Perception of Environmental Problems Among Higher Education Students in Peru

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Environmental education aims to rethink the relationship between human beings and nature. It is the most effective tool to generate change towards improving the environment and sustainable development. The university environment is emerging as the ideal context to establish an environmental education that promotes the training of professionals responsible for the environment and sustainable development. In this case, the work aims at exploring the perception of Peruvian university students regarding environmental problems both at the local and national levels. To do this, a survey was conducted of 714 university students of different ages, from different locations and university careers.

Keywords: environmental education, environmental problems, perception, environment, sustainable development

INTRODUCTION

The main objective of environmental education is to train citizens with environmental ethics and an understanding of the relationship between human beings and the environment. Also, the process of environmental education aims to inform about environmental problems to generate a correct decision-making process that seeks a balance between short- and long-term needs. In principle, to have an environmental education it is necessary to have an educational character aimed at forming values, attitudes, modes of action and behaviors aimed at caring for the environment (Vargas, Medellín, Vásquez and Gutiérrez, 2011).

In the educational field, it is necessary to begin to address these issues, especially in the field of higher education, since those who develop professional work have a leading role in human and environmental development. Then, through theoretical and practical knowledge, they should be trained to carry out responsible and protective actions for the environment (Vargas et al., 2011).

Therefore, due to the importance of knowledge on environmental issues at the higher level, it is necessary to know the perception that Peruvian students have of environmental issues.

ENVIRONMENTAL EDUCATION

The concern of science for the environment originated in the 1960s due to the evident deterioration of natural resources and their impact on human life. Studies focused mainly on the environment-human being relationship. Then one of the responses to the environmental crisis was the development of the so-called environmental education that aims to prepare the person to interact with the environment (García, 2012).

According to Severiche, Gómez and Jaimes (2016), the human being, since he emerged as a dominant species on the planet, always generated influences on the environment. In this regard, Canaza-Choque (2019) states that the relationship between human beings and nature have deteriorated, fundamentally, due to the modern way of life. Thus, human beings do not value nature and move away from the concept of belonging to it. And, in the name of progress, we are witnessing a degradation of humanity and a destruction of nature.

Taking into consideration the dominant position of human beings and the current interest in environmental conservation, the aim is to ensure that human actions in the economic, social, and cultural spheres do not cause deterioration of water, soil, and air resources. For the authors, despite the efforts to conserve natural resources, environmental deterioration has not yet been halted due to a lack of awareness and respect for nature.

Thus, in the face of the environmental crisis, characterized by the appearance of phenomena such as climate change, destruction of biodiversity, thinning of the ozone layer and the greenhouse effect, there is a need to develop an ecological conscience. Moreover, these problems do not appear as independent of each other, but constitute elements that are related to each other and are configured as a reality different from the simple sum of all of them (Hernández, Moreno, Meza, García and Olarte, 2020).

Ecological awareness includes strengthening the formation and development of citizen awareness to interpret, understand and act in relation to the magnitude of the problems. It is about developing a culture with a "convergent vision for and with nature" (Severiche et al., 2016: 272).

Sustainable behavior can be defined as the set of effective actions that are put into practice with the aim of securing natural and socio-cultural resources for present and future well-being. This concept was developed by social scientists who recognize the importance of individual and collective behavior in environmental outcomes.

In Stockholm, during the 1972 International Conference on the Environment, the term Environmental Education was used for the first time. The idea was to conceive education as a tool to generate changes through the acquisition of knowledge, attitudes, and values to face the environmental crisis.

Environmental education allows people to become aware of the importance of conserving the environment, as well as to develop the capacity to generate changes in values, behavior, and lifestyle. Also, through education it is possible to broaden the knowledge necessary to promote action aimed at preventing and mitigating existing and future problems.

So, on the one hand, environmental education aims at developing skills to solve environmental problems and, on the other, to invite to action in search of environmental improvement. It is a learning process of reflection in action. Its main objective is to generate a change in the environment through a participatory dynamic that aims at the involvement of different actors in the situation to be transformed (Severiche et al., 2016).

