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Peruvian middle school students and teachers' environmental literacy dimensions

Alfabetización ambiental de alumnos y profesores de primaria del Perú

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Abstract

The objective of the article has been to determine the relationship that exists between the environmental literacy of the students and their teachers of fifth and sixth grade of primary of the public and private schools of Metropolitan Lima 2019. A survey was applied to 1,396 primary education students, of whom 645 were in the fifth grade and 751 in the sixth grade and its 33 teachers, previously 11 public schools and 7 private schools were selected from all the UGELs of Metropolitan Lima area. According to the results of the research, it was concluded that there is an average level of literacy for students and teachers of 5th and 6th grade of primary education in Metropolitan Lima and a highly significant relationship between the environmental literacy of these students and their teachers , which leads to consider that, if you want to improve the literacy level of students, you must also improve the literacy level of teachers and the teaching of environmental issues be part of the school curriculum.

Keywords: Environmental literacy, environmental awareness, environmental knowledge, environmental attitude, environmental skills actio

Resumen

El objetivo del artículo ha sido determinar la relación que existe entre el alfabetismo ambiental de los alumnos y sus profesores de quinto y sexto grado de primaria de los colegios públicos y privados de Lima Metropolitana 2019. Con dicho propósito se aplicó una encuesta a 1396 alumnos de educación primaria de los cuales 645 fueron de quinto grado y 751 de sexto grado y a sus 33 docentes, previamente se seleccionaron 11 colegios públicos y 7 privados de todas las UGEL de LM.

De acuerdo con los resultados de la investigación, podemos concluir que existe un nivel medio de alfabetización de los alumnos y los docentes de 5° y 6° grado de educación primaria de Lima Metropolitana y que hay una relación altamente

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significativa entre el alfabetismo ambiental de dichos alumnos y sus docentes, lo cual nos lleva a considerar que, si queremos mejor el nivel de alfabetización de los alumnos, debemos mejorar el nivel de alfabetización de los docentes y que, la enseñanza de los temas ambientales, forme parte del currículo escolar.
Palabras clave: alfabetismo ambiental, conciencia ambiental, conocimiento ambiental, actitud ambiental, habilidad y acción ambiental.

INTRODUCTION

Many countries based their environmental agenda on the eradication of poverty, the fight against climate change, the preservation of species and resources (water, soil, and energy), and the reduction of the most ambitious inequalities ever adopted by the international c

ommunity. The United Nations-UN (2015) has compiled statistics from 194 member states focusing on the Sustainable Development Goals (SDG), which are a universal call to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030.

In addition, WHO (2019) states that air pollution is mainly derived from the combustion of fossil fuels, inefficient industrial processes, waste incineration, old fashioned agricultural practices and natural processes such as forest fires, dust storms and volcanic eruptions. Therefore, air pollution is a global public health crisis, because exposure to air pollutants threatens the health of people of all ages, in all parts of the world, both in urban and rural areas, affecting the most vulnerable among us, children, in unique ways.

Regarding air pollution, WHO (2016) concluded that exposure to air pollution is a health emergency that goes unnoticed by children around the world. While such exposure is a persistent problem in some high-income countries, most child deaths from exposure to air pollution by particles are generated in low-middle-income countries. Children of all ages are at a higher risk than adults due to the numerous adverse health effects of air pollution, including a combination of behavioral, environmental, and physiological factors. In addition, they breathe faster than adults, absorbing more air and, with it, more pollutants. Children live closer to the ground, where some pollutants reach maximum concentrations. They can spend a lot of time outside, playing and doing physical activity in potentially polluted air. Their bodies, and especially their lungs, develop rapidly and, therefore, are more vulnerable to inflammation and other damage caused by contaminants. But children depend entirely on us, adults, to protect them from the threat of unsafe air, because as adults we have a responsibility to find alternative solutions.

Santa Gadea (2013), from a climate perspective, points out that the Latin American and Caribbean region, and especially Lima, has a challenge to establish various strategies for the effects of adaptation and mitigation. One of the most important long-term strategies is environmental education. Thus, Peru, in its characteristics of informal governance, with a state policy that privileges even the extraction of minerals and extractive activities, is required to implement environmental education to establish the links between the ecological, socio-cultural and economic components, as well as face the deterioration of the environment.

