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Maître en Informatique

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Abstract

The subject of this study is the still fuzzy concept of 'virtual university'. This dissertation is the outcome of a four months stay at Indiana University, Bloomington (Indiana - U.S.A.).

This work tries to define the main notions involved in the virtual university, to see the major assets and visions and to have an overview of the current situation in the United States and in Europe.

As an informatics students' dissertation, a particular interest is placed into the existing technical means and tools necessary to implement such an educational model.
These tools are considered more particularly in collaboration with the VESALE project of the Institute of Informatics for which an online course scenario is proposed and implemented.

Résumé

Le sujet de ce travail est le concept encore peu ou mal connu d'université virtuelle. Ce mémoire est l'aboutissement d'un stage de quatre mois à la "Indiana University", à Bloomington (Indiana - Etats-Unis).

Ce travail essaie de définir les principales notions impliquées dans le concept d'université virtuelle, de voir quels en sont les principaux enjeux et les visions ainsi que de faire un tour d'horizon de la situation actuelle aux Etats-Unis et en Europe.

En tant que mémoire d'informaticiennes, un intérêt plus particulier est posé sur les moyens techniques et les outils existants et nécessaires à la mise en œuvre d'un tel type d'éducation. Ces outils sont étudiés plus particulièrement dans le cadre de la participation au projet VESALE de l'Institut d'Informatique dans lequel un scénario de cours en ligne a été proposé et implémenté.

Acknowledgements

First of all, we wish to thank our supervisor, professor J. Berleur, whose support and guidance have been essential for the realization of this work. His welcomed suggestions and criticisms have allowed us to progress constantly and finalize this dissertation.

The VESALE team has to be warmly thanked, in particular the team leader, professor F. Bodart for monitoring the specific aspects related to the implementation process. Special thanks to M. E. Mbaki for helping us relating the aspects of the ARIADNE tools, and to MM. R. Michiels, G. Prévot, M.-L. Magnier, Th. Bodart who worked with us on the project.

In parallel, we would like to thank professor Kling for his precious guidance and cordial availability. Special thanks to his assistant, Ms. J. Fortuna for her help in handling all local arrangements.

As we wish to be brief, we shall not mention the names of all the professors, assistants and technical experts that we had the chance to meet and interview both in the United States and in Europe. They must be assured of our deepest gratitude.

Finally, we also thank all the people at Indiana University Bloomington, who made our stay a very pleasant experience, and at the Facultés Universitaires Notre Dame de la Paix.

Introduction

In the last few years we have all witnessed the rise of information and communication technologies (ICT), which still bring deep changes in the structure of industrialized societies. The two poles, technology and society, influence each other mutually: to each change / need of the society corresponds a new technology which, in turn, influences the behavior of individuals in the society.

None field resists the "ICT wave": in a relatively small amount of time, transports, industries, health care, work, the tertiary sector, etc. have changed radically their structure, their mode of operation, their production. The educational field as well has not escaped the logic of introduction and use of ICT. Thus, we saw, and we still see, the emergence of a variety of opportunities which, if used correctly, can facilitate teaching as well as learning.

As in every case where there is a wide variety of instruments available, the issues of knowing which to choose, how to integrate them and how to adapt them to existing goals become priorities. In this framework, teachers have quickly diversified their instruments, moving from the blackboard to the Internet.

Our first confrontation with this reality took place at the time of our stay at Indiana University Bloomington by professor Kling. During our stay, we were able to collect information and materials, to meet and interview people closely involved in online education and to have a first "ground experience".

In this dissertation we analyze a particular aspect of this large technological variety: the virtual university.

At this point, the reader can reasonably ask to what questions our dissertation can give answer. We intend to deal with some of the major questions that arise when first approaching the virtual university subject: "What is the virtual university?", "What separates virtual university and online education?", "Can the virtual university support different teaching situations?", "What is happening in the world concerning virtual universities?", "Which tools allow implementing a virtual university?", "Which are available and which are absolutely necessary?", etc.

Aiming to answer those questions, this dissertation is structured in six main chapters as follow.

The first chapter focuses on the concepts, the actors and the visions relating to the virtual university and defines a global discussion thread.

Our stay at Indiana University Bloomington enabled us to gather information concerning the "state-of-the-art" of the United States online education. While comparing it with its European equivalent, we draw in chapter 2 a non-exhaustive overview of the current situation of online education.

As computer science students, our interest directed us towards the major tools for online education, which we presented in four categories (Authoring tools, Course Management tools, Evaluation and Self-Evaluation tools, Communication and Collaboration tools) in chapter 3. They are analyzed aiming at binding them to various educational goals.

Within the framework of a practical realization, we designed and implemented an online course as a contribution to the VESALE project, currently designed and tested at the Institute of Informatics of the Facultés Universitaires Notre-Dame de la Paix.

For that purpose, in chapter 4 we analyze the ARIADNE environment, which proposes a series of tools specific to online education.

Then, in chapter 5 we define a scenario for an online course in its pedagogical and structural aspects.

Finally, chapter 6 contains the description and illustration of the global online course implementation process and results.

Chapter 1. Notions involved in Online Education

Introduction

The terminology which surrounds the concept of "virtual university" is at the same time vast and vague. For that reason, we start this chapter by defining certain key terms that will be used all along this dissertation. The broadness of these definitions will lead us to restrict the field of our analysis to the specific case of online education.

After tackling with the terminology, we shall deal with the visions related to online education. Initially, we carry out a confrontation between the vision of a traditional course and that of an online course. In the second phase, we illustrate which are the most current conceptions a reader is likely to meet in the literature concerning online education. Finally, we propose the point of view of some members of the School of Education of Indiana University Bloomington.

1 Definitions

> "L'université virtuelle' (...) ne cesse d'étonner par l'imprécision qui l'entoure" ("The 'virtual university' does not cease to amaze by the fuzzyness that surrounds it") [Berleur and Bodson, 98, p.91]

There is no unique definition of what a "virtual university" is. However, we are able to point out to some related key words, such as distance education / learning, online education, virtual classroom, virtual library.

1.1 What does it mean to be "virtual"?

We borrow the general definition of what is "virtual" given by professor Hiltz:

> "The term virtual is used in computer science to refer to something whose existence is simulated with software rather than actually existing in hardware or some other physical form." [Hiltz, 95, p.5]

With the same meaning, some authors use the terms "digital" or "electronic".

On the basis of this first definition, we could say that the virtual university is a university that "exists through software". But in this interpretation, the "distance" component is missing.

1.2 What is distance education?

Behind the concept of "virtual university" lies the fundamental notion of "distance education".

In opposition to face-to-face learning, distance education can be defined as:

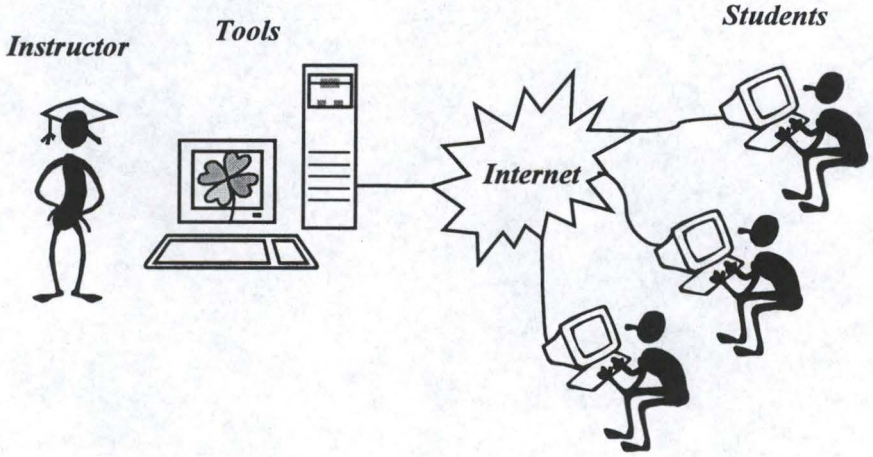
> "An instructional delivery system that does not constrain the student to be physically present in the same location as the instructor."

> "The system provides educational access to learners and connects them with educational resources. A wide spectrum of technologies can be used to reach learners at a distance."

We can see here that, as professor Kling warned us, the "distance education" concept is widely open and, according to the instructional delivery system, may include elements that are not relevant to our analysis. For instance, professor Kling pointed out an example of distance education initiative organized by the University of South Australia: their "clinical update" course is made up of seventeen videotaped lectures and an accompanying set of study questions.

This explains why it is necessary to restrain to one aspect of the concept, the "online education". To avoid any confusion, by online education we mean an educational model with the following two characteristics:

- the faculty member and some or all of the students are physically separated;
- the contents delivery medium is the Internet.



We wish to point out that two of the main authors in the online education field use other terms and their own definitions:

- professor Harasim prefers the term "learning networks", see [Harasim et al., 95];
- professor Hiltz, in [Hiltz, 95], writes about "collaborative learning".

1.2.1 Learning networks

Professor Harasim defines learning networks as:

> "Groups of peoples who use computer-mediated communication (CMC) networks to learn together, at the time, place, and pace that best suits them and is appropriate to the task." [Harasim et al., 95, p.4]

Many universities, colleges and distance education institutions use networks as part of their regular course delivery. Professor Harasim illustrates three modes in relation to learning network activities: the adjunct mode, the mixed mode and the online mode. For an overview of the three modes, we refer to [Harasim et al., 95, pp.77 to 84].
The online mode is the one that gets closer to our idea of distance education:

> "Online courses use CMC as the primary environment for course discussion and interaction. Course activities (...) can be effectively undertaken online using a CMC system that provides some structuring of the communication activities."
> "CMC is the primary environment in online courses but not the only medium used in the instructional activity."

1.2.2 Collaborative learning

Professor Hiltz defines "collaborative learning" as follows:

> "Collaborative Learning means that both teachers and learners are active participants in the learning process; knowledge is not something that is "delivered" to students, but rather something that emerges from active dialogue among those who seek to understand and apply concepts and techniques." [Hiltz, 95, p.23]

She believes that "Computer-mediated communications (CMC) suited to the implementation of collaborative learning strategies or approaches." [Hiltz, 95, p.23] and proposes to implement collaborative learning through online education, in particular via the Virtual Classroom™ system. For an overview of the Virtual Classroom, see [Bitiki and Kasel, 97], for a detailed description we refer to [Hiltz, 95].

1.3 What else?

All around the concepts mentioned above, there are other notions such as "virtual library", "virtual campus", "virtual classroom", "virtual café", "virtual laboratory", "virtual space", etc. The first one is the most important and, as suggested by professor Kling, could be the subject of a final dissertation as such and we shall briefly discuss about it. The other terms are related to different kinds of interaction systems, and will not be developed further.

A virtual library is one of the most important resources that an online course could link to, because of its role as "knowledge base".

In [Fox et al, 98], the authors give an overview of the stakes involved in virtual libraries:

> "Virtual Libraries can be among the most complex and advanced forms of information systems because they often involve collaboration support, digital document preservation, distributed database management, hypertext, information filtering, information retrieval, instructional modules, intellectual property right management, multimedia information services, question answering and reference services, resource discovery, and selective dissemination of information." [Fox et al., 98]

2 Different visions

2.1 Online Education vs. Face-to-face

We shall begin this "confrontation" of online education vs. face-to-face by raising some key questions about each of these two kinds of courses.

- Who are the main actors?
- What are the available means?
- Which are the typical teaching-learning situations?

These questions are discussed below separately but it is important to remember that they are inter-related and that the answers to one question will often affect the answers to others. For example, the available means will affect the typical teaching-learning situations of the course. Also, sometimes the answer to later questions may affect the answers to prior questions. For instance, knowing which are the typical teaching-learning situations tells us who are the main actors. The three key questions listed above are briefly discussed below in the context of university-level courses.

2.1.1 Question n°1. Who are the main actors?

2.1.1.1 Content Providers and Course Designers

In a traditional course, both roles (content provider / course designer) can be assumed by different combinations of professors, assistants and guest lecturers. But usually one person does the whole by him/herself.

For online courses, the content provider role can also be played by commercial societies. For instance, a publishing society could decide to create an online history course based on the best books published on the matter. Online course designers are not necessary people involved in teaching the course: technical assistants or design societies can help instructors in creating their online courses.

2.1.1.2 Students

The profile of the typical Belgian university undergraduate student is: between 18 and 25 years old, having obtained a non-professional high school degree, speaking the language of the host institution, living less than 50km away[1] on the average. There is also a minority of older students taking courses as "élèves libres".

On the other hand, it is not possible to establish a real profile of the typical online course student because it varies according to the course. For instance, the University of Phoenix Online students are on average 38 years old professionals (see the corresponding section in the next chapter).What we know is that there are more categories of learners taking online courses than going on campus. Some of these[2] are listed follows:

- professionals demanding formation,
- people seeking lifelong learning,
- people who want a degree to change their job,
- people who want a degree to advance in their profession,
- people who want to experience online courses,
- people who do not like face-to-face situations,
- family-raising people,
- on-campus students,

[1] We assume that foreign students live on campus housing.
[2] Kindly indicated to us by online course instructors met at Indiana University Bloomington.

- international students,
- part-time students,
- home-schooled students,
- older students,
- and many more.

As already mentioned, the kind of students that actually take online courses depends on the course subject, on admission requirements and on access restrictions.

2.1.1.3 Reference institution

What we call "reference institution" is the structure that hosts the course "logically".

For a traditional course, it is not very difficult to tell: it is usually the department or the university which is responsible for the course.

The reference institution for online courses can be a university (as above), a consortium of universities (like, for instance, Western Governors, see the corresponding section in the next chapter) or a commercial content provider.

2.1.1.4 Support institution

By "support institution" we mean the structure where the course is physically set up.

For a traditional course, it is usually the same as the reference institution.

The support institution for online courses can be the reference institution (i.e. university, consortium, commercial provider), an external society specialized in hosting and managing online courses from various institutions without being a content provider (it could also be the same society that designed the course).

2.1.2 Question n°2. What are the available means?

The means at one's disposal in a traditional environment are typically:

- oral lecture,
- paper transcription of course contents,
- blackboard,
- slides,
- videotapes,
- lab materials (instruments, computers, etc.).

In an online environment, some of the above elements are replicated through electronic elements (like, for instance, word processed text files, virtual blackboards, slide shows, audio / video sequences). Some other components find no equivalent, like, for example, hands-on labs. But the online environment can also offer "new" features, mainly through hypertext, hypermedia and networks.

2.1.3 Question n°3. Which are the typical teaching-learning situations?

There are three classic situations running in most of the university halls. We list them in ascending order of the students' degree of activity.

- During **lectures**, a speaker is active 90% of the time, a few motivated students hold the

remaining 10% and the rest of the class assists passively.

- **Seminars** consist of a presentation followed by an active discussion going on between all of the participants (the initial presentation could be done either by students or by the professor); only a few shy students stay out of the debate.

- **Laboratories** are situations in which students "experiment" under the supervision of a faculty member. Here they cannot possibly sleep.

In online courses, the student's degree of activity is almost constant because there are only a few cases in which students listen passively to the instructor. A professor from the IUB School of Education told us once: "in a face-to-face class students can put on their sunglasses and take a nap. This is not possible in an online course." (D.P.) However, it is possible to lose track on an online course just as on a traditional one.

2.1.4 Conclusion

Nobody wins the trial: on the one hand, some things are better done face-to-face (like labs, for instance); one the other side, the online environment can improve teaching in certain areas. Our conclusion is that professors should neither banish online courses as a mere translation of on-campus courses, nor embrace them blindly just because they love new technologies and "everybody is doing it". As for everything, moderation is the answer: instructors should carefully evaluate the advantages and disadvantages of each form of education and choose accordingly. "Fit technology into the course, not the course into technology".

N.B. We have confronted traditional teaching and online education as two opposite extremes, but the reader should keep in mind that combinations are also possible (like, for instance, a mix of online and face-to-face, or an online course with a few meetings, etc.) and maybe desirable.

2.2 *Utopianism and dystopianism*

In his book *Computerization and Controversy*, professor Kling writes about two particular genres of analysis concerning the relations between technology and society:

"*Technological utopianism* (...) refers to analyses in which the use of specific technologies plays a key role in shaping a utopian social vision, in which their use easily makes life enchanting and liberating for nearly everyone. In contrast, *technological anti-utopianism* examines how certain broad families of technology facilitate a social order that is relentlessly harsh, destructive, and miserable." [Kling, 96, p.42]

Obviously, there are many possibilities between these two extremes. However, as literature about the Virtual University is often influenced by these styles of thought, one has to "read with a critical eye".

For a comprehensive study of "genres", we refer to [Kling, 96] and [Graham et al., 97].

2.2.1 Technological utopianism

In most articles and other writings, technological utopianism appears under the form of a "futuristic fiction", to use the words of Professor McCain [McCain, 94]. Behind this sort of "visions" usually lies a general sense of optimism and enthusiasm towards a particular technology.

One of Prof. Kling's L597 students made once an interesting comment about technological utopianism: "I was especially pleased to see the authors point out that telecommunications and "electronic spaces" depend upon physical networks to exist. This very obvious fact is notably absent from (...) the utopian accounts which assume that everyone will be networked with no mention of the associated costs of physically doing it." (E.D.) This leads us to a more general observation: authors tend to forget essentials that, if mentioned, reduce the validity of their ideas.

An illustration of technological utopianism related to Virtual Universities can be found in Radford's article, "The Future of Multimedia Education" (see [Radford, 97]). Despite several remarks that try to prevent him from criticisms, Radford slips into an enthusiastic scenario of "the educational model most desirable for the future" achievable through interactive media.

The conclusion of the article is quite revealing:

> "The future of interastive media in education, when it is separated from the issues of technology that tend to mystify discussion and place it firmly in the sole grasp of those that are highly technologically capable, is that of communication tool. Its dimensions and capabilities will evolve and expand at the same time as the potential to author becomes more widely accessible. The potential for students of all ages to author as part of a creative educational programme that is based on achievement of goals and competencies rather than time served will assist educators to shift from teacher to facilitator and mentor. Interactive communication tools will transform our capability to embrace an educational paradigm that deals with learning as a vital, fulfilling, and continuing part of life at home and in the

workplace as well as within educational institutions." [Radford, 97, p.8]

2.2.2 Technological anti-utopianism

Let us now consider the other side of the moon. Distinctive features of technological anti-utopianism (also named dystopianism) in writings are an underlying sense of pessimism and predictions of catastrophic impacts of a particular technology on society.

Professor Eli Noam's famous article, "Electronics and the Dim Future of the University" (see [Noam, 95]) partially embraces technological anti-utopianism. In particular, Noam depicts a dark scenario where communication technologies have an end-of-the-world effect on existing higher education institutions.

According to this author, under the pressure of new technologies, universities will make a thin attempt to "get online", but their role as Virtual Universities is quickly taken over: "in any event, the ultimate providers of an electronic curriculum will not be universities (...) (they will merely break the ice) but rather commercial firms." [Noam, 95, p.247]

Noam's final prediction is that unless higher education institutions grab the opportunity to reform themselves, "many of their traditional functions will be superseded, their financial base eroded, their technology replaced, and their role in intellectual inquiry reduced" and they will end up being no more than "a collection of remaining physical functions, such as science labs and the football team." [Noam, 95, p.249]

Similarly, historian Noble argued recently that the automation of higher education is "a regressive trend, towards the old era of mass-production, standardization and purely commercial interests" that will lead to a world of "digital diploma mills" where students are used as "guinea pigs in products trials masquerading as courses." [Noble, 98, pp.1, 10]

His predictions are as dim as Professor Noam's: "Quality higher education (...) will soon become the exclusive preserve of the privileged, available only to children of the rich and the powerful. For the rest of us a dismal new era of higher education has dawned. In ten years, we will look upon the wired remains of our once great democratic higher education system and wonder how we let it happen." [Noble, 98, p.12]

2.2.3 Conclusion

We had the chance to benefit from a live explanation and class discussion of these topics during prof. Kling's L597 course at Indiana University Bloomington. What we have learned there has been very helpful, especially for picking appropriate documentation for this dissertation among the great amount of existing writings.

2.3 *Indiana University Bloomington School of Education's instructors - interviews*

"The most obvious advantage [of online education] is of course the possibility to overcome learning boundaries of *time* and *space*." [Bitiki and Kasel, 97, p.68]

At Indiana University we had the possibility of interviewing various people of the academic world who are, in many different ways, closely involved with online courses. This enabled us to go a little further in the analysis begun by two students of Namur at Virginia Tech [Bitiki and Kasel, 97].

From all of the interviews, annexed at the end of this document, we "synthesize" a list of some of the main advantages, disadvantages and limitations of online education.

It should be noticed that the great majority of people we have interviewed comes from the IUB School of Education, so what follows is not to be considered as the result of a "statistical survey" and has no claim of being exhaustive[3]. In some cases, their statements have been sustained by excerpts from [Hiltz, 95].

2.3.1 Advantages of an online course

The reader will certainly notice that some of the advantages are double-edged and could as well appear as disadvantages. We agree with the author of [Hiltz, 95] in saying it depends mostly on the course, on "student attitudes, attributes and behavior" and on the support used [Hiltz, 95, p.203].

2.3.1.1 Advantages for the class

Interaction. Communication and interaction among students in an online course is higher than in a traditional classroom. As students get to know each other better, they can eventually become an "active learning community". [Hiltz, 95, p.262]

Motivation. Students take more responsibility for their own learning. "They seem to be self-directed learners who want to do more." (E. Cotton)

Reflection. "The advantage of distance education is that students really take more time to reflect on what they are doing because they don't want to appear stupid in front of their peers." (J. Egbert) This assertion is confirmed by professor Bonk's research which shows that online conversations are generally more in-depth than traditional class discussions.

After-class. "Class discussion doesn't end when class ends." (C.J. Bonk)

People & Places. Students living abroad bring to the class new / different points of view: "I have students from really different countries, so we have really a wide perspective of ideas and locations coming into the class." (H. Elkins) This creates a very rich cultural environment where students have the opportunity to communicate, work and link with people outside their usual environment.

[3] Nevertheless, one thing we know for sure is that these interviews have been more than a precious source of information for us.

2.3.1.2 Advantages for students

Access and equity. Online education guarantees equal access opportunities to everybody and enables some students to access courses they wouldn't otherwise have had (we think about disabled people or faraway students). One professor told us this is the primary reason for her commitment to online education.

Expenses. Everybody mentioned that most of the costs a student faces with traditional learning disappear with online education; for instance, there is no need to relocate, no rent to pay for campus housing, no driving to do to reach the institution. In particular, current Indiana University's online courses are less expensive than traditional classes for out-of-state students (they are at "in-state fee" for all), but this is probably going to change.

Learning Pace. This is the second point on which everyone agreed: distant students make their own schedule and they can work at their own speed. The opportunity to be able to take the course whenever and wherever they want is possibly one of the main reasons that attracts students towards online courses.

Instructor-student Interaction. Students can ask questions to the instructor at any time and they get a more personalized feedback. "When I write back, it is a completely different way of interacting with an individual student, it is a very rich instructor-student interaction." (S. Pugh)

Publication. By posting or uploading their work on the Web, students can experience a first kind of "publication". In addition, by being in a class environment, they can also have peers reviewing their work.

Computer Comfort. Online courses push students towards getting more familiar with the computer environment and its "hurdles".

2.3.1.3 Advantages for instructors

Individual students. The big amount of one-to-one communication that goes on between instructor and student allows the instructor to know each student individually better than in a face-to-face context: "Even though I don't see their faces, I do get to know the way they write and what they think much better." (C.A.).

Abilities. The instructor can express at best his/her abilities (e.g. writing, design, pedagogy) both during the creation and the "performing" of the online course.

Skills & Methodology. In order to make use of the new teaching environment and its opportunities at their best, an instructor has to acquire a certain degree of computer familiarity and some related skills. At the same time, "online learning forces you as an instructor to re-think how you teach." (C.J. Bonk)

Improvement. Online technology can improve teaching in some disciplines. Mr. Bernbom suggested the use of computer to represent and manipulate "logical arguments", "molecular or atomic structures", "maps, geographical and geospatial data". Prof. Bonk mentioned that "for Archeology you can put up Web-tools for different time periods and cultures and be able to visualize how cultures change over time, watch movements of people/ migration patterns, etc."

2.3.1.4 Advantages for the institution

Visibility & Audience. Online courses are more visible than traditional classes: they are out for people around the world, they are available more broadly and the institution reaches beyond the campus boundaries. Therefore, the institution is more recognized and acquires credibility by being "à l'avant-garde" in its ways of transmitting knowledge.

Financial. By getting wider audience, the institution can admit more students: people from farther distance who would not have necessarily moved to take traditional classes from that particular establishment. Also, online courses make the institution save money, as there is no extra physical infrastructure to build (housing, auditoriums, food courts, etc.) and the existing is not worn out.

2.3.2 Disadvantages of an online course

2.3.2.1 Disadvantages for the class

Building a community. The instructor does not know who the students are and students do not know each other: it is hard to build a community with people who never meet.
It is also very important to build a community, because people have to work together, not only to follow the same course. But building this community may take time away from course content.

Size of online class. The limits to the size of online classes are more social than technical. Online communities are not different from any large population of people. The more and anonymous their members, the more likely there will be antisocial behavior. Moreover, beyond a certain size, the amount of material generated in the class leads to information overload, and the number of people involved gets too high to foster a sense of community.

No class schedule. Students can take the course at anytime but they need a good time management:
- for participating regularly
- for keeping reasonable workload

because it is easy to postpone class work when one is already busy with other things.

Amount of reading and writing. An online course is reading and writing intensive. Therefore students need to organize carefully the information flow (volume, topic, importance,...).

Time between question and answer. Participants may feel a sense of loss in terms of fast, real-time interaction.

2.3.2.2 Disadvantages for students

No hands-on activities. It can be replaced by simulation, virtual labs,...

Difficulty of developing new friendship in virtual class. Although a substantial proportion of students make new friends via computer-mediated communication, establishing close personal relationship is more difficult.

2.3.2.3 Disadvantages for instructors

Loss of non-verbal feed-back. Non-verbal communication is a big part of communication in the classroom. If the medium used is not video-conference, the teacher does not see

student's faces and does not know when there is a need for more information.

Student may not respond. Along the same idea, you cannot force a distant student to respond to a question as you can do in a face-to-face situation.

In general, *less control on students.*

A "virtual professor" is "on duty" all the time. The ability to take the course whenever you want can become not as "fun" as expected when student ask for interaction all the time. Moreover, estimated time to give an online course is three times greater than to give a face-to-face course.

Little interactions. Some teachers complain about the loss of time spent with "little interactions". It is the kind of interaction that takes no time in verbal mode, but can quickly become time-consuming in an online environment, like e-mail exchanges, for example. The sum of little interactions with each student can become very big for an instructor.

Evaluation. It is hard to evaluate people. Despite evaluation tools, you have to face other problems such as cheating, ...

Not for undergraduate people. For some teachers "it has not worked out" with undergraduates because an online course requires more involvement than a traditional one. Young students could face motivation problems, assiduity issues,...
Online course needs self-discipline that students just out of secondary school may not have.

2.3.2.4 Disadvantages for the institution

Expensive for the development.
Expensive in time, expensive in infrastructure (hardware, software,...)

Loss of money. In Indiana University, for example, foreign students pay a lot more money than in-state students to come to a course. But all of the distance courses are at in-state tuition. So there is a cost there for offering out-of-state students the same tuition as in-state students get.

Risk on focusing on money and not on quality.
When we met her, Ms. G. Rathbun said:

> "What universities have to decide here is: are they looking at online as an income stream (at the same time attracting students who would not ordinarily be attracted, a source of additional income) or are they looking at improving the quality of education? I tend to think that too many schools just have dollar signs in their eyes and they have a certain notion of what university teaching is. The notion that they have is that it is a lecture: the guy standing up in front of a class giving lectures and giving tests, and that is not really what it is all about. But if you use that model then you would say: "What is the problem with putting the course online? You write down the lecture, you have them read it, you give them a test and that's it, you are done!" But that is not what it is all about."

Chapter 2. Current Situation

1 Introduction

In this chapter we propose an overview of the current situation of online education within the United States and Europe, two continents that we have "experienced". This is done through an analysis of a certain number of selected institutions, consortia or projects which seemed to us particularly interesting. We remind the reader that what follows is not an exhaustive analysis of all the existing institutions that offer online course, but an attempt to release what is currently going on in Europe and the United States from a set of significant examples. Moreover, our analysis is not based on a common grid of observation, due to the specificity of each case.

2 The United States

In the United States there are myriads of institutions that propose some form of online education, and choosing was not easy. We finally selected the following four:

- the University of Phoenix
- Western Governors' University
- Indiana University
- the University of Illinois

We chose the University of Phoenix because it is among the most known for its online courses (almost everyone we spoke to about online education suggested that we look at it) and for its particular admission requirements.

Western Governors' University interested us as an example of consortium of educational institutions , the ideal organization that gets the most close to the idea of "global classroom".

During the first semester of this academic year we were at the Indiana University Bloomington campus (IUB). There, we had the chance to meet instructors and technical assistants closely implicated into online courses, and the possibility to collect a maximum of information on Indiana University's global commitment to online education (see [Final, 98] and [DETF, 97]).

Finally, at IUB we also had the chance to meet Dr. Holly Crawford, who spoke to us in detail about LEEP, one of the University of Illinois's distance education projects. We got interested in LEEP mainly because it has a special vision of online education based on advanced technology and high requirements.

Each of these institutions is analyzed in details below.

2.1 The University of Phoenix Online

The University of Phoenix Online (see < UOPHX >) was formed in 1989 and currently enrolls degree-seeking adult students from all over the world. It is a group-based learning environment offering the kind of interaction and support which take place in a traditional face-to-face seminar-style classroom.

2.1.1 Requirements

The admission requirements are very high. The university policy states that students must be currently employed and at least twenty-three years old to be admitted. Of course, students need a high school diploma to apply for undergraduate courses and an undergraduate degree to apply for a graduate course. International students must have a minimum score on the Test Of English as Foreign Language (TOEFL).

2.1.2 How it works

The online program uses the Internet to deliver online learning that is independent of time and location. Rather than gathering in a classroom, students and instructors interact online or offline in a forum using Microsoft Outlook express.

Communication in the online program is many-to-many rather than one-to-one.
Each class shares its own group mailbox, which serves as an "electronic classroom". While communication between individuals is common, each class uses a group forum where students put their work and ideas before classmates for comment.

Students can access research material from the University's Electronic Library.

Each online class lasts five or six weeks. A student can sign on any hour of the day or night, taking part at times that best fit his or her schedule. This flexibility requires greater than average discipline and does not allow a student to "lose track". Students devote an average of fifteen to twenty hours a week to their studies.

2.1.3 Online students

The online program currently serves approximately 9,500 students, whose average age is 38. Twenty percent of the students are executives or owners of their own business, 30% are middle managers in business and industry, and 44% are technical or licensed professionals. About 60% of online students graduate and receive degrees. In tests of cognitive achievement, online students perform as well as or better than students enrolled in University of Phoenix traditional classroom programs.

2.1.4 Costs

At the University of Phoenix Online, students do not have to pay for a full semester at a time. Instead, they are charged for courses individually. The tuition is 375$ for an undergraduate credit hour and 470$ for a graduate credit hour. In addition, for each student a 58$ application fee and a 75$ student service fee is asked at the time of application. When an application for graduation is submitted, a 50$ graduation audit fee is also required.

Information given on the University of Phoenix Online Web site specifies that all work is conducted "offline" for keeping connect time to a minimum to download and upload documents.

