Generating Social and Environmental Awareness among Computer Science Students

Javier Díaz, Claudia Banchoff, Viviana Harari, Ivana Harari, Viviana M. Ambrosi[1]

Computer Science School, National University of La Plata, Buenos Aires, Argentina
{jdiaz, cbanchoff, vharari, iharari, vambrosi}@info.unlp.edu.ar

Abstract

Since 2007, the Computer Science School of the National University of La Plata (Buenos Aires, Argentina) has been involved in extension projects related to social and environmental issues, where students of the Computer Science degrees are called upon to participate and collaborate actively.

At the beginning, we started working on the project called Reduciendo la Brecha Digital en Sectores Desfavorecidos de la Sociedad (Reducing the Digital Divide in Underprivileged Sectors of Society), where students and teachers went voluntarily to diners in order to teach Computer Science to children and adolescents of limited resources. We approach this from two teaching perspectives: training the students in basic PC operation concepts and teaching them to use a computer as a learning tool for other disciplines. Because the diners had no computing resources, the training took place in cybercafes near the neighborhood.

In 2009, another project came to be as a result of a growing concern about the destination of the computing equipment that was no longer in use. Normally, this is discarded and generates electronic waste. Thus, a group was formed to work on the reuse, restoration and recuperation of *Waste Electrical and Electronic Equipment* (WEEE).

In 2010, both projects were united, allowing for the donation of the restored computing equipment to the training venues, solving the problem of lack of equipment in the diners. Not only are the institutions that were excluded from ICTs given adequate computing information, but also the necessary equipment and resources.

Voluntary workers, all students, can assume the role they prefer with the wide range of activities offered from different disciplines, such as computer science, engineering and education.

Among the most important activities are taking apart disused equipment, selecting usable components, putting an equipped PC together, and installing and selecting free software computer applications, both offimatic and educational. The students an also take part in the development of the classes, dictate them, make curricular lists, and set up and maintain an internal wiki with material for the classes and data on the performance of each student.

This article consists of presenting these initiatives, passed in successive calls by the Presidency of the UNLP and the National Ministry of Education, which allowed for the voluntary participation of over 50 computer science students.

Project characteristics, motivations and results, both in the audience and among the participating computer science students, will be described in this article.

It is quite gratifying to be given the opportunity to strengthen the bond between the school and underprivileged social sectors in terms of technology, while achieving a more profound ethical and supportive formation for computer science students with a social commitment and environmental awareness, who understand how computer science can be applied to the cause of reducing the digital divide that exists in the most underprivileged sectors of society and collaborating in environmental matters.

---

[1] Profesional Principal of the Comisión de Investigaciones Científicas, Province of Buenos Aires (CIC-BA)

1. Introduction

Since 2007, the Computer Science School [1] of the UNLP [2] has been actively working to shorten the digital divide that exists in numerous sectors of our society. Nowadays, many people have no access to technologies, and many others who do have access to them, cannot use them because they lack the knowledge.

Teaching how to use ICTs (Information and Communication Technologies) implies the need for a fundamental tool: the computer, a resource that is, in general, difficult to find in the kind of environment where teaching is needed. In 2007, a university volunteering project was lanuched to train and update children and teenagers under 18 years of age in underprivileged sectors of our society on topics related Informatics and the Internet. Back then, all the classes were imparted in local cybercafés[2] that were near the dining halls[3] the students frequented. Although this solution did offer some benefits, as it allowed training to take place, it also carried with it aditional costs and adapting the applications used.

In 2009, the School staff started worrying about the destination of the computer resources that were no longer in use. That is how the project for reuse, restoring and recovery of the WEEE (Waste Electrical and Electronic Equipment) began. Because the informatic literacy project was still working, by then framed in a university extension project but with the same goals, the idea of using the product of the recovery of the informatic equipment as donations to the locations of the trainings came about, in order for the students to have their training in the dining hall itself.

Currently, the digital literacy project is still working, with some minor differences from its beginning. As regards the recipients of the training, the group was extended to include the families of the young students. The motive behind this is that many of them requested the chance to train in the use of ICTs. Regarding the amount of dining halls that offer the training, there were initially three and there are currently seven, with many on a waiting list. As regards the location of the training, three of the dining halls for which the training used to take place in cybercafés currently offer the training on site, with computers donated by the technological resuse project.