Peru's centralist policy historically, has located Lima as a node that consumes most of its resources, has always been the center of attraction of migration from the countryside to the city because it offers better life expectations, including health and education, compared to

the reality of other places in the rest of the country.

In that sense, MINEDU (2012) approved the National Environmental Education Policy by Supreme Decree No. 017-2012-ED. This national policy is the instrument that provides the specific and instrumental guidelines necessary for the implementation of the National Environmental Education Policy and compliance standards. Likewise, its general objective is to develop environmental education and culture, oriented towards the formation of an environmentally responsible citizenship and a sustainable, competitive, inclusive and identity Peruvian society. The environmental approach is applied through the formal and non-formal education system, as well as the economic and social dynamics of the national public and private sector.

After four years, MINEDU (2016) in close collaboration with the Ministry of Environment (Ministerio del Ambiente (MINAM) developed the National Environmental Education Plan (Plan Nacional de Educación Ambiental (PLANEA) 2015-2021 approving it in the framework of the 2030 Agenda for Sustainable Development. PLANEA's mission is to promote environmental education and culture that allows the formation of environmentally responsible citizens who contribute to sustainable development and address climate change at local, regional, and national levels. To do this, it specifies the efforts and commitments of different public and private institutions and organizations that, working under the creative and integrative knowledge dialogue and respecting the gender and intercultural approach, manage to maintain and implement innovative educational and communication practices to build a sustainable society, competitive, inclusive and with identity. It is important to note that PLANEA formulated three strategic axis (EE): educational community competencies for healthy and sustainable lifestyles (EE1), citizen commitment to sustainable development (EE2), and institutional commitments for development and sustainable societies under the strategic axis (EE3). Thus, it becomes a challenge for Peru to achieve a "high degree of environmental awareness and culture" or an "appropriate environmental culture" via a participatory, multiscenary and transgenerational educational process. It then proposes a pedagogical strategy that forms environmental values in the classroom, school and, above all, in community life. Education should contribute to training Peruvians as citizens capable of: a) critically think on their environment and the country; b) commit to sustainable development and the improvement of our society, and c) build a democratic, inclusive and well-being system for all (MINEDU, 2016).

In Peru, environmental education is formulated in the Basic Education Curriculum of Peru (MINEDU, 2016a) as part of its seven transversal approaches, mainly in the cross-sectional approach number five called the environmental approach. The environmental approach indicates that the educational processes are oriented towards the formation of people with critical and collective awareness about the environmental problem and the condition of climate change at local and global level, as well as about their relationship with poverty and social inequality. In addition, it involves developing practices related to the conservation of biodiversity, soil and air, the sustainable use of energy and water, the valuation of services provided by nature and terrestrial and marine ecosystems, the promotion of patterns of responsible production and consumption and the proper management of solid waste, the promotion of health and well-being, adaptation to climate change and disaster risk management and, finally, to develop healthy and sustainable lifestyles.

The Basic Education Curriculum of Peru (MINEDU, 2016a) concludes that where the implementation of the environmental education has begun is elementary school, it is therefore important to monitor how these processes

are being developed to propose trends in the medium and long term.

MINAM (2014) has retaken the Global Learning and Observation to Benefit the Environment (GLOBE) Program in 2012 as a valuable tool to promote environmental culture in schools and promote participation in the solution of problems associated with climate phenomena, the management of water resources and biodiversity management. GLOBE is promoted worldwide by international scientific institutions such as the National Aeronautics and Space Administration (NASA), the National Oceanographic Administration and Atmospheric (NOAA), the University Corporation for Atmospheric Research (UCAR) among others, and is aimed at primary and secondary level educational institutions. It was established in 1995 and has the participation of more than 30,000 teachers from around 30,000 schools in 119 countries until January 2018.

In Peru, more than 50 schools nationwide are participating, and students advised by their teachers monitor a series of environmental variables. For example, they track the evolution of weather, building a database from it. Then they carry out research using these data, interpreting and relating it to other events or phenomena happening in their local environment. Research results are disseminated and made available to the community nationally and worldwide. This also promotes the development of future scientific vocations in students. In order to make the GLOBE Peru Program sustainable, it is necessary to empower schools, professors and teachers in scientific practice and environmental research, to encourage regional and local governments aware as well as to environmental promoters to support this initiative, generating alliances with the private sector committed to the development of environmental sciences in the country.

