

UNLP experiences to reduce the digital gap

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Abstract - For several years, the Computer Science Faculty at the National University of La Plata, Argentina, has established as one of its main goals to approach the various sectors of the community. The Faculty has worked actively to reduce the digital gap in our society. During the last two years the Faculty has dictated courses for elder adults (along with the Council for the Third Age in the city of La Plata). It has also dictated workshops and updating courses on Networks and Open Source Software for teachers of diverse scholarly levels (there are ten collaboration agreements with schools of different levels).

In order to deepen this strategy, actions have been focused on young people in critical situations regarding their qualifications and the possibility of acceding to a dignifying job. The Computer Science Faculty, through its Extension Secretariat, along with the Association Center for Childhood (Asociación Centro Para la Niñez - Aso.Ce.Pa.Ni), organized and dictated a basic computer science training course for a group of young people (ages between 15 and 22 years old) who assist to different community dining rooms from that Association.

The experience was very interesting, for it was the first time that our institution worked with that student profile. This training gave the students a new alternative for a quick job search, but it had an additional accomplishment for our institution: to come closer to high schools.

The topics and the way they would be carried out in the courses were revised. Exercises were formulated in order to be alike those situations required in different organizations, so that the students could later confront real work conditions.

The objective of this article is to describe this experience, the methodology which was put in practice, the contents and the different evaluations imparted during the course.

This experience made it possible for the University to come closer to a sector of the community that is excluded from the information society.

Index Terms: digital gap, education in computer science, high school and university

1. THE INITIATIVE

The Faculty of Computer Science ¹[1] has established as one of its main goals to approach different sectors of the community. For several years, the Faculty has worked in the education area as well as in other areas, such as health, which are essential for our society.

The Faculty organizes workshops and other courses[2] for teachers of different educational levels, on Networks and Open Source Software. Since 2005, through a proposal of the Council for the Third Age[3], from the Secretariat for Social Action of La Plata Municipality, it began working with elder adults, dictating courses on Internet and on the use of Web services and e-mail. The objective was to include part of this community in the use of new technologies, thus decreasing the digital gap that separates them from younger generations.

After this successful experience –for the elders that took the course as well as for the teachers that gave it– the Faculty considered the possibility of working with young people from sectors that are in critical situations concerning work training and the possibility of getting dignifying jobs. This situation, in many cases is caused by the lack of access to technology.

The group of teachers in the Faculty of Computer Science was trained in organizing courses for non-computer science students, but this new initiative forced them to review the contents of the course and the training methods. It also led them to revise the practice contents, in order to adapt them to the objectives and characteristics of the course. The exercises had to be similar to those tasks which are necessary in administrative jobs.

Even though the Faculty and this group of teachers had trained hundreds of non-computer science students for

¹ Approximately 3500 students attend the Faculty of Computer Science at the National University of La Plata, where they can get a Degree in Computer Science and a Degree in Computer Information Systems.

years, the profile and the needs of these new participants were completely different.

The call and selection of young people was done by directors and coordinators of the NGO "Association Center for Childhood"² (Aso.Ce.Pa.Ni). They selected the students among the young people that concur to the community dining rooms³, to "cups of milk" or civil associations that belong to this Center.

The follow-up of the students was done by members of Aso.Ce.Pa.Ni and the Faculty. The activity had a formal frame given by an agreement signed between the Faculty and the NGO.

2. CHARACTERISTICS AND COORDINATION OF THE COURSE

Although the teachers of the Faculty of Computer Science were in charge of the implementation of the course, they had several previous meetings with members of Aso.Ce.Pa.Ni in order to design its contents and duration.

The representatives of both organizations coincided in the need of including contents related with learning to operate the Microsoft Windows operating system, using a Microsoft Word text processor, Microsoft Excel spreadsheets and tools for Internet access.

Regarding the location where the capacitation would take place, the decision was to impart the course in the computer lab of the Faculty of Computer Science, which has 26 computers that can operate with two operating systems: a proprietary one, Microsoft Windows, and an Open Source⁵ one, GNU/Linux Lihuen [7], developed by the LINTI laboratory⁶ at the Faculty.

