University, Society and Non-profit Organizations: the development of a partnership

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Abstract - **A major concern nowadays is the social responsibility of engineers and what nature of actions the universities should take in order to help the creation of a genuine social dimension on the students' curriculum. Aiming to address this endeavor, a program called "Poli Cidadã" was developed at the Escola Politécnica of University of São Paulo. The main goal is to foster the creation of opportunities for engineering students to develop their course projects, based on requests from different non-profitable organizations, which work with underprivileged classes or groups with special needs. This paper presents how the program creates the interaction between the non-profit organizations, the University and different sectors of the society in order to provide conditions for the development of engineering projects. Some projects have the support of private companies through the non-profit organizations. In addition, noteworthy examples of projects were given including one involving indigenous communities and another developed for some Brazilian slams. The experience has been very successful, allowing the students to interact with realities far different from their own and also to provide solutions to social segments that could not afford high-qualified professionals to mend some of their daily problems.**

Index Terms - social inclusion, engineering education, social responsibility, enterprise partnership in social projects.

INTRODUCTION

Since the last decade, the development of social responsibility projects and collective activities has gained a solid support from the enterprises and the whole society. Some worldwide known scandals involving the abuse of plant-floor employees in deprived countries have contributed to promote the consciousness of the social enterprise responsibility. As an example, it could be mentioned the regretful scandal involving child labor in Nike factories in Indonesia in 1996 or the exposition of Vietnamese workers to toxic fumes in 1997. After these scandals have got the attention from the worldwide press, Nike has embraced the social responsibility cause and has helped to disseminate this idea among others enterprises and society at all [1], [2], [3].

In the face of this sorrowful reality, universities around the world have realized the need for engaging their students in social programs within disadvantage communities and preparing them for this new market demand – professionals aware of the social responsibility are expected from the nowadays companies. As an example, we could mention the Poli Cidadã Program held by Escola Politécnica from the University of São Paulo, whose purpose is to promote the engagement of the students in social programs involving low-income communities that live in the city of São Paulo as well as around other smaller countryside cities [4]. Some other examples, worthwhile to be given, are the D-Lab course (Design Laboratory) kept by MIT Media Lab for both undergraduate and graduate students, whose purpose is to promote the development of low-cost technology solutions for daily challenges from impoverished communities [5] and EPICS (Engineering Projects In Community Service) from Purdue University a program in which teams of undergraduates design, build, and deploy real systems to solve engineering-based problems for local community service and education organizations [6].

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The main purpose of this paper is to present the Poli Cidadã program and to reveal how it has affectively accomplished its intention to create an interaction among non-profit organizations, the university and its students in order to gain ground to provide conditions for the development of engineering projects that present solutions for social demands.

This paper is organized in four sections, in addition to this first one. The second section describes the main activities and projects that have been developed under Poli Cidadã program. The third section discusses the role of the enterprise participating in this program. The fourth section presents the perspective of the students that have participated in the Poli Cidadã Program since its creation. The fifth section brings real examples of projects developed jointly by Poli-Cidadã Program, MIT-Media Lab Program and the Bradesco Foundation. At last, the final section analyses the results earned by the Poli-Cidadã program in developing social projects jointly with students and enterprises.

POLI CIDADÃ PROGRAM

In the Brazilian reality, as well as in almost all developing countries, the economical inequality, according to Fundação Getúlio Vargas in June 2006, reached the alarming rate of 18.57% of the population. As a consequence, woeful scenarios of low socioeconomic standards where groups of people are deprived of fundamental resources that modern

societies provide to everyone are faced today. In many cases these people have no access to minimum conditions of education, health care, housing or employment [7]. They cannot take part of a social and community life as full citizens. Transforming these people's life conditions represents a great challenge and in order to overcome it, a blatant clamor for a range of social partnership is required. Technological resources and educational processes are important mechanisms in the quest for these desirable transformations and represent the basic motivation for the creation of the Poli Cidadã program [4].

Poli Cidadã program has its main goals to motivate undergraduate and graduate Engineering students and professors from Escola Politécnica from the University of São Paulo to develop social projects that fulfill the needs of Brazilian poorest communities. Poli Cidadã was created in 2004 and has already fostered the development of 80 projects. It involves four main areas: Electric, Mechanics, Chemistry, and Civil, supporting two kinds of projects: **intensive** and **extensive** projects. The main intended contribution is to obtain the growth of the social sense of responsibility in the participants of the projects.

The **intensive** approach corresponds to short-term project, whose purpose is to develop specific solutions for problems identified by the students in deprived communities. As an example, it can be mentioned projects that have been executed with the partnership of the Bradesco Foundation and/or MIT Media Lab in Jardim Conceição – São Paulo, since 2006, and Canuanã – Tocantins, since 2005. In Jardim Conceição, the Escola Politécnica students and professors have worked with the Bradesco Foundation employees and students. In the first year of the project, 2006, they have investigated the main problems of the local community, their students and families. Based on the results of this investigation, they began to work with specific projects such as water and electrical distribution in the residential area. Similar process involved the projects developed in Canuanã – Tocantins, as it is described in Project Examples Section.