For Peruvian people to be aware of the importance of caring the planet, the mandatory starting point is to increase the awareness, knowledge, attitude, skills, and action (AKASA model) of children and teachers in relation to environmental problems. In addition, Peruvian students between 11 and 12 years old, who study in fifth and sixth grade (these grades represent cycle V) of primary school prioritize interdisciplinary learning.

For Piaget (1972), this happens because students between the ages of 11 and 12 will soon have a transition from elementary school to high school, so they must develop their ability to reason independently and hypothetically. Goswani (2001) also states that children, especially those from 6 to 12 years old, learn new skills and try to "obtain recognition by producing things" that have been able to generate a satisfactory experience.

Based on this background, Latin American cities, including Lima, should develop an action plan with the objective of promoting environmental education to enable their citizens to contribute to reducing pollution, due to its negative effects on global warming.

Theoretical Background

The Intergovernmental Conference on Environmental Education (EE) of Tibilisi, Georgia carried out between October 14 and 26, 1977, it established the following categories of EE objectives: 1. Awareness: to help social groups and people to acquire awareness and sensitivity towards the total environment and their allied problems 2. Knowledge: to help social groups and individuals acquire a variety of experiences and acquire a basic understanding of the environment and its associated problems 3. Attitudes: to help social groups and individuals to acquire a set of values and feelings of concern for the environment and motivation to actively participate in the improvement and protection of the environment 4. Skills and action: to help social groups and people to acquire the skills to identify and solve environmental problems and an opportunity to actively participate at all levels in

the work towards solving environmental problems. (United Nations Educational, Scientific, and Cultural Organization, Unesco, p. 30).

Education for Sustainable Development (ESD) empowers people to change their thinking and work towards a sustainable future. There is a growing international recognition of ESD as an integral element of quality education and a key facilitator of sustainable development. The SDGs adopted by the world community for the next 15 years include ESD (UN, 2015). The SDG 4, "quality education", explains that it is important to ensure inclusive, equitable and quality education and promote lifelong learning opportunities for all (UN, 2015). MINEDU (2016) visualizes and shapes the rights of students to learn in response to the current challenges and the various needs, interests, aspirations, values and ways of thinking, to interconnect with the environment and ways of life valued by Peruvian society and considers that, in Peru, there is little support for EE goals in the school curriculum.

The implementation of the different learning purposes in the Peruvian curriculum has seven interdisciplinary approaches on which the environmental approach is based. This transversal approach provides general conceptions about people, their relationship with others, with the environment and with shared space. This is transformed into specific ways of acting, constituting values and attitudes that students and teachers should strive to demonstrate in school activities.

In addition, MINEDU (2016a) has the PLANEA 2017-2022, an instrument of governance developed through an extensive process of analysis, participation and national consultation led by MINEDU and MINAM with the active participation of public sector entities and civil society. PLANEA was implemented at the national level and has the participation of several sectors of the three levels of government (national, regional and local), the private sector, civil society organizations and citizens.

Martin (1975, p. 16) defined environmental education as "a process of identifying values and concepts to develop skills and attitudes necessary to understand and appreciate the interrelation between man, his culture and his biophysical environment". In his opinion, this "implies practice in decision-making and self-formulation of a code of conduct on issues related to environmental quality". Ernst and Monroe (2006) argued that environmental education is the continuous process of development of human beings, in which they are concerned about global environmental problems, and that they have awareness, attitudes, knowledge, skills and actions to find solutions to contemporary problems.

Gonzales-Gaudiano and Lorenzetti (2009) argued that, in the case of Brazil and Mexico, the increasing number of postgraduates in EE, both in master's and doctoral level research, have contributed significantly to research in this field. A similar situation occurs in Colombia, Venezuela, and Cuba, although in smaller numbers. In Mexico, every two years EE conferences are organized around the National Academy of Environmental Education (Asociación Nacional de Educación Ambiental - ANEA), created in 2000 (Avanzi & Silva, 2004). The Environmental Education magazine issues a study every ten years of the state of knowledge of each of the areas recognized by the Mexican Council of Educational Research, In the last four decades, four non-governmental organizations have developed case studies in the departments of Lima and Cuzco, highlighting environmental activities, solutions through participatory processes with the communities involved, and conclusions from their work (Chauvin, 2000).

