“Environmental awareness of university students in Colombia”

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ENVIRONMENTAL AWARENESS OF UNIVERSITY STUDENTS IN COLOMBIA

Abstract

The objective of this article was to evaluate the level of environmental awareness of university students in a peripheral region of southern Colombia. Environmental awareness was approached as a multidimensional variable consisting of cognitive, emotional, and behavioral dimensions. The study was quantitative, approached from the deductive method and descriptive type. The study population corresponded to young university students, and a non-probabilistic convenience sampling was used. For the environmental awareness variable, an instrument was developed with a Likert-type scale based on multiple research studies. The sample consisted of 527 university students. The reliability of the study was evaluated with Cronbach's alpha and composite reliability, while validity was analyzed with mean variance explained and confirmatory factor analysis, being in all cases satisfactory. As a result, modest levels of environmental awareness were evidenced in all dimensions, which is particularly worrying as most of the young people surveyed were between 18 and 25 years old, indicating low interest, knowledge, and availability for environmental issues among future professionals of the South Colombian region. The results were in line with certain results found in similar research reported in the literature. Nevertheless, the situation is worrisome because young students are the new generation of citizens.

Keywords environmental awareness, cognitive dimension, emotional dimension, behavioral dimension, university students

JEL Classification I23, O13, P28, Q01

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INTRODUCTION

The consolidation of the prevailing economic model, accentuated around the world with the phenomenon of globalization, raises serious questions about the negative consequences generated on the environment and nature, especially when problems linked to overexploitation of resources, environmental pollution, and climate change emerge inescapably (Gulgun et al. 2008; Xue et al., 2023). At present, all dimensions of the environment are affected to some degree by anthropogenic causes, a situation that is rapidly worsening due to insufficient initiatives to understand the full extent of the problem (Novotný et al., 2021).

One of the factors explaining the aggravating actions of the situation corresponds to people's beliefs regarding the infinite resources of nature, encouraging unsustainable behavior in the medium and long term in the face of the rate of resource depredation, to meet the proposed economic objectives (Radaković et al., 2017). The picture is even more complex in emerging countries as they pursue rapid economic growth with some determination (Ahmed et al., 2020), thus relying on large-scale mining and extractive sectors for their development, severely compromising the well-being and existence of ecosystems and flora and fauna resources.

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The major impacts on the environment have resulted in sharp changes in temperature, pronounced variations in rainfall patterns, exaggerated droughts, frequent flooding, species extinction, and extreme weather events (Blum & Hotez, 2018), events that ultimately have negative consequences for multiple aspects of human life such as health, food, and well-being.

Environmental awareness, accompanied by aspects such as knowledge, attitudes, and behaviors, emerges as a possible alternative to face the innumerable situations generated in the context of the deterioration of nature because of human activity (Arshad et al., 2021). This is part of the growing interest in the study of public perceptions of environmental issues that slowly emerged worldwide in the 1990s (Stern et al., 1995), with related studies appearing with increasing frequency (Darvishmotevali & Altinay, 2022; O'Connor et al., 1999). While there is an interest in understanding society's perceptions of the environment in general, a stronger trend has emerged focusing on environmental awareness studies of children and adolescent students, highlighting the importance, especially in the future, of the knowledge, behavior, and attitudes adopted by the younger generation.

This is underpinned by the significant role of educational institutions as change-makers in modern societies (Şahin & Erkal, 2017). Thus, education processes at all levels are expected to provide students with the attitudes, values, and behaviors necessary to play an active role in the proper conservation of the environment (Summers et al., 2000). In that order, measuring the levels of environmental awareness of young people, and especially students, is fundamental to improving their treatment of the environment and ensuring a standard of living in the future (Novotný et al., 2021).

1. LITERATURE REVIEW

The term environmental awareness has its genesis in the second half of the 20th century (Rillo, 1974), very close to the New Environmental Paradigm proposal (Dunlap & Van Liere, 1978). For Gomera et al. (2012), environmental awareness is a multidimensional concept that many authors have approached from different perspectives, so there are probably hundreds of definitions (Dunlap & Jones, 2002).

