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Environmental Education and its relationship with Solid Waste in the High School Miguel Grau from the Paramonga district
[Educación Ambiental y su relación con los Residuos Sólidos en la I.E. Miguel Grau del distrito de Paramonga]

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Resumen

La presente investigación trata acerca de la Educación Ambiental y su relación con los residuos sólidos en la I.E. Miguel Grau del distrito de Paramonga de la provincia de Barranca. Cabe mencionar que se elaboró un cronograma con participación del director, alumnos, docentes, personal administrativo y del APAFA. El objetivo general es determinar cómo influye la educación ambiental en los alumnos. Durante el desarrollo de la investigación se tomó la muestra de 30 alumnos y se preguntó acerca de reciclaje, segregación, disposición final y cuidado del ambiente. Es de tipo básico de corte transversal y se empleó el diseño descriptivo - correlacional. Los datos obtenidos fueron procesados con la estadística descriptiva e inferencial. Determinándose las respuestas a las preguntas que la mayoría arroja la basura en el salón con 40 %, arroja en el patio con 36.7 %, no hay presencia de tacho 96.6 %, no utiliza tacho 96.6 %, no recicla la basura 96.6 %; en clasificación de los residuos sólidos la mayoría clasifica en sólido, líquido y gaseoso 76.67 %, orgánico e inorgánico 76.7 %, peligro y no peligroso con 83.3 %, domiciliarios con 50 %; luego de informarse acerca del cuidado ambiental se obtuvo los resultados que arroja a los cilindros para ser llevados al relleno con 83.3 % y los residuos orgánicos con 50 %; en la concientización ambiental la mayoría arroja en los cilindros con 66.7 % y presencia de tachos con 96.7 %. Lo que se interpreta que el estudiante toma conciencia en el cuidado del medio ambiente y recicla.

Palabras clave: Educación Ambiental, residuo sólido, concientización, cuidado ambiental.

Abstract

This research seeks relationship between Environmental Education and solid waste in the High School Miguel Grau from the Paramonga district, Barranca province. It is worth mentioning that a schedule was developed with the participation of the principal, students, teachers, administrative staff and APAFA. The general objective is to determine how environmental education influences students. During the development of the investigation, a sample of 30 students was taken and questions were asked about recycling, segregation, final disposal and care of the environment. It is a basic cross-sectional type and a descriptive-correlational design was used. The data obtained were processed with descriptive and inferential statistics. Determining the answers to the questions that the majority throws the garbage in the classroom with 40%, throws it in the yard with 36.7%, there is no bin presence 96.6%, does not use a bin 96.6%, does not recycle the

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garbage 96.6%; in solid waste classification, the majority classify solid, liquid and gaseous 76.67%, organic and inorganic 76.7%, dangerous and non-dangerous with 83.3%, domiciliary with 50%; After learning about environmental care, the results were obtained from the cylinders to be taken to the landfill with 83.3% and organic waste with 50%; in environmental awareness, the majority throws in the cylinders with 66.7% and the presence of cans with 96.7%. What is interpreted that the student becomes aware in the care of the environment and recycles.

Keywords: Environmental education, solid waste, awareness, environmental care.

1. Introduction

The environmental crisis that is producing solid waste is a problem of anthropic and industrial society, since, since the Industrial Revolution in England, man began with pollution and the production of solid waste, beginning the destruction of planet Earth, or as Octavio Gianni relates. "The world began without man and will end without him" (Gutiérrez, 2017). The world changed a lot after the Industrial Revolution. The system of producing all kinds of products typical of an intense and expanding economy with enormous production of domestic solid waste was changed, a technological domain, whose objective is the maximization of consumption.

The problem of garbage and the socio-environmental crisis are not isolated events, but exist in countless parts of the planet. It is not an exaggeration to also affirm that we continue to deal with these problems and without giving them due importance, as if they were just a momentary disturbance, fragmented and without defined contours, while implying the transgression of the deep logic that conditions the entire organization of the contemporary societies. Today the world generates at least 3.5 million tons of plastic and other solid waste per day, 10 times more than a century ago, according to World Bank researchers (National Geographic, 2018).

The concept of sustainable development is introduced, defined in these terms: "It is in the hands of humanity to ensure that development is sustainable, that is, to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own" (Brundtland, 1987).

