

TRAINING TEACHERS WITH HYPERTEXT: USING HTML AND INTERNET TOOLS AS DIDACTIC RESOURCES

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Abstract.

The aim of this paper is to introduce some results concerning the use of INTERNET and hypertext based languages such is HTML in teacher's training.

This paper discusses the results of an experience carried out during the last two years with education students at two Spanish Universities. During this experience a total of 1500 students (future K-12 teachers) learnt how to use INTERNET (e-mail, News, IRC, WWW, ...) as a didactic resource and also learnt how to design and publish hypermedia didactic materials in the WWW using HTML.

A course (55 h. --> 30h. theory + 25h. labs.) entitled "New Technologies applied to Education" has been designed and tested

Keywords. Education, distributed hypermedia, K-12, WWW, HTML, teaching, training.

1. Introduction.

Usually, we think about subjects as Education Technology from the Curriculum Theory point of view and also we tend to consider New Technologies only as useful hardware tools.

Often, we forget the need of fully integration of New Technologies into Curriculum, not only as a tool or an educative resource, but also as an important factor to take into account in the planning and development of new Curriculum strategies.

The use of INTERNET and their derived tools in an educative context will be a common situation for the teacher in a near future. As the interest in INTERNET grows and more schools get connected to the NET, training teachers to use these technologies (in an efficient way) becomes an essential goal for education professionals. Nowadays, INTERNET, mainly through the World Wide Web, becomes the biggest distributed hypermedia system in the world. A proper knowledge (what ...?, where ...?, how to ...?) of this "universe" of information and communication will be a fundamental aspect in the training of future teachers.

When we think about the application of so called "New Technologies" (NT) to the Education and Training we discover two opposite positions:

- People thinking that NT are only concerned with media and resources embedded into Curriculum Theory.
- People thinking that NT are only "useful hardware tools" that becomes the only important subject in the didactic process.

Our aim in this paper is to expose a combination of the above criteria. We will consider NT fully integrated into Curricular environment but also we will take into account all the didactic and curricular aspects that could be affected by NT (from teacher's initial and continuous training until the day-to-day practice into the classroom).

In this approach we will be mainly concerned with training future teachers (education students). The introduction of all these new concepts could be done easier at this initial training stage than in the continuous training of professionals.

From future teacher's point of view, our approach to didactic use of NT will affect at two different levels:

- **Conceptual.** This level aims to introduce to the student the basic necessary ideas for the complete understanding of hypertextual design, such is conceptual mapping, non linear navigation, ... (see Bush [8] and Nelson [18])
- **Application.** At this level, we introduce to the students the software usually used as searching and navigation tools in the INTERNET.

Our goal is, that at the end of the course, students will be able to use INTERNET as a didactic resource from two points of view: navigation and information recovery and also authoring.

2. Application Background.

2.1. Geographic Framework.

This experience was done during the last two years involving two Spanish Universities and aprox. 1500 students. Participating Universities have been Universitat Jaume I (UJI) and Universitat Rovira i Virgili (URV). Both universities are located at two

different autonomous communities (Catalunya and Pais Valencia) in the Mediterranean coast of Spain (see fig. 1).

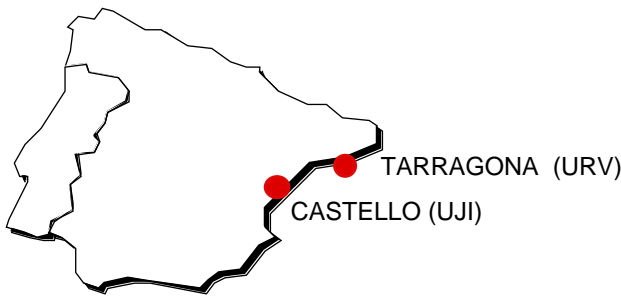


Fig. 1. Geographic location

The University Rovira i Virgili (URV), is located in Tarragona (80 km. south of Barcelona). Tarragona is a city with 100.000 citizens and the URV has 10.000 students. The Education and Psychology Faculty has 1600 students. This experience was done with K-12 teacher students and education students.

The University Jaume I (UJI) is located in Castello (200 km. south of Tarragona) . Castello is a city with aprox. 120.000 citizens and the UJI has 10000 students. The Education Faculty has 1000 students. The experience was done at UJI with K-12 teacher students.

The Education Departments of these two Universities started its collaboration in 1993. Since this year, people from both Departments have been involved in research activities about the use of Computers and Telecommunications in Education.