Undergraduate students mostly develop the **extensive** projects during a period of one or two semesters. It could become the undergraduate conclusion project or maybe just a smaller project as a special activity in some specific courses developed within the scope of an engineering course. As an illustration of the multitude of possible scenarios, there are some acute projects of the development of a equipment to produce liquid dosage portions for visual deficients, bus stop indicator through sound signal also for visual deficients, water reuse among others.

These projects are normally developed as the conclusion project of the engineering program in one of the four areas mentioned previously or as special activity in some specific courses. It is under discussion the possibility of creating some special undergraduate and graduate courses and a research area related to social responsibility issues. One of the main challenges of creating this course or research area is the multidisciplinary nature of this subject, which would involve multiple departments of the engineering school as well as of other unities in the university.

THE ROLE OF THE ENTERPRISE

As previously discussed, nowadays most of the companies are aware of their social responsibility. Some companies have embraced this cause seriously and have achieved very favorable results. Other companies have decided supporting this sort of initiative focusing on the marketing side.

In the case of social projects developed by the universities, these enterprises have participated in different ways, providing:

- **Financial support:** in this case, the enterprises sponsor the social projects development, covering personnel payment, resources acquisition, and transport expenses among others. In return, it is supposed that the university will disseminate information about the enterprise participation in their social projects. The enterprise can or cannot use the project results for its own benefit.

- **Technical knowledge:** here, the enterprise participates more closely in the social project development, providing the necessary information to accomplish the project goals or developing the solution together with the university. Normally, in this approach, the enterprise supposes to use the project results to foster the development of its own products.

- **Financial and technical support**: the enterprise involves itself both in the project development and in its financial support.

It is also possible that one social project has the financial and technical support from more than one company. Another possibility is to establish partnerships with companies through non-profit organizations or foundations or still through ONGs that assist specific publics. The last alternative is the most frequent in the Poli Cidadã Program.

It must be emphasized that finding sponsorship from the Brazilian enterprises does not consist of a straightforward activity. The culture of social responsibility is not so disseminated among the Brazilian entrepreneurs, who do not see direct advantages from such kind of investment for their own business posing a big challenge to the social inequality scenario.

In order to overwhelm such difficulties, there are some Brazilian laws and as well regulations that incentive the companies to invest in local research development. As an example, it can be mentioned the innovation law [8]. According to this law, the companies that have factory in Brazil and earn any profit, instead of paying taxes related to this income, they are eligible to use part of their tax dues in research projects developed in the Brazilian universities or research organizations. Based on this law, some multinational and Brazilian companies have invested in

research projects at the University of São Paulo. Some of these projects include social responsibility projects with innovative results.

THE STUDENT PERSPECTIVE

Since the Poli-Cidadã Program creation, we have already the participation of around 100 students. They have different background: mechanical, mecatronics, environmental, civil and electrical engineering, among others.

As it is an optional program, normally the participant students are highly motivated. They are encouraged by the mentor professors to identify and detail the problems found in some specific deprived community or suggested by a non-profit organization and to propose solutions. The problem identification as well the solution specifications are generally done through teamwork.

At the end of a project, the students are generally much more conscious about their social responsibility and enthusiastic about the insightful and enrichable experience. Based on this, they normally help us to disseminate and divulge the Poli Cidadã among other students.

PROJECT EXAMPLES

Since its inception, Poli-Cidadã has developed several social projects with some underprivileged communities not only in the city of São Paulo but also in the countryside and outside the state.

As an example, we could mention the projects that have been developed jointly by Poli Cidadã program, MIT Media-Lab and Bradesco Foundation in the indigenous tribe and settlement community of Canuanã - located in the state of Tocantins.

More specifically in Bananal Island lives the indigenous tribe, which is protected by the INCRA (National Institute of Colonization and Agrarian Reform). In this island, there was previously a white settlement community that had to leave outside the island. They are now part of the rural community of Canuanã. In Canuanã, there is also a farm school of the Bradesco Foundation, where around 800 students from 7 to 16 years old live and study. These students are selected from the poorest families from the surrounding region.

Our first cooperative project took place in 2005 and involved 3 people from Escola Politécnica, 5 from MIT-Media Lab and 12 from the Bradesco Foundation. Bradesco Foundation has participated in providing bed-bath facilities in its farm house for all Escola Politécnica and MIT students and monitors, financing the purchase of the air-ticket and providing the necessary personnel and material resources for the social activities development. Thus, it can be said the Bradesco Foundation provide us Financial and Technical Support.

The team stayed in Canuanã for 10 days aiming to identify general problems from the indigenous and settlement community.

