

Multidiscipline Teaching of Sciences for Girls

CNPq -UNISAL Campus São José Project

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Abstract— Most male employees have the majority of jobs when dedicated professionals in engineering field and technology in Brazil, and this is a cultural factor. As a result of obtained data in the Automotive Systems and Industrial Automation Technology courses at UNISAL, in a six-year period, from 2010, it was verified that the ratio between genders was one girl for every 100 boys and One girl to forty boys respectively, which shows the small amount of women performing in these markets. For the governmental incentive use to increase the interest of women in the engineering field, this project, developed in partnership with the National Council for Scientific and Technological Development (CNPq) and the Salesian University Center of São Paulo (UNISAL), São José Campus, the use of the water as an object of study allowed to explore basic concepts of mathematics, chemistry and computing, expanding notions about the need of conservation of natural resources and enabling theoretical and practical teaching for female students. Using the knowledge of different tests carried out to check water quality, specific equipment and mathematical calculations, students were able to get in touch with the universe of sciences. Experiences and observations about the use of laboratory equipment, the correlation of theoretical concepts, the elaboration of procedures motivated the learning of the female students of the public high school, influencing the behavior of being in training, expanding their possibilities of future action in the labor market. Two high school students from the Public School, a high school teacher from the Public School, an undergraduate female student and a female professor from UNISAL University Center, *Campus São José, Campinas* participated in this project.

Keywords—*woman, engineering, teaching.*

I. INTRODUCTION

Studies on the professional training of women in universities, especially in the field of engineering, have increased, and they approach the presence and insertion of this gender in the labor market, its visibility and participation in institutions that work in the scientific field [1].

Women have competence in the middle of the sciences and their quantity tends to increase in the engineering, and field research has pointed out to the presence of this gender in 14% in 2009, although they have a valuation of work within the market in a different way from the masculine gender [1].

According to Lombardi (2007) it is possible to notice behavioral changes in the feminine daily life, since historically women were only dedicated to the home, and they are

committing themselves and accepting new challenges, willing to work next to the predominantly masculine universe, obtaining its training Professional relationship in the field of sciences, which can broaden their performance in the labor market [2].

The increase in the presence of women in the area of engineering and technology seems small, and this fact can be reinforced by the information that referring to the frequency of the female in Automotive Systems Technology and Industrial Automation courses at UNISAL in a period of six Years, as of 2010, showed that the ratio between genders was one girl for every hundred boys and one girl for forty boys respectively, which proves the small amount of women acting in these markets.

Government support from the National Council for Scientific and Technological Development (CNPq) was intended to encourage the training of women for the careers related to the exact sciences, engineering and computing in Brazil, especially for women, and attending High School and graduation, to be Developed in institutions that had higher education [3].

This project was developed using as a theme the natural water resource, especially the collection of rainwater, its importance, the analysis of its quality, including the use of recyclable filters, being presented different possibilities of the use of mathematics, chemistry and computing when The collection of data, elaboration of procedures and the accomplishment of bibliographic research of the specialized literature. The environmental preservation can be included for the training of the students.

II. THE MAIN THEME CHOICE

The capture and use of rainwater and its reuse has been a reality in several regions where it does not rain abundantly, and in cities, this fact has occurred in gated communities and commercial establishments to preserve this natural resource.

Brazil is the richest country in water resources, with 6.2 million cubic meters of fresh water, or 17% of the fresh water contained in the planet, but the country presents serious problems of contamination of the waters by domestic effluents and some companies Are responsible for the discharge of industrial effluents that can contribute to degrade water resources, according to the World Water Forum [4].

The hydrological cycle has an important role for living beings, and the processes of evaporation and precipitation in the form of rain allow its continuity. The rainwater collection and its reuse in industrial processes is of fundamental importance, especially where this resource is scarce [5].

The use of water as a thematic axis provided the knowledge of its physical and chemical characteristics, its collection when precipitation occurs and the use of recyclable filters in its collection, these elements were the basis for the contact with theories for chemical analysis, equipment and Concepts that permeate environmental education.

The project was developed by the collaboration and involvement of two public high school female students, a high school teacher, an undergraduate female student at UNISAL and a female professor at UNISAL and it occurred due to the financial support of the government agency CNPq.

III. PROJECT DEVELOPMENT

Initially, high school students carried out extensive bibliographic research in specialized literature on the characteristics and quality of water so that their reuse could occur, including the theory that addresses acids and bases.

The students, together and with the help of the teachers, verified which methods would be used for analysis according to the initial proposal of the project.

Next, to increase knowledge, they studied the theory and equipment used for water analysis, such as the pH meter, turbid meter and conductivity meter, and elaborated procedures were also developed for these analyzes.

UNISAL provided a space for the collection of rainwater, and a concrete base was built for the correct disposal of the gallons, to obtain samples. In order to avoid contamination of the samples, plastic funnels and folded filter paper were placed over the opening of the collection gallons.

IV. RESULTS AND DISCUSSIONS

The use of water as the thematic axis of the project allowed the training of the students, who could get contact with equipment and chemical analyzes that can be carried out in rainwater. The knowledge about environmental preservation was emphasized and the experiences, their observations and the use of computer resources to carry out the bibliographic review and data compilation, elaboration of presentations enriched the universe of the students' performance.

There was an improvement in the agility of the students for consultation and treatment of data related to the project, internet use and information acquisition for water analysis area and its importance. Capacity building was observed for the execution and elaboration of documents, for the dissemination of results, improving the competitiveness of students for the labor market.

The use of governmental financial resources to motivate the female gender has helped to empower them, motivating the competence for the market in which future professionals can work.

V. CONCLUSIONS

The development of the project using rainwater as a main theme, its collection, analysis, physico-chemical characteristics and its reuse was important for significant changes in the interest of the students belonging to the work group.

It was also observed, their social inclusion and an improvement in knowledge in general culture due to discoveries made for the motivation of the team students of the team in different realities, broadening the understanding of the role of the women in society as a professional in the sciences field.

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