Join with the concept of EE arises the concept of environmental literacy (EL), to refer to the process of equipping people with the necessary knowledge to know, understand and face environmental problems that are increasingly serious (Liu y Guo, 2018). Dinsinger and Roth (1992) defined a person's environmental literacy, as it relates their values to knowledge to generate action.

O'Brien (2007, p. 13) defined environmental literacy as the set of "understandings, skills, attitudes and mental habits that enables people to relate positively to their environment and to take daily and long-term actions to maintain or restore sustainable relationships with other people and the biosphere". And he believes that the essence of EL is the way in which people "respond to the questions we learn to ask about our world and our relationship with it; the ways we search and find answers to those questions; and the ways we use the solutions we have seen.".

Table 1 shows twenty-one articles on the behavior, attitude or levels of knowledge of students of different ages, countries and school grades, on environmental literacy.

Tabla 1
National Studies of Individual Regions or Countries

Author	Country	Sample derived fron	Methodology	Sample size
Alp, Ertepinar, Tekkaya, and Yilmaz (2006)	Turkey	11 to 17 years old	Quantitative	1977 students
Barrett and Kuroda (2002)	Japan	High school students	Quantitative	1009 students
Bradley, Waliczek, and Zajicek (1999)	USA	High school students	Quantitative	475 students
Eagles and Demare (1999)	Canda	The sixth grade students	Quantitative	72 students
Gambro and Switzky (1996)	USA	High school students	Quantitative	2900 studentes
Gambro and Switzky (1999)	USA	High school students	Quantitative	2200 studentes
Gigliotti (1994)	USA	Undergraduate students	Quantitative	1,050 effective mailed back questionnaires
Hampel, Holdsworth, and Boldero (1996)	Australia	15 or 16 yerars old students	Quantitative and quantitative	661 students
Hodgkinson and Innes (2001)	Australia	The first yerars old students	Quantitative	391 students
Ivy, Lee, and Chuan (1998)	Singapore	Upper seccondary and junior college	Quantitative	1256 students
Kaplowitz and Levine (2005)	USA	University studentes	Quantitative	19890 students
Korhenen and Lappalainen (2004)	Madagascar	Eight to 21 years old	Quantitative and quantitative	400 students
Kuhlemeier, Huub Van Den, and Nijs (1999)	Netherlands	Upper seccondary school students	Quantitative	9000 students
Makki, Abd-El-Khalick, and Boujaoude (2003)	Lebanon	Upper seccondary school	Quantitative	660 students
Mogenson and Nielsen (2001)	Denmark	Primary, secondry and upper seccondary students	Quantitative	845 students
Negev, Sagy, Garb, Salzberg, and Tal (2008)	Israel	The sixth and 12th grade studentes	Quantitative	3121 students
Pawlowski (1996)	Poland	University studentes	Quantitative	200 students
Said, Yahaya, and Ahmadun, (2007)	Malaysia	Age distribution from 15 to 17 years old	Quantitative	306 students
Salmivalli (1998)	Finland	Age distribution from 10 to 15 years old	Quantitative (focus group)	183 students
Sivek (2002)	USA	High school students	Qualitative	64 students
Tuncer, Ertepinar, Tekkaya, and Sungur (2005)	Turkey	Last year secondary and the first year college	Quantitative	1497 students

Fuente: Mifsud (2012)

Eagles and Demare (1999) demonstrated, in early research of 6th grade Canadian students, that environmentalist and moralistic attitudes towards the environment correlated with talking about the environment at home, watching movies and reading about the environment. These students did not have a previous EE program, but they traveled to a Young Men's Christian Association (YMCA) camp before their teachers administered the survey. The results showed that there was a positive correlation between the student's environmental participation and the environmental attitude score. However, these data do not represent whether attitudes preceded the behavior, or if participation in the YMCA activity created the attitude.