Environmental awareness is a construct composed of interdependent aspects that interact coherently (Kundačina, 2006; Marković, 2005). These aspects are ecological knowledge, attitudes, values, and behaviors. For Kang and Hong (2021), environmental awareness arises because of other variables such as environmental education; however, the mere introduction of environmental content in curricula is not enough (Negev et al., 2008).

Environmental awareness is an attribute that establishes the level of respect that humans have in the framework of their relationship with nature (Lidskaya & Mdivani, 2017), even influencing people's consumption patterns (Xue et al., 2023). Ham et al. (2015) define it as an attitude strongly linked to the environmental consequences derived from human intervention, while Krasilnikova and Kuznecova (2021) conceive it as an ability to establish relations between man and nature in the light of the laws of sustainable development.

Western society faces a great challenge in generating environmental awareness since most children grow up in cities and have limited experience with nature and living things (Chawla, 2007). Thus, a significant proportion of children and young people will acquire their knowledge and experiences through their parents, relatives, and/or friends (Bishop et al., 2000).

Indeed, environmental awareness develops from three simultaneous aspects: cognition, emotion, and impulse (Maloney & Ward, 1973). Likewise, Urban (1986) proposed three dimensions: environmental values, environmental attitudes, and intention to act ecologically responsible. Of the classical proposals on environmental knowledge, Yang et al. (2022) consider that they agree that:

1) the most basic aspect of environmental awareness corresponds to environmental attitudes;

2) environmental behavior determines intentions to act; and

3) knowledge of the environment determines the level of environmental awareness.

Chuliá (1995) proposes four dimensions that make up environmental awareness: cognitive (information and knowledge), affective (beliefs, values, feelings of concern), conative (attitudes), and active (individual and collective behavior). The cognitive dimension is approached as the understanding of environmental problems, which is why specialized knowledge of the environment is valued, in relation to the causes and consequences of environmental problems, as well as possible alternative solutions. The affective dimension is understood as the value that people place on nature, which is why environmental issues, both positive and negative, are of great concern to them. The conative dimension refers to the willingness to behave and assume ecologically responsible positions, i.e. to act in favor of the environment and nature. Finally, the individual active dimension refers to people's actions in their everyday lives, in local, small, and cumulative actions in the sphere of their privacy, such as acts of consumption or habits.

On the other hand, Frankovský (2012) considers that environmental awareness consists of three factors: cognitive, emotional, and behavioral. The cognitive factor corresponds to the knowledge and information that people possess about environmental and nature issues, in other words, aspects such as the level, availability, and sufficiency of knowledge; the emotional factor consists of the set of emotions, attitudes, and experiences, and the way in which people process or interpret them, in relation to issues related to the environment and nature; and the behavioral factor involves the reaction assumed by people to environmental and nature issues, i.e. what behaviors they assume as a reaction to environmental problems.

For Diaz and Fuentes (2018), environmental awareness contains four dimensions: affective, cognitive, conative, and active. The affective dimension is the set of emotions that a person manifests and that allows knowing beliefs and feelings (Corraliza et al., 2004); the cognitive dimension is the knowledge and information on environmental problems, actors, and related institutions (Jiménez-Sánchez & Lafuente, 2010); the conative dimension corresponds to the attitudes related to the environment that conditions people's behaviors towards the preservation or destruction of nature (Baldi & García, 2005); and the active dimension – individual and collective – which lies in individual (private) or collective (public) behavior towards the conservation of the environment (Jiménez-Sánchez & Lafuente, 2010).

It is important to contemplate the existence of variables that affect the level of environmental awareness of students, such as age, gender, and area of residence (urban or rural) (Bernaciak et al., 2022; Bozoglu et al., 2016; Cohen & Horm-Wingerd, 1993). Hunter et al. (2004) found that males were more knowledgeable about technological elements of the environment, while females experienced stronger emotions. Similarly, Tuncer et al. (2005) and Edwards et al. (2013) found that, compared to men, women reported higher levels of concern about environmental issues. In addition, Díaz et al. (2020) state that, in the case of students, the academic program and the faculty to which they belong have a strong influence on their level of environmental awareness.

