopedagogical model of education for sustainability from the field of formal education. [Advanced Studies Papers] Girona: University of Girona; 2004.

Fishbein M, Ajzen. Understanding attitude and predicting social behavior. Prentice Hall; 1980.

Pérez Jiménez C. Teacher training for the construction of social knowledge [internet]. [Consulted 2010 Augst 30]. Available in: http://www.rieoei.org/rie33a02.htm

Del Olmo Amado J. Systemic networks in assessing changing attitudes towards municipal solid waste. [Work of Diploma of Advanced Studies]. Valencia: University of Valencia; 2004.

Vega Marcote P. Environmental education in initial teacher training. Analysis of a didactic model for the development of competence in action in favor of the environment. [Doctoral thesis in Pedagogy and Didactics of Experimental Sciences]. Coruña: Departamento de Pedagogía e Didáctica das Ciencias Experimental. Faculty of Education Sciences. University of Coruña; 2005.

Santisteban Cimarro A. The permanent training of teachers in environmental education: detection of conceptual, attitudinal and behavioral changes resulting from training actions. Revista Enseñanza de las Ciencias. 1994; 16(2):203-16.

Salavarría García OO, Isaac Márquez R. Environmental training in the upper middle level of the Municipality of Campeche. http://www.comie.org.mx/congreso/memoria/v9/ponencias/at03/PRE1178946480.pdf. PP 5-8