Alp, Ertepinar, Tekkaya and Yilmaz (2006) studied the environmental knowledge and attitudes of sixth to tenth grade students in Turkey, showing that women were more apprehensive about environmental issues and that, as the level of instruction increased, knowledge about the subject was higher.

Alaydin, Demirel, Altin and Altin (2014) showed that the majority of low-income students in Turkey, who took a course on environmental issues at school, had a greater environmental and recycling awareness than students of a middle socioeconomic level.
Karpudewan, Roth and Syahrir Bin Abdullah (2015) proved, in Malaysia, that climate change activities focused on 11-year-olds had helped students understand the issues related to global warming.

MATERIALS AND METHODS

The research has a quantitative approach of non-experimental and cross-sectional design. The sampling frame was obtained from the Education Quality Statistics (ESCALE) of the Ministry of Education (2018) that contains data on the student and teacher population of Metropolitan Lima area (ML), which is made up of seven Local Educational Management Units (UGEL). Only fifth and sixth grade students (between 11 and 12 years old) were considered, with a total population of more than 60 students and with teachers or tutors who were in charge of science and environment courses, both from public schools and private. Thus, 11 public and 7 private schools were selected from all UGELs in ML.

The applied survey that we call the Peruvian Environmental Literacy Assessing Tool (PELAT) is an adaptation of the Instrument for Environmental Literacy Middle School (MSELI), prepared by McBeth, Hungerford, Marcinkowski, Volk, and Meyers (2008) and used in the United States of America for its annual secondary education censuses. The survey was applied to 1,396 students of which 645 were fifth grade and 751 sixth grade and 33 teachers or tutors at their position.

The survey for students contained a set of general data (age, sex, residence and district of study, type of school, number of teachers, number of people who work and live with the student); a part I that evaluated the environmental awareness dimension, a part II to evaluate environmental knowledge; a part III to measure the environmental attitude and a part IV that evaluated the abilities and the action in environmental matters, while the Teacher Survey collected demographic data on participating teachers as well as their views on the environment and environmental education.

To test the reliability of the survey, Cronbach's Alpha was used, which for fifth grade students yielded a value of 0.707, for sixth grade students, it yielded a value of 0.856 and for teachers yielded a value of 0.715.

With the data collected, a database was created using SPSS Version 25 software, it was realized descriptive and inferential statistics. The chi-square test was used to test the hypotheses given the qualitative nature and the number of data collected and it was considered a significance level of 5%, a margin of error of 5% and for a maximum variance

RESULTS

Descriptive results

Table 2 reports the response of the surveyed students of 5th and 6th grade of primary school on the environmental awareness dimension. The majority of the surveyed students in 5th grade (61.7 %) and 6th grade (55.5 %) answered correctly to the questions asked, which is interpreted in the sense that most of them are aware of environmental problems.

Tabla 2
5th and 6th grade students' environmental awareness

Type	5th graders		6th graders	
	n	%	n	%
Incorrect answers	247	38.3	334	44.5
Correct answers	398	61.7	417	55.5
Total	645	100.0	751	100.0

Table 3 shows the response of the surveyed students of 5th and 6th grade of primary school on the environmental knowledge dimension. It was observed that the majority of the surveyed students of 5th grade (62.5 %) and 6th grade (79.8 %) answered correctly to the questions asked, which is interpreted in the sense that most of them have knowledge about environment.

Tabla 3
5th and 6th grade students' environmental knowledge

Type	5th graders		6th graders	
	n	%	n	%
Incorrect answers	242	37.5	152	20.2
Correct answers	403	62.5	599	79.8
Total	645	100.0	751	100.0

Table 4 reports the response of the surveyed students of 5th and 6th grade of primary school regarding the environmental attitude dimension. The majority of the surveyed students of 5th grade (52.6 %) and 6th grade (49.7 %) responded that they are regularly concerned about environmental problems attitude

Tabla 4
5th and 6th grade students' environmental attitude

Type	5th graders		6th graders	
	n	%	n	%
No extent	38	5.9	39.0	5.2
A little extent	104	16.1	100.0	13.3
A moderate extent	339	52.6	373.0	49.7
A great extent	164	25.4	239.0	31.8
Total	645	100.0	751.0	100.0

Table 5 reports the response of the surveyed students of 5th and 6th grade of primary school on the dimension of environmental skills and action. The majority of the surveyed 5th grade students (36.1 %) responded that they had participated in almost all programmed activities in favor of the environment and the majority of the 6th grade students surveyed (32.9 %) responded that they did it moderately.

