



## Journal of Sustainability Perspectives

journal homepage: <https://ejournal2.undip.ac.id/index.php/jsp/>



# Environmental management begins in the family

*Jesús Alfredo Liévanos Barrera\**, *Isaias de la Rosa Gomez*

Avenida Tecnológico 100 s/n. Colonia Agrícola, Bellavista, La Virgen, 52149 Metepec, Méx. Instituto Tecnológico de Toluca. Metepec, Estado de México. México

\*corresponding author: [jlievenosb@toluca.tecnm.mx](mailto:jlievenosb@toluca.tecnm.mx)

### Article Info

**Received:**  
14 March 2022  
**Accepted:**  
25 May 2022  
**Published:**  
1 August 2022

**DOI:**  
[10.14710/jsp.2022.15540](https://doi.org/10.14710/jsp.2022.15540)

*Presented in the 7th International (Visual) Workshop on UI Greenmetric World University Rankings (IWGM 2021)*

**Abstract.** The Instituto Tecnológico de Toluca, is a higher level educational institution, which belongs to the National Technological System of Mexico, which has 9 degrees, in the engineering area, citing: Industrial (IE), Chemical (CI), Logistics (LE), Electromechanical (EE), bussines management's (BME), Electronics (EE), Mechatronics (MI), Computational Systems (CSI) and Information and Communication Technologies (ICTE,) and 3 postgraduate degrees: Master of Engineering Sciences (MES), Master of Sciences in Environmental Engineering (MSEE) and Doctorate in Environmental Sciences (DES), with a population of 5,408 students. Being a proudly public institution and classified as the best, by its employers at the state level, within which there is a Coordination called Institutional Environmental Program (IEP), which manages various strategies for the care, protection, remediation of the environment. But, in Mexico, since March 2019, educational institutions have been closed due to the context of the pandemic caused by covid-19. Academic activity being carried out, since then to date, via virtual. Faced with such a complicated, difficult and uncertain scenario. An environmental management model was developed, so that students from their homes develop prevention programs, protection and care of the ecosystem, developing sustainable strategies. Starting from the premise: If there is a polluting society it is because there are families that pollute, the family is the mirror of what happens in society. Within this program, an amalgam of strategies was considered, starting with motivation, awareness, reflection, knowledge and self-management to detonate a new environmental culture, starting from their homes and extending it to their families and neighbors. To carry out a multiplier effect, in geometric progression, having an excellent response from the students of the Instituto Tecnológico de Toluca (ITT). Among the various strategies within an application scenario, the following are cited: Responsible-reflective

consumption, no generation of unnecessary waste (organic food waste reduction), no use of Unicef (expanded polystyrene), use of single-use containers (elimination of PET), no oil disposal used from the kitchen (application of a collection program), induction to the modification of nutritional intake by substituting beef for chicken, fish and vegetables, separation and classification of garbage, application of the use of compost for the organic food remains, water saving and leak elimination program, collection of cigarette butts thrown in public roads and gardens. Turning off lights in homes when they are not necessary (energy saving), only use of a motor vehicle in very necessary cases (mitigation of the effects of climate change). With these actions that began in this year 2021, we consider that we are working towards the reduction of negative environmental impacts, detonating a new culture and environmental awareness, among higher-level students (undergraduate), having a participation and involvement of 1,700 families and a number that continues to grow. Additionally, we are contributing to the 2030 Agenda, of the Sustainable Development Goals (SDG), especially regarding the objectives: 4.- Quality education, 11.- Sustainable cities and communities and 13.- Actions for the climate.

**Keyword:**

family, environmental culture, awareness, virtual scene, pollutants

---

## 1. Introduction

The Instituto Tecnológico de Toluca (ITT), is a public institution, of higher education, avant-garde and pioneer in the environmental context, in the Valley of Toluca, State of Mexico, for being a benchmark in the training of engineers in this area, which concerned and busy in giving academic continuity in these times of pandemic by covid-19, strategies were established to achieve that via virtual, using the Teams platform, continuity is given, to the imparting of knowledge and within a syncretism a set of tactics for students to develop or reorient their lifestyles towards a new environmental culture from their homes. Starting from the premise that the family is the basis and essence of society, what happens in society is a reflection of what is happening in the family, since in Mexico, we are very faithful to the concept of the family symbol. Based on this, the following lines of action were established, based on training, guidance and accompaniment and application of actions in favor of caring for the ecosystem, with a sustainable vision, addressing the following topics at home, with the students of (ITT):

- Collecting cigarette butts.
- Collection of used cooking oil.
- Do not use Styrofoam containers (expanded polystyrene).
- Responsible and selective consumption.
- Promote the philosophy of no food waste.
- Implement compost method on food scraps.
- Energy and water saving program

## 2. Method

Within the methodology, to support the development of this project, was the sensitization, awareness of the scenario that we are currently living, in terms of the contexts and levels of contamination, which are generating harmful effects towards living beings, especially towards humans, among which there are the Effects of Climate Change (ECC), with which, unfortunately, we already coexist. Subsequently, it was the training and induction of the students to apply the strategies in their homes and to share these new environmentally sustainable lifestyles with their friends, family and neighbors. Additionally, it is mentioned that this project was developed in synchrony with the academic process of the activity in front of the group, within the learning units taught and correlating with the topics of the same.