According to the Web site, students should expect to use approximately one or two hours of online connection time per month. They add that:

> "In the U.S., the cost equivalent of this monthly connect time is less than the cost of gasoline, parking fees, babysitters, or meals when attending a traditional campus to complete classes."

2.1.5 Conclusion

The University of Phoenix Online is always evolving. Last year, they were offering three different learning styles:

- Online Campus, similar to the current program;
- Center for Distance Education, a one-to-one teaching approach where interaction is done through familiar communication tools, such as fax, phone, e-mail or postal mail;
- CPEInternet, delivering continuing Professional Education entirely via the Internet.

Possibly because of a limited success, today a combination of two of these programs only subsists, it is the new conception of the Online Campus detailed above. What we ask ourselves is, as the University of Phoenix Online moves on so fast, how far will it be in online education in a few years?

Globally, we are neither enthusiast nor against the University of Phoenix Online. However, the fact that it is intended for professionals only does not fit with the idea we have of what is ideally online education, it seems closer to professional training.

2.2 Western Governors' University

2.2.1 History

The idea for a western virtual university was born at a meeting of the Western Governors' Association (WGA) in June 1995. The members of the WGA, an organization consisting of the Governors of 18 western states, two Pacific-flag territories and one commonwealth, were discussing ways to encourage states to use information technologies to collaborate in education, industry and government.

Western Governors' University (WGU, see < WGU >) was founded to promote cooperation between states and educational institutions and to make the benefits of higher education accessible to all. By using information technologies, WGU distributes courses and programs to students wherever they are.

2.2.2 Location and participants

At this time, states participating in WGU are Alaska, Arizona, California, Colorado, Guam, Hawaii, Idaho, Illinois, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, Texas, Utah, Virginia, Washington, Wyoming.

This diverse array of "education providers" includes community colleges, large public universities, small private colleges, and America's leading corporations.

WGU has two main offices. The administrative office is located in Salt Lake City, Utah. The academic office is in Denver, Colorado.
The university doesn't have a campus in the physical sense.

2.2.3 Course offerings

WGU brings together the distance learning courses and programs of dozens of institutions and corporations. This increases the range of courses and programs and gives more choice than a distance education program at a single institution.

As a WGU student, you can take courses offered by several different education providers at the same time.

The distance education courses use delivery methods such as e-mail, the World Wide Web, closed-circuit cable television, video and audio tapes, videoconferencing, satellite broadcasts, voice mail and others. Some courses meet at regularly scheduled intervals (every Thursday at 7 p.m. via videoconference, for example) while others have no set meeting times (your instructor may ask you to download course material from the Internet and discuss that material with other students via e-mail).

Students have online access to resources like an online library with over 60 full-text and comprehensive citation databases.

2.2.4 Requirements

Degree and certificate requirements are not based on the number of college credits accumulated or core courses completed.
In particular, for each WGU degree or certificate, instead of completing a certain set of courses for a given number of credit hours, prospective students must demonstrate that

they have acquired the skill and knowledge (the "set of competencies", as WGU calls them) required for a particular program. They may have acquired the necessary skills and knowledge through their life or work experiences. If not, there are distance courses available to gain those skills and knowledge.

For that reason, it is not possible to transfer credits to WGU, at least not in the usual sense. Rather, students may earn a WGU degree or certificate by demonstrating, through WGU assessments, what they learned while they were earning those credits at another institution.

2.2.5 Costs

A student that applies at WGU must pay 100$ for an application fee (that includes admission interview and entrance evaluation) and 250$ for the Academic Action Plan. In addition to that, he / she pays a tuition that varies from 1.250$ to 3.000$, depending upon the level of the degree or certificate. Students have between one and two years to complete the certificate they choose.
The Academic Action Plan is an individualized study plan that sets out the steps the student should take. The student has to formally accept it and is expected to pay the related tuition.

If a student decides to withdraw, the application fee and the Academic Action Plan are not refundable. Tuition refunds are based on a percentage of the program completed at the time of withdrawal.

In the WGU Web site, we encountered a very curious statement:

> "There is no WGU tuition for students who are taking classes offered through the WGU Catalog, but who are not pursuing a WGU degree/certificate."

Does it mean that students that just want to follow a particular course for personal interest do not have to pay any tuition? We are not sure that this is the correct interpretation...

2.2.6 Conclusion

We think that the idea of a consortium of institutions is interesting and original. This organization prevents different institutions from creating many times the same kind of online courses, while offering to the student a wider range of possibilities.

We have a positive feeling about WGU which is, for us, the kind of organization that gets the most close to our idea of how online education should be. It would be interesting to know to what extent this project is successful.

2.3 *Indiana University*

Indiana University has an original vision of online education, which is detailed in the "Distributed Education and Indiana University: Strategic Pathways and Windows of Opportunity" report (see [Final, 98, p.]). The IU Special Assistant for Digital Libraries and Distance Education in the Office of the Vice-President for Information Technologies summarized it for us in the following words:

> "Part of our vision for online learning is that it is not online learning *instead of* in-person learning, it is online learning *as well as* in-person learning and the term that is being used at Indiana University to describe this is "Distributed Education". (...) We feel that online learning, or distributed education, is as important to the student who (...) lives in a Residence Hall just blocks away from the classroom buildings as it is to the student who is a hundred miles away from campus." (G.B.)

The strategic applications of Distributed Education are left to each IU campus[1] and currently, only campuses in Bloomington (IUB), Indianapolis (IUPUI) and Fort Wayne (IPFW) use the Web to deliver some of their courses worldwide. We shall briefly look at their foreseen offerings for the period of Fall 99 (30th of August - 20th of December 1999).

2.3.1 IUB

IUB will be running twenty-four Web-based courses, the overwhelming majority being from the School of Education.

Actually, the School of Education proposes one undergraduate, two combined (graduate and undergraduate) and twenty graduate online courses and gets more and more close to offering a completely online Master in Language Education:

> "Currently, students who have been accepted into the Master's degree program select from a mixture of online, interactive TV, and campus-based courses. Though not all courses for a Master's degree are currently available online, we are working toward and are quite close to that goal. Courses taken online or via interactive television can be used to meet existing Master's degree requirements and a completely online version of the Master's degree program is being submitted for specific accreditation." [http://www.indiana.edu/~disted/masters.html]

A Web-based course is also available from the School of Health, Physical Education and Recreation, both for graduates and undergraduates.

2.3.2 IUPUI

At Indianapolis, the twenty-eight online courses offered come from a wider variety of institutions:

- the School of Nursing delivers seven undergraduate courses and ten graduate courses;
- the Purdue School of Engineering and Technology, three courses in Computer Technology and one in Organizational Leadership and Supervision;

[1] Indiana University has eight campuses around the state of Indiana: Bloomington, Indianapolis, Richmond, Fort Wayne, Kokomo, Gary, South Bend, New Albany.

- the School of Education, three courses in Adult Learning;
- the School of liberal Arts, one course in Theater and one in Philosophy;
- the Purdue School of Science, one course in Geology and one in Psychology.

This variety does not converge towards entire online degrees yet.

2.3.3 IPFW

The IPFW School of Arts and Sciences will run the only Web-based course available, a Sociology course. This can be considered as a first approach to online education.

2.3.4 Costs

We were able to collect information about costs only for the IUB School of Education, where students do not have to pay for a full semester, they are charged for courses individually.

Tuition for fall 1999 online courses at the IUB School of Education is as follows: 441.30$ for undergraduate three-credit-hour courses, 190.55$ for graduate one-credit-hour courses and 571.65$ for graduate three-credit-hour courses. This tuition rate applies to all students (in-state and international) and includes a 90$ distance education program fee.

2.3.5 Conclusion

The conclusion that may be drawn from the above is that each campus leaves the strategic initiative to its Schools, and each School puts it in practice at its own pace. IUB's School of Education has already made a remarkable effort; some IUPUI Schools are already launched in the same direction (some more than others); IPFW's School of Arts makes her first steps.

Although Indiana University is currently evolving according to a common "vision", we regret that there is not a concrete common policy for planning the effective development of online education. Moreover, there is no link between the initiatives of the different campuses whereas we think that the university could start by interconnecting its campuses via online education.

It would be interesting to give a look at Indiana University in some years and see how far it has gone in its "distributed education pathway".

2.4 *University of Illinois - LEEP*

In summer 1996, the Graduate School of Library and Information Science at the University of Illinois (GSLIS) launched the Library Education Experimental Program (LEEP). The program's aim is to offer an entire Master's Degree in library Science through a distance learning system, similarly called LEEP. LEEP3, which is currently running at GSLIS, is the third iteration of the initial project.

At Indiana University Bloomington, we had the chance to meet Dr. Holly Crawford, who is "Visiting Associate Professor" at GSLIS and instructor of LIS431 LEEP course. She spoke in detail about the LEEP project and showed us her course site for demonstration.

2.4.1 Features

In order to provide live, Web-based instruction, the LEEP system combines various features:

- one way RealAudio lectures,
- slide-showing and other graphics,
- music and audio clips,
- chat (IRC) and conferencing (via WebBoard),
- UNIX scripts for document distribution,
- ...

In addition, "in order to gain trust in their instructor and other colleagues" (H.C.), students meet on a two-week on-campus summer session involving preparatory coursework and technical training workshops.

2.4.2 Costs for the institution

The demonstration showed that LEEP offers a rich educational environment, and we believe this is of great value. Unfortunately, this advantage is translated into high costs for the host institution. According to Dr. Crawford, such costs are of two kinds:

- technology-related, because the system requires NT and UNIX platforms, RealAudio servers, archiving machines, mixing boards, scanning equipment, a decent network connection (at least 56.6Kbps), maintenance and upgrading, etc.;

- faculty- and staff-related, because "a professor can give two traditional classes or just one online class per semester because the preparation time for an online class is three times bigger compared to a traditional one." (H.C.) So it becomes necessary to hire adjunct professors, administrators, assistants, guest lecturers, etc.

2.4.3 Requirements, tuition and constraints

After listenting to Dr. Crawford and visiting LEEP's Web site at < LEEP3 >, we could spot three main types of constraints that weigh on the student side:

- financial, because the costs that the institution undergoes are reflected on tuition. At the end of 1998, a full-time student paid 14.000$ per year for taking above 6 semester hours or more than two classes[2];

- technological, as the minimum requirements for a student are: a computer with 64Mb of RAM (recommended: Pentium II 400) connected to the Internet via a 56,6 kbps modem, hosting Netscape Communicator 4.07, RealAudio player 5.0, a Telnet client, Adobe Acrobat Reader 4.0, a word processor, a spread-sheet and possibly other software required by the course;

- motivational, because "LEEP courses are intensive, they have high standards of admission", Dr. Crawford said. LEEP's Home Page (see < LEEP3 >) reads: "LEEP3 students are expected to be strong academically, able to learn independently, and willing to collaborate with faculty in refining new ways to deliver instruction."

2.4.4 Accreditation

In 1998, the Master's program and LEEP3 were accredited by the American Library Association.

2.4.5 Conclusion

LEEP shows that the University of Illinois has followed a different path than other institutions: it has chosen to deal with online education as with a classical IT project, by making a big financial investment and relying on benefits to recover the initial expenditures and go beyond it on the long run.

We think that its high requirements and technological choices deal entirely with the issue of quality online education. However, LEEP does not correspond to the idea of an online education accessible to everyone, it seems more limited to an "élite" of wealthy students.

[2] By way of comparison, the entire Master's degree program at Indiana University Bloomington's School of Library costs $18.000.

2.5 Conclusions for the United States

From the four cases described in this section, we draw three general observations concerning online education in the United States.

First, either because they believe in it or because dealing with "online" is "à la mode" and they don't want to be left out, institutions feel concerned and each one approaches online education in its own way: alone, in consortia, by small attempts, via large projects, etc.

Second, the majority of the institutions try to target the broadest population possible by imposing minimum technical constraints on students (i.e. no synchronous meetings, low hardware and software requirements, etc.); only a few specific programs (like LEEP) focus rather on advanced technologies to deliver high quality courses.

Finally, institutions are currently in constant evolution; for example over one semester the University of Phoenix completely redesigned its online offerings.

Whether everyone will be able to adapt suitably to the online environment and to keep up to date, it would be interesting to see which are the problems encountered and which are the possible solutions.

3 Europe

In Europe it seems that quite less institutions plan to propose online education in some form or another, and our choice was relatively easy. We selected the following four:

- the Learn-Nett project
- the GENESIS project
- the French-speaking Virtual University
- the Open University

We chose to write about the Learn-Nett project because the "Département Education et Technologie" of the Facultés Universitaires Notre Dame de la Paix of Namur is among the project partners and because we were able to meet some persons from this department involved in the project.

We got interested into the GENEIS project as one of the few European projects related to online education (together with the ARIADNE project, which will be described separately in chapter 4) and for its original technological choices.

The French Speaking Virtual University is worth looking at because it is a project on a wide scale with a distinguishing characteristic: it is intended for the French-speaking world and thus embraces a certain number of Third World countries, which are seldom explicitly mentioned in other European projects.

Finally, the Open University is a consortium of British universities that delivers distance education through classical means (such as broadcasting and correspondence) and that is now taking a step towards online education.

Each of these institutions is analyzed in details below.

3.1 Learn-Nett - LEARNing NETwork for Teachers

Learn-Nett (see < Learn-Nett >) is part of the European Community SOCRATES action program in the education area and includes partners from Belgium, Switzerland, The United Kingdom, Spain and France. This project is coordinated by the Education and Technology Department of FUNDP.

Learn-Nett focuses on the field of tenured teachers and teachers-to-be's professional development and training on how to use information and communication technologies (ICT) for their educational purposes, through the creation of a European telematic network connecting students, researchers and teachers via the World Wide Web.

Concretely, groups of users composed of participants from eight partner universities have remote access to the shared Learn-Nett human resources (researchers, professors and teachers) and material resources (bibliographies, software, forums of discussions). These

groups take part in one or more pre-defined work projects for a collaborative learning activity with Web tools and services and finally carry out an analysis of the experience.

3.1.1 Environment

The Learn-Nett site offers several services:

- a students database, for student management (students list, registering, search, ...),
- a resources database, containing useful resources available on the Internet,
- a work space, indexing the students' projects,
- a "trainer" forum, for discussion between trainers and organizers,
- a "student" forum, for information exchanges between students and possibly trainers,
- a bulletin board ("valves"), for information diffusion (messages placed by trainers),
- a café, an open forum for informal discussion between students,
- a Learn-Nett Journal site,
- a help site.

3.1.2 Comments

We think that the Learn-Nett project targets a specific kind of students (tenured teachers and teachers-to-be) through a very interesting approach: making students in the same field from different institutions and countries collaborate on a group project via online resources.

Currently these collaboration activities in the framework of a particular course are not supported by online contents delivery. Therefore, we consider them more as online components to a traditional course than parts of an entire online course. However, as Learn-Nett offers a complete environment for online education, we hope that the next step of the project will consist in moving towards entire online courses.

3.2 Genesis

As explained in [Cordis, 99], the GEneric NEtwork for Satellite Interactive Systems (GENESIS) is a two-year project that aims to use satellite technology and Internet protocols to deliver multimedia learning, training and education resources. GENESIS includes partners from the U.K., Italy, Greece, France, Germany and Spain and was supported by funds from the European Union's Fourth Framework Program[3].

We got interested in it for two reasons:

- as one of the few European projects about online education (and yet, it is not specifically just for online education);
- for its original technological choices.

3.2.1 The IPER-SPACE system

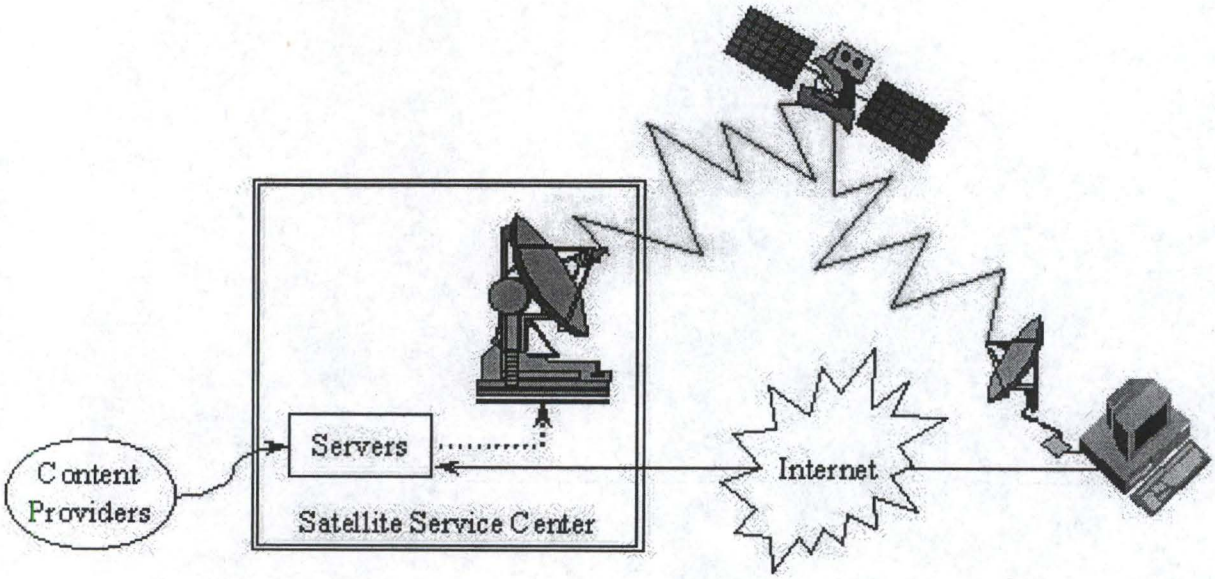


Figure 2.1. © Dr.Bowerman.

In [Bowerman et al., 99], Dr. Chris Bowerman, the project manager, describes the technology and functioning underlying the project:

- education materials are prepared by content providers (e.g. Universities, media companies) and are then placed on the servers at the satellite Service Center;
- users access the service via a menu interface and select the materials in which they are interested;
- materials are sent to the user by satellite transmission and for this purpose, the user's computer must be connected via a PC-card to a satellite dish;

[3] And so is the ARIADNE Project, which will be illustrated in chapter 4.

- user feedback is sent to the Service Center via the Internet.

The whole system, called IPER-SPACE, is limited by the extension of the satellite's "coverage area": it is meant to be available across Europe and North Africa.

3.2.2 The Multimedia delivery model

The IPER-SPACE system may be used to deliver multimedia education in many ways (for an overview, see [Bowerman et al., 99, pp.3-4]). Amongst the five mentioned, we focus on the one that we believe will offer the better online learning environment.

In this "Multimedia" model, knowledge transmission is made via a mix of different materials:

- video-on-demand lectures,
- real-time interaction tutorials,
- audio tutorials via Internet,
- multimedia courseware,
- additional printed materials.

Communication with the instructors and between students is done through computer conferencing and e-mail. Assessments are delivered to individual users' computers automatically when they are due. Students return the finished courseworks via e-mail or upload it on the conferencing system. Automated systems undertake the marking of multiple-choice assessment components.

According to Dr. Bowerman, "such a multimedia learning environment constitutes the apotheosis of what is currently practicable with the IPER-SPACE technology."

Our first feeling is that this project is very interesting. Unfortunately, as it is not effective yet, it is difficult to have a definite opinion on it. That is why we are curious to know more about it once it starts running.

3.3 The French-speaking Virtual University (Université Virtuelle Francophone)

3.3.1 Objectives

The "Université Virtuelle Francophone" (UVF) promoted by the well reputed AUPELF-UREF ("Association des Universités Partiellement ou Entièrement de Langue Française – Université des REseaux Francophones") intends to support the use and master of New Information and Communication Technologies (NICT) by the universities of southern countries. Moreover, it wants to develop new pedagogical practices.

To achieve these two goals, the UVF plans to:

- develop work through network and transmission of knowledge and know-how in a perspective of solidarity and co-development;
- develop scientific production in the South;
- widely diffuse the products of open French-speaking teaching institutions.

French-speaking students from underprivileged zones will benefit from valid formations.

3.3.2 Replacement or complement?

The UVF intends to support existing universities by assisting them in the use of NICT, but does not replace them: UVF programs are complementary to traditional lessons.

In addition, with the agreement of partner establishments, the UVF will install regional and national virtual campuses, composed of a resource center (to produce contents) and of a self-formation room (to follow lessons). The UVF also supports the development of southern universities' Intranet.

3.3.3 Covering the major fields of the university

Like any traditional university, the UVF will cover four major fields: research, formation, scientific information and services to the users.
However, these fields will be approached in a non-traditional way, using NICT. This is the basis of the "virtual university" concept.

3.3.4 Geographical aspects

The project's characteristics place it in a particular status, as it goes beyond geographical boundaries to associate establishments from areas with very different levels of development (sub-Saharan Africa, Asia of South-east, Caribbean, Europe, central and Eastern Europe, Arabic Area, Indian Ocean).
Moreover, the project is supported by well established existing regional offices which reinforce the capabilities of cooperation.

3.3.5 Students

The UVF is intended for French-speaking students of southern countries (Africa, Arabic Area, Indian Ocean, Caribbean), South-east Asia, Central and Eastern Europe. This means that a student from France, Belgium, Switzerland or Quebec cannot apply in the UVF of his country.

Initially, it is developed especially for 2nd and 3rd cycle students (4th year undergraduates and above) concerned by the UVF programs.

The UVF does not deliver a degree ("diplôme") but offers possibilities of co-degree ("co-diplômation") between establishments of the North and the South.

Although students follow courses in electronic form, examinations take place in a traditional way, in presence of a supervisor, either in the partner establishment or on the UVF campus.

3.3.6 Electronic Library

One of the main components of the UVF is its electronic library. This library gives the references of courses and of electronic libraries specific to each discipline.
There, people can find:

- information databases,
- specialized databases (medicine, data processing, agronomy, literature...),
- repository of theses and literature,
- complete works,
- electronic journals, but also
- courses already put online in the largest French-speaking universities.

They can also find software resources (courseware, shareware), lists of teachers and researchers, lists of establishments and formations, etc.

When the UVF will be actually running, the electronic library will acquire direct or partners' contributions but will have to meet quickly the users' needs, in particular those of the southern countries.

3.3.7 Conclusion

It is a wide scale project, the first which we heard about that is concerned with underprivileged countries, and this is valuable. It is also one of the rare projects proposing the French language, which could reinforce the feeling of belonging to a same culture among different countries. Unfortunately, it is not mentioned in the documentation when it will be operational.

3.4 Open University

The Open University (OU, see < Open University >) is a consortium of universities in the U.K. that use broadcasting and correspondence to deliver academic courses to distant adult students[4].

For a detailed description of the "traditional" Open University, the reader should refer to the corresponding paragraph in [Bitiki and Kasel, 97]. On the other hand, we shall focus on this institution's recent step towards online education.

3.4.1 Internet-based courses

For the academic year 1999-2000, the Open University proposes eleven post-graduate level courses, under the label "studying by the Internet". These courses come from two main fields: "Mathematics and Computing" and "Education".

3.4.2 Course materials

Course materials may include:

- textbooks and / or workbooks, sent to the students by surface mail,
- assignments and course notes, available in electronic form,
- computer software, for the course work.

3.4.3 Restrictions

3.4.3.1 Access

Internet-based courses at OU are accessible for people coming from most countries in the world. Exceptions include residents of the U.S.A., Brazil, South Africa, Malaysia, Singapore and Hong Kong, who may be redirected through the Open University affiliate in their country. In particular, online courses in the Education field can be taken anywhere except in Australia.

3.4.3.2 Residential schools

The majority of the Internet-based courses in Mathematics and Computing include a compulsory weekend residential school, usually held in the UK. As long as this restriction exists, the Open University will not be able to offer completely online courses.

3.4.4 Tutoring

As in most courses, students are followed by a "tutor". The only difference in Internet-based courses is that communication is done through e-mail and conferencing.

[4] Students must be at least 18 years old.

3.4.5 Assessment & Examinations

Course performance is measured by continuous assessment (students are expected to submit assignments electronically throughout the whole course) and by a final examination. This exam takes place at one of the OU examination centers located in Europe. Students have the possibility to have an examination arranged at an alternative place, but this option is not free of charge.

3.4.6 Conclusion

We are currently assisting to the Open University's first steps towards online education. However, as long as its mandatory residential school restriction exists, the Open University limits the extent of student population concerned by its online courses.

Knowing that the Open University has a strong distance learning tradition, we believe that it will easily switch to one-to-one online education, but moving to online courses with multiple students and collaborative experiences will be a change of educational model. As for other institutions in the same case, we are curious to know how far it will have gone in a few years.

3.5 Conclusions for Europe

From the four cases treated in this section, we draw three general observations concerning online education in Europe.

First, the majority of what we saw consists of cooperation projects between institutions and / or states but not many individual initiatives.

Second, most of these projects seem to be directed towards the creation of an online component to support existing programs. We have not heard about institutions planning to offer a completely online degree.

Finally, beside these projects, another trend shows up: the classical distance education institutions move towards online education and could perhaps complete what is not yet covered by the above-mentioned projects.

4 Global conclusion

By way of conclusion let us compare the cases concerning online education in Europe and the U.S. (table 2.1).

United States	Europe
Supply	
Wide scale	Limited choice
Institution kinds	
Individual, consortia	Cooperation projects
Target students	
Professional, distant, new categories	Distant, traditional, professional
Requirements	
Generally low, high in specific cases	Low
Costs	
From 3.000$ to 14.000$ per year	Not mentioned

Table 2.1. Comparison between Europe and the U.S.

First, the extent of supply is very wide in the United States (there is "l'embarras du choix"), whereas in Europe the possibilities are much more reduced.

Second, the two continents differ by the type of institutions which propose online education: in the United States, each institution approaches online education on its own way: alone, in consortia, etc. In Europe, most of the time this is done through a joint effort of several institutions or states.

The two continents also differ by the extent of the student categories they focus on. At first sight, we have the feeling that the U.S. try more to open to new kinds of students, whereas Europe seems to concentrate on the already existing students.

Nevertheless, we believe that a common point links the establishments of the two continents: it seems to us that they both try to impose minimum technical requirements on students, with just a few exceptions.

Finally, we cannot compare the inscription fees which the students face for online courses in each continent, because there is no information available concerning this aspect of European projects.

Even if it has a different approach, Europe is obviously behind the United States. In the United States there are already many full programs entirely online, whereas in Europe there are only some courses available, but no degree yet.

We can suppose that, while waiting for Europe to get up to date, European students may redirect themselves towards American online courses. But then, several difficulties arise, in particular the recognition of the diplomas and other cultural issues. A problem worth mentioning is that tuition for online education, even if not unusual for American universities, may appear prohibitive compared to European universities.

Chapter 3. Major Tools For Online Education

Introduction

The aim of this chapter is to analyze the major categories of available tools for building and managing online courses. Whenever necessary, we illustrate theoretical notions with examples of existing systems and software. However, our purpose is not to give an exhaustive list of available applications, for which we refer for further reading to specialized Web pages such as [http://www.osc.edu/webed/tools.html].

There are four kinds of tools related to online education, as illustrated by figure 3.1.

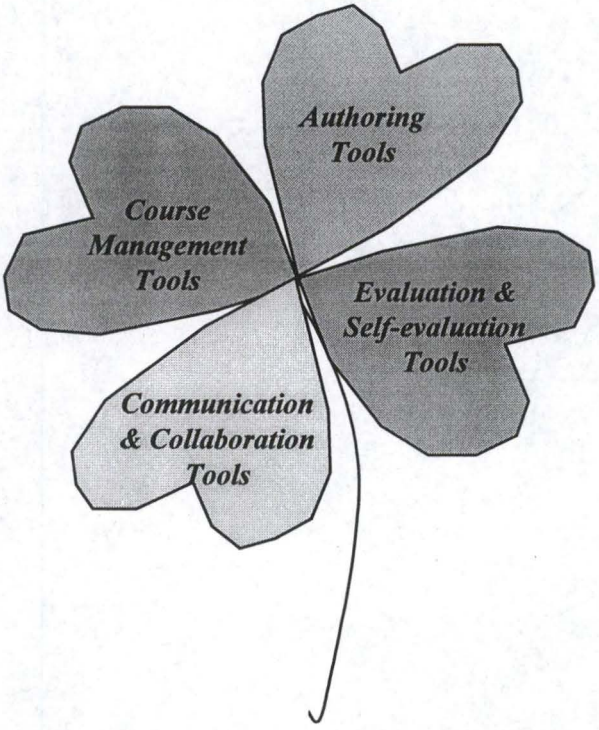


Figure 3.1: tools for online education.

These four categories of tools are treated separately but it is important to remember that they are closely inter-related. For instance, some authoring tools include assessment features that belong to the "evaluation" area, or interaction facilities inherent to the "communication" area.

We shall introduce the following categories of tools and some relevant examples, as summarized by table 3.1.

Tools	Illustrations
Course Authoring Tools	Sephyr
Course Management Tools	Blackboard CourseInfo
Evaluation and Self-evaluation Tools	WebTest
Communication and Collaboration tools	
Asynchronous systems and software	
E-mail	
Listservers and Mail Lists	
Usenet Newsgroups	Outlook Express
Online Forums	COW
Asynchronous Groupware	BSCW
Synchronous systems and software	
Chat	
Virtual spaces	
Synchronous Groupware	NetMeeting
Mixed systems	FirstClass, WebBoard

Table 3.1. Categories of tools and related illustrations.

1 Course Authoring Tools

1.1 What Is a Course Authoring tool?

Course authoring is the process of developing and designing course contents. Course authoring tools are applications, processes and their requisite infrastructure designed to facilitate course authoring.

Four basic areas are handled by this line of programs: information publishing, interaction, assessment, access to external teaching / learning resources.

Information publishing features allow to:

- distribute basic course administrative materials (course description, calendar, assignment descriptions and other documents)[1];
- facilitate the creation of hypermedia course content (i.e. combine graphics, sound, videos and hypertext while structuring course contents, create presentations, slide-shows, etc.);
- enable instructors to customize the 'look' of their work, possibly on the basis of templates and / or with some form of assistance ("wizards", tutorials, online manuals, etc.).

Interaction features are provided by tools supporting synchronous and asynchronous communication between students and their instructors and among students[2].

Assessment is supported by tools for administering tests and following students' performances[3].

By **access to external teaching / learning resources** we mean the possibility to move back and forth between the course environment and outside resources (such as libraries' online databases, tutorials and online learner-support services) without authentication problems.

Integrated application suites (or "packages") are systems that provide all of the above, but many products only handle a few features, like, for instance, multimedia course designing.

1.2 Example: TM/3 - SEPHYR

While operating in the framework of the VESALE project, we had the opportunity to use an authoring toolset, called TM/3 - Sephyr, whose detailed description will be given in chapter 4 as an illustration of the features specified above.

[1] This feature is also present in course management systems, detailed in section 2.
[2] This part, which is rather inherent to communication tools, is treated in section 4.
[3] This feature is rather related to evaluation tools and considered in section 3.

1.3 Comments

The overview of course authoring tools allows us to draw three main remarks.

First, if we assume that the creation of online courses can also be done by people having little or no knowledge of computer science, then this kind of tools appears as fundamental.

Similarly, for institutions that want to group and / or organize distributed online courses, this kind of tools allows them to keep some cohesion in the overall course "look". If such a practice tends to spread, authoring tools will become essential.

Finally, as soon as several people collaborate in the creation of a same course and mainly as soon as the courses grow by the number of registered students, this kind of tool ensures an optimal collaboration on course design (no conversions or incompatibilities between different applications) and avoids developers to get lost in their colleagues' work.