As to the duration of the course, it was set to last three months, with 2 class hours per week. It was preferable for the course to be given after 5:30 PM, since one of the conditions established to take the course was that the young people had to have finished school or to be attending it at the moment. 5:30 PM is the time classes usually finish in secondary schools in our country.

Once the subjects, the place and how long the course would last were established, the representatives of Aso.Ce.Pa.Ni let the teachers define which topics would be able to be taught in those conditions, according to the previous experience with elder adults.

With their vast experience, the teachers new that if the students had little (if any) computer science knowledge, in that period of time it would be impossible to work with all

the proposed topics, specially if the objective was for the students to end the course with a good preparation in each one of them.

In order to adjust the course to the real needs of the students, an initial evaluation test was implemented. The results would be used to measure the participant's level of knowledge on computer science and to determine which of the topics would be implemented during the course.

In sections 3 and 4 respectively, we will describe the student's profile created as a result of this test and the final list of contents to be imparted in the course.

3. STUDENT PROFILE

The number of students that took the course was 17, with ages between 16 and 22 years old. 70% of them were attending secondary school and the rest had already finished it.

During the first encounter with the students, there was an initial conversation where they mentioned if they had had previous training and where they had taken it: at school or in a private institution. After this, they took the evaluation test.

The test had questions on basic computer science concepts, on the use of Microsoft Word text processor, the use of Excel Microsoft calculate sheet and on the definition of Internet, its uses, Web and e-mail services.

These were the results of the evaluation test:

- Questions related with **basic definitions**. The **Tables I, II, III** and **IV** illustrate the erroneous concepts the students had on the different basic concepts evaluated.

CONCEPTS ON RAM MEMORY	
Correct Answers	5,9%
Incorrect Answers	94,1%
THEY IDENTIFIED RAM AS:	
An output device	5,9%
An auxiliary memory	65,8%
A processor	5,9%
A container of folders and archives	11,2%
They don't know	11,2%

TABLE I
RESULTS OF THE EVALUATION ON BASIC CONCEPTS: RAM MEMORY

CPU CONCEPTS	
Correct Answers	53%
Incorrect Answers	47%
THEY IDENTIFIED CPU AS:	
A container of folders and archives	12,5%
A primary memory	37,5%
They don't know	50%

TABLE II
RESULTS OF THE EVALUATION ON BASIC CONCEPTS: CPU

FILE CONCEPTS	
Correct Answers	23,5%
Incorrect Answers	76,5%
THEY IDENTIFIED A FILE AS:	
An output device	11,8%
Primary memory	23%
Auxiliary memory	7,7%
A container of archives and folders	38,5%
They don't know	19%

² Non profit association in the city of La Plata, Province of Buenos Aires, Argentina, with legal functions and position of agent (N° 126.473). It is a non-governmental organization that assembles 22 dining rooms, 5 "milk cups" and 25 Civil Associations from the province of La Plata. There are men and women who work in areas of extreme poverty day after day to palliate the deficiencies and need of the children. Approximately 1.928 children and 109 adults attend directly to these places.

³ The basic activity of the community dining rooms is to provide lunch for children during the five working days of the week. Some extend their activities to weekends or provide food to be consumed at home. Many of them contemplate exceptions and provide their service to elderly, pregnant women and people with disabilities. They usually give school support and in some cases they provide other services, such as legal assessment, nutritional control, medical and psychological attention, employment agencies and clothing provision.

TABLE III
RESULTS OF THE EVALUATION ON BASIC CONCEPTS: ARCHIVES

DEFINITION OF HARD DISK	
Correct Answers	18%
Incorrect Answers	82%
THEY IDENTIFIED HARD DISK AS:	
The computer processor	21%
The primary memory	43%
They don't know	36%

TABLE IV
RESULTS OF THE EVALUATION ON BASIC CONCEPTS: HARD DISK

- Questions related with the **operating system**. Tables **V**, **VI**, **VII** and **VIII** illustrate the erroneous concepts the students had on operating systems, particularly on Microsoft Windows.