In indigenous community, we have identified, among others, a serious problem of alcoholism, bad conditions for food storage and digital illiteracy. For mitigating this last problem of digital illiteracy, the Bradesco Foundation sponsored the creation of CID (Digital Inclusion Center), whose purpose was to create an electronic medium to disseminate the indigenous culture in the Internet and to enable the indigenous community to use computer and have access to Internet (Picture 1). This center was originally composed by ten personal computer interconnected by a local network with satellite link to the Internet. In order to support the indigenous, we have designated some students and instructors to monitor them to use the computers. At first, we had a massive interest from children. The adults were much shier and not easy to approach. However, as a basic problem it was verified that the standard computer keyboard did not support to type the local Javaé language, called Inỹ. To solve this problem, in 2006, the Poli/MIT team created software that enables the users to type in Inỹ [9].

In order to improve the food storage conditions, it was conceived the pot-in-pot solution based on the use of two clay pots, one inside another separated by a thin layer of sand and water. This unpowered refrigeration technique, involving nested clay pots, comes from North Africa [9]. It was assigned to the tribe pajé, an indigenous spiritual leader and a local potter, the task of producing two clay pots and testing this solution. This is a simple but powerful solution to keep the food in pot somewhat cooled increasing its fresh period. Unfortunately, we could not address the alcoholism problem.

Picture 1 – CID (Digital Inclusion Center)

In the settlement community, two main problems were identified: the bad quality of drinkable water and the inexistence of a formal bathroom. Aiming to address the first problem, the team has selected some houses and proceeded with water quality tests for bacterial contamination. The water testing was based on an experimental membrane filtration apparatus and laboratory incubator, which tests for fecal contamination of drinking water. This technique was brought by the MIT team, which explained it and transferred the necessary equipments to the local students, enabling them to reproduce and repeat the tests in other houses or in

same houses after some improvement in water treatment had been introduced [9].

The results showed that the water level was greatly under the accepted level of quality for the human beings, since the water storage was most of the time let uncovered and because of the environment conditions (it was frequently full of insects and animal excrements around). In 2006, some solutions were brought, such as solar disinfection of water, better covers and low cost water slow sand filter. These solutions are described in detail in [10]. For the lack of bathrooms, we suggested some cheap ways to build-up underground fossas.

Some of these suggestions are already implemented under coordination of some teachers and students of the Bradesco Foundation school farm. Some problems are still pending. In this case, the participation of Bradesco Foundation was critical. These students and teachers are deeply concerned about local scarce reality and they helped us with the indigenous and rural communities interaction besides the identification process of the most important problems from these communities.

This first cooperative project presented successful results thus being repeated later with different students groups from Escola Politécnica, MIT and Bradesco Foundation in the years of 2006 and 2007.

Picture 2 – Water Collection for Quality test

In this project, Bradesco Foundation was our enterprise partner participating with financial and technical support. In 2005, 2006 and 2007, professors and students from Escola Politécnica and MIT as well stayed in the foundation farm as guests in its main house (headquarter). In addition, local teachers and high-school students have accompanied us in our visits to the indigenous and settlement communities providing some information about the local culture, introducing us to these communities and participating in the discussion about the potential solutions for the identified problems. In some extent, the activities developed by us during our stay in Canuanã extended what the Bradesco Foundation already does in that region, providing education and housing for around 800 students during a period of 8 years.

The main impact of the aforementioned ongoing projects was a greater digital inclusion of the indigenous community and the improvement of the sanitary conditions of the settlement community.

Picture 3 shows the reception of MIT, USP, UCB and UFT students by the Bradesco Foundation students in 2007.

Additionally, we have developed a similar program in Rosinha Slams in Rio de Janeiro, involving MIT and Escola Politécnica. There we have visited some slams, schools and orphanage. Based on the data collected during this visit, it were defined the actions to be taken in order to promote local social development. The activities here performed were sponsored by MODEC.

Picture 3 - MIT, Escola Politécnica –USP, UCB (Catholic University of Brasília) and UFT (Federal University of Tocantins) arrival in Canuanã in 2007.

RESULTS EVALUATION

As it was mentioned, the Poli Cidadã Program was created in 2004. In the period from 2004-2007, we have concluded around 80 projects, an average of 20 projects per year. These projects have been more concerned with mechanical, electrical and sanitary engineering. Most of the cases we count on partnership of non-profitable organizations.

Poli Cidadã program has organized an annual workshop whose purpose is to disseminate the developed projects and their results. In addition, twice a year, there are itinerant expositions of posters describing the concluded and ongoing projects.

As result, the student engagement to the Poli Cidadã Program has increased and the project quality has improved from year to year.

As it was stated previously, our main challenge now is to officially create a research area related to social responsibility allowing the participation of a larger number of professors. Nowadays their participation is somewhat limited due to the lack of matching subjects between the Poli Cidadã projects and their own area of research. In addition, we would like to foster new partnerships with the industry, which will contribute to development of a more innovative and out of box projects that requires financial support or

even specific knowledge about some production process, local community culture and market evolution trends.

In near future, we are planning to extend the Poli-Cidadã program to other schools such as medicine, education, agronomy and economy in order to have a multidisciplinary group of participants and make feasible to propose solutions for much broader problem scope.

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