2 Course Management Tools

2.1 What Is a Course Management System?

Course Management consists in administering and delivering information related to a specific course.

Course management systems (CMS) are applications, processes and their requisite infrastructure designed to facilitate course management on the Web. Three basic areas are handled by this line of programs: student management, course contents delivery and grading.

Student management features include:

- accounts administration per course / per system;
- student rosters;
- statistics (students, courses, access tracking)

Contents delivery[4] components are:

- course lay out and calendar;
- document distribution features;
- communication and collaboration tools;
- evaluation and self-assessment instruments.

Grading features consist of:

- grade-book;
- statistics (reporting on student progress).

Finally, security and privacy are two important concerns about CMS as sensible data (student profiles and grades) moves around the system.

Here as well there are "complete packages" and products that offer only some features like, for instance, communication and collaboration tools, (see section 4 of this chapter) or evaluation and auto-evaluation instruments (see section 3 of this chapter).

For a first list of existing CMS, see table 3.2.

[4] This feature is also present in course authoring tools, as detailed in section 1.

Major Commercial Products
Blackboard CourseInfo - Blackboard Inc. http://product.blackboard.net/courseinfo WebCT - Universal Learning Technologies http://www.webct.com/webct/
Other Commercial Products
Lotus Learning Space - Lotus Development Corporation http://www.lotus.com/home.nsf/tabs/learnspace Web Course in a Box - MadDuck Technologies http://www.madduck.com/ (Click on "Information") TopClass -WBT Systems, Inc. http://www.wbtsystems.com IBM - IBM Global Campus http://www.hied.ibm.com/ LearnLinc3 - Interactive Learning International Corporation http://www.learnlink.com/ VCampus™ - UOL Publishing, Inc. http://www.uol.com/
Universities' Home Grown CMS
Virtual-U - Simon Frasier University, Canada http://virtual-u.cs.sfu.ca/vuweb Mallard™ - University of Illinois, U.S.A. http://www.ews.uiuc.edu/Mallard/ CyberProf - University of Illinois, U.S.A. http://www.howhy.com/home/ ClassNet - Iowa State University, U.S.A. http://classnet.cc.iastate.edu

Table 3.2. A first list of existing CMS.

As illustrated by table 3.2, the University of Illinois, analyzed in the preceding chapter within the framework of its LEEP program, also developed two CMS, calles respectively Mallard and Cyberprof. We did not hear about any tool of this category being promoted by the other institutions analyzed in chapter 2.

In the next section, we will look into details at one example of CMS package.

2.2 *Example: Blackboard CourseInfo™*

Blackboard CourseInfo (see < CourseInfo >) is one of the major commercial CMS products, priced $4,500 (July 1999) per year.

For this chapter's purposes, we shall focus on the set of instructor management features that this suite provides. Students also have the use of some management features, mainly to handle their personal information and home pages, but this is less relevant for the purpose of this example.

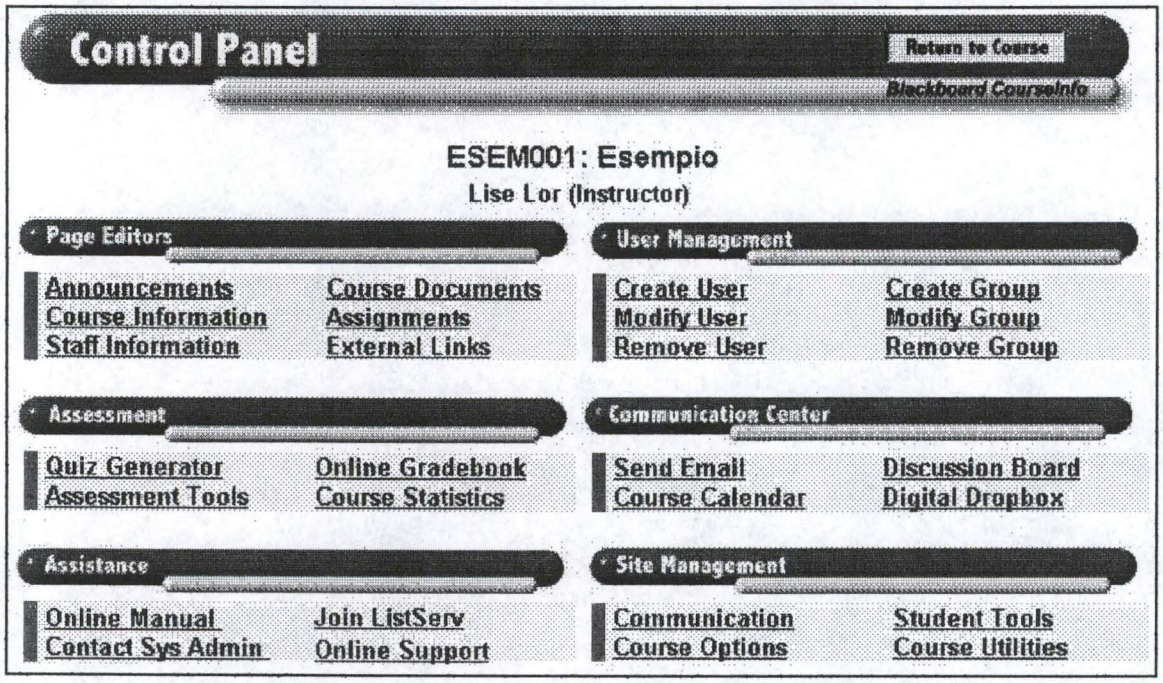


Figure 3.2. A screenshot of CourseInfo's instructor control panel.

2.2.1 Student management

2.2.1.1 Accounts administration and student roster

The User Management feature deals specifically with registration and organization of course participants. Instructors can enroll students, who receive one unique login for the whole system, and designate working groups for projects.

The Site Management feature offers a Batch Add Users Utility that allows the instructor to add multiple users to the course in one operation.

The Communication Center feature contains links to the Student Roster, to Student and Group Pages.

2.2.1.2 Statistics (students, courses, access tracking)

The Assessment feature provides the instructor with statistics related to each course area.

2.2.2 Contents delivery

2.2.2.1 Course lay out and document distribution

The Page Editors feature contains the tools for adding and managing course content. In this area the instructor can:

- post announcements,
- give a description of the course and staff,
- upload course documents,
- display assignments,
- add useful external links.

The Site Management feature contains the customization tools for each course. In this area, instructors can set default options and designate a course's "look". The Course Recycler tool of the Course Utilities area allows the instructor to selectively remove any pre-defined area of the course, like, for instance, the Announcements, the Course Information, the Discussion Board, the Grade-book, etc.

The Assistance feature helps the instructor by offering online technical support and downloadable documentation.

2.2.2.2 Communication and course calendar

The Communications Center hosts all course components involved in instructor and student communications. Instructors come here to send course members e-mail, post topics to the discussion board, and create calendar events.

2.2.2.3 Evaluation

The Assessment feature contains a Quiz Generator and the tools necessary to manage the assessment list.

2.2.3 Grading features

The Assessment area holds the grade-book, where the instructor can view and edit student grades and monitor statistics about quiz results.

2.2.4 Security and privacy

Access to courses is password protected. In addition, through the User Management and Site Management features, the instructor can define a series of restriction on users, user groups and on different areas of the course.

2.3 Comments

We believe that CMS are an excellent support for administering an online course: they avoid having to bargain with the administrators of the host machine for the attribution of user logins. It also makes it possible for the instructor to directly define and know "who has access to what".

We think that they can also be very useful for the instructor because they facilitate the follow-up of each student's progress and avoid having to manually create cards, spreadsheets or grade-books.

In our opinion, as soon as the number of students exceeds ten, the two features mentioned above become crucial.

Finally, the offering of other functionalities, such as content delivery, brings them close to being complete tools. This is confirmed by our experience of the CourseInfo system which, except for contents creation, offers to manage all the aspects of an online course.

3 Evaluation and Self-evaluation Tools

3.1 What is evaluation ?

There are two kinds of evaluation: summative evaluation and formative evaluation.
These are complementary processes, illustrated by different tools.

3.1.1 Summative evaluation

The goal of summative evaluation is certification of each student's progress.
Summative evaluation examines if the course objectives are achieved by comparing student's performances with expected performances.
Test results of evaluation are translated in a grade established on fixed basis.

To set up this evaluation you have to consider three important aspects:
- conception of the task;
- determination of criteria and sub-criteria and how to structure them;
- construction of an appreciation scale (considering the criteria).

3.1.2 Formative evaluation

Basically, formative evaluation consists in dividing a task, a course, etc. in units and determining for each unit if a student is able to manage his/her difficulties.

The unique goal is to recognize where and in what a student has problems and to inform him.
Results are not translated in "scores"; it is just a feed back for the student and the professor.
The concept of formative evaluation is close to the concept of self-evaluation.

Formative evaluation leads to success in summative evaluation.

3.2 When to evaluate ?

Evaluation can take place before, during or after instruction [Stovall, 98]. Each system has a specific purpose.
Evaluation before instruction is useful to identify what students know (prerequisites do not assure that students are ready for the course) and establishes a base performance to which final performance can be compared.
Evaluation during the instruction can correct misconception, refocus attention and identifies needs for more information.
Evaluation after instruction may measure student learning.

3.3 Advantages-Disadvantages

Online evaluation benefits and suffers from the same advantages/disadvantages than an online courses.

Students can take it from anywhere, need not to take the quiz at the same time, and

responses are legible for the instructor. But preparing online test is, as for online course, time consuming for the professor. Moreover, students can suffer if the technology doesn't work.
Specifically, the main advantage of online evaluation is the immediate feed-back students receive (if the software permits it). But the capacity exists for cheating and measures have to be taken.

As we said before, we can set up simple measures to prevent cheating, such as:
- to require user ID and password;
- to control the pressure of cheating (for example, each assessment worth only a few points);
- eventually, to offer the quiz in proctored lab (lab with a supervisor) but in this case, you loose the "anywhere, anytime" advantage.

3.4 Desirable Software Features

What are some of the desirable features of programs used to create tests and tutorials ?
As said in [Gibson et al.], the author proposes to divide them in six main areas:

- Testing
  - What are the different types of questions the software can offer (multiple choice, true/false, fill-in the blank, essay, ...)?
  - Does it provides for a timed test?
  - Is feed-back provided to the students?
  - Are there any help and hints available?
  - Does the system allow the use of text and art, perhaps audio and video?
  - Is a possibility of retry offered to the students?
  - Is it possible to skip questions and then return to answer those skipped and review/change the responses?

- Tracking
  It allows to follow where students have traveled within the lesson and to record performance on tests.

- Grading
  The grades must be given as feed-back to the student and to the instructor / manager. The capture / retention of students records should be easy.

- Tutorial building
  Do the evaluation system support tutorial inclusion?

- Implementation issues
  - Ease of use: interface for instructors and students should be easy to use.
  - Platform issues: availability of viewers, ability of hardware to support video, sound, possibility of taking the test off-line and then submit.
  - Identify questions from a test bank by varying levels of difficulty.

- Security issues
  The software must be secure through

- authentication of student;
- restricted access to testing facility;
- availability of test by date/time.

3.5 *Example: WebTest from Heriot-Watt University*

We give here one example of both kinds of evaluation because evaluation tools can easily become self-evaluation tools if the score of the test is just given as feed-back to the student and not recorded in the grade-book.
For this reason, just a few tools exists for specifical self-evaluation. The only example we encountered is the ARIADNE's GENEVAL tool detailed in the next chapter.

WebTest (see < WebTest >) is a system for delivering assessment tests via the Web.
It is used to provide assessment tests for Heriot-Watt students on a variety of campus-based and distance learning courses.
Tests can be restricted in time or place if required, or made available anywhere and at any time through any Web browser. No further software is required.
Tests are marked automatically and results are given immediately to students and instructors.

WebTest has the following features:

- Many types of questions: answers can be numbers, mathematical expressions, text, multiple choice and new types can be added.

- Randomization, which is a key feature of the Heriot-Watt WebTest. This is achieved either by choice of one from a number of alternative questions or by specifying certain parameters (e.g. numbers, text or diagrams) that are used in the question.
  The aim of randomization is usually to generate different tests of the same difficulty to large numbers of students, with the following benefits:
  - prevention of copying,
  - enabling tests to be repeated,
  - reinforcement of learning by repetition.

- Proper representation of mathematical and scientific formulae.
  HTML is not currently able to well represent maths or other scientific formulae. WebTest currently creates images using the typesetting language TeX.
  The developers plan to move to use MathML (the new XML specification for coding semantic and presentational information on mathematical expressions) in WebTest, as soon as browsers will be able to use it.

- Any HTML elements can be included in the question text. Moreover, multimedia elements such as graphs and diagrams can be included if browsers accept and display them.
  For instance, VRML can be used to show a three dimensional object but this is not supported by all browsers.

- Simple interface for students, lecturers and support staff.

- Data is recorded to provide information on student participation and performance to staff. This is typically done automatically via email.

- The default feedback is made of: the overall mark for the test, the student answer, the expected answer and the judgement for each answer. It is possible to suppress some of this information or to include additional feedback that will be shown only on the results page.

3.6 Comments

After this overview of evaluation and self-evaluation tools, we would like to conclude with some remarks.

Evaluation tools as we saw them seem adapted to evaluation at the university level. What we mean is that it is not unusual to be tested via multiple-choice questionnaires at the university (for instance in Science or Medicine courses). However, a more common evaluation method is the "personal composition", for which evaluation tools can be easily bypassed without specific knowledge in computer science, as professors from the Indiana University Bloomington's School of Education showed us.

On the other hand, inserting self-evaluation components makes an online course more active for the student. Despite that, we have no example of any practical use of such tools and the only environment we know that proposes self-evaluation tools is the ARIADNE project detailed in chapter 4.

4 Communication and Collaboration Tools

4.1 Introduction

Compared to the different tools that we just mentionned, communication and collaboration tools cannot be considered as specifically online education tools; they are rather standalone systems. However, they are to some extent a necessary support to online courses.

In the next sections we will briefly describe the most common families of communication and collaboration tools. But before, let us do a differentiation based on the two ways to use electronic services and applications between users on a network. The first one, called "asynchronous", does not require that users be connected at the same time. The second one, called "synchronous", requires users to be all simultaneously connected to the network..

Figure 3.3 summarizes the contents of the following sections.

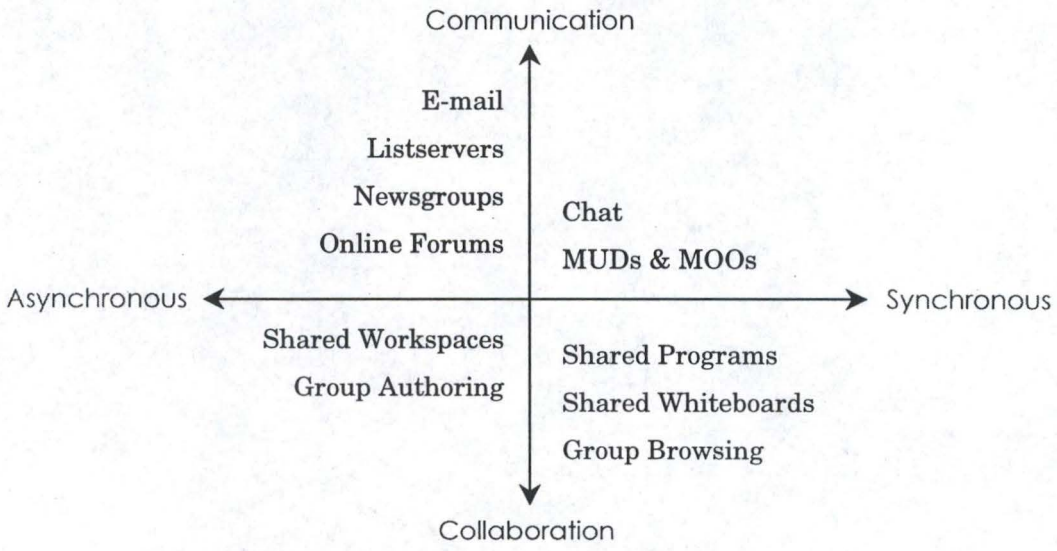


Figure 3.3. Communication and collaboration tools.

There are also a few systems combining both asynchronous and synchronous features, which shall be treated in section 4.4.

4.2 *Asynchronous systems and software*

In this section we shall introduce the following five categories of asynchronous systems:

- E-mail
- Listservers and Mail Lists
- Usenet Newsgroups
- Online Forums
- Asynchronous Groupware

N.B. By the term "groupware", we mean software that supports groups of people engaged in a collaborative activity.

4.2.1 E-mail

As everybody knows, **Electronic-Mail** is a network service that moves text-based files from one client computer to another. There are many ways of doing this, depending upon network protocols, types of access to the network and the different types of software set up on client computers and on servers, but this is not relevant to the purposes of this chapter.

4.2.2 Listservers and Mail Lists

A **Listserver** is a software program set up on a server that allows the creation and management of **Mail Lists**. List are collections of up to several thousands e-mail addresses.

Listservers and the lists they manage have a unique e-mail address: when a message is sent to a list (via any e-mail client software), the listserver program relays it to all the addresses on the list.

Lists can be configured as "open" (anybody can subscribe) or "closed" (subscription is subject to the approval of the list owner) and "unmoderated" (incoming messages are relayed automatically) or "moderated" (the list owner must approve the relay of incoming messages).
The most commonly used listservers are Majordomo (available at < Majordomo >) and Listserv (available at < Listserv >).

4.2.3 Usenet Newsgroups

Usenet is a collection of discussion topics called **Newsgroups**. Topics are organized hierarchically under general categories and structured in individual discussions.
In order to send and receive information from a Newsgroup, the user needs to set up a client software called a **Newsreader**, which is today built-in in all popular Web browsers.

Usenet has two distinguishing characteristics:

- it uses standardized protocols to format and transmit messages (Network News Transfer Protocol, NNTP);
- messages are passed from one news server to another i.e. replicated at many places around the world, rather than being stored at one central location and dispatched in multiple copies.

In some cases, this last feature makes Newsgroups more effective than a listserver. Let us consider a simple example: if 100 people in the same geographic area have subscribed to a newsgroup on a local news server, when someone on a different country posts a message to a newsgroup, only one copy of the message is relayed to the local server. If the same global exchange is done via a mail list, a listserver will send 100 copies of the same message to the local mail server which will pass them on to the 100 e-mail subscribers.

Example: Microsoft Outlook Express

Microsoft Outlook Express is an Internet connection help tool used by, among others, the University of Phoenix Online, that simplifies the process of setting up Internet e-mail and news accounts.

Users can read e-mail and access newsgroups without having to switch windows or open new applications. They can create multiple hierarchical folders to help them easily organize their e-mail, create filters for each of their newsgroups (to filter out postings that meet certain criteria) and sort their messages in many ways (for instance, grouping messages by subject to keep related messages together for easy reference).

4.2.4 Online Forums

Online Forums are commonly set up in the following way: clients connect to a server that holds several forums and runs a "conferencing software". An online forum consists of several messages organized according to one of the following basic models: "star" or "tree".

"Star-structured" forums usually propose a list of the active discussions, and to each corresponds a linear list of messages sorted by the time they were posted. Figure 3.4 shows a typical screenshot of a star-structured forum's contents.

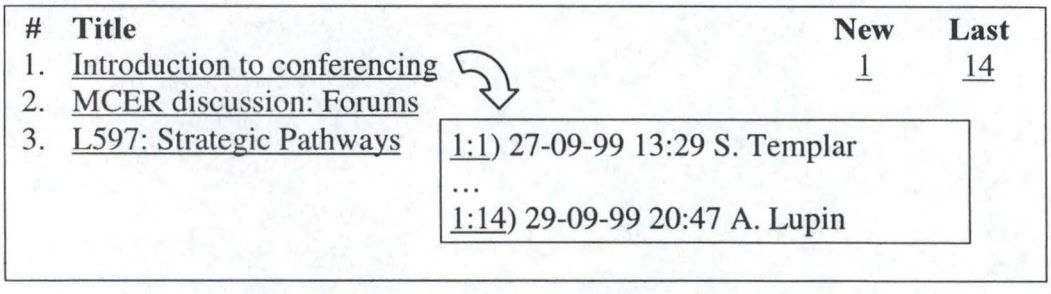


Figure 3.4. Star-structured forum contents.

"Tree-structured" systems also display a list of active discussions, but each message in a discussion is followed by its own list of replies, and each reply can have a list of replies, etc. Tree structures are often called "threaded discussions". Figure 3.5 shows a typical screenshot of a tree-structured forum's contents.

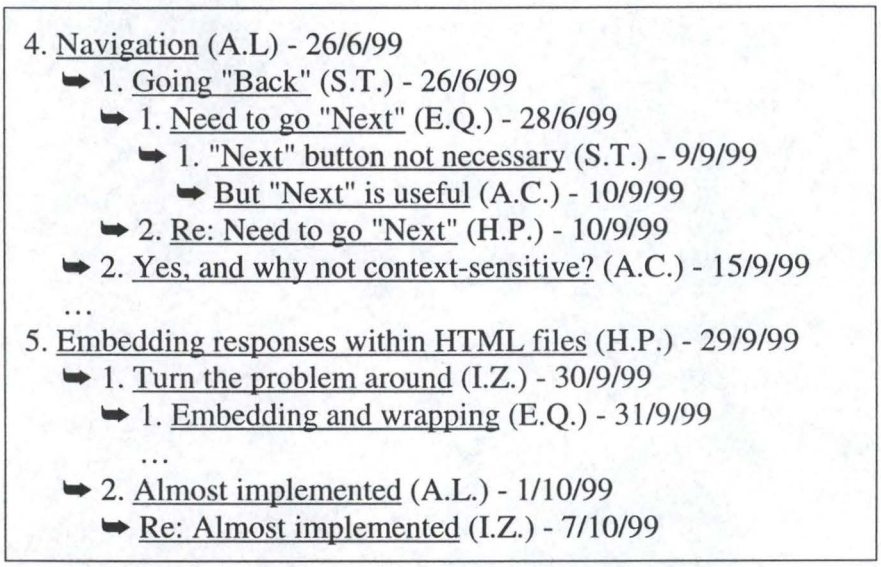


Figure 3.5. Tree-structured forum contents.

Most fora support either one or the other type of structure but not both; some systems provide no structure other than ordering all messages by time. The choice between these two structures can be made easier by thinking in terms of focus: in a star-structured system the emphasis is put on entire conversations, in a tree-structured system the important units are individual messages.

Over the years, conferencing has developed sophisticated features for managing and participating in discussions. For an overview of text-based Web-conferencing systems, one may refer to [LaLiberté et al., 97].

The next section briefly describes a Web-conferencing system, which was indicated to us by a professor from Indiana University Bloomington who uses it for his own online course.

4.2.4.1 Example: COW

Conferencing On the Web (COW, available at < COW >) is a hierarchical system organized into three main levels. The first level is the *conference* level: each class has its own conference. Each conference is then organized into *topics* (the second level), where the coursework is contained. The third level contains *conversations* between students and instructors in response to the material presented in each topic. Conferences can be public (in which case anyone with a COW account can have access), or they can be private (in which case you must ask permission by mail). Users must register (user name and password) to enter COW. To access COW, only a standard Web browser is needed.

4.2.5 Asynchronous Groupware

Asynchronous Groupware systems are set up on a server running a "groupware program" that allows and manages two kinds of collaboration features: shared workspaces for document sharing and group collaboration on the authoring of documents.

The following example is the one used by the VESALE project (and the MDL course).

Example: BSCW

Basic Support for Cooperative Work (BSCW, available at < BSCW >) is a system that provides a Web-based interface to a shared workspace for use in remote collaboration. To access a workspace only a standard Web browser is needed.

BSCW allows multiple users to track documents through multiple versions. It keeps a "paper trail" through revisions and provides locking features to prevent two users from editing the same document at the same time. It is a 'shared workspace' system which supports document upload, event notification, group management.

4.3 Comments on asynchronous tools

We believe that it is necessary to include at least one asynchronous means of interaction in all online courses, otherwise there would be no difference between such courses and a classical correspondence courses. We will briefly expose our opinion of each type of tools.

E-Mail
For specific exchanges of information it is interesting to include electronic mail. Nevertheless, e-mail alone is not enough to guarantee all the interaction necessary for the good progress of a course online. We consider e-mail as the equivalent of the telephone.

Listservers
Listservers may be a good way to diffuse course-related information and have very little hardware and software requirements for students. Unfortunately, from the "interaction" point of view, it does not propose to structure entire discussions and can quickly fill up the mailboxes of the participants. It can be more interesting as a means of information distribution at the host-institution level.

Newsgroups
Newsgroups allow to have structured discussions on a subject, but have the disadvantage of being open to anyone. We believe this system is not suitable in the case of an online course where instructors wish to restrain interaction to course participants only.

Forum
Fora and newsgroups are very similar systems. The forum has the advantages of the newsgroup, without the disadvantage of open access. Currently, the forum seems to us the most suitable means of interaction (and the most used) for communication in online courses.

Groupware
We believe groupware is very useful for sharing documents and collaborating on the realization of group work. As regards the diffusion and the sharing of documents, these tools allow users to store documents in one place without having to worry for colleagues, for instance they don't need to send them as "attachments" via e-mail and risk to overload their servers. For the realization of group work, groupware prevents each member of a group from keeping a local version of the work, not always up to date.

4.4 Synchronous systems and software

In this section we shall introduce the following three categories of synchronous systems:

- Chat
- MUDs and MOOs
- Synchronous Groupware

N.B. By the term "groupware", we mean software that supports groups of people engaged in a collaborative activity.

4.4.1 Chat

A server hosts and manages (via a "chat application") several "chat rooms", that people connect to in order to interact with each other in real-time. Some chat systems require users to install client applications on their computers.

4.4.2 Virtual spaces: MUDs and MOOs

A MUD or Multi-User Dungeon / Dimension is a general term for text-based virtual environments in which various users can interact in real-time by assuming a role and moving throughout various settings or rooms. The focus is on the exchange of text messages between participants who are logged in at a particular time.

Actually, MUDs are programs running on a central server managed by advanced participants (or programmers); they are accessible from a Web site or through telneting to the central host machine. There are a number of variations on the MUD, including MOOs (MUD Object Oriented), MUCKs and MUSHes, each associated with a server program of that name and varied mainly by the programming language used and the capabilities offered.

Although the majority are ongoing adventure games, there are some educational MUDs, namely for foreign language learning and practice or professional exchanges.

For a non-exhaustive list of existing MUDs and other M*, refer to [O'Conner, 98].

4.4.3 Synchronous Groupware

Synchronous Groupware systems are set up on a server running a "groupware program" that can be used by multiple users at the same time. Some synchronous groupware systems require client software installation. These systems allow real-time collaboration under three forms: shared whiteboards, shared application programs and group browsing.

4.4.3.1 Shared Whiteboards

Shared whiteboards allow a document or image to be viewed simultaneously by two or more participants. All participants can then view the document while making annotations on it using the drawing or text capabilities of the specific whiteboard program. Most of the shared whiteboard programs use different colors to indicate where annotations are coming from.

4.4.3.2 Shared Application Programs

Shared application programs are designed to allow participants at multiple sites to all view and control an application running at one of the sites. Basically they allow multiple users for one instance (session) of a program.

Some of these programs support a feature called "floor control": when large numbers of people are using a shared application, one person at a time has control of the program and only the participant who has the "floor" can send commands to the application. Another feature sometimes provided is the capability to have late joining (when someone joins the session after it has already begun), but not all shared application programs support it.

4.4.3.3 Group browsing

Group browsing programs offer a group tour of Web sites with a shared browser window and some interaction capability between participants and the tour leader.

4.4.3.4 Example: NetMeeting

Microsoft NetMeeting is an application with several synchronous groupware features. This system requires the users to use the same client software (i.e. have NetMeeting installed).

A shared whiteboard lets users collaborate in real-time via graphic information. The Whiteboard allows reviewing, creating and updating graphic information; dragging-and-dropping information on the whiteboard; using different-colored pointers to differentiate participants' comments.

The Program Sharing feature lets users share multiple programs during a conference and retain control over the way they're used. This feature allows:

- viewing shared programs in a frame, to distinguish between shared and local applications on the user's desktop;
- switching between shared programs using the shared program taskbar;
- choosing to allow one person to work in the shared program at a time;
- approving or rejecting conference participants' requests to work in the program the users introduces.

The File Transfer feature allows the user to send one or more files in the background, during a NetMeeting conference, to everyone or to one or several selected participants.

Chat allows users to conduct real-time conversations, via text messages, to communicate with one person or a group of people during a conference, with an additional "whisper" mode to send private one-to-one messages.

NetMeeting has also audio and video conferencing features that require extra Windows-compatible equipment.

Finally, NetMeeting offers three types of security measures to protect privacy: data encryption to encode the data exchanged, user authentication (through authentication certificates) and password protection.

4.5 Our comments on synchronous tools

Unlike asynchronous tools, we do not believe that synchronous interaction means are absolutely needed in an online course. We will briefly expose our opinion on each type of tools.

Chat

"Synchronous instruction via the chat is great for discussion about issues and controversial topics" (E. Cotton)

But this interaction style is constraining, because it requires the presence of each participant at the same time. For instance, some professors we met in Bloomington pointed out the limit of different time zones in the United States.

Another utility we see to chat, within an online course, is that:

"It takes the "social chit-chat" out of the classroom" (S. Malikowski)

This type of interaction can also be appropriate to what IUB professors called a "virtual café" and what professor Harasim defines as:

> "A space for students to talk about their interests, concerns, the weather, social plans, or even write an interactive group novel. The main point is that it should be a space moderated for and by the students, not directly tied to the curriculum. Just as face-to-face school or campus provides places for students to congregate socially."

Virtual spaces

Although some authors find many pedagogical values in virtual spaces (like, for instance, [Allison, 95] and [Guernsey, 96]), the particular case of a foreign language course is the only situation in which we think the use of such environment brings something more to the course, as illustrated by a case study in [Montandon, 96]. For us, it should remain an external and additional resource to the online course.

Groupware

Similarly to virtual spaces, the utility of synchronous groupware seems to us limited to some particular cases, for example, to give additional explanations at a student's request or for any "virtual meeting" with the instructor.

4.6 *Mixed systems and software*

There are systems that include both synchronous and asynchronous features, that we chose to define as "mixed". Here are two examples of such systems.

4.6.1 Example: FirstClass

FirstClass (see < FirstClass >) is a popular closed e-mail and conferencing package (used by, amongst others, The Open University, U.K.) that provides communication support for distance learning. Users connect to the FirstClass server through a graphics-based client application.

FirstClass offers an e-mail package that uses a graphical interface (a desktop metaphor) to simplify managing messages. Messages are sent to individual users or to conferences. A system administrator has control over who has access to individual conferences.

Real-time interaction is available using FirtsClass' chat facilities.

Also, FirstClass has a file transfer feature that allows users to directly download and upload files to and from the server.

4.6.2 Example: WebBoard

We had the opportunity to experience this system during professor Kling's L597 class at Indiana University Bloomington, and that is the reason why we chose to develop it. WebBoard (see < WebBoard >) is a Web-based application that offers primarily online conferencing. It is a tree-structured system organized in a hierarchy with four levels: *boards*, *conferences*, *topics* and *messages*, boards being the most general, messages the most specific. In particular, conferences can be public, moderated, private, read-only, or mixed. Boards can be access-limited ("closed boards"). In order to access WebBoard only a standard Web browser is needed.

