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# Ecological knowledge, individual concern and personal criteria regarding the environment in high school students of a school in Quindío

## Conocimientos ecológicos, preocupación individual y criterio personal respecto al medio ambiente en estudiantes de bachillerato de un colegio del Quindío

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## ABSTRACT

This is a quantitative, correlational, empirical-analytical, cross-sectional research aimed at identifying ecological knowledge, as well as finding the relationship between indicators of *individual concern* and personal *criteria* regarding the environment in 8th, 9th, 10th, and 11th grade high school students of an urban educational institution in Quindío. Among the knowledge about the environment, recycling (58.8%), chemicals (56.4%), biodiversity (53.7%), and water (52.7%) prevailed; *individual concern* was 45.7%, while *personal criteria* was 60.4%. *Individual concern* has a moderate correlation with *personal criteria* (p= 0.566), and high correlation with *spaces* (p= 0.657). It is concluded that the students have relative knowledge about the environment, in which the *personal criterion* prevails over the *individual concern* about the environment, an aspect that determines an individual attitude

towards repair actions and a scarce awareness of the consequences of pollution in the medium and long term.

***Keywords:*** environmentalism, environmental education, personal criteria, ecological knowledge, ecology, environmental concern. (APA Thesaurus).

**RESUMEN**

Esta es una investigación cuantitativa de tipo correlacional, empírico-analítica y de corte transversal que tiene como objetivo identificar los conocimientos ecológicos, al tiempo que encontrar la relación entre indicadores de *preocupación individual* y *criterio* personal respecto al medio ambiente en estudiantes de 8°, 9°, 10°, y 11° grado de bachillerado de una institución educativa urbana del Quindío. Entre los conocimientos sobre el medio ambiente prevalece el reciclaje (58,8%), químicos (56,4%), biodiversidad (53,7%) y agua (52,7%); la *preocupación individual* fue del 45,7%, mientras que el *criterio personal* fue de 60,4%. La *preocupación individual* tiene una correlación moderada con el *criterio personal* (p= 0,566), y alta con *espacios* (p= 0,657). Se concluye que los estudiantes tienen conocimientos relativos sobre el medio ambiente, en los que prima el *criterio personal* sobre la *preocupación individual* respecto a lo ecológico, aspecto que determina una actitud individual hacia las acciones de reparación y una escasa conciencia de las consecuencias de la contaminación a mediano y largo plazo.

***Palabras clave:*** ambientalismo, educación ambiental, criterio personal, conocimientos ecológicos, ecología, preocupación ambiental. (APA Thesaurus).

## Introduction

Environmental pollution and the scarce education regarding environmental care give shape to a problem of multiple dimensions, whose global character requires urgent educational and political measures, which impact at local, community and social levels the actions to counteract its harmful effects, while advocating for the repair of ecosystems seriously altered by the hand of man (Delgado, 2010; Galeano, 2005; Morin, 1996). In the range of reasons associated with its causes and consequences, it is possible to consider from the educational point of view: the lack of robust ecological knowledge, the difficulties of educational processes, given the scarce proposals, programs and measures of environmental education, in addition, to notable deficiencies in the generation of a solid and pro-environmental awareness and environmental education (Diario El Tiempo, 1998; Ministerio de Medio Ambiente Vivienda y Desarrollo Territorial - MAVDT, 2012; Ministerio de Medio Ambiente y Desarrollo Sostenible - MMADS, 2017, 2018). Such awareness should tend to understand the indissoluble relationship between individual-society-species (Morin, 1999), and advocate for ecological care, greening thinking, self-sustainability and environmental recovery, which environmentally constitutes one of the greatest global challenges (Anderson & Latam, 2018; Andrade, 2015; Revista Semana, 2017b). In Colombia according to figures revealed by the newspaper El Espectador (2015) there are environmental sustainability problems associated with the type of agricultural production, and uncontrolled exploitation of mining, hydroelectric and fossil fuel resources, as well as, environmental education, in terms of structuring an ecological awareness around development and self-sustainability; example of this is that, the greenhouse effect produced by the country is centered in regions such as: "Caquetá, Putumayo, meta and Guaviare. Approximately half of the greenhouse gas emissions come from deforestation, forest degradation and the agricultural sector" (p. 2).