This article describes the aforementioned projects, emphasizing on the work done by the main collaborators: the students of the school, directed by some of their teachers. Emphasis will also be made on the importance of encouraging students to develop a sense of social responsibility through these actions.

2. Reducing the Digital Divide in Underprivileged Sectors of Society

The Computer Science School is working on a line of action to reduce the digital devide in many sectors of our society. Since 2005, agreements with governmental entities have allowed the implementation of informatic training for elderly citizens, a group that, because of generational matters, had been left out of the information society. Since 2006, many different training sessions on the basic use of PCs, the Internet and social networking sites have been imparted to groups of the third sector[4].

---

[2] A public business where customers are offered Internet access and, sometimes, bar and/or restaurant and/or drugstore services.

[3] The main activity of these dining halls is to provide children with a meal five days a week. Some dining halls operate on the weekends as well or provide food for the families to consume at home. Most of the halls have exceptions and extend the service to elder citizens, disabled people and pregnant women. They usually provide tutoring, and, in some cases, other services such as legal advise, job listings, clothes, nutritional care and psychological and medical assistance.

[4] The third sector comprises civil associations, foundations, benefit societies, cooperatives, community centers, community clubs, chambers of commerce, professional associations, dining halls and religious organizations, among others.

As regards children and teenagers in underprivileged sectors of society, a pilot test took place during 2006, with the training of teenagers from many dining halls, and as of 2007 [3] there has been continuous work with projects that achieved accreditation and received funding form many national entities: the National Ministry of Education, through its University Volunteering Projects (2007 and 2009) [4] and the National University of La Plata, through its University Extension Projects (2008 and 2010, accreditation only) [5] [6] .

Although the projects presented changed names through the years, the goal was always the same: to provide informatic literacy to the most underprivileged sectors of our society, especially those in our own city, La Plata, and its surrounding areas. In the beginning, the goal was to reach children and teenagers, but it extended to include their families as well.

Although, in general terms, the training in all the levels is oriented towards getting the students to learn how to use a computer and the services provided by the Internet, there are many different orientations in relation to the age group.

In the case of children of school age, literacy work is oriented towards the application of informatics to education. These groups collaborate with the tutors that work in the dining halls and offer practice to reinforce topics where the students present difficulties. This practice features activities performed through offimatic applications and educational subject executed interactively through the Internet or software created by the collaborators. Currently, the groups are beginnig to incorporate educational software programmed by the students of many different subjects of the School, framed in final projects.

In the case of teenagers and adults, literacy work is oriented towards an informatic formation that will provide access to better job positions in the future, and helping those that are working at the moment to make progress in their current position.

In the beginning, the training was offered in nearby cybercafés because the dining halls usually lacked adequate resources. Currently, "La Casa de los Niños Madre del Pueblo", located at 6 and 602 in Barrio Aeropuerto, the "Desocupados" association, located at 16 between 78 bis and 79 in Altos de San Lorenzo and "Los chicos del futuro" or "Comedor de Wimpy", located at 519 between 119 and 120 in Barrio Tolosa, all have equipment that was donated by the project of reuse of outdated computing equipment, a situation that allows for training to take place in the dining hall itself.

In the beginning, the teachers of the project made theoretical and practical materials especially for the project, but the contents are not static: they are permanently changing with the contributions of the collaborators. Both the teaching staff and their collaborators (students, alumni and administrative staff of the School) take active part in the update of the syllabuses and the classes.

Given the characteristics of the training, both teachers and students have had to adapt to the conditions of the premises, but it is important to highlight that with the goal of achieving the goal set, the participants always find a way to have the classes.

3. Reusing Electronic Waste with Social and Environmental Purposes

The accelerated development of the electronic industry has increased the levels of production and consumption of equipment and components, which has led to an accelerated increase in the appearance of obsolete or unused equipment.

Currently, Argentina produces 100.000 tons [7] of E-Scrap each year. The lack of specific regulation for WEEE management[5] and a need for awareness in the general public regarding the toxicity of certain components (that are often burnt or buried in dumping grounds) and their correct treatment and recovery motivated the School to provide a solution to this problem.

