

## Introducing a Distance Learning Version of a Postgraduate Program on Networking in Argentina

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### ABSTRACT

The great popularity of the Internet [1] and the widespread use of the World Wide Web [2] are promoting a new methodology for distance learning. This methodology takes advantage of several different Internet services and applications mostly for the student support (as a mean of exchanging information with the professor) and to promote collaborative learning regardless the time and distance among the students.

The need of keeping the pace of technology advances usually requires a significant effort that is evident in all the new offerings of postgraduate courses all over the world. As the professionals usually have little time available and most jobs are over demanding their only chance for studying is adhering to a distance learning program. The main advantage of the Internet based courses is possibility to promote a bi-directional communication between the students and the professor and to highly motivate the student due to an adequate feedback.

This paper describe the introduction of Internet tools (such as www, e-mail, IRC, FTP, mailing list) in the distance learning postgraduate program of the 'Magister de Redes' (<http://www.linti.unlp.edu.ar/master>) of the National University of La Plata. The ongoing experience was successful due to certain facts that are stated in the paper which also mentions some drawbacks and the strategy for overcoming them.

The Curricula of this postgraduate program was proposed, in 1995, to upgrade the knowledge of IT professionals both from the engineering and the computer science field in the networking area. The traditional program is scheduled late in the evening and concentrates on Saturdays (full day sessions) so that it doesn't interfere with the normal labor day of the students.

The distance-learning version of the program started in 1998 as way to reduce the obstacles for the students, mainly the traveling expenses and the time it takes due the large geography of our country and the long distances.

Despite the fact that several professors of the other national universities of Argentina had attended the programs since it started, most persons asked for a distance learning version that reduces to a minimum the need to attend our university.

**KEY WORDS :** Distance Learning, Networking, Internet, Postgraduate.

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## INTRODUCTION

This paper presents our experience introducing Internet tools for the Distance Learning modality of the Master Degree in Networking at the National University of La Plata. Three years after the start of initial courses and in response to the requests of professors from different National Universities and technicians of the academic network of Argentina (RIU) we decided to start this new modality that reduces to a minimum the need of traveling for attending the courses (just remaining the need to travel for evaluation purposes).

In order to organize the activities without overcharging the professors and not affecting their relation with the students that physically attended the courses attending we introduce a tutor that is responsible for not only for the web site of the course but also for scheduling the tasks in the course, keeping track of the students and professors, moderates the mailing lists & interest groups, moderates the teleconferences, etc..

In particular this paper focuses on the evolution of the tools and methodology used in our Master degree, as a result of different factors like: the intended audience of the courses, problems that aroused such as poor communication infrastructure in several regions and the disadvantages of certain specific tools. We also include a brief (for the sake of brevity) explanation of the different tools that were evaluated and used in the courses.

This paper finally shows and concludes how an inexpensive combination of tools properly used & managed can be used to suit the needs of a distance learning postgraduate course and expand the horizons of the intended audience.

## STRUCTURE OF THE MASTER DEGREE PROGRAM IN NETWORKING

For an overall description of the Master (including general information, the syllabus of the courses, the teachers involved, equipment used for the laboratories, etc.) please check: <http://www.linti.unlp.edu.ar>.

Usually the professor prepared all the courses using PowerPoint presentations of the classes: they also provide reference material (like RFC [3], tutorials [4], TXT files [5] o RTF files [6] o...). All these are given to the student in advance of the date scheduled for each subject.

Evolution of the enrolment in the Master on Networking:

Year	Students that physically attended
1995	39
1996	24
1997	46
1998	42
1999	44

In order that the students get acquainted with the protocols and techniques covered in the different courses, we enforce hands on practice in our networking laboratory. This Laboratory is provided with 10 personal computers that can be used both in a Windows or Linux environment, also there are LAN /WAN analyzers, sniffers, network management tools, hubs, switches (both ETHERNET and ATM), routers, etc.

## INTRODUCING DISTANCE LEARNING

### ❖ Start

*The first specific activities were related with the inscription, the organization of the classes (both theory & practice), the constant supervision of the students activity (both logging and when delivering the results of the exercises by the professor) and organizing the question answering session (both via mail & IRC). These tasks were complemented with intensive laboratory practices (schedules during a weekend) and the final examination.*

From 1997, due to requests of professors from National Universities of Entre Rios and

Mar del Plata and technicians of the academic network of Argentina (RIU[7]) we decided to start with a mixed modality reducing the need of traveling for attending the courses (remaining the need to travel for intensive practice in the laboratory and for evaluation purposes). We started this experience mostly using asynchronous tools[8], namely e-mail.

The distance learning version of the practice for the courses is provided by a sequence of homework that the students must fill in and return subject to the schedule provided in the web site. After the deadline they are published and discussed globally. The hands on experience is concentrated in a few days intensive sessions at one or two weekends.