OPERATING SYSTEM FUNCTIONS	
Correct Answers	59%
Incorrect Answers	6%
They don't know	35%

TABLE V
RESULTS OF THE EVALUATION ON OPERATING SYSTEM: IT'S FUNCTION

WINDOWS MANAGEMENT	
Correct Answers	71%
Incorrect Answers	18%
They don't know	11%

TABLE VI
RESULTS OF THE EVALUATION ON OPERATING SYSTEM: WINDOWS MANAGEMENT

IDENTIFICATION OF SOFTWARE PROVIDED BY MICROSOFT WINDOWS	
Correct Answers	11%
Incorrect Answers	30%
They don't know	59%

TABLE VII
RESULTS OF THE EVALUATION ON OPERATING SYSTEM: MICROSOFT WINDOWS PROVIDED SOFTWARE

FUNCTIONALITY AND USE OF WINDOWS EXPLORER	
Correct Answer	6%
Incorrect Answer	6%
They don't know	88%

TABLE VIII
RESULTS OF THE EVALUATIONS ON OPERATING SYSTEM: WINDOWS EXPLORER

- Questions related with the **program Microsoft Word**. The **Tables IX**, **X** and **XI**, illustrate the erroneous concepts the students had on the use of text editors.

MICROSOFT WORD FUNCTIONALITY	
Correct Answers	17,5%
Incorrect Answers	17,5%
They don't know	65%

TABLE IX
RESULTS OF THE EVALUATION ON MICROSOFT WORD: FUNCTIONALITY

BASIC NOTIONS ON FORMAT	
Correct Answers	47%
Incorrect Answers	0%
They don't know	53%

TABLE X
RESULTS OF THE EVALUATION ON MICROSOFT WORD: FORMAT

USE OF TABLES	
Correct Answers	5%
Incorrect Answers	18%
They don't know	77%

TABLE XI
RESULTS OF THE EVALUATION ON MICROSOFT WORD: TABLES

- Questions related with the **program Microsoft Excel**. The tables **XII**, **XIII** and **XIV** illustrate the erroneous concepts the students had on the use of spreadsheet software.

FUNCTIONALITY OF MICROSOFT EXCEL	
Correct Answers	6%
Incorrect Answers	29%
They don't know	65%

TABLE XII
RESULTS OF THE EVALUATION ON MICROSOFT EXCEL: FUNCTIONALITY

BASIC NOTIONS ON CELL FORMAT	
Correct Answers	29%
Incorrect Answers	0%
They don't know	71%

TABLE XIII
RESULTS OF THE EVALUATION ON MICROSOFT EXCEL: CELL FORMAT

FORMULA DEFINITIONS	
Correct Answers	6%
Incorrect Answers	0%
They don't know	94%

TABLE XIV
RESULTS ON THE EVALUATION ON MICROSOFT EXCEL: FORMULAS

- Questions related with **Internet, its Web services and e-mail**. The **Tables XV**, **XVI**, **XVII** and **XVIII** illustrate the erroneous concepts the students had on these concepts.

DEFINITION OF INTERNET	
Correct Answers	6%
Incorrect Answers	41%
They don't know	53%

TABLE XV
RESULTS ON THE EVALUATION ON INTERNET: DEFINITION

INTERNET SERVICES	
Correct Answers	12%
Incorrect Answers	29%
They don't know	59%

TABLE XVI
RESULTS ON THE EVALUATION ON INTERNET: SERVICES

WEB FUNCTIONALITY	
Correct Answers	12%
Incorrect Answers	12%

They don't know	76%
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TABLE XVII
RESULTS ON THE EVALUATION ON WEB FUNCTIONALITY

E-MAIL FUNCTIONALITY	
Correct Answers	47%
Incorrect Answers	6%
They don't know	47%

TABLE XVII
RESULTS ON THE EVALUATION ON E-MAIL FUNCTIONALITY

Taking into account some of the interesting results of the evaluation, we can mention that the majority had an erroneous idea about the main concepts and operating system. Regarding the different components of the computer, as it can be observed in Tables I and IV, most of them had erroneous concepts on their functionality.

As to the operating system, they didn't know its function, and they believed that programs such as Microsoft Word or Microsoft Excel came with the operating system. They didn't know its functionality and they presented a lack of knowledge on the use of Windows Explorer. The topic they showed a better performance on was the use of windows.