2.2. Student Framework.

Students involved in this experience have been from the Education Science Faculties at both Universities. The age distribution was:

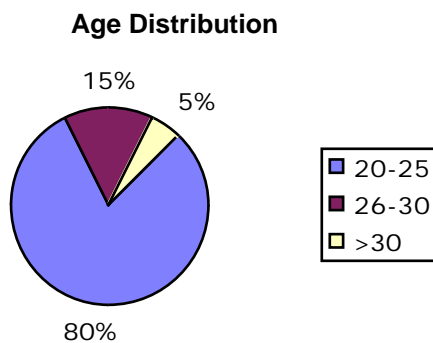


Fig. 2. Student's age distribution

Their previous knowledge of computers was:

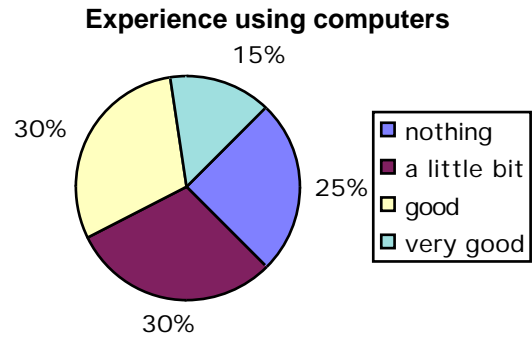


Fig. 3. Knowledge of computer use.

Concerning their use and knowledge of computer networks and computer telecommunications systems:

INTERNET knowledge

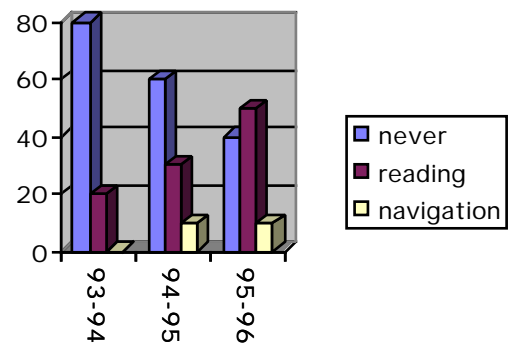


Fig. 4. Experience using INTERNET

As we may see in the above figures, students have a little knowledge of computer use (25% of them never have used a computer [fig. 1]).

Concerning the level of student's knowledge of INTERNET we may see that it varies from the first year of the experience, 1993, until the latest one, 1995.

2.3. Technical resources.

This experience has been done using the resources in the Computer Labs at each Faculty. Mainly, used computers have been Macintoshes with ethernet connection and multimedia capabilities. The Computer Labs were connected to our Campus-wide Network using a 64Kb. leased line and our connection to the Spanish Academic Network (RedIris) is through a 2 Mb. line.

We have used mainly, shareware or freeware software resources:

- E-mail: EUDORA® for the Macintosh.
- IRC: Homer® for the Macintosh.
- WWW Browser: Netscape®.

And some other tools for authoring on the WEB:

- BBEEdit® Lite with HTML extensions.
- StudioCraft® (drawing package)
- GraphicConverter®
- HTML Editor® 1.1 for the Macintosh.

3. Course design and description.

The first problem we have encountered during the design of this course was “... *How to introduce all these new concepts to students ? ...*” And even more important, ... “... *How to convince them for using INTERNET in the classroom ?*”

Mainly, our students (at an early stage in the course) doesn't know anything about INTERNET and INTERNET tools, even many of them doesn't know anything about computers (see fig. 3).

For all these reasons we have chosen to introduce all these necessary concepts in four stages:

- Introduction to computers and computer usage.
- INTERNET: history, basic concepts and tools.
- Introduction to the use of distributed resources in Education.
- Design of distributed hypermedia for Educational usage.
- PROJECT: Development of a Curricular Unit based in the use of all these techniques.

Taking in mind all the above steps, we have designed a course to introduce our students into the use of INTERNET and distributed hypermedia.

3.1. Course main objectives.

We have done the course design taking into account the following objectives:

Students must acquire the necessary skills for:

- using computers as usual tools.
- analyzing and understanding hypertext relationships from a structural point of view.
- comparing mental processes generated by navigation in an hypertext context with all those developed in the process of read-write learning.
- analyzing the possible educative use of Telecommunication systems, mainly the INTERNET.
- Learning to use a markup language, such is HTML, for writing hypermedia documents.
- Developing a curricular unit using the available distributed resources on the net.

3.2. Course contents.

Introduction to computers and computer usage. This stage is an homogenization step that aims to level the basic knowledge and skills of students. This step is done mainly in the labs, and students must work from the first day with computers. Our main goal is that students loss their “fear” to computers. The duration of this stage is 5h.

INTERNET: history, basic concepts and tools. This second level aims to introduce INTERNET as a basis for the development of distributed hypermedia materials. We begin with an introduction to INTERNET history: the birth of the network, its development, its metamorphosis from military to academic use, ...All that is explained mainly in the classroom using audiovisual materials and promoting discussion between students. The duration of this part is 5h. Also, at this level we begin to introduce INTERNET tools such are e-mail, News, IRC and the WWW. This introduction is done by the teacher in the classroom and then students go to labs to begin using these tools by themselves. The duration of this training is 5h.