According to Sánchez (2001), environmental education should move in areas of natural and social sciences so it should be based on the vision of complex thinking proposed by Morín. The environment and its problems require an approach through various disciplines and with a broad outlook. This approach assumes that the environmental crisis is closely related to the ways in which knowledge has been generated and applied: through a simplified and fragmented vision of the world and the reality of objects and objectives, and through the fragmentation of knowledge and the loss of integrative perception.

For their part, Hernández et al. (2020) define environmental education as a systematic, integral, and permanent process of information, education and training that can be established formally and informally. It is based on respect for all forms of life and aims at raising peoples' awareness individually and

collectively and developing values, skills, and attitudes in pursuit of respect for the environment and its resources.

The purpose of environmental education is the development in the individual of an awareness of dependence and belonging with respect to the environment. In addition, it tends to stimulate people to adopt a way of life compatible with sustainability (Garcia, 2012).

Thus, environmental education has a holistic approach and an interdisciplinary character. Its principles aim to consider the environment in its totality, granting a broad recognition of life and the transcendence of the change of values and the need for interdisciplinary work. This movement implies the adoption of a new moral philosophy by establishing a new valuation of the Earth, animals and plants and the pursuit of moral criteria on interpersonal, cultural, and social relationships (Sanchez, 2001).

Romero and Moncada (2007), in proposing an adequate didactic model for environmental education, consider five guiding principles of the educational process: planetary mentality, ecocentrism, environmental knowledge, eco-literacy and sustainability. The planetary mentality is based on Morin's complex thinking and proposes the need for a new vision in which the person feels capable of acting within a global and connected world. It aims to go beyond the local limits of the country, recognizing the plurality of cultures existing on the planet; the existence of global problems that affect the entire planet and understanding the connection between regions.

Ecocentrism is a vision contrary to anthropocentrism and biocentrism, since it considers that all existing forms have, in their proper measure, a certain importance and purpose. For its part, environmental knowledge comprises a change of conception with respect to the separation and fragmentation in different disciplines of human knowledge, offering a vision of disciplinary integration and an integration between theory and practice. And eco-literacy refers to the knowledge of the influence of the urban ecosystem on the natural ecosystem, understanding the relationship, influence, and dynamism between both. Finally, sustainability comprises a set of theoretical and methodological bases that provide a vision of the relationship between environmental elements and their appropriate use (Hernández et al., 2020).

Avendaño (2012) states that environmental education from a broad perspective aims at socio-cultural development at the environmental level, involving criticism as a basis for initiative and action. Thus, environmental education is a social tool that implicitly carries the concept of sustainable development as a way for social and environmental improvement. Therefore, it requires the inclusion of subjects related to human behavior such as cooperativism, quality of life, prevention, community development and ethics.
Finally, he affirms that, as environmental education aims to generate changes, it is not only the responsibility of educational institutions but of the community in general and should be shared with professional, cultural, scientific, and religious training institutions.

METHODOLOGY

To identify the perception on environmental issues of young Peruvian university students from the Universidad Científica del Sur, a quantitative exploratory study was carried out.

The sample under analysis was composed of 714 students of different careers and geographical areas of both sexes aged 16 years and older. The data collection instrument used was a survey with closed questions on the perception of young people with respect to environmental impact at the regional and national levels.

In addition, a random opinion survey was conducted with a sample of the student population in order to record their point of view regarding the achievement of the course. The questionnaire used in the research of Sosa et al. (2008), Zamorano et al. (2009) and Gädicke et al. (2017) was used as a basis.