#### ❖ Evolution

*Introducing a WWW server as a means to publish & distribute the course material initiated a new stage in our distance learning experience. The material was enriched and it was complemented with the introduction of tools such as external references and links, simulators of the networks protocols, interest groups, IRC, etc.*

Since august 1998, the inscription has extended to professional and teachers of the national universities with a dedicated Internet connection using either RIU [7] o RETINA [9], altogether with a set of conditions that allowed a more strict control of the students activity.

- The students must have regular access to full Internet (to access Web-site, download information such as theories, exercises, complementary material, solution the problems, etc.). They should use e-mail fluently.
- The students must do the exercises individually, being the receptions strictly personal, not being allowed joint responses.

#### □ Tools

The communication model on which the learning process is based conditions both the design and structure of the course. The resources used must suit the students needs and to kind of access he/she has to new technologies.

We used several kind of material, printed papers, books, video & digital supported material. In the following we present a brief description of each kind:

- Web site; based on digital material provided by the professor and reusing material from several sources. structured according to the methodology used for providing the course (ref.: <http://www.linti.unlp.edu.ar/master>).
- Web server: Internet Information System (from Microsoft)
- Individual access for each student (preventing unallowed visitor to get any restricted information). The student must be defined as a user of the NT services providing user id and password. The user profile enables the access to the material of the course he is currently enrolled.
- Asynchronous tools [8], such as e-mail among the professor, the tutor and the students (also administrative staff and the teacher assistants), these activities do not require simultaneous access from all persons involved. The general list of the distance-learning students is used for promoting activities; interchange experiences and question/answering with the professor (the latter given a minimal pre-established periodicity). The tutor provides e-mail accounts (with explicit expiration) for the automatic receptions of the resolved problems were the students send the answers with attachments and embedded in the body of the mail to avoid misunderstandings due to conversions.
- Synchronous tools [10], such as IRC [17] were the students must engage simultaneously to exchange ideas with the professors. These teleconferences are moderated by the tutor.
- Videos of the professor explanations for the local students.(by the moment we developed Analog video tapes, VHS PAL/N)

## □ Methodology

To get access to the Master site the student must be registered as an NT user, and is granted the rights to access specific folders and files (depending on the course he is attending).

- i. The students are introduced to the professor of the course (main references a sort curriculum vitae and his e-mail)
- ii. Syllabus of the course with recommended bibliography.
- iii. Syllabus of the course, on a day-by-day basis. The material for each class is provided in multiple formats (.html[13],.pdf[12], .zip[11], .ppt[14]), so as to easily browse it on line and to reduce the time for transferring it to the desktop (compressed using WINZIP[11]).
- iv. Theory complements: this is material that is presented to the student that is interested in more detail that is needed for the scope of the course. For instance these include: networking simulators, RFC's[3], related Url's[15], etc.
- v. Exercises: Structured by the unit and by subject. The control of the date of reception is automated (according to the calendar published previously) and the answers can be in any of the following formats: .pdf [12], .html [13], .doc [16]  
The students that send the exercises timely receive a correction of their homework done by the professor of the course by e-mail. Once the expiration date is over the correct answers of the questions are published in the Web site and any remaining question will be handled in the global discussion list or using an IRC session.
- vi. IRC: We hold virtual meetings for real time question answering process. In order to select the most adequate tool we evaluate several existing products MIRC [17], The Palace[17], ChatSpace[17], etc.  
The management and logging of the sessions are accomplished by the tutor, she keeps the log of the whole exchange and sends the file attached to the whole list of students not mattering if they took part the session or not and independently of their role (passive or active).
- vii. Close up class: The student was invited to attend physically a class that surveyed the principal subjects and concluded with hands on laboratory. This event was regarded as positive by all the participants, for not only students but also the professor who evaluated the feedback and was more conscious of the level of knowledge of the group.
- viii. Final Examination: this evaluation is taken in the traditional way, i.e. by the students physically attending a written exam. The correct answers were published in the Web site as a guide for those students that did not attend to the first examinations and still have to take it.

### PROBLEMS FOUND

- Low quality of the Internet links: The links to the Internet, in most states of our country, are particularly of bad quality (meaning low transfer rate and noisy connections). This affects accessing and downloading the theories, usually large files. This was overcome by the tutor sending the files as attachments via e-mail with notification of the reception (ACK). So the material of the courses is designed & formatted according to the low bandwidth connection that the students can use.
- Student with computer literacy: The lack of the experience with computers or the basics of Internet (like e-mail, web browsing, FTP, etc.) are a mayor drawback for most distance learning courses. Though the students of our Master degree overcame these inconvenients quickly, our experience teaching a new technology course in an educational program confirmed us that a certain level of computer and Internet literacy is a fundament requisite for these kind of courses. The student that lack the sufficient knowledge either of the Internet basic tools or that are not fluent using computers at all can not stand the give and give up (sooner or latter) tampering the overall success of the course.
- Labour problems: the highly competitive standards of the professionals that attend this kind of programs are heavily over demanding in time, an also the frequent changes of enterprise affect the students attention an the time they can dedicate to study.
- Keeping up the pace: It is essential to keep the students motivated. The possibility that the students can adjust the time to study gives flexibility but also needs the necessary discipline to study and return the homework timely. The absence of the physical presence of the professor usually lessen the amount of time devoted to the course, this is also enforced by

the isolation and the difficulties to develop collaboration and integration among the different students. This is partly because of the tools used but mostly caused by the lack of collaboration tools over the Internet among the student spread all over the country. These difficulties usually provide for the extension of the courses, that generally take longer than the initial schedule (which is very unusual in the traditional courses).