Because many of the mishandled components can potentially become highly toxic contaminants, the need for both the safe disposal and the environmental awareness implied must be taken into account in the many sectors of society, including the university environment.

---

[5] In May 2011, tha National Senate gave preliminary approval to the Draft Waste Electric and Electronic Equipment Management Minimal Budget Law presented by Daniel Filmus and debated for three years. [8]

Moreover, the reuse of the recovered equipment for social and educational purposes offers the possibility of continuing the projects aimed at reducing the digital divide, while giving a practical purpose to the work related to digital literacy and environmental awareness. Nevertheless, this is a relatively small contribution to the solution of a larger, deeper problem that must be addressed in its entirety by the government and society as a whole.

As mentioned previously, in 2009, the School started worrying about the destination of the large quantities of informatic equipment that was becoming obsolete, which is why work began to take place in order to reuse, restor and recover the WEEE in the gray line [9]. In this framework, the E-Waste (E-Basura) University Extension Project [10] was launched.

First, the School staff contacted recycling companies that handled these elements in an environmentally safe way. In our region, only two companies were located that had the corresponding certifications. A framework agreement was signed with one of them to dispose of the elements.

The general public was called upon to donate the informatic equipment that was no longer in use with the purpose of restoring them and donating them to institutions. Here there was collaborative work with the aforementioned digital literacy project, because the lack of resources was a main issue for their teachers and students.

A work strategy was proposed that focussed on giving environmental awareness lectures and sessions with special guests such as the Greenpeace environmental organization.

Donations are received periodically with a well defined procedure, which shows the great concern of the general public for this issue.

The work group has contemplated having periodic computing waste collection campaigns. The first one was organized in October 2010, in the framework of the "Green Informatics Week", during which there were talks and a three day collection campaign. A total of 484 elements was collected, most of which were screens and CPUs. The next campaign is scheduled to take place in August 2011.

One of the main problems detected in the donations is that the equipment had been stripped of memories and disks, which made it impossible to reuse because the components were too obsolete to be found in the market.

Many donations were possible due to the construction of a single computer from many different components, using free software. In relation to this, actions are coordinated with the development team of Lihuen GNU/Linux [11], a Debian-based distribution adapted especially to educational environments.

In places that lack resources, work is done with thin client networks and free software. The institution is encharged with purchasing the server and other necessary ressources to set up the network. In some cases, the collaborators are in charge with setting up the network, while in some others, this task was performed by the institutions' own staff.

A total of 25 donations have been achieved so far, some of which are PCs and CPUs, others are hardware components for specific purposes.

Among the beneficiaries are Comedores Populares Desocupados (in two stages), Pro-Infantia dining hall, Tricolor dining hall, Casa del Niño Obra del Padre Cajade dining hall, Caritas Alegres dining hall, El Nuevo Mercadito dining hall, Jardín Rural N°972, Unidad Carcelaria 12 in Gorina, Biblioteca Popular José Morandi, Biblioteca Popular y Cultural José Ingenieros, and Biblioteca del Albergue Universitario Estudiantil.

Hardware components have been donated for other uses and for the improvement of existing equipment in some institutions. Among these cases, we can highlight the requests by students of the Fine Arts School, which used components in their artwork, and the robotized tests of the students of the Computer Science School. All these types of reuse give components a different purpose than the original one.

The Project has been presented in many sessions and conferences, by the teachers envolved and even by the students that participate, which is an important contribution to their formation.

The E-Waste (E-Basura) Project was granted Primer Premio "Inclusión Digital 2009" by the Programa Nacional para la Sociedad de la Información (PSI) of the National Communication Secretary in the "C" category for non-governmental and/or university extension initiatives related to the reduction of the digital divide. This award seeks to distinguish and encourage good practices in digital inclusion activities.

The project was presented to the Senate on November 24, 2009 and proposed as a project of provincial interest.
This project has been funded for two consecutive years by the University Extension Project Calls (2010 and 2011), which gives it continuity.