## 3. Results

Within a management process, the evidence is described, with the results obtained, in favor of a better sustainable context, in a Continuous Improvement Process (CIP), for the good and survival of human beings.

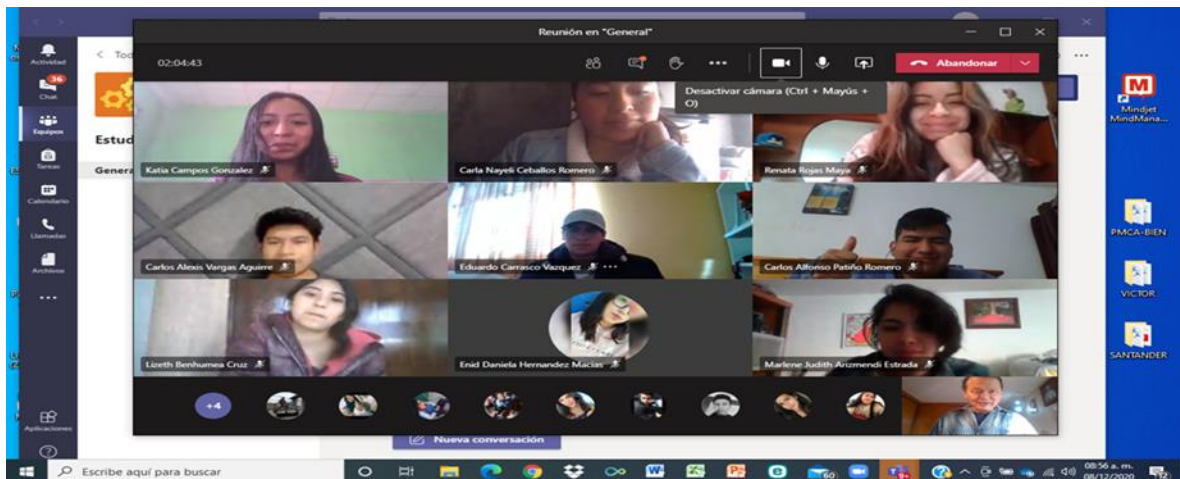


Figure 1. Virtual meetings, via Teams, with ITT students.

### 3.1. Collection of cigarette butts

Cigarette butts are an element that causes a high impact on the environment, since it contains substances that are harmful to the environment, known as persistent chemicals such as: nicotine, tar, cellulose acetate and hydrocarbons, as well as heavy metals such as lead, lead arsenic, and polyaromatic hydrocarbons and cyanide. A cigarette butt accumulates up to 2 thousand toxic substances, 200 of them carcinogenic, it is said that 3 out of 10 people are smokers and potentially approximately 65% of the butts end up on the ground.

Based on the aforementioned in the (I.T.T). We took on the task of collecting cigarette butts from the floor and gardens, to be sent to the Ecofilter S. A de C.V. Company, which recycles and transforms the cigarette butts into cellulose acetate. With this environmental activity developed by the students, we now have an (ITT), cleaner and free of cigarette butts. Having 6 containers ready to be sent to recycle



Figure 2. (IIT) student, collecting cigarette butts, with her plastic gloves, for personal protection.



Figure 3. Containers with a capacity of 1 Gallon, containing the cigarette butts

### 3.2. Collection of used cooking oil

Used cooking oil, discharged down the drain, has a high content of pollutant load. Since a liter of oil pollutes the same as a thousand liters of waste water. Additionally, another source indicates that a liter of used oil can contaminate the equivalent of 40,000 liters of water. Likewise, the treatment in a treatment plant of a liter of used oil represents a cost 700 times higher than the cost of treating a liter of waste water. Considering the aforementioned data, the ITT students and a server, we are dedicated to raising awareness among family, friends and neighbors about the damage that used oil causes to the ecosystem and this is delivered to Dr. Romero, who is working on a project to obtain biodiesel. Currently, we already have approx. 150 L. to be delivered.



Figure 4. Collection of used oil with neighbors and relatives.

### 3.3. No to the use of Styrofoam containers (expanded polystyrene).

In the current context that we live in the pandemic due to covid-19, it is very common to attend commercial places and buy ready-made food, which is delivered in expanded polystyrene containers (technical name), with a commercial name in Mexico, like: Unicel, which is not biodegradable by nature. For which, families were made aware not to use this material. Instead, High Density Polyethylene (HDPE) containers are now used to store and transport food, which is washed, reused and ready to be used again.