Tabla
5th and 6th grade students' environmental skills and action

Type	5th graders		6th graders	
	n	%	n	%
Not at all	49	7.6	106	14.1
Little	73	11.3	134	17.8
Moderately	215	33.3	247	32.9
Almost all	233	36.1	228	30.4
Greatly	75	11.6	36	4.8
Total	645	100.0	751	100.0

Table 6 shows the response of the surveyed students of 5th and 6th grade of primary school on the environmental literacy variable; this table is a synthesis of what the surveyed students answered about the dimensions. 78. 1 % of the students in 5th grade and 73.5 % in 6th grade had a medium environmental literacy.

Tabla 6
5th and 6th grade students' environmental literacy

Type	5th graders		6th graders	
	n	%	n	%
Low	117	18.1	192	25.6
Medium	504	78.1	552	73.5
High	24	3.7	7	0.9
Total	645	100.0	751	100.0

Table 7 reports the response of the surveyed 5th and 6th grade teachers on the environmental awareness dimension. The most of 5th grade teachers surveyed (75 %) and 6th grade (82.4 %) responded that they felt bad about the environmental problems of the country and their district, which is interpreted in the sense that most of them are aware of environmental issues.

Tabla 7
5th and 6th grade teachers' environmental awarenes

Type	5th grade teachers		6th grade teachers	
	n	%	n	%
Wrong	12	75.0	14	82.4
Indiferent	4	25.0	3	17.6
Total	16	100	17	100

Table 8 presents the response of the surveyed 5th and 6th grade teachers on the environmental knowledge dimension. That most of 5th grade teachers surveyed (68.8 %) and 6th grade (76.5 %) answered correctly to the statements made, which is interpreted in the sense that most of them know the harm that human actions can do to the environment.

Tabla 8
5th and 6th grade teachers' environmental knowledge

Type	5th grade teachers		6th grade teachers	
	n	%	n	%
Agree	5	31.3	4	23.5
Disagree	11	68.8	13	76.5
Total	16	100	17	100

Table 9 shows the response of the surveyed 5th and 6th grade teachers on the environmental attitude dimension. The majority of the 5th grade teachers surveyed (62.5 %) answered that they have had experiences in favor of the environment many times and the sixth grade teachers share their answer between many times and almost always (35.3 % in each case).

Tabla 9
5th and 6th grade teachers' environmental attitude

Type	5th grade teachers		6th grade teachers	
	n	%	n	%
Never	0	0.0	2	11.8
Sometimes	2	12.5	1	5.9
Many times	10	62.5	6	35.3
Almost	3	18.8	6	35.3
Always	1	6.3	2	11.8
Total	16	100	17	100

Table 10 reports the response of the surveyed teachers of 5th and 6th grade of primary school on the dimension of environmental skill and action. The majority of the surveyed 5th grade teachers (68.8%) responded that their environmental actions have been effective and the majority of the 6th grade teachers surveyed (58.8%) responded that they were very effective.

Tabla 10
5th and 6th grade teachers' environmental skill and action

Type	5th grade teachers		6th grade teachers	
	n	%	n	%
Less effective	0	0.0	2	11.8
Effective	11	68.8	5	29.4
Very effective	5	31.3	10	58.8
Total	16	100	17	100

Table 11 shows the response of the surveyed 5th and 6th grade teachers on the environmental literacy variable. 81.3 % of the teachers surveyed in 5th grade and 76.5 % in 6th grade hade a high level of environmental literacy

Tabla 11
5th and 6th grade teachers' environmental literacy

Clases	5th grade teachers		6th grade teachers	
	n	%	n	n
Medio	3	18.8	4	23.5
Alto	13	81.3	13	76.5
Total	16	100	17	100

Inferential analysis

It had tested the specific hypotheses by Chi square.