In some cases, WebBoard allows participating to conferences through mailing lists: it sends the user all messages posted to the selected conferences and posts e-mail responses accordingly. There are three mailing list formats:
- "non-digest", where messages are sent individually as they are posted;
- "digest", where all messages from a conference for a day are sent in a single e-mail, and
- "digest / ZIPped", where a digest is created and compressed into a standard ZIP file, which is sent once a day as a file attachment.

In addition, WebBoard has a built-in chat system for instant interaction sessions.

Users must register to access WebBoard conferences, otherwise they can enter as "guest users", in which case all conferences are read-only.

4.7 Our comments on mixed systems and software

If the instructor gives some importance to synchronous exchanges, mixed systems like those described above can be very useful as they include in one package both features and avoid using too many separate tools. Actually, we believe that it is easier for users to get familiarized with one single application instead of having to learn the characteristics of each different system. Moreover, this excludes any incompatibility issue that arises when using various tools.

5 Conclusion: linking tools and purposes

The systems that we described can be used to accomplish different purposes related to online education, as summarized by table 3.3.

Systems	Purposes
Authoring tools	Authoring, information dissemination and / or exchange , assessment
Course Management Systems	Student management, information dissemination and / or exchange, assessment
Evaluation and Self-Evaluation tools	Summative and formative evaluation
E-Mail	Information dissemination and exchange
Listservers	Information dissemination and exchange
Newsgroups	Information dissemination and exchange (open, non-moderated virtual bulletin boards)
Online Forums	Information exchange (conferencing)
Chat	Synchronous informal interaction (virtual café)
MUDs & MOOs	Synchronous virtual spaces
Synchronous Groupware	Real-time collaboration: virtual blackboard, shared program usage or group browsing
Asynchronous Groupware	Asynchronous collaboration: data sharing, shared document authoring.

Table 3.3. Linking tools and purposes.

This set of tools is not exhaustive, and will quickly be outdated, as new technologies emerge at great speed. One evolution that we were able to notice is the trend to create a unique package containing all the necessary features for online course creation and management, instead of several standalone applications. An example of such package is given in table 3.4.

Oncourse
Oncourse (available at < Oncourse >) is a Web-based instructional environment developed at Purdue University, Indiana University Indianapolis. Oncourse features include: ▪ a "Class" section for user management (system accounts, student and instructor profiles, etc.); ▪ a "Syllabus" section (general information about the course); ▪ a "Schedule" section for course activities (tasks, assignments due dates, etc.); ▪ an "In Touch" section for communication (announcements boards, e-mail, tree-structured forums, chat); ▪ a "Tools" section (web authoring, online testing, linking to external resources) ▪ assessment ("online quizzes"); ▪ grading (gradebook, notebook); ▪ a context-sensitive online help and tutorials. In order to connect to Oncourse, only a standard Web browser is needed.

Table 3.4. Oncourse.

In general, aside from any trend, we believe that there is no "miracle online course package". If the online environment is suitable for a certain subject (and this is not so obvious), then the choice of developers / instructors shall still depend on other factors than the technology, such as the means they have at disposal, the investment they are willing to put in a similar project ("online courses may consume three times as much faculty time than traditional classes" (C.J. Bonk) and are not for free), the students they intend to reach, etc.

Chapter 4. The ARIADNE environment

1 Introduction to the ARIADNE project

The Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE) is a four-year project (January 1996-June 2000) that includes partners from Belgium, Finland, France, the U.K., Italy, the Netherlands, Spain and Switzerland and is supported by funds from the European Union's Fourth Framework Program[1] and by the Swiss Federal Office for Education and Science.

ARIADNE is focused on computer-based and network-supported education. Practically, the project's aim consists in "the development of tools and methodologies for producing, managing and reusing computer-based pedagogical elements and telematics-supported courses" (from the Project Description page in < ARIADNE >). This is translated into the concept of "ARIADNE environment", whose global architecture is shown in figure 4.1.

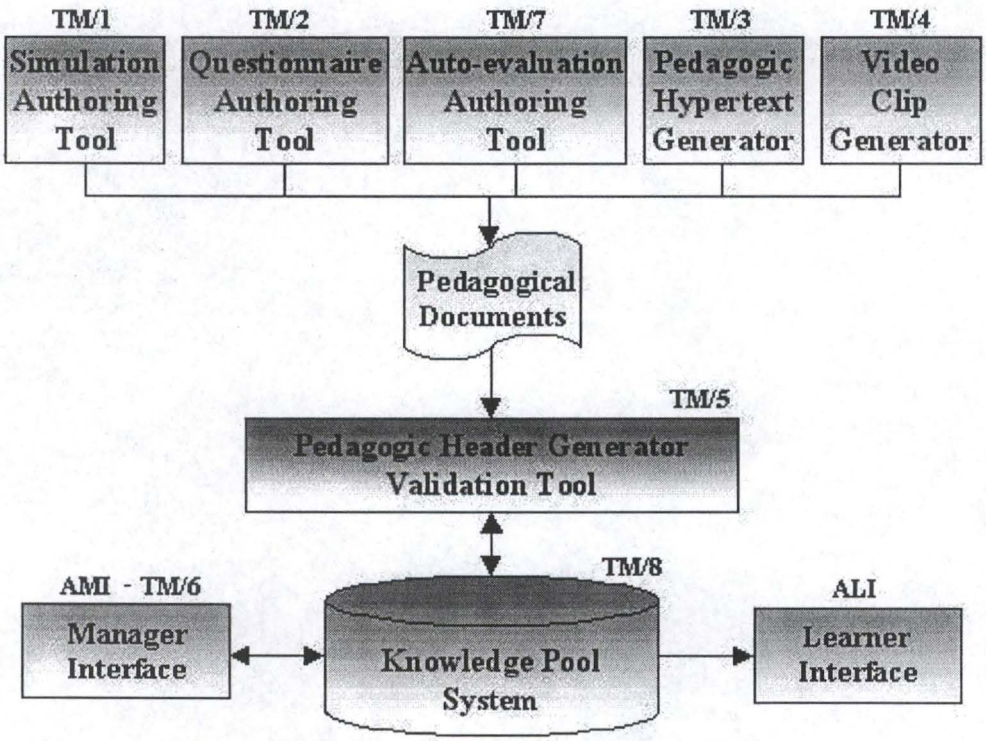


Figure 4.1: global architecture of the ARIADNE environment.

The ARIADNE environment relies primarily on an international system of interconnected "knowledge pools", the Knowledge Pool System (KPS). The KPS is a large database containing structured fragments of course materials, such as lessons, exercises, etc. The structure of the knowledge pools will be detailed in section #.#.

The rest of the ARIADNE environment offers two main families of tools:

- ⋆ **authoring tools** (TM/1 to TM/4 and TM/7), for the creation of "pedagogical documents";

[1] And so is the GENESIS Project, which was illustrated in chapter 2.

- ⋆ **core tools** (TM/5, TM/8, AMI and ALI), for storage and retrieval of pedagogical contents to and from a Knowledge Pool.

The ideal scenario of use of the ARIADNE environment proceeds according to 5 steps:

Step 1: Authoring
The instructor creates new pedagogical material either from scratch (via some authoring tools[2]) or by reusing existing elements retrieved from the Local Knowledge Pool (LKP) where he wants to set up his course.

Step 2: Indexing and validation
Using TM/5, the instructor "indexes" his new pedagogical documents for storage into the LKP and asks for validation by the LKP's administrators.

Step 3: Course structuring
In the ARIADNE Manager Interface (AMI), the instructor creates a "curriculum" that structures his course (course summary, resources, sessions and assignments referencing all the validated documents, etc.) using TM/6; then he / she defines which users have access to the course.

Step 4: Diffusion
Through the ARIADNE Learner Interface (ALI), students are able to see the curricula of the courses they registered for.

Step 5: Updating
At any time, the instructor can modify and update his course either via AMI or by going through steps 1 to 3 again, depending on the adjustment he wants to make.

N.B. In this scenario, we have assumed that one person (the instructor) is simultaneously course author, manager and reviewer, but it is likely that these three roles are assumed by different people.

Now that we have given an overview of the ARIADNE environment, we shall focus on its main tools.

[2] These tools can be those proposed by ARIADNE or other authoring tools.

2. The Knowledge Pool System

The Knowledge Pool System is a distributed database that contains "pedagogical elements". A pedagogical element, that we previously called "a structured fragment of course material", is actually the combination of a "pedagogical document" (any file or group of files containing educational material) and its attached "header" (a standardized description of the document). [Forte, 99a]

N.B. A pedagogical document can be created with other tools than those proposed by ARIADNE.

The KPS is made of several "Local Knowledge Pools" (LKP) all linked together through a central node; this "Central Knowledge Pool" ensures the integrity of the whole distributed database and is responsible for mirroring the information needed across all the LKPs. [Forte, 99b]

Actually, the Central Knowledge Pool is located in Belgium, at the K.U.L., as shown by figure 4.2. Several LKPs are located in each country member of the project.

The local knowledge pool to which the VESALE project is connected is the one from the Katholieke Universiteit Leuven (KUL LKP).

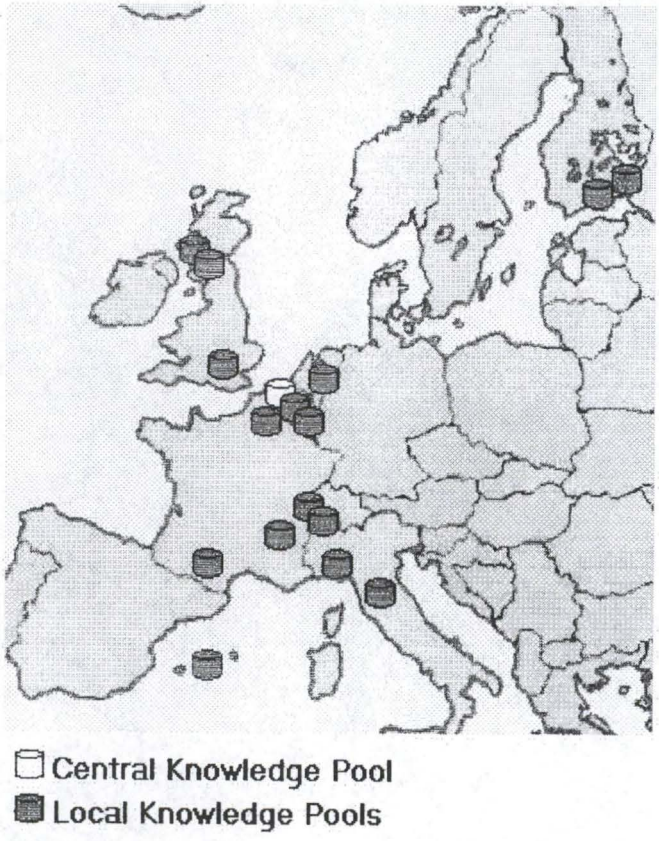


Figure 4.2. The Knowledge Pool System.

3 Description / analysis of the tools

We are interested particularly in the tools which we will successively use in the implementation of our personal project. Therefore, we leave aside TM/1 (the simulation authoring tool), TM/4 (the video clip generator) and ALI (the ARIADNE Learner Interface). For more details about our choice, we refer to the "preliminary hypothesis" section of chapter 6, dedicated to the implementation.

3.1 Authoring tools

3.1.1 TM/3 - SEPHYR

TM/3 is an authoring package that "aims at alleviating the pedagogues from the cumbersome task of creating expositive components from scratch." [Fernandes et al, 98, p.2]

The SEPHYR package includes six tools:

- the *Toolkit*,
- the *Author*,
- the *Reader*,
- the *Merger*,
- the *HTMLizer*,
- the *Cleaner*.

3.1.1.1 The *Toolkit*

The *Toolkit* is simply an interface that gives access to some of the other tools. It can easily be bypassed as each application can also be launched separately. For a general view of the *Toolkit*, see figure 4.3.

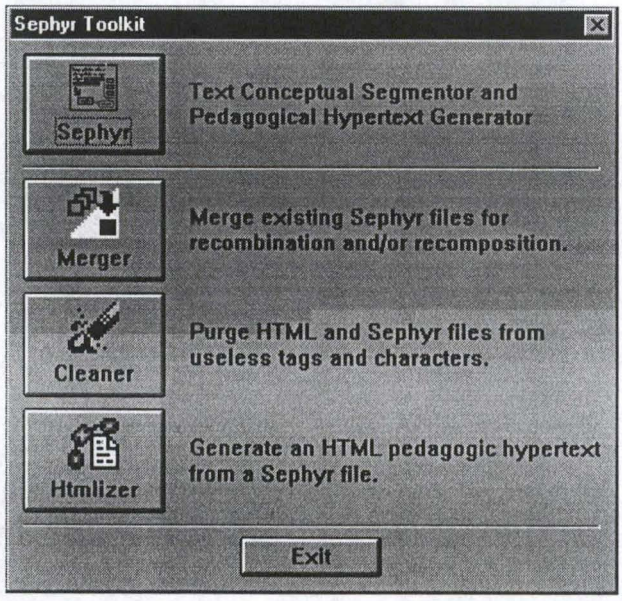


Figure 4.3: general view of the *Toolkit*.

3.1.1.2 The *Author*

The *Author* is an authoring tool with a very important feature: it enables defining a conceptual structure on top of HTML documents.

In order to do this, authors have to mark up parts of an HTML document as "pedagogical elements" according to the methodology described by [Wentland Forte, 94].
These elements are of three types, "concept", "argument" or "solved problem", and they can be linked together in three ways:

- concepts can be related to other concepts previously defined through a generic relation, named "parent-child";
- an argument is directly attached to a concept during its definition;
- a solved problem is also instantly linked to the concepts that characterize it during its definition.

The tool automatically shows a graphical representation of the corresponding "conceptual web".
It also displays a hierarchical "table of contents" of the document which helps navigation.
Finally, authors have the opportunity to index words or expressions that they did not previously mark as pedagogical elements.

Figure 4.4 gives a general view of the *Author*.

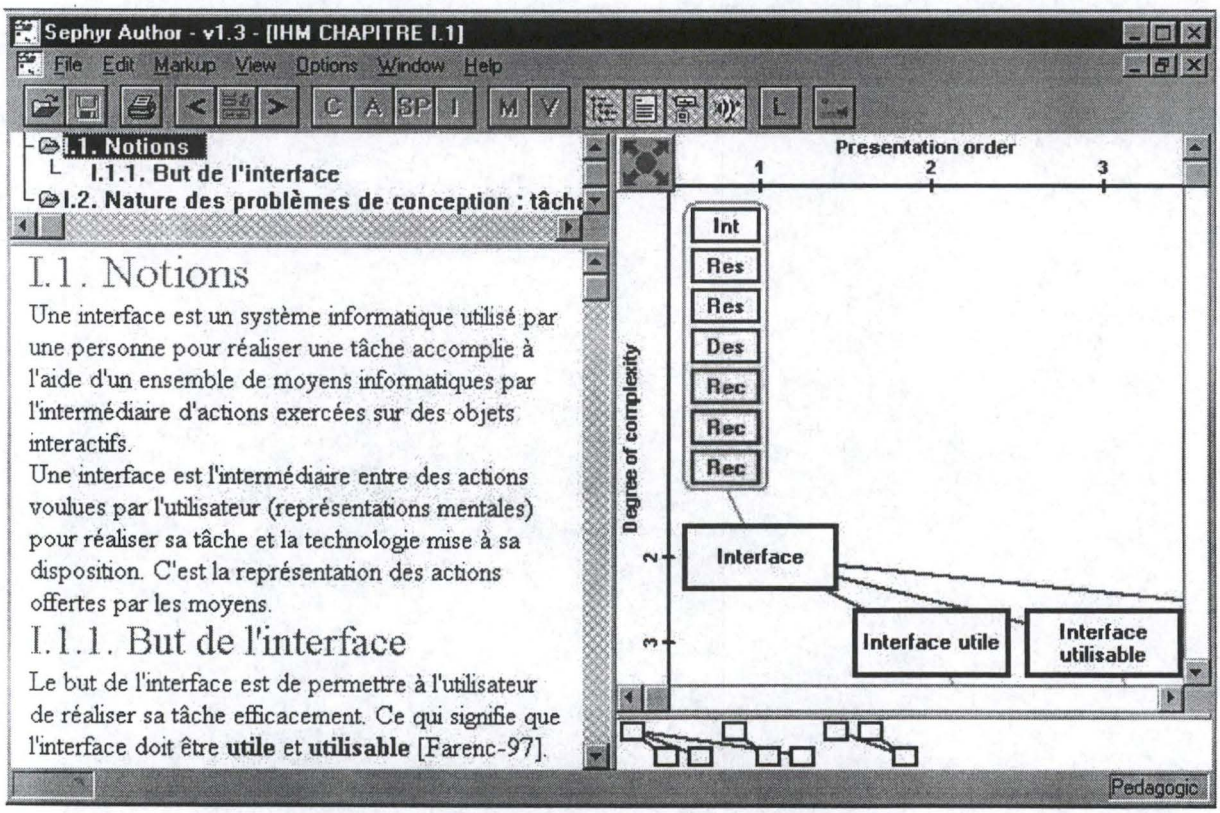


Figure 4.4. General view of the *Author*.

The *Author* has a limitation on the size of the documents it can open: files larger than 200 kilobytes must be split into smaller "chunks". In order to keep the links between pedagogical elements of different chunks, it is possible to define a "virtual concept" corresponding to a concept existing in a different chunk. Pedagogical elements can be associated to a virtual concept as to a normal one. When merging all the chunks, the *Merger* will be able to reconstruct the links between all the related elements and build the right conceptual web.

The *Author* generates a "SEPHYR file" (which is actually an SGML document) that contains the original file with its multimedia components, its hierarchy (title structure) and its conceptual web.

Unfortunately, this tool does not offer HTML editing capabilities, which would avoid going back to the Notepad for manual corrections.

3.1.1.3 The *Reader*

As they are, SEPHYR files cannot be interpreted by a Web-browser. However, they can be viewed via the *Reader*, which acts a simplified version of the *Author*: it allows navigating via the conceptual web or the table of contents, but all other features are disbled.

3.1.1.4 The *Merger*

As explained before, the *Merger* allows combining several SEPHYR documents into one single file.

3.1.1.5 The *HTMLizer*

Starting from a SEPHYR file, the *HTMLizer* generates an equivalent HTML version of the document (called "pedagogical hypertext") composed of several files which can be viewed under a current browser supporting Javascript.

Figure 4.5 shows a view of one step of the *HTMLizer*.

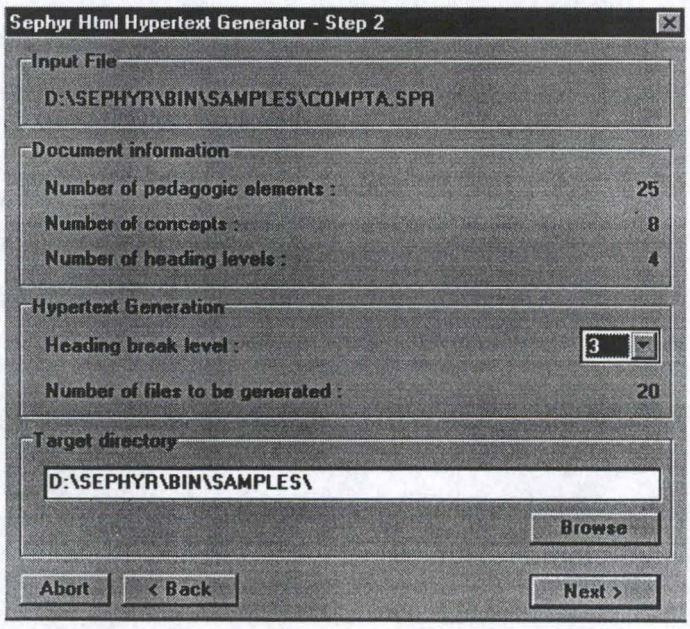


Figure 4.#: one step of the *HTMLizer*.

Actually, the *HTMLizer* splits the SEPHYR document according to title tags (<H1>, <H2>, etc.). The user can define to which extent he wants the contents of the SEPHYR document to be split: if level 3 is chosen, each time a title of level 3 or higher is encountered (i.e. <H1>, <H2> and <H3>), a new HTML document is started. This way, the user influences the structure of the result.

The Pedagogical Hypertext.

The pedagogical hypertext resulting from the use of TM/3 on a HTML file integrates two different aspects: a hierarchical table of contents and the conceptual web. These structures, as they are translated into HTML, offer two separate kinds of navigation to the user on the basis of a conventional interface that we shall briefly describe.

The browser window containing the pedagogical hypertext appears divided into three frames:

- a "main frame", used to display the current pedagogic document, the table of contents, the search form or the index list;
- a "structural navigation frame", that contains buttons which allow browsing sequentially through the hypertext, displaying the table of contents, the search form or the index list;
- the "conceptual navigation frame", which contains information about the current pedagogic element (concept, argument or solved problem) and links toward other related elements.

In the main frame, the starting position of a pedagogical element is indicated by a particular icon (a red ball for concepts, a green for arguments, etc.) that changes when the element is selected (it becomes an arrow icon).

Another image located on top of the conceptual navigation frame indicates the degree of correspondence of its contents with the main frame: an arrow stands for exact correspondence, a broken arrow for no exact correspondence between the two sides.

Figure 4.6 represents an overview of a pedagogical hypertext generated by TM/3

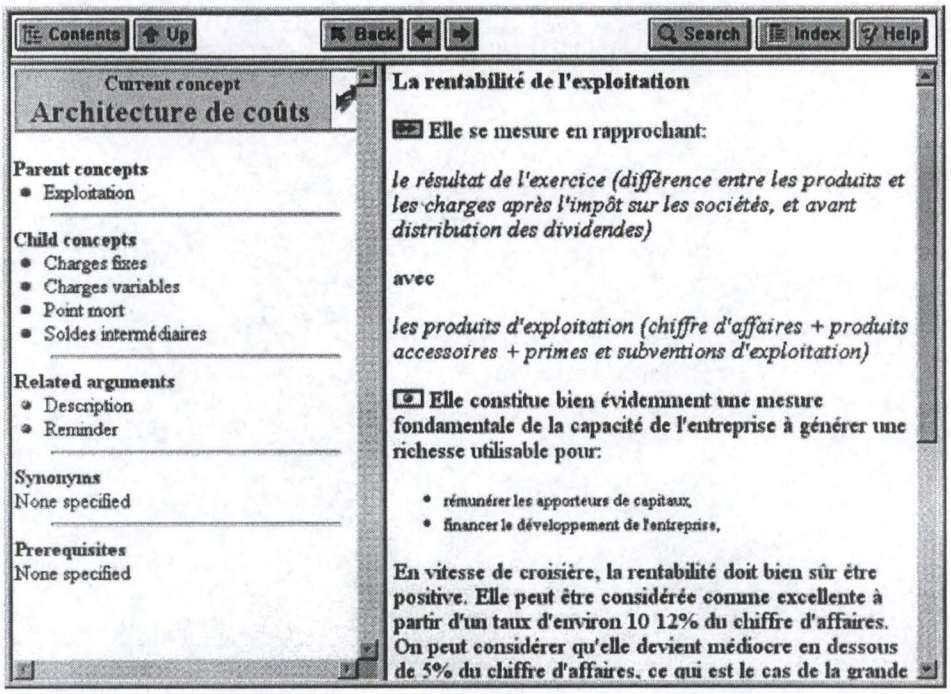


Figure 4.6. Overview of pedagogical hypertext.

3.1.1.6 The *Cleaner*

Finally, the Cleaner purges unwanted HTML symbols from HTML or SEPHYR files. For a general view of the *Cleaner*, see figure 4.7.

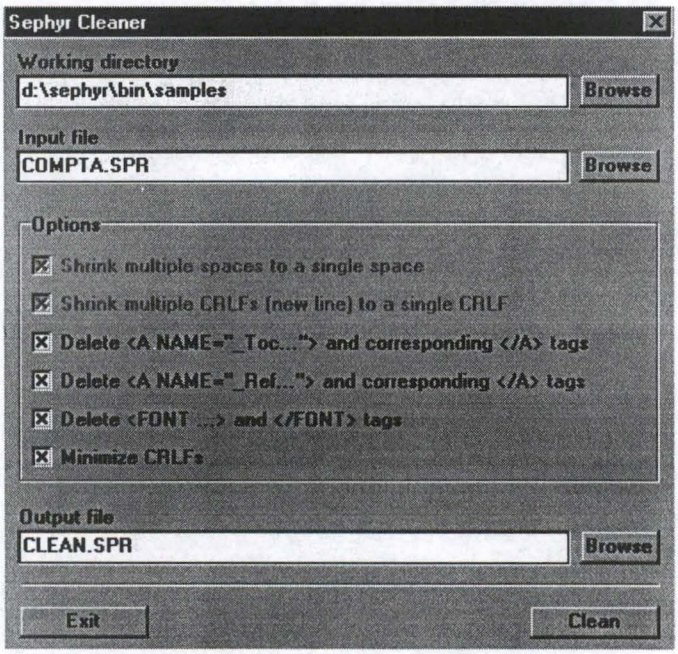


Figure 4.7: general view of the *Cleaner*.

3.1.2 Comments about TM/3

TM/3 corresponds to that we called in chapter 3 an "authoring tool", and particularly in one aspect: the "information publishing" feature. At first sight, it only misses an HTML editing capability (which would avoid going back and forth from another application for any contents correction) to be a complete design package.

The originality of this set of applications is to propose a double structuring (in "conceptual web" and "hierarchical table of contents") and a double corresponding navigation.

In spite of that, this toolset has some curious aspects. An example is the *Cleaner*: considering the position that it occupies in *Toolkit* (the last place, below all other the tools, as shown in figure 4.3), we believed that it was used to clean the code generated by the other applications, whereas it is actually intended for cleaning the code of HTML files before treating them with the other tools.

This leads us to ask two questions:
- why do TM/3 tools have to work on "purified" HTML code rather than on generic code? (i.e. why are there some tags that the *Author* is not able to accept?)
- why did TM/3 developers create six different applications instead of a single tool being able to do everything?

In conclusion, TM/3 is ideally an excellent tool, unfortunately we were confronted to a series of implementation issues, detailed in chapter 6, that reduced our initial enthusiasm towards this tool.

3.1.3 TM/2 - Questionnaire Tool

TM/2 is a set of tools provided by the ARIADNE environment to assess students using questionnaires and feedback. This set is composed by three tools: *TM2Author*, *TM2 QuizServer* and *TM2Analyzer*. [Cole et al, 99]

An important feature of TM/2 is the use of XML-based document languages for the different files:

- questionnaires are encoded using the Questionnaire Definition Format (QDF),
- answers are stored using the Questionnaire Answer Format (QAF),
- results are stored using the Questionnaire Processed Format (QPF).

The global process is detailed below and illustrated in figure 4.8.

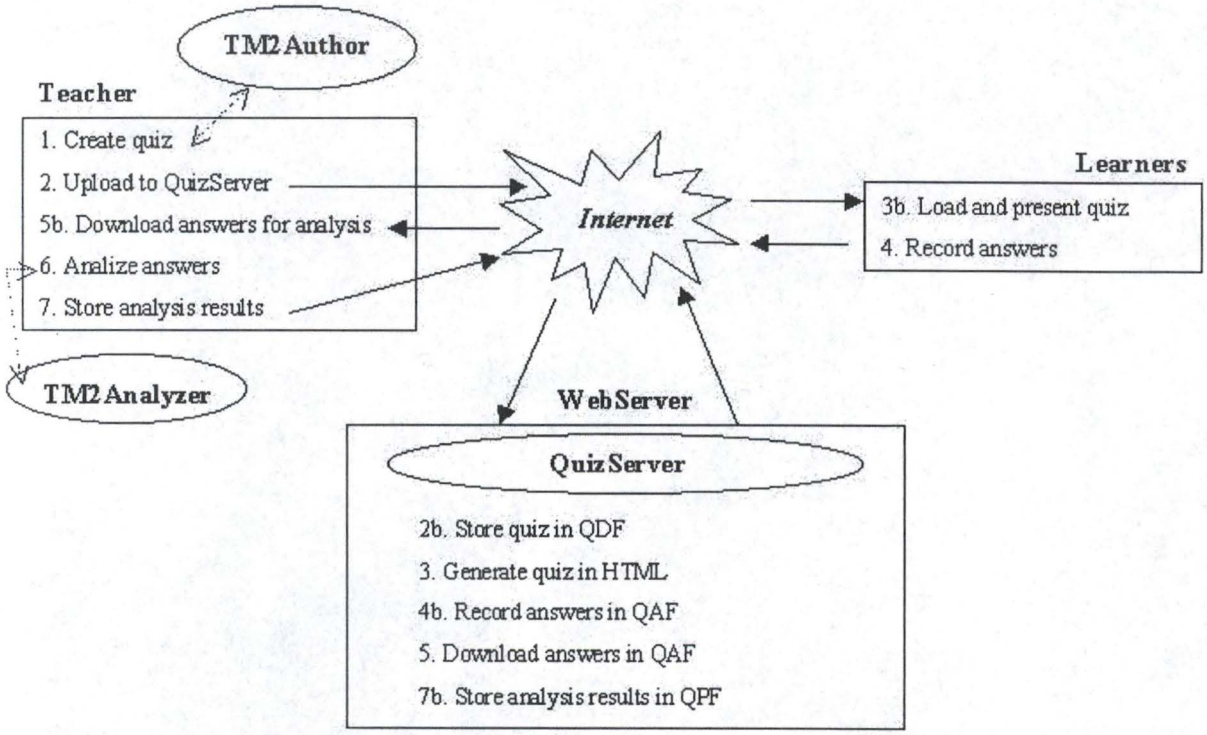


Figure 4.8. TM/2 use process.

1. The teacher uses *TM2Author* to create the questionnaire.
2. The questionnaire is stored into the *TM2 QuizServer* in the QDF format.
3. The questionnaire is converted into HTML to be presented to learners.
4. Learners answer and submit the questionnaire. The answers are stored into the *TM2 QuizServer* in the QAF format.
5. The teacher downloads the answers in the QAF format.
6. The teacher uses *TM2Analyzer* to analyze the answers.
7. The results are stored into the *TM2 QuizServer* in the QPF format.

3.1.3.1 The *TM2Author*

TM2Author enables the creation and editing of questionnaires. It allows the author to specify the questions and all the relevant parameters of any question.
In addition to text, questions can include images as well as links to reference material.

The different types of questions that *TM2Author* allows are:

- multiple choice: a set of choices where one or more are correct;
- radio button: a set of choices where only one is correct;
- true-or-false: a set of statements which are either true or false;
- word: the answer is a word or a string;
- fill-in-blanks: the question contains one or more sentences that have one or more "blanks" to be filled in;
- number: the answer is a number;
- essay: the answer is a free text. There is no automatic scoring for this question type;
- graphical: the answer is one or more area of a certain image.

The creator of the questionnaire can test it immediately and see the feed-back and comments through *TM2Author*, without having to use a "viewer".

3.1.3.2 The *TM2 QuizServer*

TM2 QuizServer is a tool that runs on a server and interacts with the Web server for presenting to the end user (the learner) the questionnaire in a HTML form generated automatically.
Therefore, there is no need to install specific software on the learner's machine other than a Web browser.

3.1.3.3 The *TM2Analyzer*

TM2Analyzer allows the teacher to view and process the answers of a questionnaire. In assessment, this tool helps to identify the students' problematical areas.

The results tables can be saved in HTML format to be viewed on the Web. Also, they can be exported to a text file for later processing with other application software.