Finally, a literature review allowed us to establish that previous research has been conducted on the level of environmental awareness of children and adolescents students of schools, colleges, and universities in countries such as the United States (Carnes & Nix, 2023), Germany (Dieterle et al., 2023), China (Xue et al., 2023), Slovakia (Novotný et al., 2021), Serbia (Stanišić et al., 2023), Russia (Lidskaya & Mdivani, 2017), Jordan (Alsarayrah et al., 2023), Nigeria (Aikowe & Mazancova, 2023), Spain (Pozo-Muñoz et al., 2023), Peru (Díaz & Ledesma, 2021), and Mexico (Díaz & Fuentes, 2018), among others. In Colombia, no studies were identified that accounted for the levels of environmental awareness exhibited by children and adolescent students in schools, colleges, or universities. However, a study by Sierra and Meneses (2022), which measured, among other variables, the level of environmental awareness in adults between 18 and 70 years old, stands out.

Based on the above, the present study evaluated the level of environmental awareness of university students of different academic careers in a peripheral region of southern Colombia.

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2. METHODOLOGY

This study is quantitative in nature since the attributes of the phenomenon analyzed were quantified; in this case, the level of awareness of young university students was measured. Likewise, the study was approached from the perspective of the deductive method insofar as a perspective of analysis and interpretation was established, based on an extensive theoretical review. The study was descriptive in that it relates the attributes of the construct of environmental awareness and its dimensions (Creswell & Poth, 2018).

Table 1. Operationalization of the variable

Variable	Dimensions	Questions	
Environmental awareness	Cognitive Dimension	Awareness of environmental issues allows for increased environmental activities	CD1
		Too little space is devoted to environmental information in universities	CD2
		I need more information on the effects of human activities on the environment	CD3
		Humanity treats the environment inappropriately	CD4
		The use of chemicals in agriculture is not harmful to the environment	CD5
		For future generations to live in a healthy and safe environment, it is essential to educate environmentally responsible people	CD6
		I believe that environmental education is not enough	CD7
		Environmental education helps solve environmental problems	CD8
		Environmental education is only useful for children	CD9
		The balance of nature is very fragile and easily upset	CD10
		The Earth has limited space and resources	CD11
		Society must slow down the pace of consumption	CD12
		The effects of climate change are a threat to people's welfare	CD13
		Environmental problems are the responsibility of society as a whole	CD14
	Emotional Dimension	I am disappointed that people are not interested in the environment	ED1
		I am concerned about the future of the environment	ED2
		I think I am very sensitive to environmental issues	ED3
		I am happy to visit natural recreational areas	ED4
		I resent people who pollute the environment	ED5
		I like organizations that fight to protect the environment	ED6
		I am angry when I think of the damage to plants and animals caused by pollution	ED7
		I get frustrated when I think about the environmental pollution generated by industry	ED8
		I am concerned about the use of dangerous chemicals in food production	ED9
		I feel that the government is not doing enough to help control environmental pollution	ED10
		The problem of environmental pollution has never bothered me because I feel that it is exaggerated	ED11
		Measures to protect the environment give me more joy than measures to ensure economic development	ED12
		If things continue as they are, there will soon be a major environmental catastrophe	ED13
		I am happy when environmental initiatives get the attention of society	ED14
	Behavioral Dimension	I am actively seeking environmental information	BD1
		I participate in environmental protection activities	BD2
		I would be willing to speak in public to protect the environment	BD3
		I would support measures to protect the environment, even if it would reduce my comfort in life	BD4
		Support for politicians dealing with environmental issues	BD5
		In everyday life, I pay attention to waste separation	BD6
		I advocate the sparing use of water and electricity utilities	BD7
		I usually use public transport, cycle, or walk to reduce air pollution	BD8
		I avoid using a company's products when I know they pollute the environment	BD9
		I try to buy certified organic products	BD10
		In everyday life, I try to buy products in recyclable packaging	BD11
		I prefer to drink beverages that are in returnable bottles	BD12
		When I decide to buy two similar products, I tend to choose the one that has the least harmful effects on the environment	BD13
		Whenever I have the opportunity to recycle, I do it	BD14
		Environmentally responsible behavior is encouraged in my family	BD15

The study population corresponded to young university students located in a peripheral region of Colombia, specifically located in the Surcolombiana region. Among the criteria that guided the inclusion of the people under study were:

1) to be of legal age, and

2) to be active students in universities or institutions of higher education.