RESULTS

The final sample consisted of a total of 466 women, 229 men and 19 people who did not choose to answer. In terms of age, most respondents were between 16 and 18 years old; then, 164 people were between 19 and 21 years old; 45 people were between 22 and 24 years old and only 21 people were older than 25

years old. The interviewees were from different careers such as human medicine, veterinary, communication and advertising, stomatology, environmental engineering, administration, psychology, agroforestry engineering, pharmaceutics, architecture, marine biology, sustainable tourism, performing arts, systems engineering, administration and marketing, law, economic engineering, nursing, dentistry, nutrition, obstetrics. In conclusion, the sample was made up of students from different careers, some more closely linked than others to environmental issues. They are mostly women and very young students.

TABLE 1
DISTRIBUTION OF STUDENTS BY AGE

Age		
Rank	**Frequency**	**Percentage**
16 - 18 years	484	67,79%
19 - 21 years	164	22,97%
22 - 24 years	45	6,3%
+ 25 years	21	2,94%
Total	**714**	**100%**

TABLE 2
DISTRIBUTION OF STUDENTS BY SEXUAL ORIENTATION

Age		
Rank	**Frequency**	**Percentage**
16 - 18 years	484	67,79%
19 - 21 years	164	22,97%
22 - 24 years	45	6,3%
+ 25 years	21	2,94%
Total	**714**	**100%**

TABLE 3
STRATIFICATION BY STUDY CAREER

Stratification by study career		
Career	**Frequency**	**Percentage**
Human Medicine	238	33,33%
Veterinary	99	13,86%
Communication and Advertising	24	3,36%
Stomatology	39	5,46%
Stratification by study career		
Environmental Engineering	39	5,46%
Administration	47	6,58%
Psychology	52	7,28%
Agroforestry Engineering	6	0,84%
Pharmaceutics	11	1,54%
Architecture	22	3,08%
Marine Biology	29	4,06%
Sustainable Tourism	4	0,56%
Performing Arts	10	1,4%
Systsems Engineering	14	1,96%
Administration and Marketing	10	1,4%
Law	20	2,8%
Economic Engineering	15	2,1%
Nursing	11	1,54%
Dentistry	3	0,42%
Nutrition	12	1,68%
Obstetrics	9	1,26%
Total	**714**	**100%**

When asked about the environmental issue that has the greatest impact at the national level, the vast majority stated that deforestation and global warming are the two most important problems, followed by the deglaciation of snow-capped mountains and the acidification of the oceans. Desertification processes come in last place.

As can be observed, students selected the environmental issue that is most evident and of greater verification in their usual contexts. But in cities, the problems that have the greatest impact at a local level are pollution (660 responses) and waste management (260 responses). To a lesser extent, the extinction of species (184) and the lack of alternative energies (212) are perceived as important problems.

TABLE 4
NATIONAL IMPACT

National environmental impact		
Environmental issue	**Frequency**	**Percentage**
Global warming	380	53,22%
Deglaciation	221	30,95%
Deforestation	563	78,85%
Ocean acidification	135	18,9%
Desertification	108	15,13%

Note. Values exceed total respondents because more than one response could be selected.

TABLE 5
LOCAL IMPACT

Local impact		
Environmental issue	**Frequency**	**Percentage**
Contamination	660	92.44%
Waste management	260	36.41%
Species extinction	184	25.77%
Lack of alternative energies	212	29.69%
Water shortages	69	9.66%

Note. The values exceed the total number of respondents because more than one answer could be selected.

When it comes to the impact on natural resources, respondents note that the negative impact is greatest on issues such as the ecosystem, biodiversity, water resources and natural landscapes, with genetic resources in last place.

TABLE 6
NATURAL RESOURCES IMPACT

Natural resources impact		
Natural resources	**Frequency**	**Percentage**
Water resources	349	48.88%
Ecosystem	393	55.04%
Biodiversity	459	64.28%
Natural landscapes	223	31.23%
Genetic resources	42	5.88%

Note. Values exceed total respondents because more than one response could be selected.

Finally, environmental problems are perceived as having a lesser impact on cultural issues such as tourism and recreation and a greater impact on support services such as primary production and habitat, food and water supply, and issues such as climate regulation and pollination.