Likewise, the newspaper El Tiempo (2017) indicates that in the last 30 years the country's temperature has increased 0.8 degrees Celsius, which has caused that in some departments between 51 and 52 centimeters of coastline is being lost each year,

to which is added, that 40% of the soils have affectation of some degree of erosion. For example, in the Amazon, a large number of hectares of forest area has been lost, being this the most impacted region with 178,597 hectares affected; another global effect is the significant decrease of ice coverage in glaciers in the last 50 years, which has been 63%, and has put approximately 12 million people at risk of flooding. According to figures provided by the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), by 2040 the most affected departments in Colombia will be: San Andrés, Providencia, and Santa Catalina, Atlántico, Caldas, La guajira, Cundinamarca, Magdalena, Caquetá and Casanare. In addition to the above, there is the pollution caused by garbage, the generalized ignorance regarding the implementation of environmental measures, and the retreat of the land on the Colombian coasts, since by the end of the 21st century almost 50,000 hectares of land will have been lost. IDEAM figures reveal that in 2017 in Colombia deforestation increased by 23%, especially in the Amazon with 65.6%, the Andes (17%), the Caribbean (7.1%), the Colombian Pacific (6.1%), and the Orinoquia (4.5%) (Correa, June 14, 2018). The above reveals that deforestation had an increase of 44% between the years 2015-2016, with the main causes of forest misfortune being "land grabbing (45%), illicit crops (22%), infrastructure (10%), forest fires (8%), extensive cattle ranching (8%) and mining (7%)" (Revista Semana, 2017b, p. 2).

In the environmental aspect according to data referred to by the Governor's Office of Quindío (2016), the department is currently at high risk of contamination, as it has a high human influence on its parks and ecosystems, which concentrate up to 10% of Colombian biodiversity in 86 ecosystems, which in terms of fauna are home to approximately 1,500 species, with a number of 546 birds, 87 different species of mammals, butterflies 500 species, 41 species of fish and flora with a number of 3,000 species. That said, aspects such as non-self-sustainable tourism, illegal hunting, the introduction of new species, monoculture, the affectation of water sources by solid waste contamination, and the indiscriminate logging of vegetation in the region are part of the conglomerate of problems that environmentally affect the department, so they are a small-scale reflection of what happens in other Colombian departments (Andrade, 2017a). It is here where adequate environmental education can promote a culture of care and protection of the environment of all the ecosystems that compose it (Berenguer & Corraliza, 2000; Páramo & Gómez, 1997). Such education cannot go unnoticed by governments and societies, since it implies becoming aware of aspects such as the pedagogical work at school, community and home, the example given to students and the globalized social empowerment on these issues, as specific actions

and also in the generation of public policies with an environmental approach (Álvarez & Vega, 2009; Aragonés & Amérigo, 1991; Martínez, Martínez, & Gazquez, 2008). This implies strengthening ecological knowledge, individual concern, personal criteria and actions for the care and protection of ecosystems (Moreno et al., 2005).

In Colombia, environmental problems also have an undeniable relationship with the armed conflict, given that the warlike confrontations, terrorist attacks, subversive settlements, the depredation of native species, and the fields of cultivation of base plants for the development of illegal psychoactive substances, have drastically affected the stability of the ecosystems, making them vulnerable to extinction and environmental-ecosystemic degradation (Correa, 2015; Morales, 2017); in this sense Colombia has specific challenges in terms of environmental restoration, among which the most important and urgent are:

> (...) environmental conservation, the eradication of illicit crops and illegal mining, the development of environmentally sustainable activities and the implementation of the Colombian Low Carbon Development Strategy. It also considers the adaptation of a Colombia vulnerable to climate change and the launching of programs of payments for ecosystem services that promote the conservation of strategic areas (Revista Semana, 2017a, p. 1).

