

## Implementation of Extension Projects in Chemistry at SENAI CIMATEC University: Experience Report

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This article describes the current extension projects in chemistry at SENAI CIMATEC University, which includes innovative and sustainable practices that can generate income for the most vulnerable population, combined with initiatives to enhance student education and promote scientific outreach. All these actions are based on the Sustainable Development Goals – SDGs, such as quality education, reduced inequalities, and sustainable communities. To make this a reality, two projects were implemented: “CIMATEC Saneantes” and “Química Inspira: Um Show de Química”. The result is the engagement of undergraduate students with the community, developing scientific knowledge.

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University extension projects promote a fundamental role in the development of undergraduate students, especially in engineering courses, by inseparably integrating teaching, research and community action. As established by Resolution No. 7/2018 of the Ministry of Education [1], extension is now mandatory and curricular, corresponding to at least 10% of the workload of undergraduate courses. This measure reinforces Goal 12.7 of the National Education Plan [2], which aims to ensure the presence of extension practices in the curriculum and promote transformative interaction between university and society. In the context of engineering, this means that future engineers are exposed to real challenges, strengthening not only technical skills, but also critical thinking and social commitment to the demands of the community.

In the same way, projects aimed at community actions bring the future engineer closer to the social reality, enabling him to act in complex contexts and promoting the full exercise of citizenship.

In this context, the development and implementation of extension projects in

Chemistry and, consequently, Chemical Engineering, presents itself as a important need of the University, while building a citizen identity and the full demonstration of the importance of Chemistry in all areas of knowledge. Therefore, this article aims to present an experience report of the current extension projects in chemistry at SENAI CIMATEC University.

### Projects Developed

Extension activities in chemistry are developed through two projects: CIMATEC Saneantes associated with professional training, and the project Química Inspira: Um Show de Química aimed at scientific dissemination through playful experiments. They were implemented in 2024 and are now completing their first year.

#### CIMATEC Saneantes Project

The CIMATEC Saneantes extension project represents an important professional training initiative, providing participants with operational knowledge in the manufacture of sanitizing products, such as soap, liquid soap, alcohol gel, bleach, detergent, disinfectant and automotive cleaning products. This practical approach is in line with the trends discussed in events such as ExpoTech, held at SENAI CIMATEC itself, which have reinforced the importance of proximity

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between educational institutions and companies [3]. By offering this type of training, the project not only improves the quality and reliability of the products subsequently manufactured but also opens concrete paths for the generation of employment and income in Salvador and the Metropolitan Region, following the central objectives of university extension aimed at regional and social development.

In addition, the project shows commitment to the circular economy and sustainability through the production of bar soap from waste cooking oil. This type of practice promotes the reduction of improper waste disposal, transforming it into useful products, and stimulates environmental education by demonstrating the importance of correct oil storage, the seriousness of this waste as a polluting agent and a concrete alternative for its reuse as another way to train the population in general.

Finally, by working in the training of entrepreneurs and small producers through production workshops, the project fosters the economic autonomy of the participants and strengthens the connection between the University and the productive sector. The training offered by CIMATEC Saneantes reflects the objective of the extension courses to bring future extension workers closer to the real market, preparing them to innovate, solve community problems and develop products aligned with regional demands. This model of extension action, practiced in partnership with industrial entities such as SENAI itself, is an example of how university extension can contribute to the strengthening of local production chains, circular economy and social inclusion, consolidating itself as a fundamental instrument in the training of complete and engaged professionals.

#### Project: Química Inspira: Um Show de Química

The Química Inspira: Um Show de Química project is a university extension initiative that seeks to arouse students' interest in science

through playful experiments. By promoting scientific dissemination both in basic education schools and within the SENAI CIMATEC University itself, the project follows the model consolidated by similar experiences such as the Química Show at UFScar and the LADIQ at UESB [4,5], where demonstrative experiments arouse creativity and curiosity, consolidating chemical concepts in a sensorial and emotional way.

This strategy through visual, auditory and tactile observation allows students to connect with science even before entering theoretical abstraction, strengthening the natural assimilation of the themes.

The possibility of promoting the Química Inspira project in elementary and high schools of basic education has the potential to expand the reach of scientific dissemination, making chemistry more accessible and interesting for different audiences. Similar projects have already demonstrated positive results in this itinerant format, with significant impacts on student engagement [4,5]. Also, by allowing students to experience the university environment, through visits to SENAI CIMATEC, the project stimulates the scientific vocation and strengthens the bridge between basic education and higher education.

In addition to promoting academic interest, the Química Inspira project offers an opportunity for professional and social development for the extension workers themselves. By planning, structuring and presenting the experiments within the parameters of scientific dissemination, these students improve technical skills, scientific communication and teaching skills. This experience in extension corroborates the principles of Resolution No. 7/2018 of the Ministry of Education [1], which emphasizes the integration between teaching, research and extension as the essence of higher education. Thus, Química Inspira project establishes itself as a strategic tool to inspire the next generation of scientists and engineers, making chemistry an inspiring and transformative experience.