TABLE 7
AREAS OF IMPACT OF ENVIRONMENTAL ISSUES

Areas of environmental impact			
Areas	**Higher impact**	**Lower impact**	**No impact**
Procurement services	401	296	17
Regulatory services	404	285	25
Cultural services	298	352	64
Support services	511	181	22

Note. Values exceed total respondents because more than one response could be selected.

DISCUSSION

Avendaño (2012) identifies several currents of environmental education: naturalistic; conservationist; resolute; systemic; scientific; humanistic and moral-ethical. The naturalist current recognizes the value of nature beyond the resources it can provide. It is about knowing how nature works as the main axis to address the problems that develop in nature. From a cognitive, experimental, affective, and artistic approach, this approach focuses on the relationship between nature and human beings. Nature is an effective means of learning to understand environmental rights and to understand nature ontologically.

Within the so-called conservationist current are grouped all those proposals that aim at the conservation of resources in a qualitative and quantitative manner. In this current, there is a concern for environmental management and community education. Emphasis is placed on the development of environmental management skills and eco-civism, encouraging both individual behavior and promoting collective projects aimed at greater social equity.

On the other hand, the resolutive current is based on UNESCO's International Environmental Education Program, which interprets the environment as a set of problems that society must take on. Therefore, skills must be acquired to solve these problems by modifying behaviors and carrying out collective projects. The resulting pedagogical model is based, then, on the acquisition of problem-solving skills. For this purpose, the following scheme is followed: identification of the problematic issue, diagnosis, search for solutions, evaluation, and choice of the optimal solution.

The systemic current understands the environment as a set of interrelated elements that make up a system. From an ecological emphasis, this current allows a more adequate understanding of environmental realities and problems. From this current, environmental education is transformed into an interdisciplinary work that addresses the complexity of the objects and phenomena studied. The understanding of the problematic structure is carried out considering the following stages: elements of the system (actors and factors); interaction of the elements; the structure in which they intervene and the laws that govern these factors.

In contrast, the scientific current is based on the identification of cause-and-effect relationships and on the concept of the environment as an object of knowledge. To this end, by means of observations, it induces hypotheses that are verified through experimentation. The stages of the pedagogical model of this current are equivalent to the stages of a scientific process: exploration and observation of the environment, identification of phenomena, elaboration of hypotheses, verification of the hypotheses and elaboration of a project to solve a given problem.

The humanist current is based on the human dimension of the environment, on the relationship between nature and culture and its historical, political, and economic heritage. The model also emphasizes the exploration of the environment as a means of social coexistence. Finally, the moral-ethical current affirms that action must be framed by a set of coherent values.

In this way, moral development is emphasized in conjunction with social and scientific reasoning. Therefore, the pedagogical model is as follows: a case is presented, the case is analyzed considering its social, scientific, and moral components, a solution is selected in accordance with appropriate conduct and the choice is argued, and finally, a debate is held in which the interrelation of different ethical positions is encouraged.

Environmental Education and the University Context

Because society requires disruptive changes aimed at improving the environmental situation and young people are those who can bring new questions and answers, researchers in environmental issues and education focus on investigating what young people think and do in relation to the environmental challenge.

Thus, in the work carried out by Álvarez, López and Chafloque (2018), the frequency of environmental behavior was studied in 6,429 business and engineering students of both public and private universities in Peru. Environmental behavior was characterized considering three types: recycling and reuse; resource saving and environmental purchasing. According to their findings, one out of every four students manifest a habitual environmental behavior, with women and students with a high average being the ones with the most frequent environmental behavior. The most practiced environmental behavior is saving resources and the least frequent is environmental purchasing. On the other hand, teachers and peers play the role of influencers in the adoption of environmental behaviors.

Regarding the incorporation of environmental education in the university context, Ariza and Rueda (2016) state that the incorporation of environmental issues in the university curriculum reflects the importance of environmental education for the development of societies. In the same line, the United Nations Environment Program (1985) highlights the role of higher education institutions as responsible for the generation and transmission of knowledge in environmental matters.