In these elements, the concept of environmental education is inherent in each process, taking into account that this concept has changed according to the ideas of ecosystem, sustainability, preservation, environmental awareness and environment. Currently, the preservation of natural environments and species is integrated with technological, social, cultural, industrial, political and economic dimensions, which are essential to understand human interactions with ecosystems and the remedial measures to be implemented with the environment (Delgado, 2007; Morin, 1999; Páramo & Gómez, 1997). Environmental education can be defined as proposed by the Ministry of the Environment as follows:

> Comprehensive and systemic training of Colombian citizens to know, be and act coherently with sustainable development. When we speak of education, we do not refer exclusively to schooling or formal education, but to the broad spectrum

> of scenarios where people learn, know and transform themselves. When educators are mentioned, they include environmental activists, youth leaders, forest rangers, volunteer park rangers, health promoters, rural and urban community leaders and organizations, among others (MMADS, 2012, p. 1).

In Colombia, in the 90's, the construction of educational scenarios was initiated, aimed at the care and proper treatment of the environment, a project with which the Advisory Commission for Ecological and Environmental Education sought to implement in educational institutions, subjects that would facilitate social and environmental empowerment, promoting spaces where students could identify the great variety of ecosystems in the country, while facilitating the interpretation and recognition of the constant relationship between the environment and people, among other elements (Pita-Morales, 2016). In this line of intentions, in 1994 the "Environmental Education School Project (PRAE)" was regulated (Decree 1743 of August 3, 1994), which is currently applied in schools, as a didactic tool that brings together comprehensive training with environmental education in the curricula of formal and informal education in the country (MAVDT, 2012). The objective of the project was to encourage the community to participate in the solution of environmental problems of the context, as well as to train critical and participative people in the construction of an environmental culture (Pita-Morales, 2016). Currently, the positive impacts of the PRAE are not very visible, and although many people and institutions consider the program to have little ecological impact, the proposal constitutes an important measure to improve the ecosystem relationship from early childhood (Polo, 2018). In broad terms, environmental education is key to perceive the existing relationships between natural and social systems, as well as to achieve a broader and clearer knowledge about the importance of sociocultural factors in the origin and trajectories of environmental problems.

Similarly, the project seeks to promote people's awareness of the values and actions that favor positive collaboration among the population, and thus strengthen the process of environmental remediation and decision-making in this field. In this sense, "environmental education thus understood can and should be a strategic factor that influences the established development model, in order to reorient it towards sustainability and equity" (Martínez, 2010, p. 1). With all of the above, the environmental problem requires urgent measures that imply the development of an environmental conscience coupled with a political conscience that implements

educational, industrial, scientific, technological and economic adjustment measures, and at the same time understands the relationship between individual, society and species raised by Morin (1999), as a basis for the development of an increasingly ecological thinking, that weaves together the ecological as a categorical imperative of biotic survival of the various species that share the planet.

## Materials and methods

Design: this is a quantitative-correlational, cross-sectional, empirical-analytical research.

Population: the target population was 328 students, 159 males and 169 females between 12 and 18 years of age who attend classes and are enrolled in the 8th, 9th, 10th, and 11th grades of an urban educational institution. The sampling was non-random, purposive and the sample was representative.

Instruments: a socio-demographic characterization form was applied and the scale of environmental attitudes towards specific problems by Moreno and Corraliza (2005), which is a Likert-type scale composed of response types: not at all, somewhat, quite a lot, a lot, totally, consisting of 50 statements that are internally subdivided into 16 subscales, of which the following scales were taken for the study: indicators of individual concern and the scale of personal criteria, both part of the dimensions to evaluate the pro-environmental attitude. Procedure: Design of the research and request and approval of the bioethics committee; Signing of the informed consent, application of instruments; Systematization and analysis of data through the statistical software for social sciences SPSS ver. 20.0; Construction of results and research report; Return of results to the institutions.