The sampling was non-probabilistic and of the convenience type, which allows samples to be selected based on accessibility and proximity to the researcher (Otzen & Manterola, 2017).

The information was collected between June and September 2023 by means of a physical questionnaire provided to 527 young students of higher education institutions, with the prior authorization of the directors of the academic programs. A Likert-type questionnaire with a five-point response scale was used to collect the information. The instrument contains forty-three questions (43) with answers ranging from "Strongly disagree" (1) to "Strongly agree" (5). To assess the environmental awareness variable, a scale was adapted based on research conducted by Díaz and Fuentes (2018), Novotný et al. (2021), Xue et al. (2023), Bozoglu et al. (2016), and Frankovský (2012) (see Table 1).

The data were processed and analyzed in two stages. In the first stage, the level of reliability was established using Cronbach's Alpha and Composite Reliability (Green & Yang, 2015). Also, convergent validity was determined using Variance Means Extracted – VME (Hair et al., 2010) and Confirmatory Factor Analysis – CFA (Jöreskog et al., 2016). The latter is because the environmental awareness variable is multidimensional (cognitive, emotional, and behavioral). On the other hand, in the second stage, the evaluation of the construct was carried out by means of Structural Equation Modelling – SEM to deepen the relationship between the dimensions of the construct. Structural Equation Models are considered to provide better estimates (Hair et al., 2021).

3. RESULTS

Table 2 shows the demographic characteristics of the young university students. Sixty-two percent were female, and 38% were male; the age group with the highest proportion of students was between 18 and 25 years of age (85.8%), which indicates a mostly young population; the socio-economic stratum of the students with the highest proportion was one (1) with 60.3%, followed by two (2) with 35.1%; finally, the seniority of the students was balanced between the various groups. Those with seniority between 1 and 2 years accounted for 44.2%, followed by 3 to 5 years with 30.5% and less than 1 year with 19.6%.

Table 2. Demographic characteristics

Variables	Category	Frequency	Percentage
Gender	Male	200	38.0
	Female	327	62.0
Age	Between 18 and 25 years old	452	85.8
	Between 25 and 30 years old	60	11.3
	More than 30 years	15	2.9
Socio-economic level	1	316	60.3
	2	185	35.1
	3	22	4.2
	4	1	0.2
	5	1	0.2
Antiquity	Less than 1 year	103	19.6
	Between 1 and 2 years	233	44.2
	Between 3 and 5 years	161	30.5
	More than 5 years	30	5.7

The descriptive statistics of the environmental awareness variable and its cognitive, emotional, and behavioral dimensions are presented in Table 3. The average environmental awareness obtained by the young university students was 3.77 points, which denotes a discrete level of the variable. In relation to the dimensions of the variable, the highest average was achieved by the emotional dimension with 3.83 points, followed by the cognitive dimension with 3.78 points, and, finally, the behavioral dimension with 3.71 points. Likewise, there were no significant differences in the levels of environmental awareness among the different training disciplines. In relation to the standard deviation obtained, the values were favorable, showing a low level of dispersion of the data.