For countries like Mexico, the experiences of other states are important, as you can learn from experience and develop more efficient waste management programs. From this vision, the proposal for the Guadalajara Metropolitan Area has been developed; However, for the correct implementation and the achievement of the expected results, it is necessary for each part of society to take its obligations seriously. In the Guadalajara Metropolitan Area, as well as in the rest of the country, it will be necessary for citizens to begin to make themselves heard, to exercise their power and demand from their governments measures consistent with the magnitude of the problem, while they will have to accept that the Decreased power of local entities is the main impediment to obtaining positive results from state and national programs (Rivera, 2005).

The issue of management and final disposal of urban solid waste represents a problem from different perspectives, among which we can mention: the increase in the generation of garbage is directly linked to the phenomenon of urban growth of the city, that implies the need to expand the coverage of the collection service; But the generation of solid waste is also associated with the problem of its final disposal, and its effects such as water, soil, air pollution and damage to public health (Sánchez, 2010).

Regarding organic waste, it can be used to make compost as organic fertilizer for the physical and chemical improvement of the soil and providing nutrients for the development of plants in green areas. Which is favorable for environmental management in its final disposal for use as

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organic fertilizer for vegetables; since it is sustainable and sustainable, obtaining an agro-ecological product (Cruz, 2018).

There is also the work of Cruz (2010), whose work period ranged from February 2009 to January 2010 and eight workshops were given to the six groups, which in turn are divided into three groups of 2nd grade and three groups of 3 °. The sessions were held on Wednesdays, Thursdays and Fridays, divided into two per day, from 9:00 to 10:00 a.m. and from 11:00 to 12:00 a.m. The duration of the sessions was one hour per group: they worked for three months starting in the second week of September and concluded in the last week of November. Additionally, two more weeks were used for the preparation of the final forum. Next, the results were presented by workshop with the different groups, including the workshop for teachers and administrators, as well as the workshop for parents and the final forum.

The High School Miguel Grau is not alien to the consumption of food and the use of products, creating a large amount of organic and inorganic waste, the present work of scientific research, aims to apply an Environmental Education in the management and treatment of solid waste with the students, teachers, administrators and fundamentally with the parents through the organization APAFA (Association of Parents of Family), considering that the proper treatment and management of waste is an economically viable activity and can generate income for the School

2. Materials and Methods

This research was carried out at the High School Miguel Grau, district of Paramonga, Lima and includes the following research activities:

- Socio-economic and cultural information of the student.
- Consumption habit and level of environmental awareness.
- Environmental topics.
- Open questions on practices to minimize the amount of solid organic waste (RSO).
- Bins were delivered for each classroom, the bathrooms, kiosks and cafeteria.
- Each sample was weighed.
- Manual separation in waste.
- Selection and classification of waste.
- Final destination of waste

The present work is Non-Experimental, descriptive-correlational cross-sectional, which is summarized in the following study diagram:

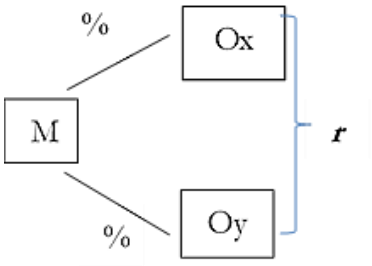

Figure 1. Descriptive-correlational design (Sánchez, 2015)

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Where:
M: It is the research sample.
Ox: These are the observations of the independent variable (Environmental education).
Oy: It is the observation of the dependent variable (Solid residuals).
r: It is the correlation between both variables
In addition, the linear correlation formula will be used, as shown in Eq. (1):

$$r = \frac{N\sum xy - (\sum x)\,(\sum y)}{\sqrt{N\sum x^2 - (\sum x)^2} * \sqrt{N\sum y^2 - (\sum y)^2}} \quad (1)$$

The population of the High School Miguel Grau are 820 students, in two teaching shifts: Morning shift with 520 students, with 17 classrooms and afternoon shift with 300 students, with 10 classrooms.
The sample was determined by carrying out a probabilistic lottery among the 10 sections of the afternoon shift, having chosen the Third B section, with 30 students for the investigation.
The data collection techniques are:
• Survey: To collect information from students or students and standardize their computer processing for statistical analysis.
• Interview: To collect verbal information through individual questions regarding the research problem.
The techniques for processing information are:
• The analysis of the data and its interpretation obtained in the information, the data were organized through a tabulation matrix in Excel and SPSS 20.
• Interpretation of the relationships between variables.
• Determine the degree of generalization of the research results.
• Comparative tables: Systematize the information and contrast the elements of the environmental impact of waste.
• Describe the characteristics of the object of study.