As for the use of Microsoft Word, most of them didn't answer the question on the function of the program. Approximately half of them knew the basic notions for formatting fonts and paragraphs, but they ignored the use of basic tools such as tables.

In the use of Microsoft Excel, the results were less encouraging: the majority could not answer which was its function, or how to format cells and use or define formulas.

Finally, respecting Internet and its Web services and e-mail, the results evidenced that they had used these services intuitively, for they didn't have a clear notion of the functionality of each one of them or the programs associated with each one.

As a conclusion, the results evidenced that the students had scarce knowledge on computer science and that those who had received some kind of training in secondary school, had received it erroneously or hadn't been able to incorporate the knowledge that had been imparted to them.

4. ANALISYS OF THE CONTENTS OF THE COURSE

From the results of the evaluations at hand, the following topics were defined for the three month course: general concepts, Microsoft Word operating system, basic functions, basic use of Microsoft Word text editor, Internet and Web services and e-mail.

The content of the course was formulated and organized in the following way:

1st and 2nd Class: "General Concepts and Operating System": The first two classes were designed to clarify erroneous concepts on the functionality of the different components of the computer and the operating system. Teachers used analogies with elements that were familiar to them, for example, comparing auxiliary memories with libraries, to help students understand the functionality of the components. Teachers also talked about the importance of

the operating system. The definition of Open Source Software was introduced as well as the operating systems developed with this philosophy. Its functionality was explained along with the basic use of the operating system Microsoft Windows.

3rd Class: "Definition of files, folders, Windows Explorer and MyPC": In this class, the teachers explained the concepts of files and folders. They also explained how the different types of memory were organized and the functionality of the programs for file management.

4th, 5th, 6th and 7th Class: "Microsoft Word program": During these classes, they worked on the functionality of the Microsoft Word program, along with basic notions for the production of letters, reports, orders, memos, etc.

8th Class: "First Evaluation": A first test was taken to evaluate the concepts acquired on general concepts and use of Microsoft Word.

9th and 10th Class: "Internet, Web services and e-mail": A definition of Internet was given, and the participants involved were presented: providers, users, and services provided.

An initial explanation of Web service was given, including the presentation and use of different navigators, a proprietary software one (Internet Explorer) and an Open Source Software[8] one (Mozilla Firefox).

The selection of these two navigators was based on the facts that the first one is the most commonly used in most of our homes; and the second one was chosen because nowadays, in our country, there is a new tendency towards the use of Open Source Software, which is being incorporated to the commercial sector, for example in phone booths and Internet cafés.

The notion that -independently from the navigator they had and the user interface it provided-, the basic functionality was the same, was emphasized.

At the end of the 10th Class, the teachers began with an explanation of e-mail, its use and function.

11th Class: "E-mail": This class was dedicated to an explanation about the creation of a free e-mail account through a Web service, and to the basic use of it: writing, reading, receiving and sending e-mails.

12th Class: "Second Evaluation": A second test was taken to evaluate the concepts acquired on Internet, its Web services and e-mail.

5. COURSE MODALITY

In the first class, the course began directly with a theory explanation, and continued with the corresponding practice. The rest of the course was structured in a similar way. At the beginning of each class, the teacher began handing the students a series of questions and simple exercises related with the issues studied in the last class. These exercises had to be solved at the moment, and without consulting, if possible. The objective of these simple practices was to evaluate if the concepts imparted in the previous classes had been well understood.

This mechanism had various objectives for the teacher: on one hand, it enabled them to identify clearly which concepts had to be reinforced before starting with the new

ones; on the other hand, it allowed them to observe and evaluate how the student solved the task individually; and finally, the teacher was able to confirm that the students had exercised on the topics they had learned at least once.

The previous experiences with other courses indicated that there was a very low percentage of probabilities that the students would dedicate part of their time during the week to review what they had learnt and to solve the exercises.

Once the exercises were finished and evaluated, the teacher reinforced, if necessary, the topics in which they had detected difficulties and then began with new a topic. Once the theory was finished, the resolution of practice exercises began.