## Results

The characterization data reveal that 14 years of age prevails (23.8%) followed by 15 years (21.3%), 13 years (21.0%); of them 48.5% are male and 51.5% are female; 100% live in urban areas. The students belong to 8th grade (22.9%), 9th grade (33.8%), 10th grade (10.1%), 11th grade (33.2%). The common type of housing is house in the city (82.3%), as well as stratum 3 (54%), 2 (31.7%) and 1 (10.4%). 62.2% live in a nuclear family, and 30.8% in an extended family. Eighty-six percent consider themselves to be environmentally friendly and to know "enough" about ecology (52.7%), while 40.5%

say they know little about ecology. 97.6% indicate that the educational institution teaches them guidelines for caring for the environment.

The internal consistency of the instrument or Cronbach's alpha of the "Scale of environmental attitudes towards specific problems" Moreno, Corraliza and Ruíz (2005) was 0.724 corresponding to a good reliability. In relation to knowledge about ecology, the following prevailed with an intensity of quite a lot: pollution (46%), transport (39.6%), waste (50%), chemicals (56.4%), noise (39.6%), energy (42.2%), water (52.7%), recycling (58.8%), spaces (46.6%) and biodiversity (53.7%). With respect to individual concern about the environment, it was found that the criterion prevails a lot (45.7%), quite a lot (43.3%), while the value of somewhat was 6.1% and that of many times was 4.6%. Similarly, the criterion regarding the environment was quite a lot (60.4%), very much (25.0%) and somewhat (13.4%) (see Table 1).

**Table 1.** *Ecological knowledge, individual concern and criteria*

| Ecological Knowledge | Quite |
|---|---|
| **Contamination** | 46 % |
| **Transportation** | 39,6 % |
| **Garbage** | 50 % |
| **Chemicals** | 56,4 % |
| **Noise** | 40 % |
| **Energy** | 42,2 % |
| **Water** | 53 % |
| **Recycling** | 58,8 % |
| **Spaces** | 47 % |
| **Individual Concern** | 43,3 % |
| **Criteria** | 60 % |

Likewise, according to Pearson's correlation between individual concern and personal criteria regarding the environment (Table 2), a "moderate" directly proportional correlation was found between both (p= 0.566). In relation to individual concern and knowledge about ecology, "moderate" directly proportional correlations were found between individual concern and pollution (p= 0.481), waste (p=0.541), energy (p=0.525), recycling (p=0.410), spaces (p=0.657, high correlation), biodiversity (p= 0.516). Similarly, the personal criterion regarding the environment had "moderate" correlations with waste (p=0.504), energy (p=0.579), recycling (p= 0.429), spaces (p=0.542) and biodiversity (p=0.579). It is worth mentioning that low correlations were found between individual concern with transportation (p= 0.176) and personal criteria (p=0.224).

**Table 2.** *Correlations between personal criteria, individual concern and ecological knowledge.*

| | **Individual Concern** | **Criteria** | **Contamination** | **Transportation** | **Garbage** | **Chemicals** |
|---|---|---|---|---|---|---|
| **Individual Concern** | 1 | ,566** | ,481** | ,176** | ,541** | ,446** |
| **Criteria** | ,566** | 1 | ,343** | ,224** | ,504** | ,332** |
| | Noise | Energy | Water | Recycling | Spaces | Biodiversity |
| **Individual Concern** | ,375** | ,525** | ,274** | ,410** | ,657** | ,516** |
| **Criteria** | ,384** | ,579** | ,392** | ,429** | ,542** | ,579** |

In the crosstabs of variables, it was found that the criterion is related to the environment and gender, in "quite a lot" in males (28.4%) and females (32%), while individual concern in males in "quite a lot" was 22.6%, and in females 25% in "a lot". Individual concern in relation to grade level scored "quite a lot" in ninth grade (17.4%), "a lot" in eighth grade (10.4%), tenth grade (4.9%) and eleventh grade (18.3%). Individual concern was 40.2% in relation to the question "do you consider yourself a person who cares for the environment" (Table 3).