3. Results

3.1. Evaluation of Solid Waste Disposal

In this evaluation, the attitudes of the students about the disposal of solid waste generated by the school were determined through statistical analysis, the results indicate that the majority throw garbage in the classroom, there are no bins, do not use a trash can and does not recycle garbage (tables 1, 2, 3 and 4). So it should be taught about how solid waste influences the environment.

Table 1. Evaluation of the final disposal of solid waste

	Frequency	Valid percentage	Accumulated percentage
Throw the trash in the classroom	12	40.0	40.0
Throw the trash in the yard	11	36.7	76.7
Throw in plastic bags	2	6.7	83.3
Throw in the sacks	2	6.7	90.0
Throws in the toilets	2	6.7	96.7
Throw in the cylinders	1	3.3	100.0
Total	30	100.0	

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Table 2. Presence of trash cans in the school and classroom

	Frequency	Valid percentage	Accumulated percentage
There is presence of bins	1	3.33	3.30
There is no presence of bins	29	96.66	100.0
Total	30	100.0	

Table 3. Use bins to dump solid waste in the school and classroom.

	Frequency	Valid percentage	Accumulated percentage
He/She used bins	1	3.33	3.30
He/She did not use bins	29	96.66	100.0
Total	30	100.0	

Table 4. Students recycle garbage at school.

	Frequency	Valid percentage	Accumulated percentage
I recycle trash	1	3.33	3.30
I do not recycle trash	29	96.66	100.0
Total	30	100.0	

3.2. Evaluation of the segregation and classification of solid waste

Regarding the results of how solid waste is classified, most stand out in the classification of the three states of matter solid, liquid and gaseous, because of their chemical composition they are organic and inorganic because of their potential risk, they are classified as hazards and not dangerous and due to their generation origin they are domiciliary. These data are observed in tables 5, 6, 7 and 8.

Table 5. Evaluation of how it classifies the waste states

	Frequency	Valid percentage	Accumulated percentage
Solid, liquid, gas	23	76.7	76.7
Solid	2	6.7	83.3
Liquid	3	10.0	93.3
Gas	2	6.7	100.0
Total	30	100.0	

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Table 6. How to classify the states of the waste by its chemical composition

	Frequency	Valid percentage	Accumulated percentage
Organic and inorganic	23	76.7	76.7
Organic	5	16.7	93.3
Inorganic	2	6.7	100.0
Total	30	100.0	

Table 7. How it segregates and classifies the states of the waste by its potential risks

	Frequency	Valid percentage	Accumulated percentage
Dangerous and not dangerous	25	83.3	83.3
Dangerous	3	10.0	93.3
Not Dangerous	2	6.7	100.0
Total	30	100.0	

Table 8. How to classify the states of the waste by its origin of generation.

	Frequency	Valid percentage	Accumulated percentage
Addresses	15	50.0	50.0
Industrials	1	3.3	53.3
Markets	3	10.0	63.3
Commercial	1	3.3	66.7
School	9	30.0	96.7
All	1	3.3	100.0
Total	30	100.0	

3.3. Environmental education influences the sending of waste to landfills

After having informed about how solid waste influences the environment, the students used the cylinders to place their organic and inorganic solid waste for final disposal and in this way reduce pollution in their school (see tables 9 and 10).

Table 9. Answer to the question: What do you do with inorganic solid waste, such as metals, glass, plastic, etc.?

	Frequency	Valid percentage	Accumulated percentage
He throws them into garbage cans to be taken to landfills	25	83.3	83.3
Do not dump them in garbage cans to be taken to landfills	4	13.3	96.7
Recycle and sort them for sale	1	3.3	100.0
Total	30	100.0	

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Table 10. Answer to the question: What do you do with organic solid waste left over from food?

	Frequency	Valid percentage	Accumulated percentage
He throws them into garbage cans to be taken to landfills	15	50.0	50.0
Do not dump them in garbage cans to be taken to landfills	15	50.0	100.0
Total	30	100.0	

3.4. Environmental awareness on final disposal

Recycling was also reported, which is shown in tables 11 and 12, obtaining that the majority put the waste in the cylinders, if they put bins in the classroom and patio. What is interpreted that the student becomes aware in the care of the environment and recycles.