3.1.4 Comments about TM/2

As described in the previous chapter, TM/2 is a traditional evaluation tool. This is shown by its main features, which correspond largely to those mentioned in chapter 3.

Testing
Instructors have the choice between a broad range of question types and can include graphic elements in them. They also have the possibility to provide for a timed test. Unfortunately they can neither include video or audio components nor add new kinds of questions.

On the other side, until the questionnaire is submitted, students can move back and forth among questions and change their answers. As soon as the questionnaire is submitted, the tool provides them with immediate feed-back.

Compared to WebTest, which was detailed in the previous chapter, TM/2 does not provide the instructor with an option for randomizing questions or some question-parameters.

Tracking
The tool allows to record students' performances but not to follow their way through the test.

Grading
A score is immediately given to the student for the questions that are automatically graded (all except the essay type). But the system seems complex when the professor wants to analyze the results. He has to download results from the *TM2 QuizServer* under format QAF and use *TM2Analyzer* to analyze them.

Tutorial
There is no tutorial available. However, it is possible to link the test with the textbook, or any other external document having a URL.

Implementation
Implementation issues will be discussed in chapter 6.

Security
It is possible for the teacher to ask for student authentication. Likewise, the accessibility to the test can be restricted by date / time.

In conclusion, it seems to us that this tool is neither worse nor better than a traditional evaluation tool. However, a positive element we wish to point out is that no other software than a browser is required for the student because the tool generates HTML files. But beside that, a negative aspect is that it requires the professor to work with several tools for creating and diffusing the test and analyzing the results.

3.1.5 TM/7 - GENEVAL

GENEVAL, a GENerator of self-EVALuation exercises, allows the teacher with to create exercises to help the student in reflecting on a problem. [David et al, 99]

GENEVAL produces two types of files: a file with the extension .GVL, which can be opened with GENEVAL to be modified and a file with the extension .TBK, which is executable with a runtime version of the ToolBook.

3.1.5.1 Exercise components

An exercise includes the following elements:

- the general statement of the exercise (containing text and optional graphic illustration),
- a list of questions, including
  - the statement of each question (containing text and optional graphic illustration),
  - a maximum of three methods for helping the student answer the question ("orientation", "more help", "complete answer"),
- a bibliography,
- a "did you know it?" screen,
- a summary of the student's activity.

3.1.5.2 Creation process

The process of creating an exercise follows four main steps:

1. the teacher creates the self-evaluation exercise with GENEVAL,
2. he stores it on its local disk in GVL format,
3. he compiles it to a TBK format and stores it to the Web server,
4. the student downloads it from the server and executes it with the ToolBook runtime.

3.1.5.3 Self-evaluation

At any time, students can consult the summary and verify what they are doing (how much time they spend on the exercise, etc.). Also, they can hear a word from the teacher. If they wish to go back to some part, they can access it easily and do it all over again. In order to evaluate themselves, they can give a score on three scales of criteria that have been predefined by the teacher.

3.1.6 Comments about TM/7

This tool is a specific self-evaluation tool. Some of its features are common to evaluation tools, but a lot of usual characteristics are missing. Let us examine these features in detail.

Testing
From the instructor's point of view, the tool offers the opportunity to define questions of only one kind: statement, with optional graphic elements. An audio component is available in the "instructor's word", but not in the question's statement and video is not managed by this tool. Also, there is no randomization possible in the exercises.

On the student side, there is no real possibility of answering (for instance, they cannot physically type their answer), but help and hints are available: for each question, the teacher can define three methods to guide students. Moreover, a bibliography and a "did you know it?" page are also proposed.

As the aim of this tool is to create exercises that permit students to evaluate themselves, there is no timing option available, but the time spent on the exercise is given to the student as an indication.

This tool generates an exercise executable on the student's machine with the ToolBook runtime. As students work locally, they can go through the exercise as many times as they want, without limits. In the same sense, students can skip questions and return to them later.

Tracking
As already said before, this tool is used locally by students. Therefore, it is not possible to follow students and record their performances.

Grading
Students have to grade themselves on three scales of criteria predefined by the instructor. If they wish, they can export their grades to a word processor in order to write a report and submit it to the instructor.

Tutorial
The tool does not allow the instructor to build a tutorial. The instructor can only define a bibliography that can refer to a manual.

Implementation
Implementation issues will be discussed in chapter 6.

Security
There is no security concern here. The security is on a higher level, when students access the exercise to download it to their machines.

In conclusion, this tool offers features that seem poor as compared to evaluation features. The only interesting characteristic is the capacity to indicate three methods to help students solving the given problem.

3.2 Core tools

3.2.1 TM/5 - Indexing Tool

TM/5 is a tool that allows the *indexation* of pedagogical documents, their validation and their insertion in the Knowledge Pool System (KPS) in order to facilitate the querying and retrieval of documents from the KPS. [Forte, 99b]

The tool is intended for three categories of users:

- readers, who may only connect to the KPS for querying, downloading (in read-only mode) relevant validated headers;
- indexers (i.e. creators), who may, in addition to readers, create a pedagogical header and insert it into the KPS, upload the corresponding pedagogical document to the KPS (this is the *indexation* process), edit or delete his / her non-validated headers and download pedagogical documents from the KPS;
- validators, who may, in addition to creators, correct and validate headers or delete them.

A "pedagogical header" is a standardized description of a pedagogical document containing:

- general information (authors, title, free / not-free access, etc.)
- document semantics (discipline, main concept, important topics, etc.)
- pedagogical information (degree, active / expositive document, duration of activity, etc.)
- technical information (main file name, file types, package size, O.S., etc.)

Via TM/5, headers are introduced into the KPS at the same local node as their corresponding pedagogical document. Once validated, they are usually replicated across the whole KPS. [Forte, 99b]

3.2.2 Comments about TM/5

TM/5 does not correspond exactly to one of the categories defined in chapter 3, it has rather features of both a course management system and of an authoring tool.

Actually, due to the fact that it allows to store course-related documents into the KPS, TM/5 embraces the document distribution aspect of course management. On the other hand, the possibility of recovering pedagogical documents from the KPS facilitates the creation of course contents, which is rather a course design characteristic.

TM/5 is a tool specifically for the ARIADNE environment and cannot be considered as a standalone application. Outside such an environment, it would have no reason to exist.

3.2.3 AMI and TM/6 - ARIADNE Manager Interface and CDF-Editor

The ARIADNE Manager Interface (AMI) is "the basic tool for course creation and management." [Forte, 99a]

It is the "intermediary" between instructors and each node of the KPS, and is currently accessible via the Web.

Course management is done through a particular application, the *CDF-Editor* (TM/6), which enables to use indexed pedagogical documents contained in the KPS, in order to build a course "curriculum" whose structure is captured in a "curriculum description file" (CDF). [Forte et al., 99]

AMI is intended for two categories of users:

- course managers, who may connect to the AMI, add and administrate learners and their own courses' curriculum;
- AMI administrators, who may add and administrate all users (course managers and learners) and all curriculums.

A "curriculum" is a standardized description of a course containing:

- general information (course title, summary, dates, etc.),
- communication resources (privileged e-mail addresses, Web sites, etc.),
- sessions description (time-fixed session, "fuzzy" session, pedagogical documents used in each session, etc.),
- reference documents (documents that appear in all sessions such as textbooks, etc.).

The course curriculum is placed in the LKP and the student can access it

The *CDF-Editor* can also be acquired as a standalone Java application. In this case, instructors may create locally new curricula and then upload them to the KPS. [Forte et al, 99]

3.2.4 Comments about AMI and TM/6

AMI, with its users management features, is a typical course management system. However, its *CDF-Editor* facility helps the structuring of course contents, which is rather related to course authoring.

Similarly to TM/5, AMI and TM/6 are specific ARIADNE tools that cannot be considered outside such environment. However the structuring principle underlying the *CDF-Editor* seems useful to us for keeping a coherent "look" between online courses.

4 General conclusion

We believe that the ARIADNE environment contains all the necessary tools for the creation and management of online courses, but not for the communication aspect. Actually, the project does not provide any tool for supporting the interaction between instructor and students or among students. This problem is solved in the VESALE project via the BSCW application and via e-mail, as illustrated in the following chapter.

We also raise a question in connection with the underlying choices as regards "authoring tools": why developing new ones rather than using existing applications?

Our study of this environment will be completed by an effectiveness analysis carried out within the framework of the implementation of our personal project. For more details, we refer to chapter 6.

Chapter 5. Online course scenario - VESALE Project

1 Introduction to the VESALE project

The VESALE project (Visual user interface design Education Supported by a computer-Aided Learning Environment) was developed at the Institute of Informatics of the "Facultés Universitaires Notre Dame de la Paix" (FUNDP) of Namur by a team of researchers, under the supervision of professor F. Bodart.

This two-years project (September 1998 - September 2000) is realized in partnership with the Technological Center of FUNDP, the Education and Technology Department of FUNDP and the University of Port Elizabeth, South Africa.

The following brief description of the project and its purpose is adapted from [Bodart et al., 99a].

Teaching and research relating to Human-Machine Interfaces (H.M.I.) focus on the theories, models, methods and tools necessary to all the stages of the life cycle of a H.M.I.. The project's basic idea is to use the specific knowledge from this field to help the development of software tools to support computer-assisted learning.
In addition, for the particular case of H.M.I. courses, the project envisages the opportunity to use the course's interface itself to illustrate the knowledge and the techniques specific to the H.M.I. field, and thus support their learning. This "bootstrapping" principle forms the basis of the VESALE project, which is defined as "a multi-media environment intended to support teaching in the H.M.I. field." [Bodart et al., 99a]

This teaching support is designed to meet four learning situations:

- learning as part of live teaching, i.e. when teacher and students are face to face;
- learning complementary to live teaching, essentially for knowledge evaluation and revision of course contents;
- distant learning, i.e. self-learning enriched by interactions with the teacher;
- improvement / enrichment of teaching, in particularly through reasoned cases and illustrations of multimedia technologies.

1.1 Logic architecture of the project

The logic architecture of the VESALE project is composed of several "modules", or bases, as described in [Bodart et al., 99a] and illustrated by figure 5.1.

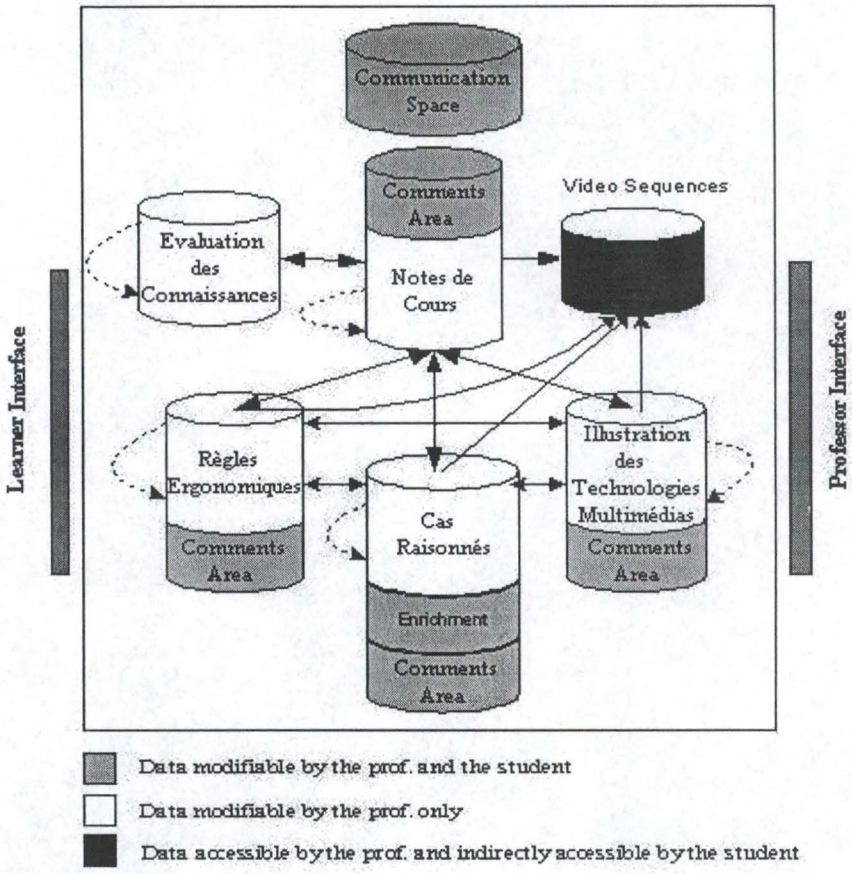


Figure 5.1. Logic architecture of VESALE.

The ***"Note de Cours" base*** includes the contents of the "Human-Machine Interface" (H.M.I.) course presented in the form of a hypermedia software.

The ***"Cas Raisonnés" base*** contains critical examples of interfaces, including some examples of design. This base could be enriched by cases suggested by students or other interested persons. This part of the project is developed in the dissertation of MM. R. Michiels and G. Prévot.

The ***"Illustrations des Technologies Multimédia" base*** is related to interaction objects and technologies. This other part of the project is developed in the dissertation of MM. Th. Bodart and M.-L. Magnier.

The ***"Règles Ergonomiques" base*** is intended to illustrate the use of the ergonomic criteria and rules in order to build useful and usable interfaces. It will consist of a subset of ergonomic rules of design of H.M.I. This phase of the project is not yet in development.

The ***"Evaluation des Connaissances" base*** contains exercises, questions and evaluation of

knowledge acquisition by the learner. These elements allow for summative and formative evaluation.

The ***"Séquences Vidéo" base*** contains video sequences of introduction of certain parts of the H.M.I. course or sequences to illustrate the handling of certain interactive objects. This phase of the project is not yet in development.

A ***communication space*** supports dialogue between the professor and students on general topics.

A ***comments area*** is associated with each particular base; this space allows students to express comments and eventually the professor to react to these comments.

A specificity of the VESALE project is that it will offer two ways of examining course contents:

- through the hypermedia course notes according to an approach suggested by the professor. The student chooses his plan of navigation and follows this plan starting from the interface of access to the hypermedia syllabus;

- through any data base, directly from the course home page to the interface of any data base, not throughout the course notes. Moreover, from an object of the data base that he visits, the learner should have access to linked objects. For instance, the examination of an ergonomic rule could result in seeing one or more cases of design where the rule is applied.

In addition to the communication space, two particular bases are of interest for us: the "Notes de Cours" base and the "Evaluation des Connaissances" base. We shall look at them more in depth.

1.2 The "Notes de Cours" base

Course contents will be presented to students in the form of a hypermedia enriched textbook. It consists of a number of HTML pages generated from the course contents base and other bases.

A priori, the multimedia textbook should be structured according to three lines:

- by ***inter-linked conceptual units***;
- by ***grouped units*** (chapter, section...);
- by ***sessions*** or ***learning modules***.

The syllabus is organized and presented in a dynamic and personalized way according to the profile of the student and his model of learning.

Ideally, the "Notes de Cours" base should include:

- *course contents*, as we detailed before,

- a *comments area* for the instructor, learners and / or other interested people,
- *references* towards illustrations of multimedia technologies, video sequences, ergonomic rules, questions of evaluation of knowledge and reasoned cases.

In relation to the "Notes de Cours" base, course managers should have at disposal several functionalities, such as the creation, suppression, addition and the capacity of structuring learning units as well as the management of the multimedia syllabus.

1.3 The "Evaluation des Connaissances" base

As already mentioned in chapter 3, evaluation exists under two forms: summative and formative. The VESALE project plans to deal with both.

In the specific framework of ***formative evaluation***, the project's objective is to give students the possibility to evaluate the state of their knowledge and to optimize their preparation for examinations via exercises and questionnaires. This kind of evaluation is not necessarily tied to each lesson: it can be independent from the fact that students follow the course at the same time or not. Student could evaluate themselves at any time and by going through an evaluation session, they could be advised to re-study certain parts of the course.

Summative evaluation, as for it, enables instructors to measure the performances and the assets of students' learning, also in relation to each topic.

Ideally, the "Evaluation des Connaissances" base should include:

- *exercises of evaluation*,
- *questions of evaluation* described according to a model to be defined: e.g. by statement, chapter, concept...
- *plan of evaluation and guidance*.

In relation to this base, course managers should dispose of several functionalities, such as the creation, suppression, addition or consultation of any content of the base and the definition of an evaluation and guidance plan.

1.4 The Communication Space

Beside the comments area attached to the various data bases, the communication space will be used to support the general dialogue (general remarks, request for references, appointments with the professor, etc.) between the professor and students and among students themselves.

In addition to e-mail, the VESALE project plans to use a groupware tool called BSCW to implement a communication and collaboration space. For more details about BSCW, see the description given in the corresponding section in chapter 3.

2 Online distance learning scenario

2.1 Introduction

Our project, in collaboration with the VESALE team, consists of two main parts.

First, creating a scenario of online teaching over the first chapter of the Human-Machine Interface (H.M.I.) course. Ideally, the scenario would be independent from any technical consideration such as the environment of implementation, the platform, etc.

Then, using the tools offered by the ARIADNE environment for implementing the scenario.

We shall discuss the first part in the next sections. The implementation process will be treated in the next chapter.

2.2 Pedagogical analysis

2.2.1 A little bit of theory ...

In order to design an adequate scenario, we took [Besnainou et al.,88] as starting point. The authors suggest to carry out a pedagogical analysis before planning teaching / learning activities. Their pedagogical analysis consists of three steps:

1. define the pedagogical objective to reach
2. determine the target population
3. outline the pedagogical strategy

In relation to the course we want to create, the three key components collected via this analysis will allow us to make choices and decisions at the course structuring and implementation level.

2.2.2 Pedagogical objective

By "pedagogical objective" we mean the conceptual change aimed globally and at each lesson.

The global objective of the first chapter of the traditional H.M.I. course is that students understand and manage the difficulty of a series of concepts which will enable them to have a critical view on design and evaluation issues of man-machine interfaces. We consider that it remains the same for the online course.

We shall subsequently define a specific objective for each lesson.

2.2.3 Target population

The traditional H.M.I. course is intended for students of the university level. Currently, it is given by professor F. Bodart to undergraduate students of the "Maîtrise et Licence en Informatique" program at the Institute of Informatics of the FUNDP during the fourth year of a five-years curriculum. This program can also be completed through a "shifted schedule" mode.

We intend the online course to be accessible to a wider variety of distant students, which corresponds to the third learning situation envisaged by VESALE. For instance, people can access the course either form their work place, or from their home, and this, at the time that suits at best their constraints.

Note: although the online course can be accessed at any time, students may be required to follow a calendar established by the instructor (for example: "lesson two runs after the lesson one").

2.2.4 Pedagogical strategy

2.2.4.1 Again, a little bit of theory...

According to [Leclercq et al., 98], a pedagogical strategy results from a combination of teaching / learning paradigms. The authors identify six main paradigms, that we summarize in figure 5.1 and that we describe shortly in the spirit of the authors.

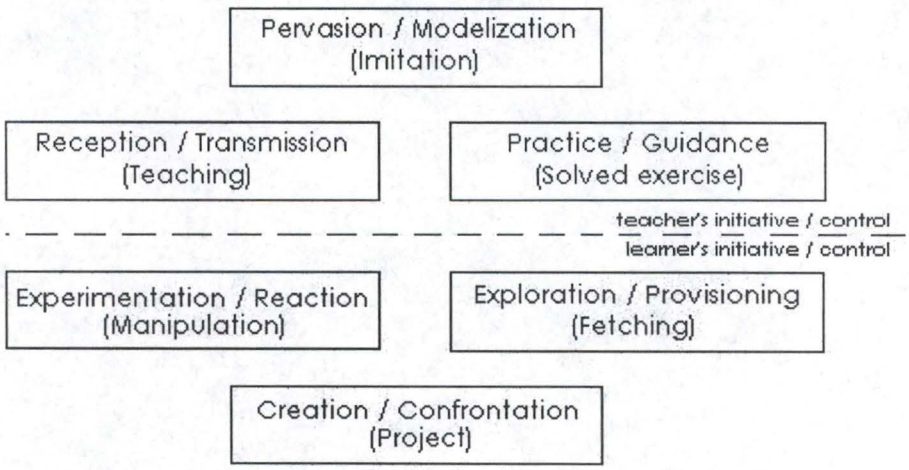


Figure 5.1: Teaching / learning paradigms.

Paradigm n°1: Pervasion / Modeling
The student's activity in this first paradigm is to learn without really seeking it by interiorizing different kinds of perceptions (visual, sound, etc.) provided by the instructor. This "pervasion" process is often unconscious and results from the simple fact of being immersed in the classroom context. On the other side, the actions of the instructor are also often unconscious, and without knowing it, they become their student's "model". For instance, physical education students imitate the example provided by their trainers.

Paradigm n°2: Reception / Transmission
In this second paradigm, the student's activity is to learn by receiving messages. On the other side, the instructor is often a professional of the development and transmission of messages. Unlike paradigm 1, underneath the transmission process lies a language which must be common to both the sender and the receiver. For a classical example, see any university-level *ex cathedra* class.

Paradigm n°3: Practice / Guidance
The student's activity in this third paradigm is the practical experience. The instructor, on his side, undertakes the guidance task, which includes analyzing students' needs, planning exercises, monitoring performances, correcting and delivering feedback. As in previous paradigms, the initiative is mostly in the hands of the instructor. Typical examples are guided exercises, especially in a computer assisted learning environment.

Paradigm n°4: Exploration / Provisioning
Unlike the preceding paradigm, in this fourth model, the student takes the initiative of browsing, seeking information, asking questions, etc. The role of the instructor is to provide students with didactic resources. Representative examples are the library, documentation centers, museums, multimedia products, etc.

Paradigm n°5: Experimentation / Reaction
In this fifth paradigm, on the basis of personal hypothesis students handle and modify an environment in order to answer a question. "Trials and errors" is the most current form of experimentation. In this context, the instructor provides learners with a case and a reactive easy-to-handle environment. Examples include laboratories and simulation software.

Paradigm n°6: Creation / Encouragement - Confrontation
In this sixth and last paradigm, the student learns by creating new works from personal ideas. The instructor, as in the two preceding paradigms, provides a stimulating environment. Moreover, he/she has to encourage the student and criticize its work. Classical examples are personal compositions, final dissertations and work group productions.

2.2.4.2 The specific case of the H.M.I.course

The *ex cathedra* course

During the 1997-98 academic year, we had the opportunity to follow the H.M.I. course given by M. Vanderdonckt. Let us briefly analyze here the paradigms we were confronted to in the part of the course corresponding to the first chapter.

1. Pervasion / Modeling
   This paradigm appeared in the simple fact of being in the audience, "immersed" in the context of the course and conditioned by visual perceptions (drawings at the blackboard, gestures and movements of the teacher) and sound perceptions (voice and other sounds) which we unconsciously held in mind.

2. Reception / Transmission
   The professor's speech (the "lecture") was the main transmission medium of course-related information, together with a textbook.

3. Practice / Guidance
   In this part of the course (the first chapter) there were no guided / solved exercises.

4. Exploration / Provisioning
   The bibliography at the end of the textbook indicated interesting books and articles for further information on the topic illustrated during the course. Personally, that did not pushed us towards exploring the university library at all.

5. Experimentation / Reaction
   In the part of the course there were no exercises / simulation experiences.

6. Creation / Encouragement - Confrontation
   In the part of the course, an original composition was not asked.

The online course

In our particular project (creating online lessons based on the first chapter of the H.M.I. course), the combination of five paradigms out of six seems to us particularly adapted to a distance education strategy.

1. Pervasion / Modeling
   We believe that this paradigm is not applicable, since we deal with an environment where the student and the professor are not face-to-face. Video sequences could fill this lack, but we decided not to use them (see preliminary assumptions).

2. Reception / Transmission
   We retain this paradigm as it is the traditional model of university education. In absence of oral lectures, the contents transmission vehicle is an improved online textbook. In our case, enriched by a conceptual and hypertext structuring, which is impossible on a paper document.

3. Practice / Guidance
   We think it is very useful for a distance education framework to include guided / solved exercises for self-evaluation, as they keep the student active.

4. Exploration / Provisioning
   The Web is an enormous source of information that the student can explore in the course context, on the basis of some significant URL addresses. Moreover, we plan to let the student freely access the VESALE databases (like, for instance, the "Illustrations des Technologies Multimédia" or "Cas Raisonnés" databases).

5. Experimentation / Reaction
   We believe that this paradigm is not applicable, since simulation exercises are not suitable for the first H.M.I. chapter.

6. Creation / Encouragement - Confrontation
   We keep this paradigm because it seems interesting to include a personal creative exercise for the summative evaluation of the student.

The heart of the VESALE project combines paradigms 3, 4, 5. Paradigm 6 represents an issue at stake for both projects.

In our particular case, we choose to apply paradigm 2 for transmitting the course's main theoretical notions and concepts, while taking care to include in lessons passive and active illustrative components, respectively graphics / textual examples and self-learning exercises. This last kind of elements is inherent to paradigm 3, such as the summarizing questionnaires we plan to include after each lesson.

In addition, in agreement with paradigm 4, we intend to give students the possibility to access and explore other didactic resources, such as the various bases of the VESALE project and the complete online textbook.

Finally, for final assessment students will have to produce an original project including the whole knowledge acquired from the course, as in the line of paradigm 6.

What changes?

In traditional teaching models, the professor has every initiative. The new environment transfers this initiative to learners by giving them more autonomy and freedom in their learning process. The pedagogical strategy of our online course makes it possible to explore a great number of paradigms of teaching / learning, which can be very enriching for all the actors involved.

2.3 Synthesis of results for the pedagogical analysis

The results of our pedagogical analysis are the following:

- we define a global teaching objective (see 2.2.2) and specific objectives for each lesson (see 2.4.1.2 and 2.4.1.3);

- we focus on a population of learners of the undergraduate level (see 2.2.3), may they be students, working professionals or else;

- we choose a pedagogical strategy which combines four paradigms: transmission / reception, practice / guidance, exploration / provisioning and creation / confrontation (see 2.2.4).

2.4 Course structuring and organization

On the basis of the pedagogical analysis' results, the structuring and organization of our course is done following two lines, suggested by [Besnainou et al.,88]:

1. structuring course contents
2. proposing active learning components

Let us detail these points respectively in sections 2.4.1 and 2.4.2.

2.4.1 Contents structuring

Contents are structured after examining chapter 1 of the textbook of professor Bodart's course (see [Bodart, 98]), and on the basis of the pedagogical analysis, in the framework of paradigm 1 (transmission/ reception) and keeping in mind who are the targeted learners.

Contents are organized sequentially into two main lessons. For each one we specify its teaching objective and hierarchy. But before that, we establish the global conceptual organization of the chapter's contents.

Although we previously mentioned that the scenario is independent from any implementation choice, the second kind of structuring is carried out because the TM/3 tool of the ARIADNE environment requires it.

2.4.1.1 Conceptual organization

The following figure illustrates the conceptual structure that we envisage for the online course contents, which is the same as that of the traditional course.

We wish to mention that, as the course is in French, figure 5.2 illustrates concepts with their original names. In the following explanation of the conceptual web, French words appear between quotation marks next to their English equivalent

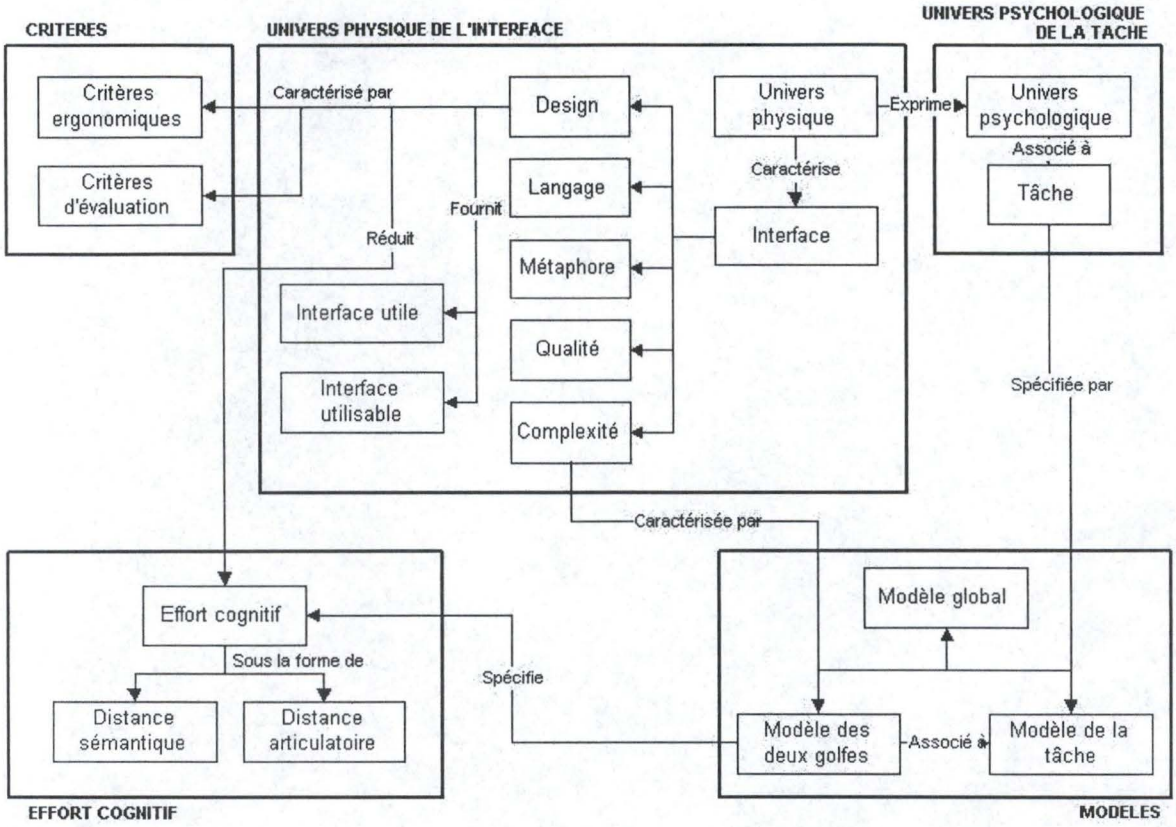


Figure 5.2. Conceptual web of the online course.

In the course, the central concept is that of interface ("interface"), which is characterized by a physical universe ("univers physique") intended to express the psychological universe ("univers psychologique") associated with a task ("tâche").

A task ("tâche") is specified by a task model ("modèle de la tâche").

The complexity ("complexité") of the interface ("interface") is characterized by the model of the two gulfs ("modèle des deux golfes") associated with the task model ("modèle de la tâche"). It allows to specify the cognitive effort ("effort cognitif") required in the form of semantic distance ("distance sémantique") and articulatory distance ("distance articulatoire").

The purpose of the design ("design") of an interface ("interface") is to reduce this effort by providing a useful ("interface utile") and usable interface ("interface utilisable"). It is characterized by ergonomic design criteria ("critères ergonomiques de design") and by evaluation criteria ("critères d'évaluation").

2.4.1.2 Lesson 1

Pedagogical objective

The objective of this first lesson is making the student understand and be able to manage the difficulty of the "interface" and "task" concepts, as well as the "ditch" which separates them.

Sequential hierarchy of contents

The subjacent structure of lesson 1 corresponds to that of the traditional course. However, it is redefined in order to keep a certain coherence in each sub-lesson:

- different paragraphs corresponding to similar notions are organized in the same way;
- small sections are assembled;
- big paragraphs are divided.

The hierarchy of the first lesson's contents is detailed in table 5.1.