Table 12 reports the relationship of environmental awareness of students and teachers of 5th and 6th grade of primary school. (Hypothesis 1)

Tabla 12
Chi square test between 5th and 6th graders and their teachers' environmental awareness

	Value	df	p
Pearson's Chi square	182,399	1	0.000
Likelihood ratio	200.508	1	0.000
Linear association by linear	182.269	1	0.000
N of valid cases	1396		

According to the results of this table, there is a significant relationship between the environmental awareness of students and teachers of 5th and 6th grade of primary school in public and private schools in ML.

Table 13 shows the relationship of environmental knowledge of students and teachers of 5th and 6th grade of primary school (Hypothesis 2).

Tabla 13
Chi square test between 5th and 6th graders and their teachers' environmental knowledge

	Value	df	p
Pearson's Chi square	168,352	2	0.000
Likelihood ratio	191.747	2	0.000
Linear association by linear	76.449	1	0.000
N of valid cases	1396		

There was a significant relationship between the environmental knowledge of students and teachers of 5th and 6th grade of primary school in public and private schools in ML.

Table 14 reports the relationship of the environmental attitude of students and teachers of 5th and 6th grade of primary school (Hypothesis 3).

Tabla 14
Chi square test between 5th and 6th graders and their teachers' environmental attitude

	Value	df	p
Pearson's Chi square	1,759,893	9	0.000
Likelihood ratio	1563.761	9	0.000
Linear association by linear	493.984	1	0.000
N of valid cases	1396		

According to the results of this table, there was a significant relationship between the environmental attitude of students and teachers of 5th and 6th grade of primary school in public and private schools in ML.

Table 15 reports the relationship of the skills and environmental action of students and teachers of 5th and 6th grade of primary school (Hypothesis 4).

Tabla 15
Chi square test between 5th and 6th graders and their teachers' environmental skills and action

	Value	df	p
Pearson's Chi square	479,887	8	0.000
Likelihood ratio	461.137	8	0.000
Linear association by linear	328.523	1	0.000
N of valid cases	1396		

There was a significant relationship between the skills and environmental action of students and teachers of 5th and 6th grade of primary school in public and private schools in LM.

Table 16 shows the relationship of environmental literacy of students and teachers of 5th and 6th grade of primary school (General Hypothesis)

Tabla 16
Chi square test between 5th and 6th graders and their teachers' environmental literacy

	Value	df	p
Pearson's Chi square	273,228	4	0.000
Likelihood ratio	158.935	4	0.000
Linear association by linear	140.445	1	0.000
N of valid cases	1396		

There was a significant relationship between the environmental literacy of students and teachers of 5th and 6th grade of primary school in public and private schools in ML.

DISCUSSION

In Peru, there is no research that measures environmental literacy, although there are efforts by public institutions, such as the Ministry of Education and the Ministry of the Environment, which have coordinated efforts to improve the knowledge, understanding and attitude of students and teachers of basic education on environmental problems. However, there is not yet the training of teachers and the energy of managers to promote it significantly. So what is perceived in students and teachers is something that they have achieved in an intuitive rather than organized and rationalized way, hence their literacy level is around the average, noting some degree of ignorance and indifference of the problems environmental

Logically, if teachers are not well prepared or have a formal obligation to train their students in environmental matters, few results can be expected, because as the results of the research have shown, the level of environmental literacy of students is deeply associated with the literacy of their teachers.

Alaydin, Demirel, Altin and Altin (2014) demonstrated the influence that taking a course on environmental issues had on environmental awareness in low-income students in Turkey. By the way, school is not the only place from which environmental literacy can be improved. Eagles and Demare (1999) have already demonstrated the importance of watching movies at home and talking about the environmental situation in Canada.

Similarly, Karpudewan, Roth and Syahrir Bin Abdullah (2015) proved, in Malaysia, that climate change activities focused on 11-year-olds had helped students understand the problems related to global warming.

CONCLUSIONS

- There was an average level of literacy for students and teachers in Metropolitan Lima.
- There was a significant relationship between the environmental literacy of students and their teachers in grades 5 and 6 of primary school, which was also verified by the relationship between each of the dimensions of environmental literacy (environmental awareness, environmental knowledge, environmental attitude and environmental habit and action).
- The literacy level of students should be improved, to improve the literacy level of teachers and the teaching of environmental issues is part of the school curriculum.

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