



INSPIRING PRACTICE



REGIONAL FINALIST



PANAMA, 2022

#ENVIRONMENT

Panamanian youth reuse cooking oil to make soap and mobilize the community in favor of the environment

When developing the product, young people used not only chemistry content, but also engineering, by building an automated machine to mix the substances

TEACHER

Xenia Vigil

SCHOOL

Joaquín José Vallarino
Educational Center

STEM AREAS

Science, Engineering

OTHER AREAS OF KNOWLEDGE**NAME OF THE PROJECT**

Aceibon

Reuse of cooking oil in the manufacture of soap for cleaning, seeking to minimize environmental pollution. This was the proposal of three students and a teacher from the *Centro Educativo Joaquín José Vallarino*, located in Mariato, district in Veraguas, Panama. With the most diverse aromas and textures – coffee, orange, lemon, oats, for example – soap not only started to be used by the school but also became a proposal for financial and environmental sustainability in the community.

The initiative, which was named Aceibon, was born from a proposal by English teacher Xenia Vigil, who has part of her workload at the school dedicated to supervising and mentoring students, accompanying them in their studies and their life projects. Upon receiving the invitation to participate in the program, Xenia decided to present the proposal to her group of 22 mentees, with whom she meets once a week. Engaged with the initiative, two students, also living at school, approached the teacher interested in participating in the proposal. Along with a colleague who decided to join the project, the group started the Design Thinking process, stimulated by Samsung Solve for Tomorrow.

School-dormitory

The college is the only one in the region to offer a secondary course and serves a large population of students from the most remote areas of the province. The school, which offers from the 7th to 9th grade, and from the 10th to 12th grade with a Bachelor of Science, has part of its students internal in the institution. Young people study and live at school during the term.

“I did not understand anything about STEM. It wasn’t my area, but I was sure that together, with the support of other teachers, we could learn and develop a proposal”, explains Xenia. In addition to the 40 minutes of weekly meetings in her regular classes with the students, she dedicated a good part of her planning time at school to the group. “And when I got home, and the students were already at home or boarding school, we continued communicating online,” adds, impressed with the dedication and involvement of young people in the process.

From the beginning, the teens emphasized that they wanted to develop something that would benefit the local community and indicated a great interest in preserving the environment. The region, which is rich in natural resources and home to paradisiacal beaches, is also one of the most remote and least served by public resources. It was by investigating the territory and sharing ideas that the group arrived at the problem of domestic pollution and its contribution to environmental pollution. Among the problems listed was the improper disposal of cooking oil: 1.5l of the substance contaminates an average of 6l of water. Discarded down the sink, for example, oil directly contaminates aquifers, creating a waterproofing layer in the water, preventing oxygenation, and directly affecting the photosynthesis process and the development of the local fauna and flora.

It was then that Xenia’s mother, upon hearing the group’s concerns about the issue from the teacher, remembered making soap from oil. The teacher then took the idea to the group that not only liked the proposal but sought to qualify it, thinking about how to improve its composition so that it could also be used safely for cleaning hands, due to hygiene issues personnel that gained greater evidence with the Covid-19 pandemic.

The process of ideation and subsequent prototyping involved consulting different sources and studying everything from the composition of the soaps to the chemical process of saponification. “The first tests were a disaster”, jokes the teacher, remembering that it was necessary to adjust the temperature, then ensure adequate ventilation, adjusting the size of the cylinder for mixing the ingredients.

With the base soap ready, and with the support of the chemistry teacher, the safety and quality tests began, evaluating the pH and foam formation, for example. And then, they started adding different fragrances and textures, seeking to improve the quality of the product, making it more interesting for consumption. “We evaluated everything you can imagine. We had several hits and others that did not turn out as we imagined. The oatmeal and coffee were wonderful! When washing clothes, they are spectacular, and they are excellent for hand washing”, she celebrates. For each aroma, texture, or dye used, new tests were performed. With the approved parameters, the soaps started to be used in the school and boarding school sinks and to clean fabrics — without any case of allergy.

Aceibon Ingredients

Soap is made from sodium hydroxide, water, and oil. Natural essences are added to the mixture, such as infusions of plants and fruits, for example. In addition to the proportions, it is essential to pay attention to the order of the ingredients - especially when handling sodium hydroxide, which is highly corrosive.