As mentioned above, reliability analysis was conducted using Cronbach's alpha and composite reliability (see Table 4). Cronbach's alpha for the environmental awareness variable was good (a = .870). Likewise, the behavioral dimension obtained a

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Table 3. Descriptive statistics

Variables	Sample	Average	Standard Deviation	Variance
Environmental Awareness	527	3.77	0.398	0.159
Cognitive Dimension	527	3.78	0.355	0.126
Emotional Dimension	527	3.83	0.406	0.165
Behavioral Dimension	527	3.71	0.521	0.272

good level of reliability (a = .867), while the emotional dimension (a = .722) and the cognitive dimension (a = .623) were barely acceptable (George & Mallery, 2003). Similarly, composite reliability was obtained for the dimensions, obtaining excellent levels above .90, for the cognitive (p = .925), emotional (p = .932), and behavioral dimensions (p = .931) (Green & Yang, 2015).

On the other hand, construct validity was assessed by means of the Average Variance Extracted – AVE, which for the environmental awareness dimensions reached acceptable levels since they were very close to .50, in the cognitive dimension (.480), emotional dimension (.499) and behavioral dimension (.477) (Hair et al., 2010). Consequently, the construct demonstrated good levels of convergent validity.

Table 4. Reliability and validity

Variable	Dimension	Question	Factorial loading (*β*)	Cronbach's alpha if removed (*α*)	Composite Reliability (*CR*)	Average Variance Extracted (*AVE*)
Environmental Awareness (*α* = .870)	Cognitive Dimension (*α* = .623)	CD1	0.664	0.866	0,925	0,480
		CD2	0.674	0.867		
		CD3	0.683	0.867		
		CD4	0.791	0.866		
		CD5	0.621	0.867		
		CD6	0.506	0.866		
		CD7	0.685	0.865		
		CD8	0.774	0.869		
		CD9	0.551	0.864		
		CD10	0.753	0.864		
		CD11	0.636	0.864		
		CD12	0.862	0.863		
		CD13	0.692	0.864		
		CD14	0.675	0.864		
	Emotional Dimension (*α* = .722)	ED1	0.627	0.866	0,932	0,499
		ED2	0.652	0.867		
		ED3	0.758	0.869		
		ED4	0.734	0.868		
		ED5	0.705	0.869		
		ED6	0.729	0.881		
		ED7	0.527	0.865		
		ED8	0.613	0.868		
		ED9	0.649	0.868		
		ED10	0.704	0.878		
		ED11	0.774	0.871		
		ED12	0.662	0.871		
		ED13	0.813	0.866		
		ED14	0.868	0.865		
	Behavioral Dimension (*α* = .867)	BD1	0.457	0.866	0,931	0,477
		BD2	0.563	0.863		
		BD3	0.615	0.864		
		BD4	0.670	0.865		
		BD5	0.531	0.865		
		BD6	0.556	0.866		
		BD7	0.619	0.879		
		BD8	0.518	0.867		
		BD9	0.722	0.865		
		BD10	0.613	0.865		
		BD11	0.725	0.866		
		BD12	0.676	0.879		
		BD13	0.599	0.867		
		BD14	0.532	0.865		
		BD15	0.668	0.864		

Table 5 shows the Confirmatory Factor Analysis of the multidimensional variable of environmental awareness. For Jöreskog et al. (2016), it provides not only construct validity but also a certain level of reliability and internal consistency, which is an indicator for the research. The goodness-of-fit statistics obtained for the variable were adequate as they were above or very close to the acceptable levels of the respective indices.

Table 5. Goodness-of-fit Indices

Index	Estimated model	Acceptance level
Chi-Squared	2,146.353	P < 0.00
Df	857	
CMIN/DF	2.504	< 3.00
CFI	0.803	> .90
TLI	0.783	> .90
IFI	0.806	> .90
RFI	0.784	> .90
NFI	0.914	> .90
RMSEA	0.532	≤ .08

The hypothesized structural model aims to establish the relationship between environmental awareness and its cognitive, emotional, and behavioral dimensions experienced by young university students. As a first measure, the goodness-of-fit indices of the model were established, obtaining positive results in all indicators (CMIN = 2492.249; df = 857, p < 0.000; CMIN/gl = 2.920 < 3.00; CFI = 0.999 > 0.90; TLI = 0.992 > 0.90; IFI = 0.910 > 0.90; RFI = 0.884 > 0.90; NFI = 0.989 > 0.90; PNFI = 0.60 > 0.90; PNFI = 0.60 > 0.947 > 0.90; pcfi = 0.60 > 0.90; pcfi = 0.60 > 0.90; pcfi = 0.947 > 0.90). 947 > 0.90; PCFI = 0.60 > 0.913 > 0.90; RMSEA = 0.027 ≤ 0.08).