4. Social Responsibility Awareness in University Students

Both projects are maintained owing to the collaboration, work and dedication of all their participants, but the work of the university students is fundamental to their continuity and development.
To date, there are 55 students involved, out of which 35 are working with literacy and 20 with the reuse of computing resources.
It is worth emphasizing that a large number of students have been involved for over two years, which shows the high level of commitment.
Vale destacar que un alto porcentaje de alumnos permanecen realizando prácticas sociales con una continuidad de más de 2 años, por lo que demuestra su alto nivel de compromiso. These students dedicate part of their time in the fulfillment of the obligations these projects demand. The activities they engage in correspond to their goals and are generally planned ahead together with the teachers, but many times they face unplanned situations and must make their own decisions.
In the case of the students dedicated to training, they not only learn how to teach the topics of each class, but also to deal with different groups that not always match the ones they are used to interacting with, as well making micro decisions to solve specific problems that arise unexpectedly. These students also learn to interact with people in situations that are different from their own and with different needs.
It is our belief that this kind of activities help train our students in other aspects that differ from their specific university formation but are fundamental for their personal growth.

5. Conclusions

Although the use of computers has increased considerably, there are still sectors of society where access to this technologies is very limited. Such is the case of dining halls located in the periphery of La Plata, Buenos Aires, Argentina, where most children seek a daily meal and tutoring.
On the other hand, the accelerated development of the electronic industry has increased the levels of production and consumption of equipment and components, which has led to an accelerated increase in the appearance of obsolete or unused equipment.
With these reasons in mind, the Computer Science School staff developed an integrating project that not only provided ICT literacy but also offered the necessary equipment.
The reuse of the recovered equipment for social and educational purposes offers the possibility of continuing the projects aimed at reducing the digital divide, while giving a practical purpose to the work related to digital literacy and environmental awareness.
This article explains the work of the Computer Science School of the National University of La Plata to reduce the digital divide, that actively involves the students of its undergraduate programs.
These projects have consolidated a community of computer science students, teachers and administrative staff that offer their voluntary work in different roles and with different degrees of responsibility to train the most underprivileged sectors of our society in ICTs.
All this effort generates gratification in all the participants, both the addressers and the addressees of the projects that make the satisfactory execution of these tasks possible. Regarding the computer science students, their participation in these social initiatives supplements their learning of the aspects specifically related to computer science. It contributes to the formation of professionals that are responsible, caring, ethical and compromised to the problematics of our current society.

References

1. www.info.unlp.edu.ar

2. www.unlp.edu.ar

3. Javier Diaz, Harari Ivana, Claudia Banchoff Tzancoff, Harari Viviana. "*Reduciendo la Brecha Digital en Sectores de Bajos Recursos*". Congreso CACIC 2008. Universidad Nacional de Chilecito y RedUNCI. Chilecito, La Rioja, Argentina 2008. ISBN: 978-987-24611-0-2. http://cacic2008.undec.edu.ar/

4. http://www.me.gov.ar/spu/guia_tematica/VOLUNTARIADO/vu____proyectos.htm

5. http://www.unlp.edu.ar/articulo/2009/5/15/proyectos_de_extension_subsidiados_y_acreditados_ano_2008

6. http://www.unlp.edu.ar/uploads/docs/dictamen_de_la_comision_de_extension..%5B1%5D.pdf

7. Verónica Tufró "Destino final de los equipos electrónicos obsoletos de usuarios corporativos de TIC en Argentina", Enero 2010, (Plataforma RELAC IDRC/SUR), http://www.escrap.com.ar/descargas/informe-raee-arg.pdf

8. Senador Daniel Filmus, "Proyecto de ley sobre Presupuestos Mínimos para la Gestión de Residuos de Aparatos Eléctricos y Electrónicos (RAEE)", con media sanción. http://www.ar.enfa-sys.com/news/imagenes/PDF/Ley-RAEE-Filmus.pdf

9. Gustavo Fernández Protomastro, "Estudio sobre los circuitos formales e informales de gestión de Residuos de Aparatos Eléctricos y Electrónicos en Sudamérica Información con datos de Argentina, Chile, Bolivia y Venezuela", http://www.basel.int/centers/proj_activ/tctf_projects/001-2.pdf

10. Proyecto E-Basura, http://e-basura.linti.unlp.edu.ar

11. Proyecto LIHUEN http://lihuen.linti.unlp.edu.ar