**Table 3.** *Cross-tabulation of variables with gender, grade and perception of ecology.*

| | ***Genre*** | | ***Grade level*** | | | | ***Additional questions*** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Items** | Male | Female | 8° | 9° | 10° | 11° | Do you take care of the environment? | Do you know about ecology? | Does the school teach environmental care guidelines? |
| **Individual Concern *Quite a lot*** | 22,60% | - | - | 17,40% | - | - | - | - | - |
| **Individual Concern *Much*** | | | 10,40% | - | 4,90% | 18,30% | 40,20% | 24,70% | 45,10% |
| **Personal Criteria *Fairly*** | 28,40% | - | 13,10% | 20,70% | - | 21% | 50,90% | 28,90% | 58,50% |
| **Personal Criteria *A lot*** | 32% | - | - | - | 15,90% | - | - | - | - |

## Discussion

The research found that when it comes to individual concern, adolescents directly recognize the impact on spaces, their relationship with waste and energy, which is consistent with the studies by Berenguer and Corraliza (2000), Herrera, Acuña, Ramírez, and De la Hoz Alvarez (2016) and Martínez et al., (2008). Similar case, happens with the personal criterion, which is higher when seeking to recognize the effects of energy, spaces and litter, results that agree with the studies conducted by Aragonés and Amérigo (1991) and Camacho and Jaimes (2016). Individual concern and personal judgment were found to coincide with moderate values of biodiversity knowledge, analogous to the findings of Barazarte, Neaman, and Vallejo (2013), Durán, Alzate, López, and Sabucedo (2007), and Herrera et al., (2016). Studies show that in cities or urban spaces, both the media and the communities and families, tend to identify more easily, the ecological impacts in their adjacent daily spaces, but given the habituation to the landscape that pollution, garbage, noise or visual saturation produce, and due to the regularity of the polluting elements, they may not notice other problems related to pollution (Álvarez & Vega, 2009; Andrade, 2015, 2017b; Sandoval, 2012; Trelles, 2006; Zimmermann, 2006).

This coincidence reveals from the study that many serious impacts on animal and human ecosystems can be overlooked, and although concern about energy and contact with various forms of energy production is greater in cities, personal criteria, that is, the impulse that shapes the ecological task, is affected by the lack of information, as well as by a low perception of the risk of pollution, even when there is the idea that knowledge about ecology is ample. From the above, it is possible to consider an evident triadic contradiction, present between: what is claimed to know about the environment; what is actually known about the subject; and what is done as practices of attenuation, prevention and reduction of negative impacts on ecosystems. This contradiction could be associated with shortcomings in the educational processes, particularly with regard to the PRAE, which, in spite of including pedagogical elements on ecology in the subjects taught in the curriculum, have not been able to motivate the educational communities to move to action, that is, to the dialogical and practical meeting between individual concern and personal criteria. The above brings to the scene the need to analyze them critically in terms of effectiveness, impact and

contextual applications to educational, community, social and global scenarios (Burgos, 2017; Obando, 2011; Porras et al., 2008; Torres, 2011; Velásquez & Leal, 2012).

Therefore, it is difficult for adolescents to understand the negative ecological impacts, beyond their immediate perception, which results in a lack of solidarity with the environment, as well as resistance to thinking about the medium and long term consequences. This is evident in different studies, which identify the educational stagnation regarding the environmental issue, in the lack of ecological knowledge in context in students, and in the difficulties of cooperation between communities to mitigate and prevent negative ecological impacts (Martínez et al., 2008; Obando, 2011; Pita-Morales, 2016; Porras et al., 2008). Likewise, this can generate biased ideas about remediation from an individual dimension, which is associated more with personal concern than with collectively elaborated criteria. Ergo, there are difficulties for the generation of a robust ecological awareness, which transits from the identification of the problem to the construction and application of reparative environmental measures, by all social actors co-responsible for such impacts. The research found that, between individual concern and personal criteria, there are certain important elements for the development of environmental awareness, such as: knowledge about Waste, Energy, Recycling, Spaces and Biodiversity, however, there are also three necessary elements that are little taken into account, or scarcely developed, which are: transportation, water and noise.