Innovations: automated mixer and in-process scale

As the saponification process requires a step of mixing the ingredients and as the students worked with enormous amounts of oil, it became impossible to mix everything by hand, with a broom handle. With

the support of the school janitor and the group members who understood more about engineering, and as they advanced through the stages of **Samsung Solve for Tomorrow**, they were able to buy a motor from a used washing machine and build an automated mixing arm that allowed for greater agility and scale to the process. The machine was also detachable and could be taken to different areas of the school. "This was a necessity, as we needed to follow the process closely, on weekends, between classes," explains Xenia.

Next, the group began to develop soaps in different formats, using cookie molds and wrapping the soaps in the biodegradable manila paper. "Later, they developed the logo, but they needed to make sure it wasn't put on a sticker or printed on paper at an environmental cost. That's when they came up with the idea for the stamp," narrates the teacher.

To meet the demand, and as the oil collected in the school cafeteria was not enough, the youths left for the territory, starting a simultaneous campaign to collect the base material and raise people's awareness. Xenia says that when they were getting ready to go out into the community, they found an old Solve for Tomorrow banner at school. "And the 2019 poster ended up becoming our promotional and dialogue material with the community", she says.



Eureka moment!

For Xenia, the project's big leap came precisely when the group went on an awareness campaign and oil collection around the school. "When they realized that the initiative had the potential to mobilize and meet a real need of people, engaging them to care for the environment, everything made even more sense," he argues, reporting the importance of empathizing with the pain of the community.

Earnings and possibilities

With the support of the program's mentoring, the young people also created a business sustainability plan. Those who donated oil won a soap. The rest were used at school and the remainder was sold. "I supported them to conduct an analysis and price the product, seeking that it could become a sustainable project," explains the teacher.

For the teacher, the project not only allowed youths to develop new skills, especially soft ones, such as communication, collaboration, and problem-solving, but she was able to develop new opportunities to work as a teacher. "I'm sure I became a better teacher. In addition to learning a

Identity!

As a complement to the project, Xenia says that the students wanted to demonstrate their cultural identities, both within their own country and in their encounters with other countries in the region. For them, the opportunity to participate and advance in the program also allowed them to better present the local culture and their identities to others. An example was the typical costumes they used in the video-pitch for the program.

lot about science, chemistry, physics, and engineering, I had the opportunity to get to know my students better, to think creatively with them, to listen to them, and to overcome challenges next to them”, she celebrates. The group’s idea is to continue Aceibon, involving new students and community members. With the program’s support, Xenia intends to seek testing and comply with the official regulation of soaps so that they can even be used for bathing.

As Solve for Tomorrow finalists (and the first in the region) Xenia also says that the school gained a greater capacity for dialogue with local authorities, focusing on expanding resources for local education and in the country. Among the teachers’ concerns is that of creating more opportunities for students in the province to continue studying. “They live far away and need support to continue in higher education”, argues the teacher.



Focus on practice!

See the teacher’s guidelines on how to support students in developing soap from used cooking oil.



Problem identification



Xenia stimulates student’s free listening processes, encouraging them to share their interests and concerns. For her, the project will only make sense if it starts from a genuine interest of the group.



Definition



To define the problem, the teacher believes it is important to go deeper into it. As a suggestion, she indicates a shared research work in which each teen brings additional data on the identified issue for discussion in the collective.



Ideation

For the ideation process, Xenia believes in the importance of collective dialogue, even justifying the importance of talks with other people beyond the group, about the problem, thus bringing new perspectives and possibilities for solutions. For the teacher, the solution is not born ready-made, it is built throughout the process, in the dialogue of the group and from the group with those supporters they meet along the way.



Prototype

Xenia indicates the importance of trial and error, assuming testing as fundamental for understanding the proposed solution. She explains that it is in the attempt, and the monitoring of the solution, that the alternatives arise. To this end, the teacher encourages the group to keep a record diary, in which all agreed parameters must be noted by a person responsible for each period and discussed in the group.



Feedback and evaluation

For the teacher, dialogue with the community is fundamental. And, in the case of Aceibon, returning the solution to those who participated and engaged with it was an important commitment by the students to make the community a co-participant in the project, increasing its chances of success and sustainability.