- Presential Examination & labs: Due to the need of hands on practice the students must still travel for each course a couple of times. This can not be avoided until there can be provided means for the students to use over the Internet the different sort of equipment & experiments that can be arranged at our Networking. The final examination is still presential but there can be provide some alternative examination points over the country where the examination is taken by some tutor or professor specially designated.
- The number of active participants, in the virtual chat, continues being moderate.

*Obtained results at this time:*

Promotion	Inscribes in the first course	Practices given	Participation in theTeleconference	Final evaluation given	Approved the first matter
1998	29	18	7	15	11
1999	22	20	10	In course	In course

#### *FUTURE TRENDS*

*The following considerations are being taking into account in the planning for this year courses:*

- The enforce and provide better feedback techniques is essential for a Distance Learning program. We are evaluating tools that promote cooperation and the workgroup among the students. The evaluation involves technical aspect such as performance, ease of use and also the integration with other tools and the role of the professor and tutor to moderate fruitless discussions.
- Provide a simpler way to follow up of the students performance & activities, by means of a combination of the logging of asynchronous services (used when the student wishes it, email and Web browsing under demand) and logs synchronous tools (used for motivating and to communicate horizontally, telephone - IRC)
- To extend the basis of information available on line. Register and publish everything (events - assistant, questions, answers, bibliographical resources, etc.). This will diminish the need of the students to count with plenty of support material, of the traditional courses (videos of the classes, notes of students attending to the classes).
- To provide On-line surveys for the studies, and also for self paced test. These are intended to provide immediate feedback to the student
- To provide better models and formats, for the teachers, that allows them to the fast creation of lessons or educational units and materials, etc.
- To provide the professors and tutors with means to upload materials, schedules and contents of the assigned course, regardless of the time and place. This tool will make more efficient the time it takes to answer the mails & request from the students as the teachers can access & provide the information needed from any computer with Internet access.

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### Glossary

- [1] **Internet.**Net of networks that are connected physically, enabled to communicate and to share data and a set of norms or protocols for connection between computers. Based on protocol suite TCP/IP
- [2] **World Wide Web.**Organizes, transmit and recovers information of all media and formats in Internet. It uses a combination of hypertext, graphs and technologies of multimedia, providing a unique user view assembling resources, network protocols and documents formats.
- [3] **RFC.** Request for comments – <http://www.ietf.org>
- [4] **Tutorial.** Tutorial over services of the Internet - <http://urano.linti.unlp.edu.ar/tutorial>
- [5] **ASCII.** Plain asc-ii text file
- [6] **RTF.** Rich text format
- [7] **RIU.** Red de Interconexión Universitaria - <http://www.riu.edu.ar>
- [8] **Asynchronous communication:** communication is established in deferred time, the messages sent, the reception and the possible new reply (feedback) are not produced in the same time. (E.g.: postal mail, electronic mail). *Dr. Lorenzo Garcia Aretio-1999.*
- [9] **RETINA.** Red Teleinformática Académica <http://www.retina.ar/>
- [10] **Synchronous communication:** communication is established in real time, simultaneously and immediate to the production of the messages. (E.g.: telephone, interactive chat, and videoconference). *Dr. Lorenzo Garcia Aretio-1999.*
- [11] **WINZIP** – Compress/ uncompress the files to save disk space, over Windows 95, 98, 2000. <http://www.winzip.com>
- [12] **PDF.** Portable Document Format - <http://www.adobe.com>
- [13] **HTML.** Hypertext Markup Language. is a simple frame language to create hypertext documents, being able to be used in any platform RFC: 1866 [http://dir.yahoo.com/Computers and Internet/Information and Documentation/Data Formats/HTML/HTML 4 0/](http://dir.yahoo.com/Computers_and_Internet/Information_and_Documentation/Data_Formats/HTML/HTML_4_0/)
- [14] **PPT.** Microsoft PowerPoint – <http://www.microsoft.com/office/powerpoint/>
- [15] **URL.** Uniform Resource Locator. Direction used by a web browser to locate a resource on Internet. <http://www.netSPACE.org/users/dwb/url-guide.html>
- [16] **DOC.** Microsoft word -<http://www.microsoft.com/office>
- [17] **IRC.** Internet Relay Chat - <http://www.mirc.com> - <http://www.ThePalace.com> - <http://www.ChatSpace.com>