I.1 Notions
- I.1.1. But de l'interface
- I.1.2. Enjeux économiques

I.2. Nature des problèmes de conception: tâche et interface
- I.2.1. Univers psychologique de la tâche et univers physique de l'interface
- I.2.2. Modèle de la tâche
  - I.2.2.1. Modèle
  - I.2.2.2. Schéma
- I.2.3. Localisation des écarts: le modèle des deux golfes
  - I.2.3.1. Modèle
  - I.2.3.2. Schéma
  - I.2.3.3. Intégration des modèles

Table 5.1. Hierarchy of contents of lesson 1.

2.4.1.3 Lesson 2

Pedagogical objective

The objective of this second lesson is making the student understand and be able to manage the difficulty of how to reduce the "ditch" which separates the notions of the previous lesson.

Sequential hierarchy of textbook

As for lesson 1, the subjacent structure of lesson 2 corresponds to that of the traditional course. However, it is redefined it in order to keep a certain coherence in each sub-lesson and among lessons:

- different paragraphs corresponding to similar notions are organized in the same way;
- small sections are assembled;
- big paragraphs are divided.

The hierarchy of the second lesson's contents is detailed in table 5.2.

I.3. Efforts cognitifs et distance contenue dans le langage de l'interface
- I.3.1. Distance sémantique
  - I.3.1.1. Notion
  - I.3.1.2. Niveau conceptuel
  - I.3.1.3. Niveau sémantique
  - I.3.1.4. La distance sémantique au plan du golfe d'exécution
  - I.3.1.5. La distance sémantique au plan du golfe d'évaluation
  - I.3.1.6. Comment la réduire?
- I.3.2. Distance articulatoire
  - I.3.2.1. Notion
  - I.3.2.2. Niveau lexical
  - I.3.2.3. Niveau syntaxique
  - I.3.2.4. Distance articulatoire dans les golfes d'exécution et d'évaluation
- I.3.3. Modèle global

I.4. Effort cognitif et le degré d'implication directe de l'utilisateur
- I.4.1. Interface construite sur la métaphore de la conversation
- I.4.2. Interface construite sur la métaphore du mini-monde
- I.4.3. Conditions requises pour fournir un sentiment d'implication directe

Table 5.2. Hierarchy of contents of lesson 2.

2.4.2 Active learning components

After having detailed the online course structure, we define the active learning components we wish to include in each lesson, in the framework of paradigms 4, 5 and 6.

2.4.2.1 Lesson 1

On the basis of the lessons' contents determined in the previous section, we define three types of active learning components:

- guided exercises,
- links to didactic resources,
- personal composition exercises.

These elements are specified in table 5.3.

Subject	Active components
▪ Task model ("Modèle de la tâche")	– a guided exercise (step by step application of the different stages of the model to the case of formatting a letter with a word-processor) – a guided exercise (demonstration of the iterative feature of the model by application to the case of writing an electronic message)
▪ Whole lesson	– link to resources from the "Cas Raisonnés" and "Illustrations des Technologies Multimédia" VESALE databases – comprehension test on main notions

Table 5.3. List of active learning components for lesson 1.

2.4.2.2 Lesson 2

As for lesson 1, on the basis of the lessons' contents previously determined in the previous section, we define three types of active learning components:

- guided exercises,
- links to didactic resources,
- personal composition exercises.

These elements are specified in table 5.4:

Subject	Active components
▪ Small-world metaphore "Métaphore du mini-monde"	– an exercise (practical concept illustration)
▪ Whole lesson	– link to resources from the "Cas Raisonnés" and "Illustrations des Technologies Multimédia" VESALE databases – comprehension test on main notions
▪ Final evaluation	– personal composition

Table 5.4. List of active components for lesson 2.

2.5 *Global scenario*

The various stages of the scenario can be seen as a succession of Web pages where users have access to different functionalities of the underlying system. Although they have full control over their choices, they have to proceed through several obligatory phases. We will explain in detail all the possible choices for instructors and students, i.e. all the pages they are likely to navigate into in order to achieve the goal initially set.

2.5.1 Instructor's view

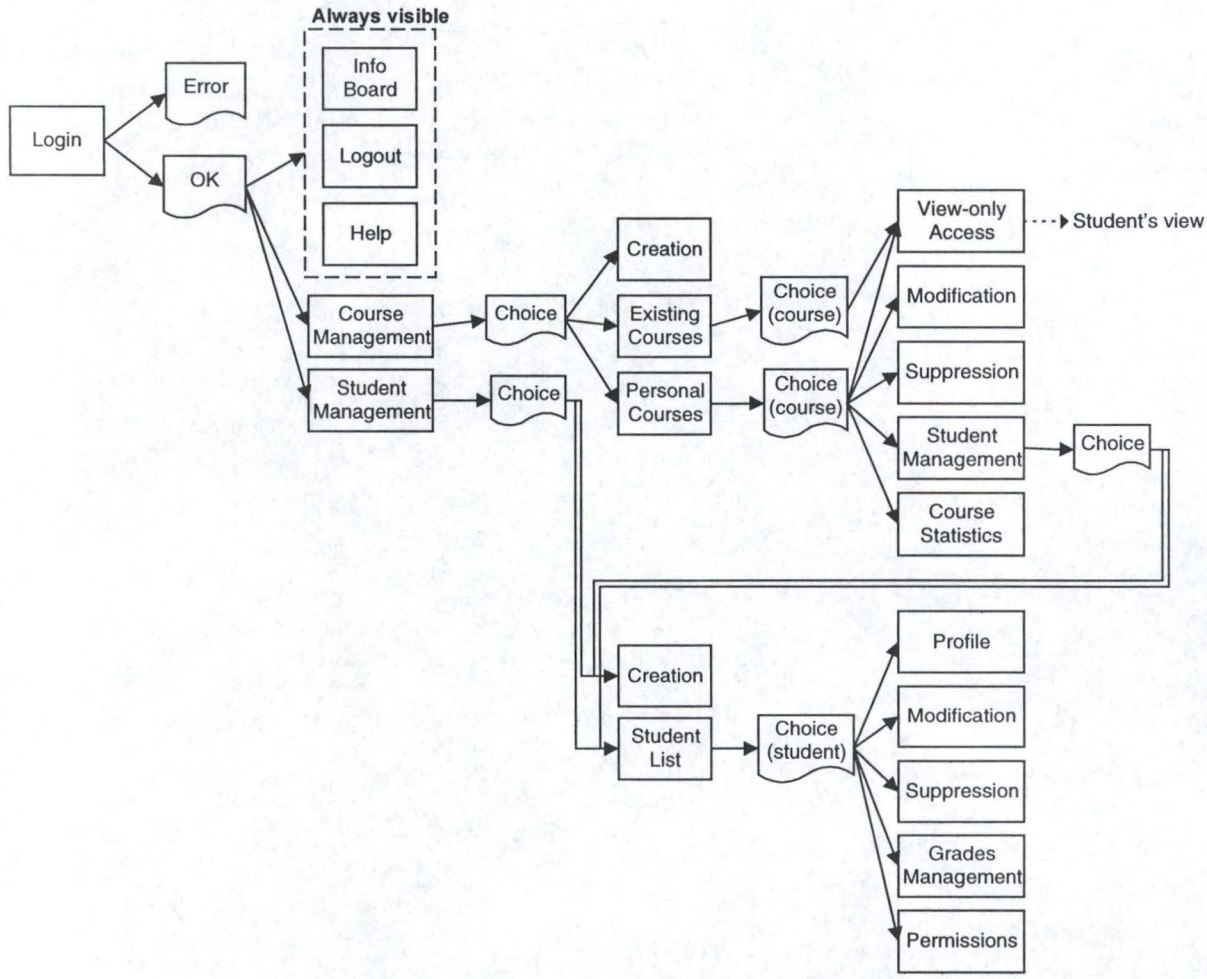


Figure 5.3. Instructor's view.

First of all, instructors must be identified. For reasons of security, this first phase is mandatory, but also due to reasons of personalization of the functionalities available. Therefore, the first page, which is the system's entrance gate, contains a *login* window where instructors must enter their user names and passwords. If this first phase fails, the scenario stops here.

If the identification succeeds, instructors enter a phase offering two kinds of functionalities, some "always visible" and some specific to the phase.

There are some kinds of features that must always remain visible so that the instructor can access them at any time. In our scenario, they are of three different kinds:

- an *info board*, where general information valid for all the system can be distributed and read (a sort of electronic bulletin board),
- a *help* page,
- a *logout* functionality, for exiting the system.

In addition to these, two other specific functionalities are available for instructors at this stage: *student management* and *course management.*

The first option brings instructors into a new page which offers the following functionalities: *creation* of a course, visualization of the list of the *existing courses* or, more specifically, of each instructor's *personal courses*.

If instructors choose to list all the existing courses (their own and those created and managed by their colleagues), they can select one and access it as a student, i.e. in a *view only* mode, with no possibility of modifying it.

If they choose to list their own courses, then they can choose one in particular and manage it, i.e. reach the following functionalities: *modification*, *suppression*, *students management* specifically to this course and course *statistics* (participation rate, students' success rate, etc.) Just as for all courses, they can also choose to access their own in the view-only mode.

Coming back to the *students management* option, at the general level or relating to one course in particular, instructors enter a new phase proposing two main functions: *creating* a students or see the *students list*.

If they choose to see the *students list* and selects one, then they can either see his / her profile, remove him / her as a student, manage his / her results or modify his / her access permissions.

2.5.2 Student's view

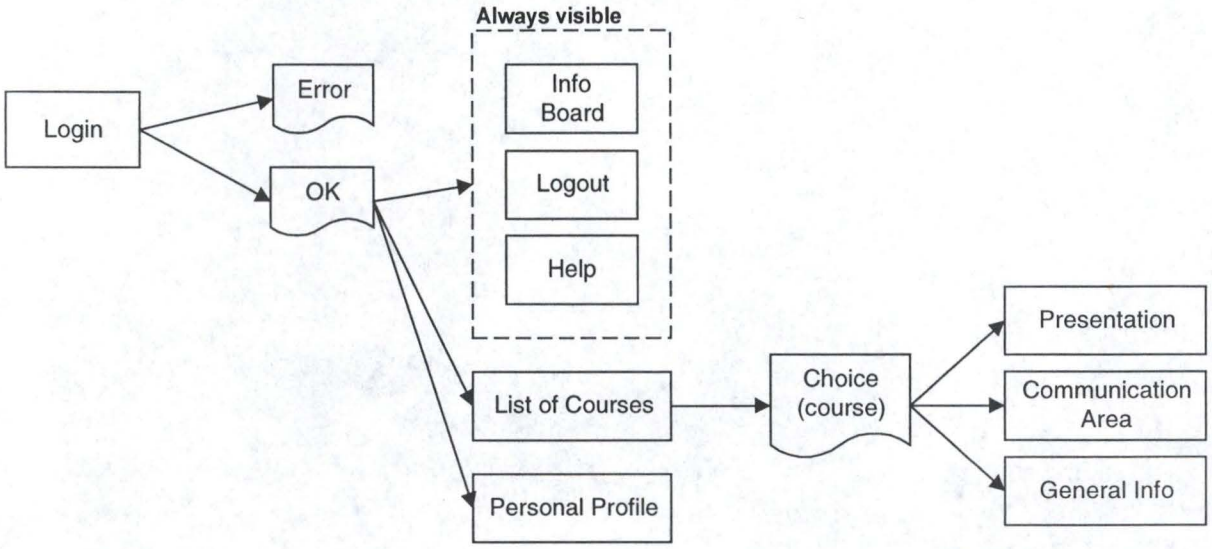


Figure 5.4. Student's view.

Like instructors, students must start by identifying themselves in order to enter the system.

After succeeding the identification process, students see a window offering functionalities which will remain always visible and accessible to them. Those functions are the same as for instructors, namely the access to *info board*, the *help page*, and the *logout* option to leave the system at any time.

In addition, at this stage students have the choice between seeing and managing their *personal profile* or looking at the *list of courses* where they are registered.

Finally, if students choose a particular course in the courses list, they enter a phase giving them three kinds of information:

- a *presentation* of the selected course,
- a *communication area* specific for this course,
- some *general information*. Notice that the information presented here is specific to the selected course and is not contained in the general information board of the system.

We shall look more in detail at the presentation phase, which is illustrated in figure 5.5.

This *presentation* phase proposes primarily information on the selected course (information dissemination) and access to course contents and activities.

The first page contains the following information:

- the *title* of the course;
- the *instructors* of the course, i.e. the people who are responsible for contents and

management;

- a generic *description* of the course;
- an access to the course *calendar*, which gives dates of all the events related to the course (for instance, the date of a particular lesson, the due date of a homework, etc.);
- an access to the *lessons* composing the course. If users choose this option and selects a particular lesson, they will be able to see a *summary* and the *contents* of this lesson;
- an access to the *evaluation area* of the course. This space will be detailed below;
- the *grade-book* containing results of each test completed by the student and some statistics showing where the student is located in the class level;
- the *resources* needed for the course, online or not (for instance, references to books necessary for the course, access to the online textbook, etc.) ;
- the list of course *participants* and a way to contact them.

In particular, the *evaluation area* offers access to several kinds of information. First of all, it gives access to *tests and homework* and for each one gives the statement of the *exercise* and the *resources* necessary or advised to its realization. Then, it indicates each work's *due date*, the access to an *upload area* for saving completed works (or at least instructions to do it), as well as the *results* of previous works.

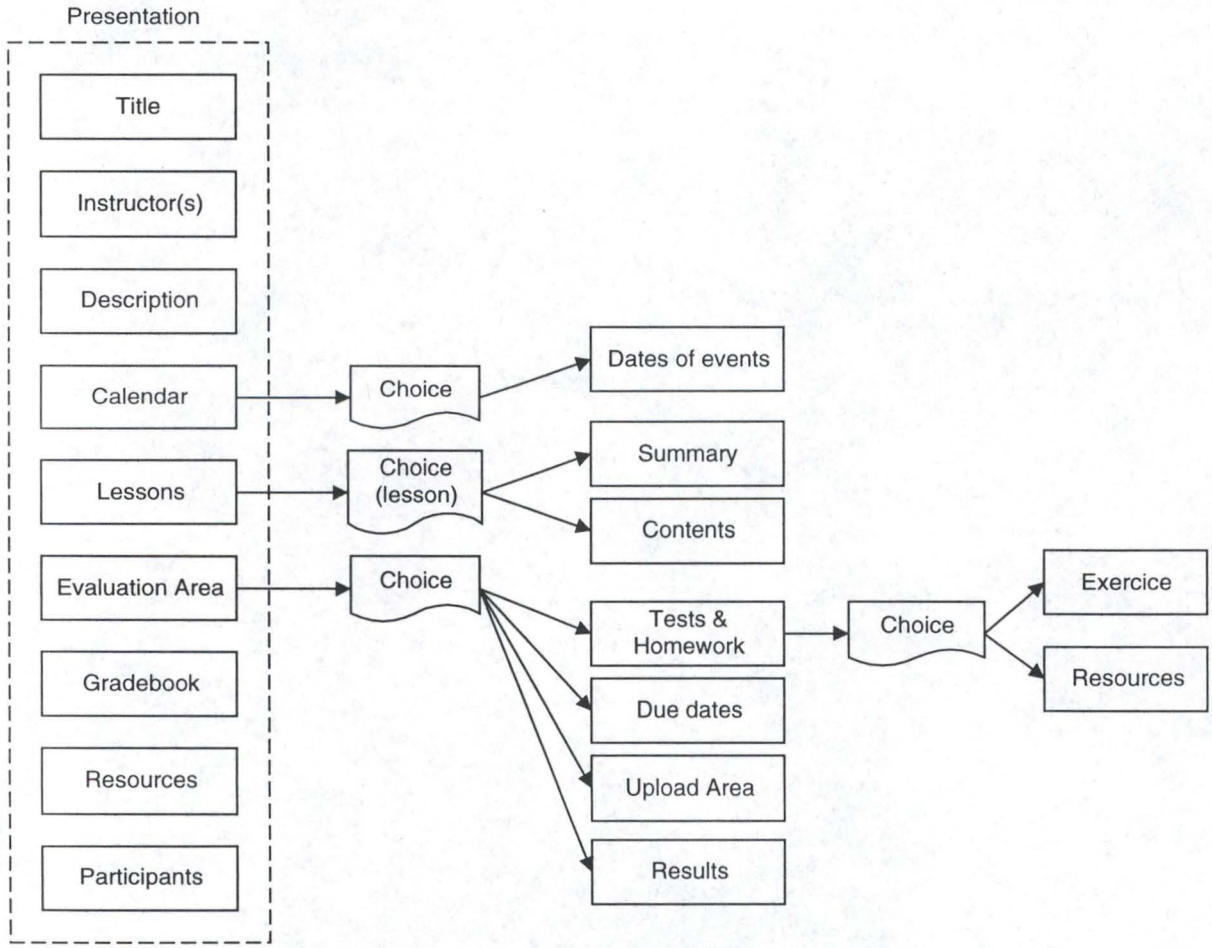


Figure 5.5. The *Presentation* phase.

Chapter 6. Implementation

1 Preliminary choices

Before starting the realization of the project, the scenario defined in the previous chapter allows us to formulate a few choices concerning the implementation of the online course.

Keeping in mind that, in our scenario, students connect in a distant way to the course, we want it to be accessible to the largest possible variety of students.

This is the reason why, between a synchronous and a completely asynchronous teaching perspective, we choose that one less constraining for the student, i.e. the asynchronous one. Therefore, our online course does not contain any synchronous interaction components.

However, we have to mention that, as the course contents relate to an introductory chapter, it could have been interesting to consider situations where the professor presents a case and the students react immediately, "to make them finger HMI problems" (F.Bodart).

The same reason applies for the case of video sequences (proposed by ARIADNE's TM/4 tool): we choose not to manage them because they require a powerful connection for the student as well as a particular hardware for the teacher.

Finally, as specified in chapter 5 when defining our pedagogical strategy, the online course does not include simulations (proposed by ARIADNE's TM/1 tool) because this kind of exercise is not adapted to its contents.

2 Implementation process

The implementation process that we went through can be divided in six main steps. Table 6.1 summarizes the actions corresponding to each step.

Step	Action
Step 1	Paper course contents restructuring
Step 2	Conceptual organization
Step 3	Evaluation and self-evaluation components
Step 4	Course authoring and design
Step 5	Documents indexing and validation
Step 6	Course curriculum definition

Table 6.1: implementation steps.

We wish to point out that steps 1 and 2 don't follow each other chronologically, they are carried out in parallel and in close connection with the scenario described in chapter 5.

Moreover, these six steps correspond to part of the ideal use of the ARIADNE environment, detailed in chapter 4: steps 1 to 4 correspond to the "authoring" step (step 1), step 5 to the "indexing and validation" step (step 2) and step 6 to the "course structuring" step (step 3).

Figure 6.1. shows the global implementation process workflow.

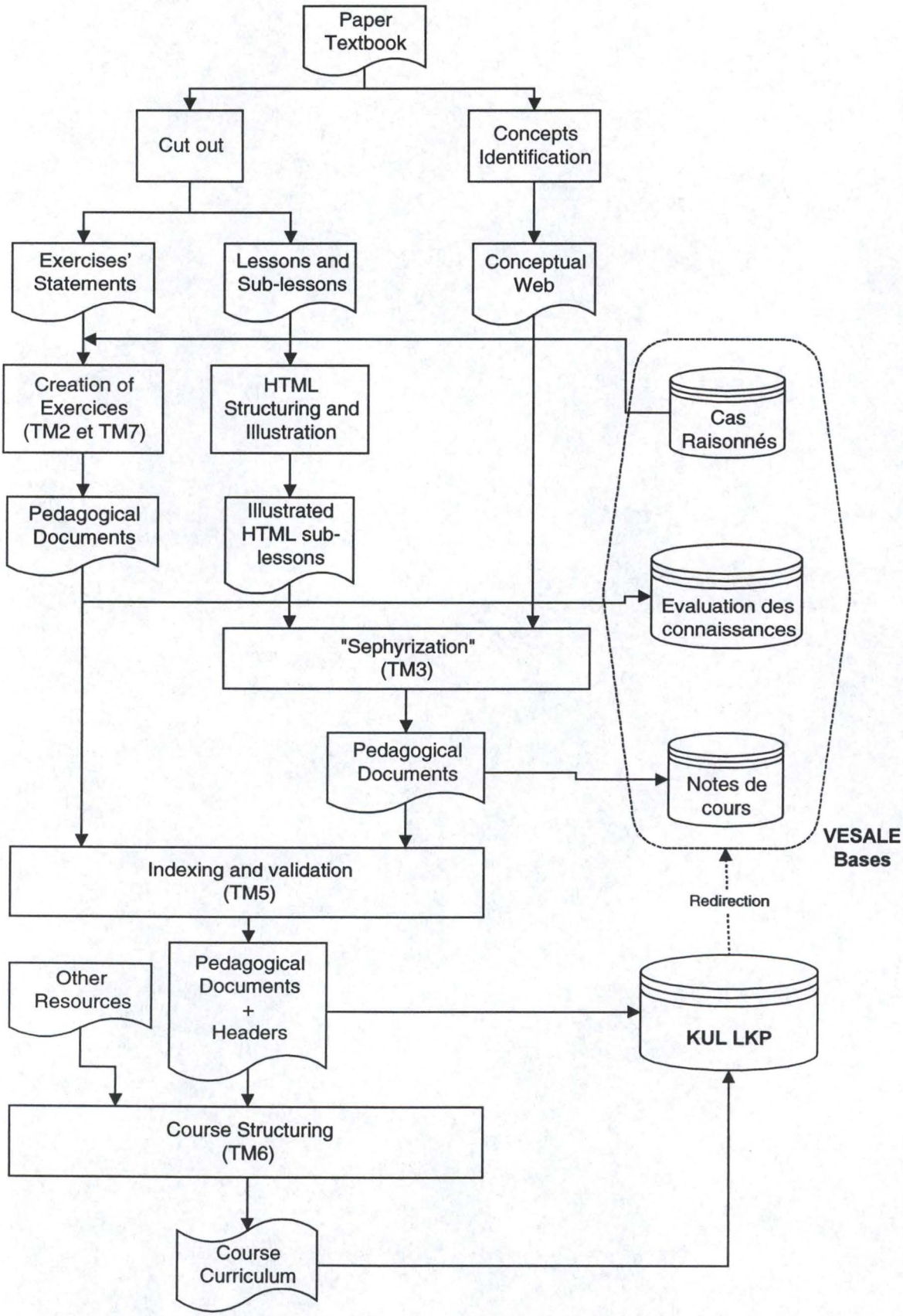


Figure 6.1. Implementation process workflow.

2.1 Step 1

This fist step (figure 6.2) consists in restructuring the first chapter of the I.H.M. course on the basis of its paper transcription.

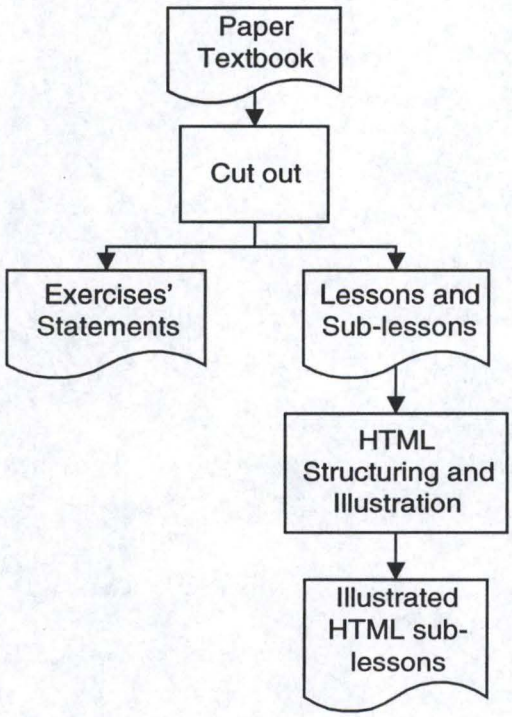


Figure 6.2. Step 1.

Fist of all, we divided the chapter into two main lessons and various sub-lessons. Then, we marked out the parts corresponding to illustrations (text and graphical examples). Successively, we extracted the exercises (guided or traditional) and added a few ones that we thought were missing.

Finally, each lesson was translated into HTML and improved with elaborated versions of the illustrations previously marked.

2.2 Step 2

The second step (figure 6.3) establishes the conceptual web of the whole chapter, on the basis of the paper transcript and the document "Méthodologie de segmentation pédagogique" of Ms. Wentland Forte (see [Wentland, 94]). For an overview of the graph, the reader is referred to the corresponding section in chapter 5.

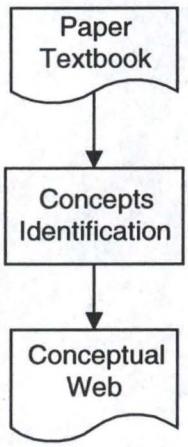


Figure 6.3. Step 2.

This step is made in close collaboration with the realization of the scenario because the conceptual web is part of the two process.

This task is harder than what it may seem:

- first of all, we find it difficult to draw concepts out of a document that we did not create ourselves, our view is not necessarily the same as of the creator's;
- moreover, it is not easy to clearly link or group concepts together;
- finally, the methodology we follow is relatively complex: one delicate point for us is choosing between "concepts" and "arguments" in marking up some parts of the course.

Note on the utility and usability of the conceptual web

The **utility** is obvious, for the student as well as for the professor. The former takes advantage of an alternative (possibly personalized) navigation of the course, the latter can better identify and display the global structure of his course and the links between its concepts.

The issue of **usability** is tied to the choice of tools used to implement the graph. We believe that it is necessary to make the balance between the advantages brought by the graph and the problems generated by the tool. When negative points exceed the positive ones, such option is not profitable any more.

In our case, the use of the ARIADNE's TM3 tool (described in chapter 4) has brought many disadvantages. We think that it would be perhaps necessary to undergo a deep usability analysis during the development of such a tool, or to consider alternative solutions.

This whole step has been very time-consuming, also because we had to do it three times in order to get an adequate result.

2.3 Step 3

In this step, we use ARIADNE's TM/2 and TM/7 tools to translate the previously listed exercises into self-evaluation guided exercises and summative evaluation questionnaires. The process followed in this step may be seen in figure 6.4.

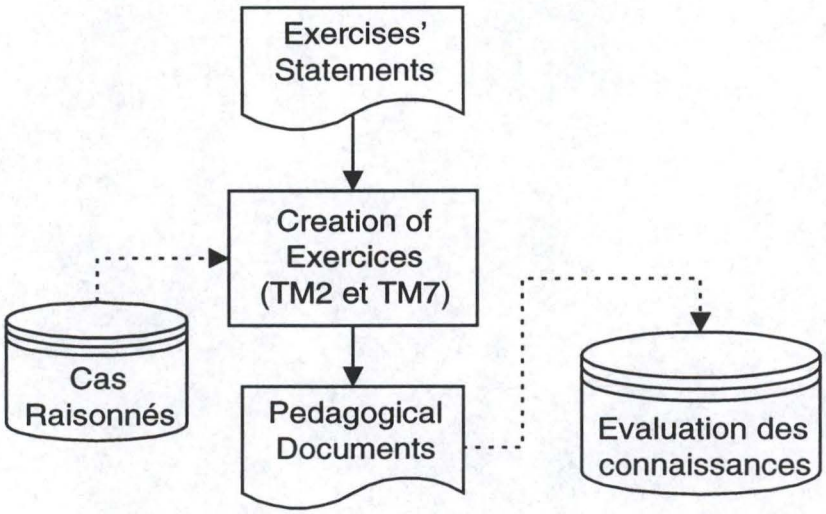


Figure 6.4. Step 3.

In this step, we plan to use references from the VESALE "Cas raisonnés" base. It will be possible to realize this as soon as the base will be running.

Each of the tools we use has advantages and disadvantages that we shall outline hereafter in two separate sections.

2.3.1 TM/2

The ARIADNE's TM/2 questionnaire tool help instructor creating tests for students' summative evaluation. The tool allow several kinds of questions such as multiple choices, true-or-false, fill in the blanks, etc.

With this tool, we develop three exercises to illustrate the course:
- in the first lesson, the exercise on the whole lesson,
- the exercise on the "small world metaphor" of the second lesson,
- the exercise on the whole second lesson.

We think that the *TM2Author* application is relatively easy to use. Moreover, it reduce our workload by letting us test immediately our questionnaires without using the Viewer.

Nevertheless, we notice that the application fails frequently without any reason. Also, the interface of some of its windows is heavy and some feed-back elements are not significant.

2.3.2 TM/7

The ARIADNE's TM/7 GENEVAL tool is a generator of self-evaluation exercises used for students' formative evaluation.

In the implementation process, we used it for two exercises, both guided exercises. These two activities are about the "task model", in the first lesson. To realize them, we based our work on an example presented by the author of [Norman, 86].

You can see a screenshot of a guided exercise realized with the TM/7 tool in figure 6.5.

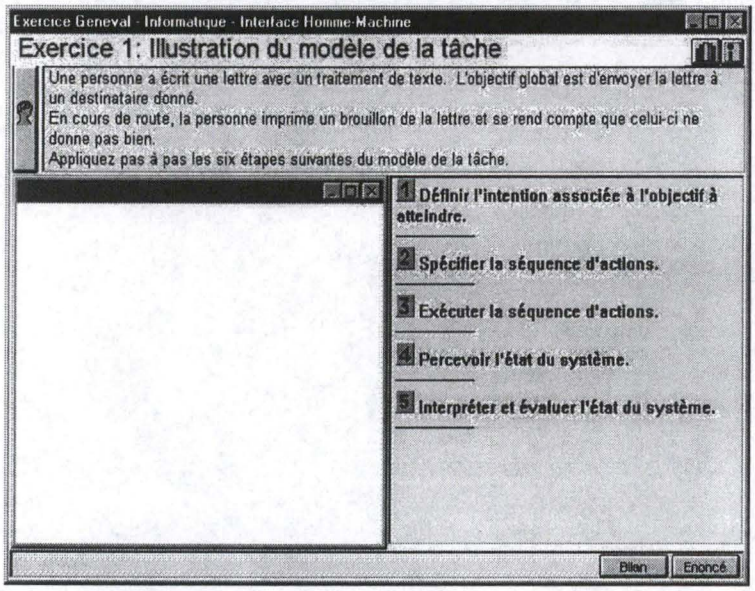


Figure 6.5. Screenshot of a Geneval exercise.

We do not find any major advantage to this tool except that it is relatively easy to use.

Among the disadvantages, the following aspects are worth mentioning:

- TM/7 is really slow;
- it depends on another tool, the Toolbook, which is subject to frequent failures;
- the files compiled are also Toolbook-dependent, which obliges students to have it installed to run the exercise;
- Geneval does not allow more than 5 questions per exercise, but we were told this problem is solved in the forthcoming version;
- when we inserted some images, the file generated by GENEVAL became very large and maintained this same size even when we tried to remove the images.

At the end, all of the resulting exercises should be put into the VESALE "Evaluation des Connaissances" base, as soon as it is set up.

2.4 Step 4

This was one of the most important steps amongst all. Here, illustrated HTML lessons were re-designed ("sephyrized") using ARIADNE's TM/3 set of tools. The process followed in this step can be seen on figure 6.6.