Table 11. Regarding the disposal of solid waste

	Frequency	Valid percentage	Accumulated percentage
Throw the trash in the classroom	3	10.0	10.0
Throw the trash in the yard	1	3.3	13.3
Throw in plastic bags	2	6.7	20.0
Throw in the sacks	3	10.0	30.0
Throws in the toilets	1	3.3	33.3
Throw in the cylinders	20	66.7	100.0
Total	30	100.0	

Table 12. Presence of garbage cans at school and in the classroom

	Frequency	Valid percentage	Accumulated percentage
There is presence of bins	29	96.7	96.7
There is no presence of bins	1	3.3	100.0
Total	30	100.0	

4. Discussion

Evaluation of the final disposal of solid waste

At the beginning of the investigation, the students were evaluated with questions about how many carry out the final disposal of solid waste, presence of bins to dump garbage in school and classroom, use bins to dump solid waste in the school and classroom and recycle the trash at school (tables 1, 2, 3 and 4). Determining that the majority throw the garbage anywhere, do not recycle, lack of cans in the classroom and playground, for not promoting, promoting knowledge about caring for the environment. In addition to implementing recycling bins, this can be based on Mayer (1998) who mentions environmental education has developed a lot during the last twenty years, reflecting on the profound contradiction. Among the need for human development. This is interpreted as important for students to know about environmental pollution and recycling, which should be encouraged by teachers and education personnel in order to have a clean and adequate space for teaching.

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Evaluation of solid waste segregation

Regarding the segregation to the source that can be seen in tables 5, 6, 7 and 8, it was determined that the students classify solid waste according to the quantity it produces; obtaining a higher percentage of organic and inorganic waste, in hazardous and non-hazardous waste and, due to its generation, the majority are household waste. What is interpreted that the majority classifies solid waste by its physical and chemical composition in different places such as schools and residential shopping centers. However, students should be promoted and encouraged to classify waste efficiently in this way, it will reduce environmental damage in order to have a healthy and adequate environment. This is based on López (2014), he states that the greatest crises that society is going through is the excessive consumerism that is putting the subsistence of the human species at risk, this consumerism has important consequences such as the generation of solid waste that is overwhelming due to the amounts that are generated daily and because there are no appropriate places of destination, such as sanitary landfills.

Environmental education influences the sending of waste to landfills

After having informed the students about environmental contamination how it affects health and their environmental care, it was determined that the majority threw 83.3% into the garbage dump and threw the food into the cylinder to be taken to the sanitary landfill 50%, this is Look at table 9 and 10. The percentages mentioned are encouraging, since the student's attitude to recycling was significant for its final disposal; However, talks should be held more frequently, events that motivate students 100% to recycling and in good social attitudes, which will favor environmental care, this research is supported by Mayer (1998), states that environmental education could become a new way of looking at education, bringing together theories of the importance of making sense of ignorance and uncertainty, and the need to build and compare values. This new way of conceiving education calls for new educational structures and consistent strategies for evaluation: the action carried out around the world in recent years indicates the themes and strategies.

Environmental awareness on final disposal

Regarding the information on the final disposal of solid waste, the students took good attitudes about environmental care, determining that 66.7% threw in the cylinders and 96.7% have bins in the classroom and patios, the results are shown in tables 11 and 12. This is interpreted to be favorable; since the student takes the initiative to recycle and not throw anywhere, in addition to the implementation of bins and deposits, this study can be supported by Villalobos (2015), who mentions the desired result of the program related to environmental education includes the change of attitudes of the population; In order for the goals to be met, local authorities and the general public must: change their behavior, know how solid waste affects health and the environment, as well as learn that putting solid waste in its place, because with these tasks it reduces risks of contamination.

5. Conclusions

According to the results obtained by authors, it can be concluded that:

- It was determined that at the beginning of the investigation the majority of the students in a percentage of more than 40% threw garbage in the classroom, patio and anywhere else, there was no presence of cans, they did not use cans, they did not recycle; which reflects that environmental care should be promoted.
- In the evaluation of questions about the classification of waste, it was determined that the majority in more than 50% classifies waste into organic, inorganic, hazardous and non-

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hazardous waste, by its generation and by the solid and liquid states of matter and sodas. These results are favorable, but classification for proper final disposal should be promoted and encouraged.

- Regarding environmental education, the students responded favorably to the questions after being informed, obtaining the results that more than 50% threw the waste into the cylinder for the sanitary landfill and organic waste. Which means that it is favorable to have the environment healthy and clean.
- Regarding environmental awareness about final disposal, after being informed, it was determined that the majority of students in more than 66.7% throw the waste in cylinders and there are more bins or waste deposits for final disposal, which is favorable, since he takes the initiative to have a clean and healthy environment in his school.

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