Introduction to the use of distributed resources in Education. This is one of the most important steps from our viewpoint. At this stage we introduce to the students the use of INTERNET in Education. Our goal is that students conceive INTERNET as a gateway that removes borders in the Information space. Nowadays, using INTERNET, is not so important where in the world is located the information, the really important thing is how to find this information in an efficient way and how to use this information in the correct way (always from a didactic perspective). A couple of important concepts at this level are communication and collaboration. We must teach students how could they use tools like e-mail, mailing lists, NEWS or IRC from an educative point of view. The duration of this level is 5h. th. plus 5h. labs.

Design of distributed hypermedia for Educational usage. Now, we introduce to students the basic concepts required for designing distributed hypermedia materials. At this level, we must teach concepts like:

- **Conceptual mapping.** This will be the foundation for the correct design of hypermedia documents.
- **Global thinking approach.** Students will learn how to develop the same topic from different curricular fields. This kind of approach will introduce smoothly the concept of non-linear structures of information.
- **“Contextual” applications.** We mean with “contextual” an application embedded in its educative environment. Students must learn how to select the adequate materials according to the grade of final users.

The programmed duration of this level is 15h. th.

Development of a Curricular Unit based in the use of all these techniques. Finally, after the completion of all the above referenced steps students are ready to start building a real application. Students are organized as a teamwork and they decide the subject in what they will work, how long will the planned activity extend over time and the age level of intended users.

The duration of this stage is 5h. th. plus 10h. labs.

3.3. Used methodology.

The used methodology is twofold. First, the main concepts of each stage are explained at a theoretical level. We make use of supplementary media such audiovisual materials and computer-screen projection systems showing how to use the needed applications. Second, teamwork techniques are used during course development. Students are grouped forming teams of five persons, must develop a full distributed hypermedia application, including design, implementation and testing.

At the end of course, students are assessed with the presentation of their Projects. They must explain their objectives, the structure of designed application and all the decisions taken during the development phase.

4. Conclusions.

We think that the best way to promote a better understanding to students, of the design and implementation of hypertext based materials, is to relate the main underlying concepts in this task to more familiar ones. Taking this premise as starting point, we begin our course showing the equivalence between hypertext concepts and all the cognitive processes related to learning how to read/write.

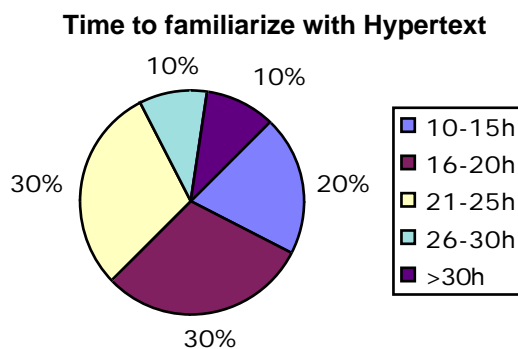


Fig. 5. Estimated time to understand hypertext structures.

This technique has revealed to be very useful and students quickly acquire the hypertext concept. Usually we have find that the necessary time to acquire all this concepts varies from 16 to 25 h. (see fig. 5)

The next step is the most complex, students must learn how to design a conceptual non-linear structure based on an established subject. Our students are habitued to use linear or quasi-linear structures in the development of didactic projects. Now, they must use a global thinking approach to take into account all the relevant information concerning the subject of their Project. Through this global approach, they will be able to find the underlying non-linear structure of the developed didactic content.

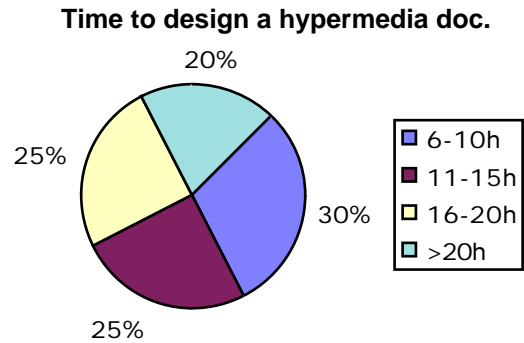


Fig. 6. Estimated time to complete an hypermedia design.

The main problem we have find during this experience has been *how teachers must adapt the hypermedia materials to be used into the usual didactic program of the classroom.* Usually, teachers aren't familiarized to use this kind of resources and they are very reticent about its use. A complementary action to this experience could be the development of a didactic unit to introduce this technologies into the day-to-day professional practice of teachers.

After this experience our main conclusions are:

- **Computers produce an important psychological impact on inexperienced users.** At an early stage, many students had strong problems with the use of computers, they seemed to be "blocked" by technology. To overcome this problems we choose to introduce the use of computers in the first step of the course.
- **INTERNET resources may be easily introduced to students as a communication channel.** Using communication tools as e-mail and IRC revealed to be an useful way of introducing this kind of technologies to students. "Talking" with other students in the NET they learn how to use the mixture of computer and telecommunications in a friendly way. We think that this approach produces better results than start the course introducing tools like the WWW.
- **Developing hypermedia materials using HTML produces good results with students.** The most satisfactory aspect in this experience (for students and also for teachers) has been the design and development of didactic units in

the World Wide Web. Students learned how to write their own HTML documents and how to create hypermedia materials ready to be used as support materials in a classroom.

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