Generally, the teacher accompanied the theory with direct evidence of the applications studied. This way, the student could see in practice what it had been explained in theory.

In the beginning there wasn't an active participation of the students. This is why teachers decided to insert small evaluations related with the issues they were working on. This helped to revert the situation and stimulated more participation during class.

Regarding the practices, their difficulty grew as the course advanced and as the students incorporated new competences.

For this student profile the decision was to work with practices that were associated with tasks carried out by administrative staff in private and public companies. To design the exercise there was a previous investigation of these type of activities in different sectors.

6. EVALUATION OF THE COURSE

As it can be observed in section 4, "Analysis and contents of the course", two evaluations were taken, one during the 8th class and the other at the end of the course. Both had to be passed in order to obtain a course certification. If they didn't pass one of the tests, they had the possibility of taking each one again only one more time.

The decision of taking two tests was due to a necessary demand. Let us remember that the characteristics of these students were very particular: most of them were teenagers coursing secondary studies, with a weak basic school formation. This is the reason why more than one evaluation was taken, requiring it to be passed in order to continue the course. It was a way of making students aware of their responsibility with the course.

The first evaluation included questions on general concepts and exercises related with text processors.

In Table XIX it is possible to observe the results of the test.

FIRST EVALUATION	
Passed the test	70,5%
Didn't pass the test	29,5%

TABLE XIX
RESULTS OF THE FIRST EVALUATION

All of the students that didn't pass the test had to take it again. This second time, either they passed it, or didn't attend it.

The second evaluation had questions associated with Internet, its definition, services and it included exercises related with the use of Web services and e-mail.

In Table XX it is possible to see the results of the second evaluation.

SECOND EVALUATION	
Passed the test	100%
Didn't pass the test	0%

TABLE XX
RESULTS OF THE SECOND EVALUATION

As it can be observed, all of the students passed the second test.

7. CONCLUSION

The general result obtained with this training was very positive. It is necessary to underline that in the beginning the relationship between students and teachers was distant and an extra effort was required to create a proactive attitude. This initial distance was due to age factors, social level and a weak initial school formation.

The final success of the course is related with the flexible methodology, as observed before in this article. This allowed modifying these attitudes.

In Tables XIX and XX, we can observe that only 29,5% of the students didn't pass the test. It was a very intensive course that required a great effort from both parts, students and teachers.

We can come to the conclusion that this experience was very useful for the students and for the teachers as well.

As for the students, it enabled them to obtain a certificated training, which will enrich their CV, positioning them better in a job selection situation. It also enabled them to explore the university world and to let them know that they have the possibility of continuing their studies in this institution if they are interested.

Regarding the teachers, it enabled them to confront a new challenge: they had to use all their abilities and effort not only to help the students acquire the knowledge imparted, but also to help them be aware of the opportunity they were having.

One of the main concerns of the authorities and teachers of the Faculty is the high level of desertion during the first years of the careers. This type of activities, that have the objective of training young people to enter the university, present the opportunity for establishing a closer contact with students and with the people responsible for them, either the school or, in this case, the NGO that convoked them.

This experience was of great social importance: not only because of the satisfaction and gratitude manifested by the students, but also because of the social recognition to this project, where a transcendental proximity was established between the University and the community.

To conclude, we must keep in mind that the present course had motivation as a main challenge, which shouldn't

be developed only from a pedagogical point of view, but also from the utility it represents for the student. Creating a community of peers helps to generate level of acknowledgment that couldn't be achieved working individually. Motivation, the creation of a community, and local contents are our next work objectives.

As final suggestions for the development of these and other related activities, we set up this list of actions. Although there may exist more, we understand that these are the most important in order to improve the final outcome:

- More interaction with the University in the training of students, during their last years of high school. Initiate test courses with University schools.
- Promote the training of teachers to dictate these courses, including pedagogic aspects related to the audience they will meet.

- Interaction with the school teachers, supporting their formation in computer science.
- Organization of meetings to discuss the matter of computer science as an indispensable tool.
- Shorten the distance between “knowing” and “doing”, in order to avoid adverse attitude reactions to an abstract concept such as the one it is being imparted.

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