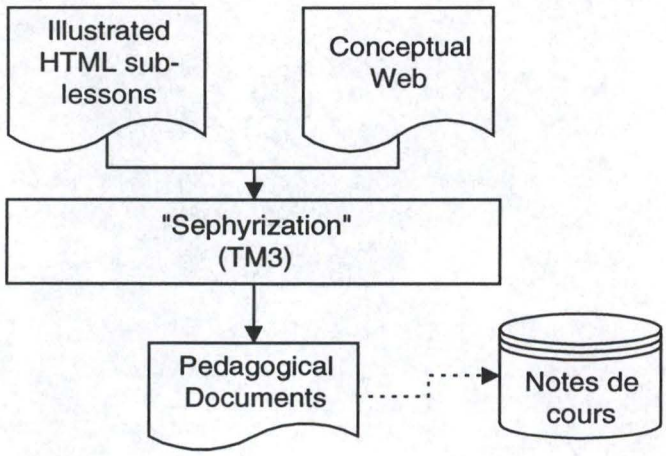


Figure 6.6. Step 4.

As a reminder, the ARIADNE TM/3 Sephyr tool is an authoring tool that enables instructors to define a conceptual structure of their course documents

Their conceptual organization was based on the conceptual web established previously on step 2.

Actually, we use this tool to implement the conceptual web following the "Méthodologie de segmentation pédagogique" of Ms. Wentland Forte (see [Wentland, 94]). This document explains in detail the nature, genre and other characteristics of "concepts" and "arguments".

An illustration of the conceptual organizing of documents is shown in figure 6.7.

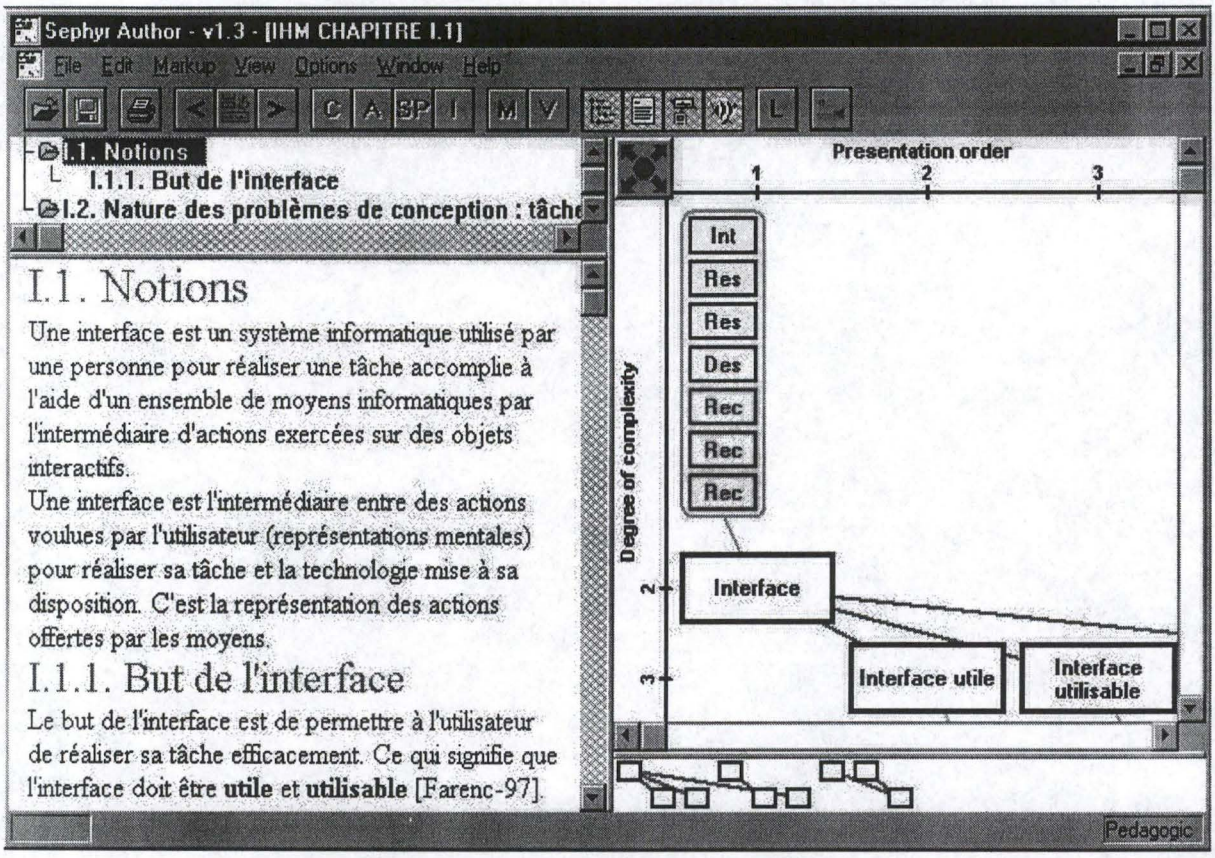


Figure 6.7. Conceptual organizing.

We think that the possibility of defining and managing concepts is a great advantage of this toolset, as well as the underlying methodology. In addition, we wish to point out that the program offers an excellent "Virtual Concepts" management for linking concepts in different files which will be "merged" afterwards.

Moreover, we find very positive that TM/3 gives the possibility to generate HTML pedagogical documents, which are immediately visible from any browser without a specific viewer.

An example of HTML page generated by TM/3 is illustrated by figure 6.8.

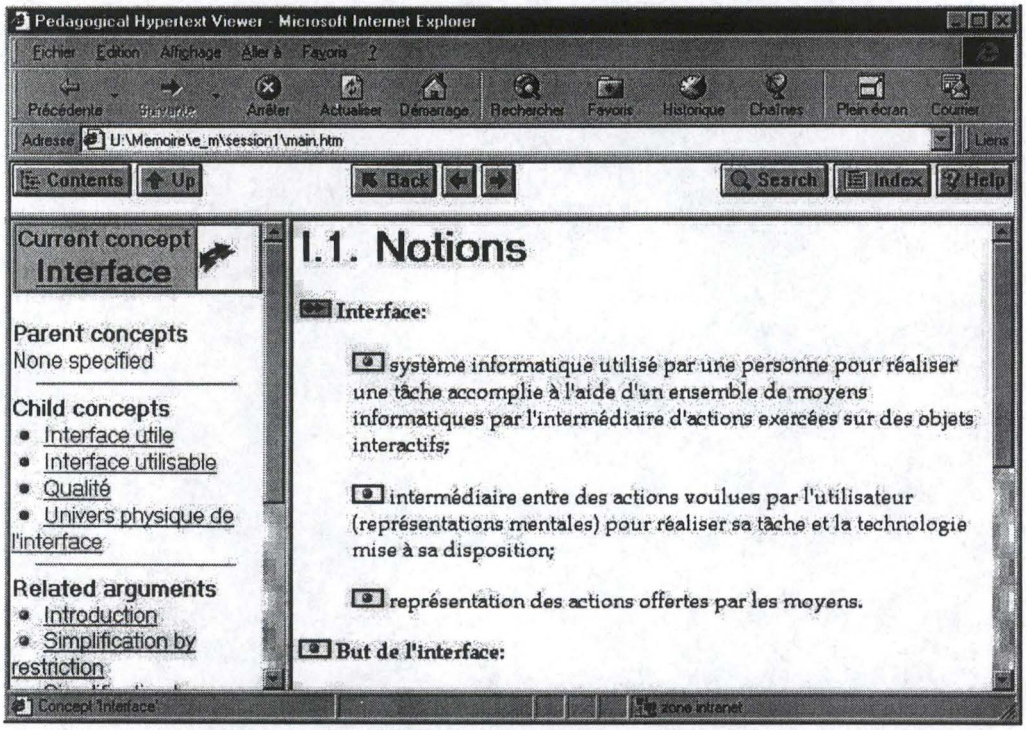


Figure 6.8. HTML page generated by TM/3.

On the other side, we also experienced some negative aspects in three main areas of the toolset.

Interface

The interface of the resulting pedagogical documents transgresses most of the ergonomic criteria of Web sites interface design, namely in the aspects listed below.

- As there is no limit on the definition of concepts and arguments, sometimes the resulting Web page is too heavy with the corresponding icons (red and green bubbles).

- The size of pages is also not controlled by the tool so it can happen that the screen is filled with too much information (heavy visual load).

These issues add a considerable effort on the teacher's side as he has to check by himself for the legibility of the resulting documents.

Design

A big disadvantage of TM3 is that it does not allow a global HTML visualization of the conceptual web built with the Sephyr tool. Currently, the developing team is working on a Java version that would solve this problem. Meanwhile, we decided to translate the graph into an image map and inserted it into the HTML pages in order to make it visible from any browser.

Implementation

About toolset implementation, we notice that:

- one of the applications (the Merger) generates erroneous SGML code (some HTML title headers are truncated) and to correct these errors, the developer has to know HTML...

- concepts management between files which will not be combined afterwards is lacking (i.e. it is not possible to maintain links between concepts of different Sephyr documents if we do not wish to combine them in the end). This is a serious problem for inter-lessons linking;

- the HTMLizer formats pages according to HTML titles (level 1, 2 or 3) which does not necessarily correspond to what the developer wanted.

At the end of the step, we submitted our work to the VESALE team. Professor Bodart suggested that we change our preliminary hypothesis because the result was visually too dense. He proposed that we keep the complete chapter content as a self-standing resource and that we restart the whole process with a lighter version of the course transcription. Therefore, we went again through step 1 and 4 and reached a satisfactory work.

Finally, we made available a complete online textbook so that the lessons developed are a support but not a reproduction of the course. In an integration preoccupation, the presentation of the complete version of the syllabus is inspired by the work completed by MM. Th. Bodart and M.-L. Magnier, as can be seen on a screenshot in figure 6.9.

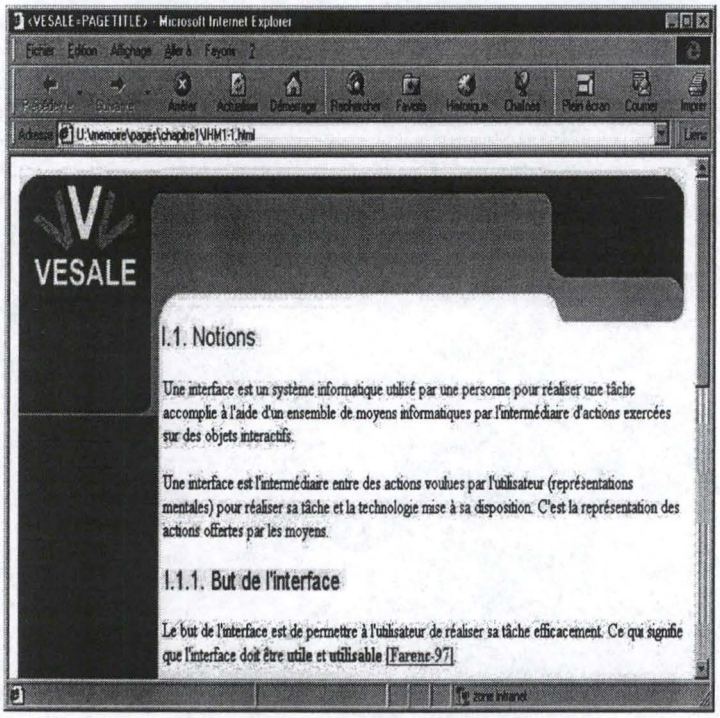


Figure 6.9. Online textbook.

All of the resulting documents (the complete textbook and the pedagogical documents) are put into the VESALE "Notes de Cours" database.

2.5 Step 5

For the fifth step (figure 6.10) we use ARIADNE's TM/5 tool to index the pedagogical documents created with TM/2, TM/3 and TM/7 during steps 2 and 4 and store them in the Knowledge Pool System, specifically in the Katholieke Universiteit Leuven's Local Knowledge Pool (KUL LKP).

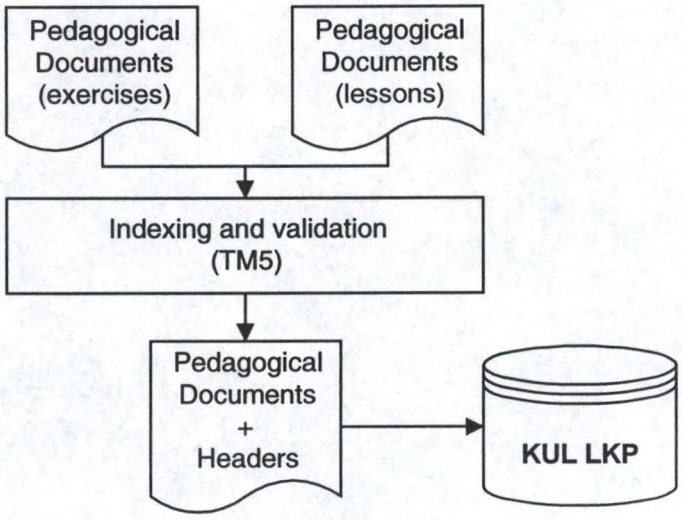


Figure 6.10. Step 5.

The main advantage of this tool is that it facilitates structured queries through TM5/Query from any node of the Knowledge Pool System.

Despite this, indexing a pedagogical document is an additional workload because of the tool's interface and implementation, that we shall discuss below.

Interface

TM/5's interface transgresses some ergonomic criteria of interface design, namely in the following aspects:

- the user is often forced to work with a variety of open windows and the manual closing of these windows weighs down the interface seriously. In particular, guidance windows should disappear automatically when the action of the user ends correctly;

- some procedures should be simplified in order to reduce the number of actions of the user. For example, for inserting a *File Media Type*, the user has to click sequentially on the following buttons: add, search, accept, okay, which could be replaced by a single operation.

Implementation

The program requires the user to modify the main Java file (TM5.bat) in order to run the application and connect to any Local Knowledge Pool (LKP), and we cannot say that everyone is able to do that, especially beginners. This could be improved by presenting, for instance, a connection list box from with all the addresses and ports of the existing LKPs.

Apart from these considerations, we faced another source of additional workload.

Our initial idea was to keep all documents locally on a FUNDP server and to put in the LKP a few files that would redirect users towards the FUNDP server, as described in the VESALE project.

The first time, we had to change this plan because some documents (those generated by ARIADNE's TM/2 tool) need to be stored on a server running a particular kind of software (QuizServer). For further details on this process, we refer to chapter 4.

At this point, we still intended to keep all documents locally except those mentioned above. Our plan was finally abandoned because the policy of the KUL LKP does not allow for "redirection documents".

Therefore, we decided finally to send everything to the KUL LKP and keep a local copy of the documents in foresight of the setting up of a LKP at FUNDP.

2.6 Step 6

In the last step (figure 6.11), we used ARIADNE's TM/6 tool to build a course curriculum on the basis of the pedagogical documents indexed in step 5 and of external resources, namely the online textbook.

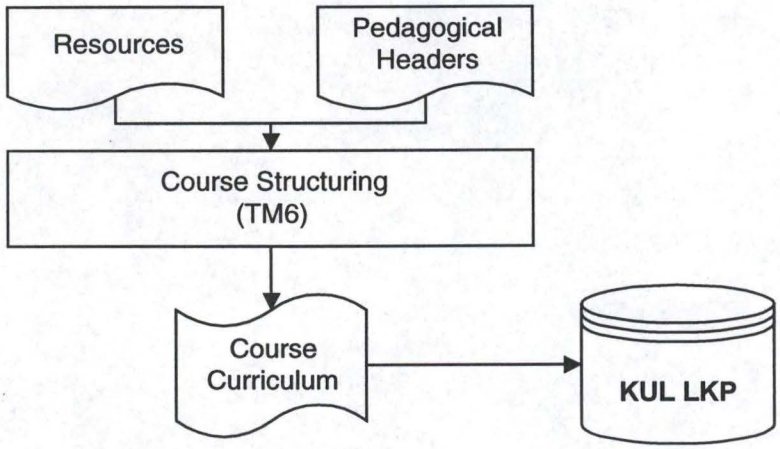


Figure 6.11. Step 6.

The curriculum of our online course contains:

- general information, as shown by figure 6.12,
- communication resources (URL of the communication space (BSCW), e-mail address of the instructor),
- sessions description and pedagogical documents used in each session, as illustrated by figure 6.13,
- reference documents (the complete online textbook).

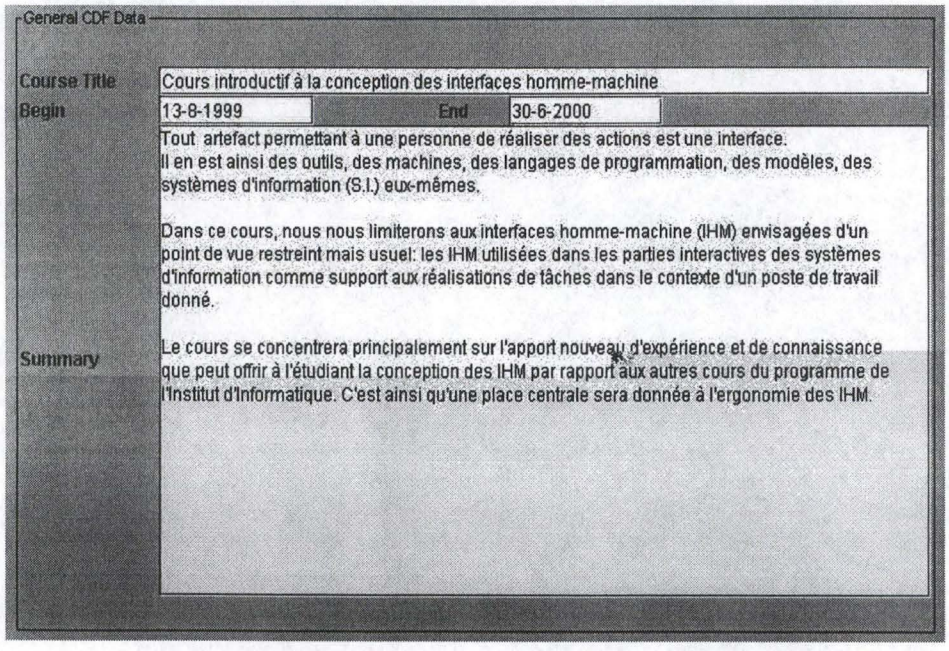


Figure 6.12. General course information.

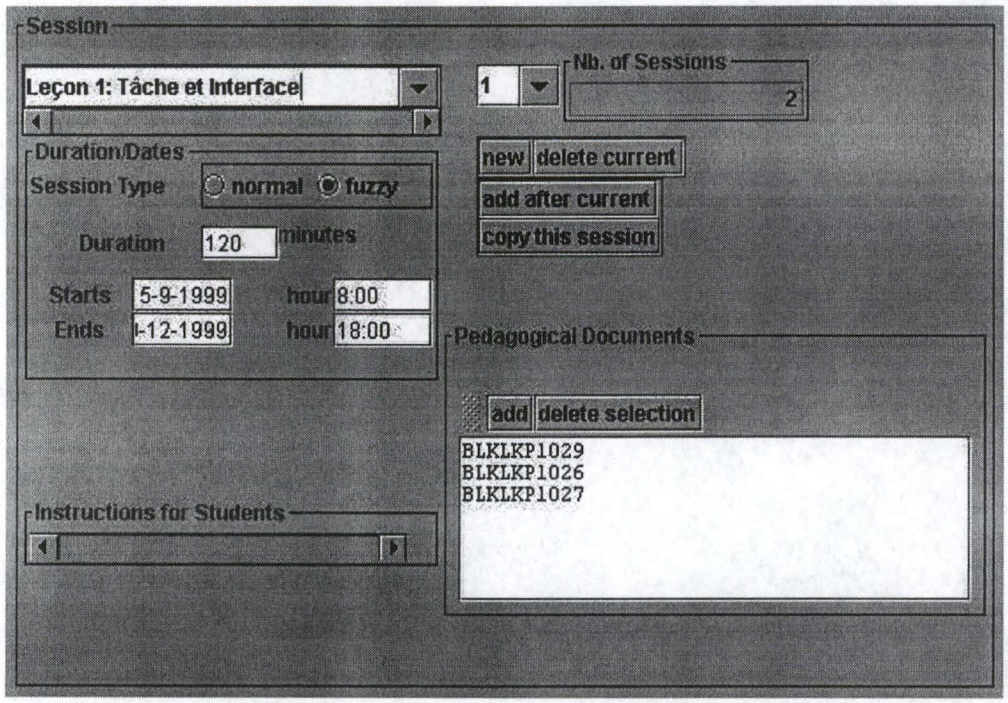


Figure 6.13. Session description.

The curriculum is finally stored in the KUL LKP. Successively, using the ARIADNE Manager Interface, we defined the course's access as "free", which makes it accessible to all students via the ARIADNE Learner Interface. What students see is shown in figure 6.14.

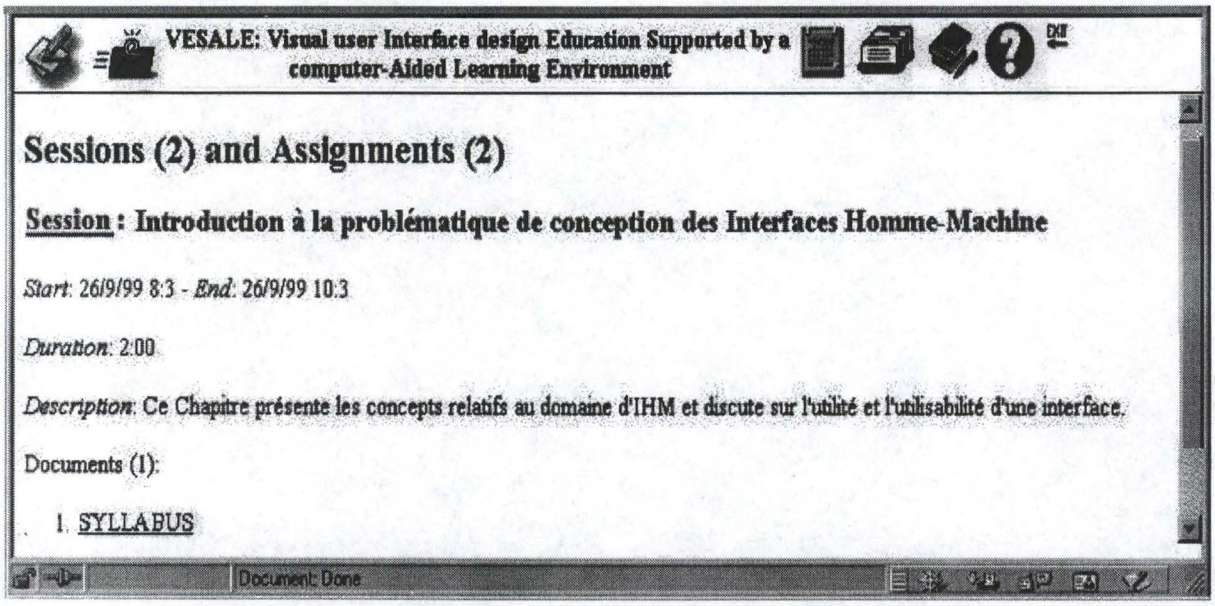


Figure 6.14. The course curriculum as students see it.

The main advantage of this tool is that it makes the structuring course contents easier according to a sort of common template. This ensures a similar "look" and underlying structure for all courses.

Moreover, it is a tool relatively easy to use that automatically establishes the link with the documents previously indexed, without obliging the instructor to retrieve them from the LKP.

3 Scenario and implementation

3.1 Instructor's view

Once the online course is structured through the CDF-Editor, the ARIADNE's AMI interface allows us to offer to the instructor almost all the functionalities previously described in our scenario (see figure 5.3. in chapter 5). The exception is the *course statistics* feature, which is not envisaged by AMI and therefore we shall not propose it in the end.

We wish to point out that AMI also allows us to implement the *info board* and the *communication area* via a hyperlink to the BSCW server of the Institute of Informatics, as stated in the VESALE project.

3.2 Student's view

Similarly, the ARIADNE's ALI interface allows us to offer to students the majority of the functionalities previously described in our scenario (see figure 5.4. in chapter 5). Exceptions are the *evaluation area* and the *grade-book* that are not planned.

Therefore, we choose to split the evaluation area among other functionalities of the system:

- we assimilate *Tests and homework* to course sessions (either as part of the related sessions or as independent sessions),
- we integrate *due dates* into the course calendar and within the course description,
- we implement the *upload area* through the BSCW communication and collaboration space.

As ALI does not offer any way to distribute results and give feed-back on exercises, we suggest that this kind of interaction take place via e-mail. The instructor will have to manage a *grade-book* separately on his own, as for the course statistics, and inform students of their results.

4 Conclusion

The implementation process as we described it in the chapter is only in its first phase.

Some limitations of our model, mentioned along the whole chapter, are due to the ARIADNE environment which is not, at this time, fully effective yet. But as it is constantly evolving, we are sure that some of these limitations will be absent from a further version of the tools.

Moreover, for a complete implementation, we intend to leave our model to the VESALE project in order to have it tested by instructor and students, which will show if there are any problems.

Conclusion

We wish to point out first that our experience in the United States was extremely positive. We had the chance to meet high level people, to work in a completely different academic world and another life style. This was the most enriching part of this last year.

Also, the VESALE experience was very valuable as it allowed us to enter, become part and experiment the world of online education.

At this point, the reader can reasonably ask what questions our dissertation tries to answer.

The first part of our dissertation consisted in a general overview of the main notions, actors and visions relating to the virtual university, as well as the current situation showing the effective realization of these notions in the United States and in Europe.

Then, driven by our interest of informatics students, we focused on the major tools involved in online education, which we presented and analyzed in detail..

In the second part, we centered our work on the use of such tools, in particular by realizing an online course scenario and implementing it in the framework of the VESALE project.

Therefore, we can consider that we have dealt with some of the major questions that arise when first approaching the virtual university subject: "What does virtual mean?", "What are the different teaching visions that can be supported by an online course?", "What is the general trend of the current situation in the United States and in Europe?", "Which kind of students are interested by online courses?", "What are the tools behind them?", etc.

We hope that the answers we gave to these questions may interest people planning online courses and/or working in the distance education field.

However, there are some other interesting questions that we could not answer and that can be the subject for further work. For instance, political issues, such as "Why sponsoring online education? Why not?", "Must universities and educational institutions be the only education providers?", "Can private companies offer their own online courses?" Also, economical concerns, like determining the costs of online education for societies, institutions and individuals. Or, social matters, such as estimating the consequences of online education for individuals, existing institutions (universities but also other knowledge providers) and the society.

Moreover, we have chosen to focus on online education, but this work can be extended to related distance learning topics using other delivery technologies.

Finally, even if online education is something relatively new, we believe that it will have a growing importance in the future. This will cause the current university system to undergo major or minor changes in its structure, to require and train for new skills and professions, to deal with a wider demand, to open or restrain the target population, concurrence corporate content providers, etc. What will be the place of FUNDP in this vision? Will they merely follow the movement or lead it?

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http://ariadne.unil.ch/ [August 1999]

Distance Instruction for Adult Learning (D.I.A.L.)
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Illinois Online Network
http://illinois.online.uillinois.edu [July 1999]

Indiana University - Distributed Education
http://www.indiana.edu/~disteduc/ [July 1999]

Indiana University School of Continuing Studies - Distance Learning
http://www.indiana.edu/~iudisted [July 1999]

Indiana University School of Education - Distance Education Program
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< Learn-Nett >
Learn-Nett
http://tecfa.unige.ch/proj/learnett [July 1999]

The Electronic University Network
http://www.wcc-eun.com/wln/campus/eun/ [July 1999]

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The LEEP3 Home Page, Graduate School of Library and Information Science - University of Illinois at Urbana-Champaign
http://alexia.lis.uiuc.edu/gslis/leep3/index.html [August 1999]

< LEEP 99 >
The Library Education Experimental Program (LEEP) for Summer '99
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< Open University >
The Open University
http://www.open.ac.uk/ [August 1999]

< UOPHX >
University of Phoenix Online
http://online.uophx.edu/ [August 1999]

Walden University Online
http://www.wcc-eun.com/walden/ [July 1999]

Walden University - M.S. in Education
http://www.wcc-eun.com/walden/msed.html [July 1999]

< WGU >
Western Governors' University
http://www.wgu.edu/ [August 1999]

Electronic Journals

Diversity University Journal of Virtual Reality Education (DUJVRE)
http://tecfa.unige.ch/edu-comp/DUJVRE/ [July 1999]

Electronic Journal of Science Education (EJSE)
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Think of it
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< COW >
Conferencing on the Web – the San Francisco State University
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FirstClass – SoftArc
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Majordomo – Great Circle Associates, Inc.
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ANNEXES

see p. 13

Annex 1

Interview - Gerry Bernbom

1. What is your position at Indiana University Bloomington?

I am Special Assistant for Digital Libraries and Distance Education in the Office of the Vice-President for Information Technologies at Indiana University. My position is a university-wide position; I am involved in providing technology to all of the eight Indiana University campuses around the state of Indiana.

About online courses,

2. What are the overall costs of an online course for the institution? (Implementation, maintenance,…)

I don't know.
I know the elements that go into the costs but we don't keep track of all of them, for instance, we don't keep track of faculty time, which is very valuable.

I can name some of the elements that go into the costs.

There is the entire technical infrastructure (networks, ways of accessing the networks, servers, support staff, all of these need to be in place), which just creates the opportunity for a course to occur.

Then the faculty member needs to develop and adapt his/her course material to the online environment and that takes time, faculty time. Moreover, if a faculty member is going to deliver a quality interactive experience for students, they are going to spend a lot of time teaching that course. They may spend more time teaching that course than they spent teaching the course in person. I have heard some data about this; it was something like in the first semester a faculty member might spend three times as much, but a lot of that time is spent developing and learning, so it is not going to stay like that. But the person who gave this data said they don't expect that it will ever be any less than the amount of time spent teaching it face-to-face, they suspect in fact that it probably will be at least a little bit more. That is very anecdotal, it is not very scientific data, but it is as little as I know about the elements of costs. We have not gone in try to pull out what a course could cost.

3. What are the overall benefits of an online course for the institution? (also compared to a traditional course)

There are rather a number of them.

An important benefit of online education for Indiana University overall is to make courses available even more broadly within the State of Indiana, there are geographical locations where we don't have campuses and we still want students to benefit from Indiana University education.
Secondly, and this is particularly true for our Indianapolis campus, a large number of the

students there are working professionals, working adults, part-time students; online courses or some component of online material in a course allow these students to take a regular course without having to come to campus as often, sometimes not having to come at all. So, reaching out into a local community is an important part.

A third benefit is making Indiana University more recognized. We have a certain value, a certain brand-name value and I think putting courses online can spread some of that sort of recognition through.

Fourth, I suppose that using the online technology to teach in some disciplines, in some subject areas substantially improves the discipline and changes the teaching. We have a faculty member (a member of our Advisory Committee) who is a very strong proponent of this: he says it is really important to focus on the content of the course when you put courses online, and to choose courses to put online where the content actually improves the benefits. He happens to be a professor of Logic and Mathematics and he has done a lot of work with software visualization to actually visualize logical arguments in diagrams, not just hear about them or see them in formula. You learn more about Logic this way, so putting that kind of course online actually improves the instruction, there is a pedagogical gain.
Those are among the benefits I think we realize.

4. What environment do you think is needed for an online course? Which one is available here at Indiana University Bloomington?

There are two ends to an online course: the university's end and the learners' end.

We have a project under way which has more to do with function than technology. The project is called Oncourse; it is a software system developed here at Indiana University for putting courses online. The essential of it is it puts the syllabus online and it allows for each element in the syllabus to have additional text or multimedia or links to other network resources inserted with it. It also incorporates a class roster (list of students), a quiz and test online module, a faculty member sets up the test elements.