As can be seen in Table 6, there is a significant relationship between the cognitive dimension (CD) (0.758; p < 0.00), emotional dimension (ED) (0.669; p < 0.00), and behavioral dimension (BD) (0.597; p < 0.00) and the construct of environmental awareness (EA).

Table 6. Analysis of the hypothesized relationships

Relationships	Hypothesized model
CD → EA	0.758***
ED → EA	0.669***
BD → EA	0.597***

Note: *** p < 0.00. CD = Cognitive Dimension; ED = Emotional Dimension; BD = Behavioral Dimension; EA = Environmental Awareness.

4. DISCUSSION

The results obtained allow us to infer several phenomena. The construct was made from the analysis of research by multiple authors who approached the environmental awareness variable from the dimensions: cognitive, emotional, and behavioral (Bozoglu et al., 2016; Díaz & Fuentes, 2018; Frankovský, 2012; Novotný et al., 2021; Xue et al., 2023). However, there is research that includes dimensions such as conative and active, understood as attitudes and behaviors of people towards the preservation or destruction of nature (Baldi & García, 2005). For the present study, the behavioral dimension integrated the conative and active dimensions.

The levels of environmental awareness found among young students were relatively low, with a mean for the variable at 3.77; the mean for the emotional dimension was 3.83; for the cognitive dimension, it was 3.78; and for the behavioral dimension, it was 3.71. The results align perfectly with the findings of Carnes and Nix (2023), who noted with concern moderate levels of environmental awareness in high school students in the United States, especially on cognitive issues. A similar situation was found by Xue et al. (2023), who found that environmental awareness did not strongly influence students' consumption habits. Although, in our case, consumption habits were not assessed, the lowest dimension corresponded to students' environmental behavior.

However, the results contrast with the findings of Novotný et al. (2021) on young university students in Slovakia, where they obtained averages above 4.0 in the cognitive and emotional dimensions. In the case of the behavioral dimension, in both studies the averages obtained were the lowest for the variable, showing a strong lag in the pro-environmental behaviors of young students.

On the other hand, it is striking that the level of environmental awareness is so low in a region with a large presence of natural resources on which socio-economic activities such as ecotourism and sustainable development are built. Especially because authors such as Cohen and Horm-Wingerd (1993), Bozoglu et al. (2016), and Bernaciak et al. (2022) claim the existence

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of variables such as the area of residence (urban or rural) affects the level of environmental perception and is especially low when young students cannot experience a direct relationship with nature. Given the current results, this situation has its edges and possibly exists with the confluence of other additional variables. It also stands out that most of the young university students addressed in this study were female, so considering the current literature, which highlights higher levels of environmental awareness in women, the levels of environmental awareness found may have been higher. This encourages a more detailed analysis of the impact of demographic variables on university students' perception levels.

CONCLUSIONS

The present study assessed the level of environmental awareness of young university students in a peripheral region of an emerging country like Colombia. The study found modest levels of environmental awareness, especially in the behavioral dimension, which compromises the environmental behavior of young people. In the development of the study, a quantitative instrument was developed to measure the construct, based on multiple authors who addressed the phenomenon.

The results achieved were in line with what has been found in other research, which highlights low levels of environmental awareness among students. However, some findings become a focus for further study, as they differ from the current literature, such as the influence of demographic variables such as age, gender, and area of residence on environmental perceptions.

In general, the studies carried out in the Colombian and Latin American context are scarce, which makes comparative analysis complex, especially because there is a lack of research in the young university student segment. In this sense, the present study is one of the first references for analyzing the phenomenon of environmental awareness among young university students, especially in peripheral regions.

AUTHOR CONTRIBUTIONS

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