## Results

### CIMATEC Saneantes Project

The CIMATEC Saneantes project involved the participation of 12 students from the Chemical Engineering course from SENAI CIMATEC University over 1 year, and during this period it was possible for students to study and develop 20 practice scripts for the manufacture of sanitizing and cosmetic products, such as: soap, liquid soap, alcohol gel, bleach, detergent, disinfectant and automotive cleaning products. It was also possible to carry out an in-depth study of the manufacture of soap from waste cooking oil (Figure 1). To develop this knowledge, it was necessary for students to understand the saponification reaction of the Organic Chemistry discipline and understand the function of a strong base and a fatty acid. In Figure 2 it is possible to verify the soap produced.

The great gain for the students was the improvement of their basic laboratory techniques, being an opportunity to expand the knowledge acquired in the disciplines. In this way, it was also possible to generate a sense of belonging to the extension students, because since the first semester of graduation they have already been taken to the laboratory to experience the project.

While the instructional scripts were developed, it was possible to hold the first workshops for the manufacture of soap from used oil and other sanitizing products. The first workshop was held with students from SESI's integrated education (Figure 3), and the second workshop was held as part of the Environment Week held at the IES itself. It was a moment in which we took the first steps of university extension and, currently, we have started negotiations to carry out the professional training workshop for chemistry technicians in Salvador and the Metropolitan Region.

### Project: "Química Inspira: Um Show de Química"

The Química Inspira project involved the participation of 8 students from the Chemical

**Figure 1.** Extension students manufacturing detergent.



**Figure 2.** Soaps produced by extension students.



**Figure 3.** Workshop on the production of soap from waste cooking oil for SESI students.



Engineering course at SENAI CIMATEC University, from the most varied semesters, over 1 year. In this process, it was possible to validate several playful experiments to promote scientific dissemination. It was an opportunity to encourage and motivate the extension students

themselves, but, in addition, it was possible to develop a presentation for the schools, and we held a workshop with students from the Mestre Paulo dos Anjos school, located in Bairro da Paz – Salvador – Bahia. It was a very rich initial moment for all involved, promoting university extension and citizenship, as the extension workers were able to understand the reality in which visitors lived and thus recognize privileges and discuss issues for a more egalitarian and just society.

This project was also involved with the student recruitment sector promoted by the SENAI CIMATEC University, in which high school students from different schools in the city participated in the CIMATEC Experience, an opportunity in which we carried out some experiments and the extension workers talked a little about their experience.

#### Challenges, Achievements and Next Steps

Currently, the projects have six extension students and one extension scholarship holder, after a partnership with the extension program Public Office of Engineering and Architecture, which is linked to the university extension center (Figure 4).

The great challenge associated with the two projects was precisely regarding the resources needed for the acquisition of reagents and the use of the University's chemistry didactic laboratory that supports all practical disciplines, whether in technical education or undergraduate. Numerous practical project activities need to be postponed due to the lack of an adequate schedule in the laboratory and resources. However, it was possible to obtain financial support through a public notice carried out by the University itself, the Public Notice for the Promotion of Teaching Initiatives 2024, in which we competed with other projects to obtain a financial resource of R\$2500.

Despite of all that, even with a little significant resource regarding the needs of projects associated with chemical practice, we managed, over 1 year of existence, to promote the participation of 20 undergraduate students in workshops in

**Figure 4.** The current team of extension students.



remarkable events such as the Environment Week and our own workshops that involved the external public and, mainly, students of basic education from a school in the community.

Also, the possibility of creating an extension program in chemistry will strengthen the projects, as it will be possible to apply for more extension scholarships and various other resources through funding notices. These practices make the program more robust and can attract students from the most diverse engineering degrees at the University itself.

#### **Conclusion**

Both the CIMATEC Saneantes and Química Inspira projects are successful examples of how university extension in chemistry can consolidate itself as a strategic axis in academic training and social transformation. Their participatory methodologies, applied content, and strong community component make them not only pedagogical projects, but true agents of scientific citizenship, social innovation, and strengthening the links between science, technology, and society.

In addition, these initiatives dialogue directly with the Sustainable Development Goals: they contribute to SDG 4 (Quality Education) by offering scientific training from basic education to

graduation; for SDG 10 (Reduction of Inequalities) by generating income opportunities and access to knowledge in vulnerable populations; to SDG 11 (Sustainable Cities and Communities) and SDG 12 (Responsible Production and Consumption) by encouraging circular economy practices and conscious consumption [7].

The prospects for improvements begin with the implementation of indicators to assess the impact of the project, the strengthening of partnerships with schools, city halls and local companies for better accessibility, teaching materials in online formats to expand the reach and enable asynchronous learning and the offer of more workshops with the communities served.

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