This is somewhat contradictory, since all "urban and rural" communities are called upon to identify these impacts in a timely manner, and even more so when contact with noise and transportation are so direct in the urban area; perhaps this does not happen because of the high level of integration of pollution in the urban landscape, as well as the scarce political-social-collective participation in the processes of environmental care. In all cases, the central issue gravitates around the understanding that the management of environmental pollution should be installed in the framework of collective responsibility, and this includes the action of all social institutions, while the timely identification of the impacts of such pollution on the quality and perspective of life of human communities and other biotic systems (De la Caridad, 2013; Estrada, Gallo, & Nuñez, 2016; Valencia & Suaréz, 2010). Of course, it is worth considering that the scarce sensitivity is also associated with an inappropriate anchoring of environmental repair, which can be collectively built as an anthropo-ethical-political

criterion, where elements of responsibility, care and repair are dialogically combined, integrated to a mental ecology -ecologized consciousness- of the global as repair, acquisition and transmission of legacies of care, hospitality and planetary solidarity.

Both individual concern and personal criteria are key for the transition to ecological action and, therefore, in the development of an ecological environmental awareness, which understands ecology from the multidimensionality of both the phenomenon and the collective reparatory actions necessary for the positive impacts to be greater than the negative ones, and the criteria of self-sustainability and environmental care to influence students in early forms of ecological action and reparation. In this regard, Edgar Morin (1996, 1999) points out that ecological thinking is a thinking that acts and mobilizes knowledge for the benefit of humanity and the common good, which means that ecological consciousness is at the same time an anthropoetic consciousness. Hence, families, communities and educational institutions have the historical, cultural and bioethical obligation to strengthen, protect and improve environmental education, while providing scenarios, tools, strategies and knowledge to redefine what is understood by pollution, environment, ecology, ecological awareness, cooperation and environmental self-sustainability, which can collectively amplify the measures implemented to repair the damage to ecosystems.

## Conclusions

The ecological knowledge prevalent in order of importance in the population investigated were: recycling, knowledge about chemicals and transportation, as well as water, spaces, pollution and energy. Personal criteria regarding the environment is greater than individual concern, which may be due to the fact that individual concern is formed from the actions that the subjects can implement regarding a problem, on which they take specific actions and measures, and as this happens very little, the personal criteria inscribes them in knowing, but very little in doing.

Both individual concern and personal criteria coincide in that the knowledge most strengthened by adolescents in school are: waste, energy, recycling, spaces and biodiversity, with space being the most important in terms of individual concern, while in the personal criteria, biodiversity is the most important. With respect to the knowledge that is not strengthened given the scarce knowledge they have about them, it was found that these are: transportation, water and noise.

It is striking that an element such as water, which has a strong implication in environmental awareness, presents low correlations. In this aspect, it is important to consider elements of information that are strengthened by a low perception of the decrease or contamination of water in the scenarios that adolescents inhabit. Correlatively, waste, energy and biodiversity, being themes strongly supported by the media and some ecological projects, are very much anchored to the ideas and knowledge of adolescents.

There are no significant differences by gender in terms of personal criteria and individual concern. However, individual concern is greater in the ninth and eleventh grades, where adolescence is in formation, and in the eleventh grade, where adolescence is closing its cycle to enter youth. Both moments are crucial for the formation of personal character, and with it the solidity of a green environmental awareness. This means that ecological knowledge and practices should be strengthened at all stages of development, but it is at the beginning and end of adolescence where they are strengthened to a greater degree.

Finally, it is observed that there is a perception that the educational institution strengthens environmental awareness through educational guidelines to care for the environment, however, they do not point out the implication of this knowledge in the classes received, nor is the transition to ecological praxis visible; these elements require further investigation in future research. Environmental education and social and family reinforcement with respect to environmentalized behaviors constitute the basis for forming personal criteria and individual concern, which is why it is imperative to work on better ways of educating in an environmentalized manner.

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