Figure 5. In the family sometimes food is bought to eat at home. But, Unicel (expanded polyethylene), in nature and is single-use. Since it is used and disposed of in the garbage, as Urban Solid Waste (USW).



Figure 6. Now to store the food, high-density polyethylene (HDPE) containers were purchased, which is reused. It is used, washed and reused.

### **3.4. Responsible and selective consumption**

Within this scenario, in families, neighbors and relatives, reflection and awareness are made to be more selective, in acting in the responsible consumption of articles, goods and food, considering the utility, use of the products and the times of biodegradability of packaging. Since currently, in Mexico they have very beautiful, resistant packaging. But, with a very high biodegradability time

### **3.5. Promote the philosophy of no food waste**

In Mexico, approximately 20.4 million tons of food are wasted each year, an average of almost 158 kilos per person. According to World Bank data, equivalent to 34% of production for human consumption. Likewise, it is cited that there are people with an income below the extreme poverty line by income, up to a total of 31.7 million Mexicans, 25.3% of the population. This means that one in four Mexicans would now suffer from extreme income poverty. Considering this scenario of chaos, it is sensitized and trained not to generate food waste



Figure 7. Now, food scraps are no longer generated. With just awareness, society reacts.

### **3.6. Implement the application of compost in food leftovers.**

Organic food remains are subjected to a composting process, so as not to be dumped as Urban Solid Waste (USW) and thus enrich the soil, for better plant growth, in the gardens of the students' homes.



Figure 8. Images of the application of compost to food waste

### 3.7. Energy and water saving program.

An energy and water saving program was developed in the students' homes and this was replicated with friends, family, neighbors, in which a set of strategies was established, citing the following: turning off lights when not required, opening curtains For the entry of natural light to the homes, the vital thing about this program is to measure, since there is no improvement without measurement and the savings should be reflected in the payment for this service. Context, which was achieved. Additionally, water leaks were eliminated and a new culture of caring for and saving water in general was created. Reinforcing this structure, the guidelines cited in the international standard ISO 50001:2018 were taken as a basis. Energy Management Systems. Requirements for use.

In general, the aforementioned strategies have a favorable impact on approximately 2,100 families and the number continues to grow, as they continue to work.

## 4. Conclusions

Within this scenario that we are living in Mexico and in the world, due to the covid-19 pandemic, which generates adverse effects on the economy and in other contexts, with macro impacts as nations and micro as families, in Mexico a strategic plan to continue with essential activities, vital such as education and thus has been working virtually. Within a scenario of chaos or with signs of entropy, the educational system emerges as a bulwark, especially the one taught in Higher Education Institutions (HEI) and specifically in public institutions, this responsibility falls to create a new culture. training and involving society with new environmentally sustainable lifestyles. Especially at the Technological Institute of Toluca (ITT), this context of covid-19 was considered as an opportunity to improve environmentally, finding in students a great acceptance, commitment, involvement, response and social responsibility referred to the context that is currently a challenging issue, such as the icon of promoting a new environmentally sustainable education for families and society in general. All of the aforementioned, to form a benchmark of unity of purpose, for the noblest cause that is to care, protect and restore the environment, for the benefit of the living beings of this planet, essentially human beings, beginning with the basis of society, which is the family.

## References

1. Aldonado Salazar, T. (2009). Educación ambiental para la sustentabilidad. *Horizonte Sanitario*, 8 (2), 4-7.
2. Arias Pabón, C. H. (1995). La dimensión ambiental y la educación, *Nómadas (Col)*, núm. 2, marzo, Universidad Central Bogotá, Colombia.
3. Caravantes G.S. (2020). El medio ambiente en signo de pesos. eBook. pp. 55-79. México.
4. Cárdenas G.G. (2019). La basura. ¿En su lugar? ¿Cómo ves? *Revista de divulgación de la ciencia*. UNAM. Año 21, núm. 242. México.
5. Cárdenas G. G. (2018). Acciones contra el cambio climático. ¿Cómo ves?, año 20, número 237. UNAM, México.
6. Contaminación. El futuro en riesgo. *El Universal*. 17 de diciembre de 2017.
7. De la Rosa I.G. (2018), La sustentabilidad en el Tecnológico de Toluca. *Empretec*. México.
8. Díaz C.R. (2015). Desarrollo sustentable. Una oportunidad para la vida. Editorial Mc Graw Hill. pp. 16, 34-36, 236-238, 244-247, 264.269. México.
9. González O., (2014), Los 10 problemas que más me preocupan de la educación actual, *Escuela de padres con talento*. Editorial Omega. México
10. Maldonado Salazar, T. (2009). Educación ambiental para la sustentabilidad. *Horizonte Sanitario*, vol. 8, núm. 2, pp. 4-7 Universidad Juárez Autónoma de Tabasco Villahermosa, México.