The Ibero-American Congress on Environmental Education (1992) identified the need to integrate environmental issues into university curricula. Furthermore, according to Herrero (2006), environmental education should not only be limited to teaching and research but should involve all aspects of university life. But, according to Carrasco and Ramón (2015) environmental education is a subject that was introduced

very slowly in the university curriculum. This causes the presence of scarce training and sensitivity of young people to face the current environmental problems.

Cárdenas (2013) states that the incorporation of environmental education would imply the assumption of the so-called university environmental responsibility which is defined as the set of actions at the university level that involve the practice of principles and values to form professionals and citizens with awareness, commitment, and proactive participation in the solution of environmental problems through training, research, extension, and management.

The university acquires two primary functions from the environmental approach: to train professionals who can perform their work in an environmentally correct manner and to be an example for their social environment by carrying out activities in a way that generates the least environmental impact. As a first step, universities should explicitly state their environmental commitment through the formulation of an institutional environmental policy.

Then, they should develop an organizational structure capable of proposing and executing priority actions. And, as a last measure, they should environmentalism education, which implies the incorporation of environmental careers; the inclusion of environmental subjects in the curricula of the careers; the inclusion of environmental issues in the curricula and the inclusion of environmental criteria when teaching the contents of the subject (Cárdenas, 2013).

And, to include the environmental issue to university life, it is a requirement, according to Ariza and Rueda (2016), the following actions: to replace the fragmented and static vision with a complex and dynamic one; to promote systemic thinking; to address local and global environmental issues; to promote coherence between theoretical discourse and action; to promote a comprehensive training of students; to promote research for sustainable development, to conduct training days for teachers with the inclusion of concepts on sustainability and to carry out non-curricular environmental education actions for students.

According to Cantú-Martínez (2020), to establish environmental education, it is necessary to develop three different types of rationality: theoretical rationality, practical rationality and ethical rationality. Theoretical rationality allows access to scientific knowledge in search of improving the exercise and act of education; practical rationality facilitates the construction of new knowledge from observation, experience, and feedback and, finally, ethical rationality allows the integration of theoretical and practical knowledge from a reflective approach.

This type of education aims at building a more committed citizenship, providing instruments to solve problems and to promote responsible actions at the individual and collective level. Therefore, it is an education based on the socio-critical paradigm that generates judgments, values and interests of a social nature and a commitment to transformation within society itself.

In addition, Cantú-Martínez (2020) proposes a series of necessary changes to develop an education that aims at sustainability. As a first step, the dichotomous and opposing vision of the natural and social world must be reversed. Then, the effects of the following visions must be counteracted: anthroprocentrist vision (it is about abandoning the Judeo-Christian position in which the human being is superior and alien to nature); the vision of reason and dominance (which drives human beings to abandon their own beliefs due to the pressure exerted by the consumer society); the reductionist vision (which simplifies the relationships between the world and life and prevents the analysis of systemic and complex relationships); the irresponsible vision (which assumes the neutrality of actions and promotes a lack of awareness of the consequences); the utilitarian vision (which considers nature as an inexhaustible good and gives more importance to needs than to resources); finally, the economistic vision (which establishes money as the only criterion of value).

CONCLUSIONS

Environmental education was proposed to rethink the relationship between nature and humanity. And, under this purpose, the inclusion of environmental education in the curricula of formal education was sought. From the beginning, attention was paid to the education provided by universities due to their role

as trainers of professionals who will have to act in the future and provide adequate solutions to the multiple eventualities that may arise.

The objective of this study was to investigate the perception of young university students with respect to the impact of certain events at the environmental level, both nationally and locally.

From the 714 surveys carried out, it has been possible to identify that the environmental problems that are perceived as having the greatest environmental impact are those that are easiest to identify at both the national and local levels. This leads to the conclusion that there is a need to establish a more systemic and reflective environmental education on natural phenomena and their relationship with the social and cultural context.

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