When you ask what kind of environment is needed for online courses, well, those are the elements: you need to be able to manage class lists, to create a syllabus, to include links in the syllabus towards other learning materials, to administer quizzes and tests. In addition to that, you need to be able to communicate by e-mail and also in some sort of forum fashion, whether it is a real-time chat environment or simply an asynchronous forum with threaded discussions. You need to be able to have group discussions as well as one-to-one communication.
I think those are things we need to have and we have all those things at Indiana University.

Q. Do you have a virtual café? A virtual library?

Excellent point! Virtual café meaning an informal meeting place? No, and we probably should, not associated with a specific course but maybe more generally for students to gather. Of course, we have an endless number of newsgroups and those kinds of things to talk asynchronously but we don't have anything like a virtual cafe.

Virtual Library? We have some materials online but we don't have enough online.
Distance Education and Digital Libraries are very closely connected in our thinking but we are not as far in Digital Libraries as we could be or should be. That is an area I am giving attention to because it is really necessary for Distance Education or Online Education.

At Indiana University Purdue University at Indianapolis (IUPUI) we have an electronic reserve: individual articles or other faculty designated materials are put online in a protected environment so that only students who are enrolled in a given course can see those materials, which helps address the issue of copyright for journal articles that shouldn't be widely distributed but may be distributed to students in a class.

We have this at the IUPUI campus but we haven't nearly enough. We have more than several hundred online databases to which students have access, everything from journal articles to newspapers to magazines, all that sort of things, also indexes and abstracts.
There is actually quite a bit of material online, it is not oriented around specific courses yet, and that is one of the things we will need to do, but we do have at least one hundred journal and text databases that all students have access to.

5. [Technology] Which structures / technologies allow the 'implementation' of a course online? (software and hardware requirements)

The technology part is where questions like "What does the university have?" and "What does the student have?" actually make sense.

First and foremost there needs to be a network, but there needs to be enough of that campus network that faculty and frequent users of network services are familiar with. It is not just that we need a network to the outside world to deliver online courses, we need enough of a network here that people treat as second nature (as a normal and routine part of their work life) and simply assume that it is there. Our on-campus network is a fiber network; its chief backbone is FDDI (Fiber Distributed Data Interface) ring; there is a switched Ethernet network (which operates at speeds at 10 or 100 Mbps, essentially we have switched 10Mbps to most desktops). This basically means that people get a good network access and decent speed.

After a decent network on campus, we need decent connection to the Internet. We simply continue to upgrade our connection to the Internet to keep speed and access to a sufficient basis. I don't know where we are right now, maybe at 45 Mbps, might be 22 Mbps, I don't know if we have a full DS3[1] or part of a DS3.
I know we have decent Internet connectivity.

Another we provide students is the ability to dial into something to connect to the network and there are two choices in the American higher education: (1) the Internet Service Provider model, where students dial into some company that sells Internet services, or (2) they dial the university directly.

At Indiana University we have chosen to provide modems so students can dial in directly to

[1] DS3 is a US telecom standard equal to 45 Mbps. More information about the Indiana University network is available at: http://www.indiana.edu/~uits/telecom/networks/networks/net-overview.html

us and we have hundreds and hundreds of modems. Never enough, we just added hundreds more this fall; we have very large "modem banks" (or, "modem pools") at the Bloomington and Indianapolis campuses. We do provide students ad faculty the possibility to dial into our network at no cost: we have our end of the modem, we give them the phone number and at their end, of course, they have to have their own modem. The modems are now mainly 56 kbps although most people are at 33.6 kbps or whatever their local phone company will actually support.

So, for the network on the student end they need to have a computer with a modem and phone service to access an ISP or us; on our end we need a good robust campus network and a modem bank.

The next on top of that is, of course, a server. On the university end you need a decent server environment, both the computers and the server software, and we are doing a good job at that, we keep adding more and we will continue to add more to be sure to have a substantial server environment, also to support that "Oncourse" that I described.
We use primarily UNIX for web serving. We are also doing some NT-based Web serving but not as much and I believe we are going to do more of that in the next year. As a forecast, I would say the number of NT Web servers will go up faster than the number of UNIX-based Web servers. NT is very popular, very cheap and there is this software called FrontPage... Indiana University has a license agreement with Microsoft, we have all of their software and FrontPage is one of them, now it's what's popular.

On top of that, the application software is Oncourse and it's able to do good things for us. It is similar in some ways to Lotus Notes Learning Space, in a general way it has some of the same functions. It has other functions that Learning Space doesn't have.

What you don't ask here is about support requirements, which is very important. In addition to hardware and software is the amount of technical support we need to have available and add in order to make online courses work. We do technical support in a number of ways: we make a great deal of use of online technical support, we have a very large knowledge base with several thousand entries in it and that is our first line of defense for providing technical support to students and faculty.
If you want to take a look at the knowledge base you can go to http:\\www.indiana.edu\~uits\ from there you will have a link to the knowledge base.
I mentioned the knowledge base because a number of other American universities have made links from their page because it has a lot of answers that basically everyone wants: "How do I do this in Pine?", " How do I do this in UNIX", etc. Everyone has the same questions. Now, sometimes we have answers that are specific to us and that could be confusing.

So, we need support, we need a good knowledge base environment and behind that we need the people. One thing these people do is keep the knowledge base current and fresh, another one is they handle the problems that are too hard for the knowledge base, so we do have a sort of help desk; both of those functions are necessary.
What we have found in the initial trial of Oncourse (it was on the Indianapolis campus in the fall semester, with several hundred courses) is that the number of calls to the help desk

increased and most of the calls were about setting up the modem, using PPP[2], very basic technology questions that we are already well equipped to handle. In other words, the software itself (Oncourse) didn't create a support problem, simply more people using online systems, more people dialing in and using modems. The good thing about this is that it is a one-time learning process for a student: once you have learnt that, you are over it.

6. Do you know about any institutional guidelines to follow when someone develops an online course? Is there some control over what one creates? (Templates, standard results,...)

Well, if people use Oncourse, they are basically working with a set of templates and to a certain degree their course will look like everyone else's course, so there will be a certain standard appearance, or a common "look-and-feel". There are also certain features that they will all have like e-mail, threaded discussions, etc. To that extent, we have something available. Now, must a faculty member use that? No, they can do whatever they want, pretty much like in regular classrooms, that is part of what faculty members are allowed to do. So, no, no one is controlling this.

7. How far do you think a university can go 'online'? (One online course? One program? One degree? ...) Why? Which are the limitations?

It can offer all those things: a course, a program, a full degree ...
I think this is probably where I need to make my point: part of our vision for online learning is that it is not online learning instead of in-person learning, it is online learning as well as in-person learning and the term that is being used at Indiana University to describe this is "Distributed Education". It is just a change in terminology to make a point that we are talking about something that is a little bit different. We feel that online learning, or distributed education, is as important to the student who comes to Bloomington from another country and lives in a Residence Hall just blocks away from the classroom buildings as it is to the student who is a hundred miles away from campus.

Everyone needs a certain amount of access to online materials, a certain amount of online interaction between student and faculty or among students, maybe in a team project basis. The same technology that we would use to deliver an online course a hundred miles away we would use to deliver some portion of course to a student who is on campus. In that sense there are no limits because every course can have some elements of online learning in it and every student should have some exposure to online courses.

Now, some things are better done face-to-face and some are better done at a distance, a certain kind of group experience you will only have if you are physically present and manipulating some material. We are not far enough along in virtual reality technology so that you could actually experience and manipulate some remote object as if you were in the same place. It is very hard, I suppose, to teach archeology online: there are certain elements like going out and digging for which you need to get out and dig! But there are some software programs that take you into a laboratory and allow you to do chemistry lab

[2] PPP is the Internet Standard for transmission of IP packets over serial lines. PPP emulates an Ethernet connection, allowing graphical user interfaces, online graphics, and workstation-based client-server applications that use the power of the workstation's own processor.

experiments online much more safely and cheaply than you would do in a chemistry lab. Those are interesting things and there are maybe some of those we can do even more of, but there are some things that always require people-to-people contact.

It is really important to note that it is not a matter of taking some material, packaging it, putting it out there, folding your arms and say "Now a hundred people can take the course instead of just ten!" The faculty-to-student interaction is very important and it is just as important if the course is online as if it were face-to-face. If you are a teacher, you need to be able to talk with your students and to allow students to talk to each other, so high-degree interactivity is important, not just access to the materials but interaction between the people.

Q. Why do you say everybody should have some exposure to online courses?

Because I think this is how we are going to work in the future: some portion of our work and of the way we find and use information will be online and you should have that experience here, not wait until you are into a company to find that out; you could need to work, or to do an entire project, through e-mail with people you never meet and I think that is worth learning.

Q. Could you name some examples of disciplines whose teaching would be improved if done online?

The one I mentioned is the best example, which is the visualization of logical arguments. I do know about something else that is better done online: I am thinking about maps, geographical and geo-spatial data, it is really better to use a computer to represent and manipulate that. Also, to represent a molecular or atomic structure a computer does apparently help, I am not a chemist. I know a little bit about logic, though, and I support the argument about logic. So, because of the way that a computer manages and represents data, a number of these things can be improved through the use of online.

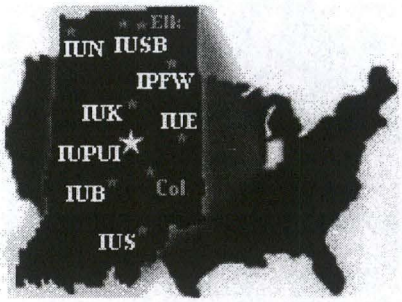
I believe also that certain kinds of communications done online are different from communications that take place face-to-face and you only learn about that if you do it, that's why I think everyone should work on a project with people they have never met, your work is going to be like this when you are out of the university.

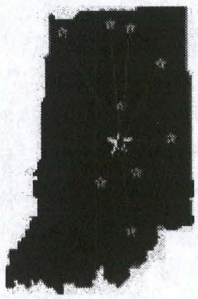
Q. Do you want to add something?

The entire discussion has been about what you have called "online courses", which I have taken to mean "courses delivered over the Internet", not video-delivered courses like television broadcast. Thus, I have not spoken about two-ways interactive video, video-conferencing-based courses. We do a lot of that, it is an entirely different pedagogical teaching model and an entirely different technology.
Let me tell you briefly what it is all about.

We have eight campuses around the State of Indiana: Bloomington (IUB), Indianapolis (IUPUI), Richmond (IUE), Fort Wayne (IPFW), Kokomo (IUK), Gary (IUN), South Bend (IUSB), New Albany (IUS). We also have an extension center in Columbus and one in

Elkhart, so we have ten locations around the state (fig. 1). We have a network of T1[3] or multiple T1 lines from the center point (Indianapolis) to the other locations (fig. 2).





(fig.1 - Map of Indiana with the 10 sites) (fig.2 - Map of Indiana with the network)

Each T1 is capable of carrying one two-ways reasonably high quality video-conference. Most of these places have two or more video-conference rooms that are set up with an integrated system that has a camera, a microphone, at least two television displays, a PC that controls them and a control pad.

The central location, Indianapolis, is a "bridge", a network connector device that allows these sites to select who they are going to talk to and if they can mix three or more people into a conference.

This network is referred to as "VIC", Virtual Indiana Classroom, and we conduct a lot of classes using this network. A typical use might be a faculty member on one campus, let's say Bloomington, who is going to teach a course for a few students in Bloomington, a few in Indianapolis and some in Gary. This faculty member reserves (through their department and bureaucracy) the network and the rooms on each campus, for instance every Monday, Wednesday and Friday from 4.00 pm to 5.00 pm. On these days at 4.00 pm this faculty member goes to the reserved room with a few students while a few others gather in Indianapolis and a few show up in Gary; as the network comes up, they can all see each other and the teacher teaches the course just as they would teach a normal course. The students can not only hear and see but be seen and heard as well.

This is how you can have a distributed class taught, and we do a lot of that: we have, over all of the ten sites, something like twenty-two classrooms with the appropriate technology in it and there are several hundred classes taught every semester this way.
The web page where all of this can be looked up is:
http://www.bloomington.in.us/~aat/iudoc/vic.html

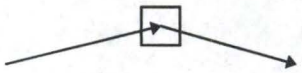
Q. There is a big need for technology: is it possible for people who are not in Indiana to take this kind of classes?

[3] A line which offers a data transfer rate of 1.5 Mbps and is a dedicated connection, meaning that it is permanently connected to the Internet.

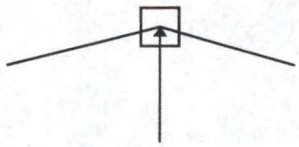
Actually what we use is a fairly common technology, we bought it from a company called V-Tel, it is standard-based in terms of the way it compresses video and audio data. We are using a very high bandwidth (1.5 Mbps) and V-Tel can compress it down to 128 kbps so it can go over a standard ISDN connection. We have conducted conferences or classes with people elsewhere, outside of Indiana and outside of the United States, using the same video compression technology (128 kbps or multiples than 128 so we sometimes combine up to three times 128) and we can get pretty decent video.

For instance, our School of Music has conducted Master's classes in cello and flute, the other end being the Royal Conservatory of Music in London, using this network, these systems, over 384 kbps with a sideband of audio running at 128 kbps, the audio was given a very high priority separate channel to have high quality music.

So, it is Indiana University Bloomington to the Royal Conservatory of London, you can do it with the rest of the world because at that bridge (the center point) there is not only the ability for everyone to connect to one another, but there is the ability to connect to the outside. Then each individual site also has the ability to individually connect, so if you wanted, you could do simply a point-to-point connection (fig. 3). But if a third unit wanted to participate, then it needs to come in at the central point, get on the bridge and connect (fig. 4).



(fig.3)



(fig.4)

So we can do either.

So, it is a different kind of online education, probably not what you were thinking about, but we do a lot of this.

Annex 2

Interview - Curtis J. Bonk

1. What is your position at IUB?

I am an Associate Professor in the department of Counseling and Educational Psychology. My undergraduate degree is in Accounting. I spent five years working in the corporate world doing various things and I got bored so I want back to school to get a Ph.D. in Educational Psychology. Initially I came back for a Master's degree and I was going to help design educational software for children.

2. What software did you use for the development and maintenance? Why did you choose it?

At Indiana, if you have noticed, there is no one software tool that is used for online learning: some are using Alta Vista Forum, some are using First Class. Before First Class there was a tool called VAX Notes, which is off the VAX computers. Some people use something called Allaire Forums, which was around for a little bit of time.

I used VAX Notes here, my first couple of semesters, then First Class. I haven't used Alta Vista Forum. What I am using now is COW, "Conferencing On the Web", as I showed you before. It is a freeware/shareware tool.

There are two or three reasons to use COW:

(1) one is I don't have to get access to an IU account to use COW, I set it up for you, I control everything. If I want to make an account, I don't have to go through TLTL and say that I have, for instance, fifty people from Finland or Korea that want to be part of this conference. So I think one of the main reasons to use COW is the fact that you have control.

(2) A second reason to use COW is because of longitudinal studies. Once we collected data one semester, to have comparable data the second semester and the third semester we need to have a baseline of what occurred. If we switched tools, if we started using Alta Vista, then we would have problems with the instability and the inconsistency of our approach and we would have a problem in our research because of the new tool, so that is one reason we have stayed with COW, maybe longer than we should have, maybe we should be using Alta Vista.

(3) A third reason not to use Alta Vista is because it has more graphics in it, it is slower to download especially off-site and it doesn't offer that much more than COW does. COW is text-based, it is linear, sequential; Alta Vista is threaded, that is the main difference between the two. There are some other things: you can poll down things in Alta Vista; you can put a question and people vote on the question, so you can poll or vote to see how you class feels about a topic. That is an advantage of Alta Vista, but I haven't gone to it yet.

I have experimented with other tools as well, I have used various kinds of online tools and

there is no one tool that I feel like it is the only tool for me. This COW project just has evolved so that we have to use it to compare for research basis.

I have developed a tool for writing that gets children to reflect on their writing: it maps out the writing, it can replay it back and we can match revisions in writing. So, in terms of software, I have helped develop software.
I am not a programmer, I programmed a little bit but if I learn a programming language today, tomorrow or two weeks later I will forget it. I am a designer, an evaluator. I like to think about little things that might be needed to make the tool better. I am a good tester of tools, I like to pilot-test things and suggest what could be changed.

A designer comes up with ideas and has the programmer develop the tools for what he wants. That is why I didn't major in computer science, I guess. I could have majored in something related to technology and design principles, I thought about Artificial Intelligence. When I went to grad school I was reading a lot of AI journals and I thought about that, then I went to take a class and it was boring so I didn't do that. But now intelligent tutoring systems are becoming interesting.

I guess I have always been interested in technology somewhat, I have never been interested enough to be a programmer. I like to see the big picture, I don't like to simple look at the details, I did that when I was in Accounting: I got bored then of little details and didn't need to be bothered again. I have taken programming languages but they just don't mean enough for me.

Design, on the other hand, is much more fun. Designing, thinking about the next tools for the Internet, what kind of course-based tools could be designed, what kind of templates or prototypes could be built for instructors so that they could have critical thinking activities in their class, ... so you would go down and scroll and say "here are some critical thinking activities", hit on it and a template comes up and now you have a debate or some kind of role play or discussion, some kind of selections, options, that you would have as an instructor.
That is why I am thinking about the Internet, I think we need options for creative thinking, critical thinking, cooperative learning, ... Instructors that say "I want to do co-op teamwork, here are some optional activities" then the template comes up, try and use it.
I would be helping develop the template, evaluate how it is used. I wouldn't program anything.

3. Which are the hardware requirements?
4. Which are the software/hardware requirements for your students?

We try to keep them minimal so that students can access things from home.
With COW there are not a lot of graphics so they can download it from home very easily. Alta Vista takes a long time to download because of the graphics.
In terms of machine requirements very few of my projects require a lot of hard disc space or RAM memory or very fast modem. You can have a basic 486 machine and get by but with a Pentium, you will be fine; you don't need much more than that, a Pentium II would be great.
So, hardware requirements are just a modem, a Pentium-type machine (or a 486 if you happen to have one). I have a 56.6 Kbps modem but we only use 28.8 Kbps here at the

university so it is all you need.

5. Do you use video or audio data? If yes, how do you diffuse it?

I don't use much video.
I would like to use more video and I think that it is coming, I think we will be embedding and streaming in video into the systems, having short little "clips". At CNN they have specials on education and one person I know has put a CD together with little clips form CNN that explain educational problems, special education, technology in education, motivation… Short little one-minute clips. And I think that's what we are going to move to in my field, we will have a lot more of these short clips.
Putting instructors like me for one minute up there lecturing, that would be boring so I would rather have something much more interesting, that is why I haven't done much of that.

I think the audio would be good for the instructor, though, if it laid over on top of some lecture notes, maybe. I don't think you ought to have too many lecture notes, but you could have a voice over from the instructor explaining why "this goes there" and why "this is important."

I actually see that audio could be relatively useful in building a class. For one thing, to personalize things so that you get to know the instructor. If you were in France taking a course with me (as some of my students this spring will be), you could hear my voice, which you normally might not be able to hear. To see me teach: useless. Maybe having a picture of me in a teaching setting, that is all you would need.

I think about excerpts, though, that you could catch from the best teachers: the best sociology teacher or the best anthropology teacher, etc. Put them on you Web site… that would be interesting!

How do we give it to our students? I think you make it an optional activity on the Web, you have animation options, audio voice-over options… You don't require to use it but you embed it in a such way that sometimes they will have to use it but most of the time it is optional. It is an extension of a class, it adds to a class. You might have it diffused over a CD-ROM disc so you would have like textbook and voice-over and audio clips and that kind of things on a CD, because the Internet might be too slow for all that. I think CDs with discussion groups on the Internet are the best way to go because the text discussions don't take much space or time but the CD can speed things up, and you can standardize that: everyone can look at that CD as a resource, you can distribute it out. If you want it interactive, you can take that activity to the discussion group.

6. Which kind of interaction do(es) your course(s) support? [synchronous / asynchronous / mixed, one-to-one / many-to-many / …]

Asynchronous, many-to-many, I guess.
We have some one-to-one but we don't use that as much. I do some one-to-one with e-mail but more of it is many-to-many kinds of discussions. There are some private discussions that you can set up in COW, so you could make it one-to-one or you could

make it one-to-two kind, with a small group. We do some of that but most of it is with the whole class. We do groups: we divide the class in half.

I think there is a need for synchronous. I do want to use synchronous more, I think it can help with guest experts, bring them to the class.

To get everybody in the class talking about an issue or a problem is important to them, so synchronous can play a role, an important role. I would like to do more synchronous, I think we need better tools for synchronous. I have one colleague here who just wrote me a note, he is very synchronous: everything he does with his teacher training is all MUDs and MOOs. He does everything using MUDs and MOOs, I don't. I don't see the purpose for it quite as much. I do think that having immediate answers is useful but the problem with that is that you always have to be there checking on things, you can't be anywhere else. Mark Schlager has a program called "TAPPED IN", which is for teachers. Mark is a person from the Stanford Research Institute (SRI) and he has Tapped In for a professional community of teachers that talk about issues important to them, so he is always there.
That would be hard. I think just getting everybody once in a while to talk to one another in a class live synchronous system is cool. It would be needed, but not all the time, there not much substance, not that much depth. My research shows there is not so much depth in synchronous, that there is more depth in asynchronous.

7. As you develop an online course, do you have any institutional guidelines to follow? Is there some control over what you create? (templates, standard results,...)

We built some institutional guidelines last year and the School of Education built some guidelines.
There are problems in online teaching: "How much fees do we charge people?" access fees, all those fee issues (if you are out-of-state you pay in-state, you pay cheaper fees)...
We haven't resolved all those things yet.
"How many students should be in a class before you let it run online?" We just decided fifteen.
I don't know why they came out with the magic number of fifteen: it could have been twenty, it could have been ten, I don't know. But I think that is where they make money on the course, if there is more than fifteen they make some money, a small amount of money, if there is less than fifteen, they lose money.

Go to the homepage for all of IU and then go to IUITS. There is actually a report that just came out with all the recommendations for information technologies on this campus, where they are headed, and it is a report, which summarizes the kind of recommendations that relate to students, to computing services (like how fast you want the information), to courses, grants, etc. All of that is covered in one big report, it is very interesting.

If you talk to people at IUITS, you might get to have that report. You could write to Karen Hallette [hallette@indiana.edu], TLTL might also have guidelines but she is in charge of all online courses here in the School of Education, she might have some guidelines to share with you, for instance that "every course should have a collaborative component or cooperative if it is going to be taught online", otherwise if you are going to teach it like a correspondence course, just don't do it. So some pedagogical guidelines, also about learning, student interaction, collaboration... that was in our guidelines. There were other

things in our guidelines too: about residency ("do students have to show up on campus" and all that kind of things), cost issues were in there, "when does a course start and when does it end?", "is it going to be run over a normal semester or is it going to run forever?", those kinds of issues we covered in our report.

There are other things that we had in the guidelines, a whole range of issues, policy issues about grading and assessment, how we get enrollments, how do you market a course, recommendations about how to get the word out about the course, what a syllabus should look like, etc.
We addressed all these issues, I am not sure if they got to our final report but those were the kinds of things we discussed. I was on the committee.

There is a white paper on the Internet about online learning and recommendations. Dr. Kling might know about this. Dean Blaise Cronin wrote that with Tom Duffy.

8. [Benefits] What are the overall benefits of an online course for you and your students?

Yesterday, someone from another department asked me about the costs of online learning and I outlined for them the costs, minor costs, major costs, how much it takes to develop a course, how long to develop a course, but also gave him the benefits, and the benefits of an online course are ten, let me see if I remember them:

(1) you have exposure of your program beyond where you are, your program is well known to people beyond Bloomington to the whole world. The marketing of your program, it markets your university and it markets you State or country better;

(2) you get multiple perspectives in your class, you get more people offering opinions about things;

(3) online learning forces you as an instructor to re-think how you teach, how you might teach in a regular class differently;

(4) to be able to take the course whenever you want and wherever you want;

(5) peers and students take more involvement, more responsibility for their own learning and give feedback to each other;

(6) you have got the Internet to explore, you have got these resources across the world and you have more resources to look at (not every resource is free, some have charges);

(7) discussion in your class doesn't end when class ends, it can continue after class;

(8) you get personalized feedback, you can ask questions of the instructor after class and so things are more personalized or can be;

(9) you get to know each other better, you really get to know someone as you tell more about each other;

(10) your students are forced to read everything and not sleep.

9. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class)?

All kind of course entirely online?
You have two problematic words there: "all" and "entirely". So, "all" and "entirely", no. If you said "some" kinds of courses and "entirely" online, I would say yes. Also if you said "all" kinds of courses and "somewhat" online, I would say yes, but not "all" and "all".

Some classes would be boring online: I would be bored to take an Accounting class online because there would be so many numbers! But of course then I wouldn't have to see the professor, if he was also boring.

There are advantages and disadvantages here. I think that some courses lend themselves better to online discussions and online learning. In a Statistics class it would be hard to have a discussion but there are some other classes that do very well with it.

The virtual world could help model how to do something that you need to experience live: painting, dance, performing Arts, etc. For Archeology you can put up Web-tools for different time periods and cultures and be able to visualize how cultures change over time, watch movements of people/ migration patterns, etc. You would be able to see things on the Internet you never saw before. You can also watch music, watch notation, see the notes and listen to the music, look for patterns in Mozart, etc. These are some of the things that you couldn't do before this kind of technology.

But to go beyond appreciation, to actually do something, to actually dig an archeological site… you have to go to the site and dig. In music you actually have to play and perform in front of people. So not everything can be done online; I think chemistry labs could be done online because then you could be experimenting without fear of chemicals blowing up the place! If you are on a computer this danger is reduced, there is more safety. In my field, Educational Psychology, most things can be done online.

10. How far do you think a university can go 'online'? (One online course? One program? One degree? …) Why? Which are the limitations?

It depends on the university and how they are situated. Some small universities are putting entire programs online. We have put an entire program in Language Education online. MBA programs are online, I don't know if they are doing that here, they might be.

Again, it depends on the university: what they are equipped with, what technology they have, what people they have… I believe some universities are putting programs on, some are putting degrees, some are putting the whole university online, the Virtual University to name one.

But they are finding that 86% of the instructors in the Virtual University are using a mixed mode, that means some live, some distance education. Most instructors are doing both and I think that we are going to find that it is going to cost the university more money than the old model because it is definitely more expensive to do something to put online than a

normal kind of class.

Online is more expensive if you still have the live class, if you do both. If you only do the online, by the third semester it becomes cheaper: the first semester it is more expensive, the second semester might be even, the third semester it is cheaper and more efficient. It takes two semesters to get used to it, I am going into my third semester here.

Limitations of online?

- your population in your country or in your state might not have access to computers,
- people might not have training to use technology,
- the technology might go down during the day,
- they might replace it with something new,
- people overuse the system so much that you can't get on,
- people are confused about what the requirements are,
- they have computer anxiety,
- some people are afraid of technology,
- structuring activities is not easy electronically,
- some people need a live setting, they need to talk to someone,

those are some limitations.

I think one limitation is also that we are so early in using these tools, we don't really know how to use them, we haven't been trained, we haven't had examples of good use yet.

Another limitation is the lot of work and time: it is a lot of work for me to structure an online course, more than a regular class. Now, by the third time you teach it, it might be less, I don't know.

11. How can a prospective student evaluate an online course before subscribing?

Talk to the instructor, ask them for password access, take a look at the discussion and not just the interface, look at the activities, look at the syllabus, ask questions, maybe write to a former student, look at prior students' work if it is up there on the Web.

12. What is the environment of your online course(s)? (syllabus, library, café, ...)

Well, we have all of that.
[demo]
We have got a place called "International Cafe" where students can go and bring up topics that are of interest to them, type in responses, start new topics, etc.

We have got discussion groups going on.
Students can make suggestions. They have portfolios, they post their work in their own unique avatar name.
There are weekly activities on the Web, the syllabus is also up there.
If you click on "Course contents" you can see what is due every week.
We have profiles and pictures of the students that tell a little bit about them.

You can see last semester's students.
We also do have somewhat of a library of resources that is available, Web-links suggestions, weekly activities, portfolios, case discussions, …
So there are a lot of different things.

Q. Do you meet with your students at any time?

Yes, I meet with them the first and the last week of the semester.
The first two Saturday mornings, we meet to learn how to use this and the last two Saturday mornings they present what they have learned. In between, they can meet me for lunch or come to my office.

Annex 3

Interview - C. A.

1. What is your position at IUB?

I am a fourth year graduate student in language education.
I teach English as a second language back in Puerto Rico.
At the University level, I am an assistant professor but I only got to assistant professor because I need a Ph.D., so I have come here to get my Ph.D.
I am in my fourth year, I have been assistant instructor for three years and now I am teaching as an associate faculty over at IPFW (Indiana University-Purdue University Fort Wayne), I am teaching Spanish.

2. Which courses do you give? Which are face-to-face / online / mixed?

I am teaching Spanish on campus but I also work with L501 («Critical Reading and Reasoning in the Content Areas»), which is online. Sometimes it is given on campus, sometimes it is both on campus and online, but that is the second semester it is exclusively online.

3. Which are the advantages / disadvantages of one compared to the others? Which one do you prefer? Why?

As an instructor, I get to know each student individually much better than in a general group because I am addressing students individually online. In that sense, even though I don't see their faces, I do get to know the way they write and what they think much better, mostly because there is a lot of one-to-one type of communication between instructor and student. You also want to promote communication among students themselves and sort of stay out of it. So it has that advantage.

The only disadvantage is I really don't know who my students are. When you are teaching on campus, like I am teaching a course on campus, I can become friends with them, I see them «outside», I know who they are and we can talk about other things, not just during that semester but later on. But those students that I taught online, if I see them and I don't hear their names, I don't know who I am talking to, I don't know who they are.
So that is the disadvantage I see, but in terms of getting to know how they write, how they think, on a one-to-one basis I think online is pretty good, it has this advantage.

Which one do I prefer? That is a good question.
As a student I prefer the online because I can choose when to sit down and work on it and I make my own time, but as an instructor, I prefer teaching on campus, face-to-face, because there is a schedule, I get to know my students, I see their faces and they react: I know when they need more, when they don't need more, when we can move on to something else, …
So as a student, online has a lot of advantages in terms of time.
As an instructor, I like the idea of having a specific time when I see my students and know we are going to do certain things so that there is more control in terms of when students do their work, when I see them and when not.

The problem with online is: because the student does have the advantage of choosing when to work, sometimes the student chooses not to work and that is a disadvantage. I mean, how can you tell that student... You can e-mail him, call him and say «I want to hear from you, please let me know what is going on!», but the student may or may not respond because he/she may or may not have access to e-mail or to a computer at that moment, he/she may be travelling, may be doing something else.
In this course I am taking, it is interesting, there is one student who can only log in late at night because she works (and where she works she doesn't have access to a computer), and then at night she has her family, so it is not till all the kids go to sleep and everything is quiet in the house that she can go to the computer and do her work. Sometimes we get feedback from her that says 3:32 in the morning! She is working that late.

4. ["Demand" profile] Which kinds of students are interested in taking your courses?

Most are teachers, in-service teachers.
A good number in L501 are basically people who have a job as teachers but who need more credits to advance in their profession. They have families, they have work, they have a lot of commitments therefore they find it very difficult to take time to come to Bloomington to take courses; so what they do is they take summer courses, when they have time and they can go to their kids out during the day and they can take the class late in the afternoon or they can make their own schedule. So a lot of them are basically in-service teachers, they are teaching.

5. [Technology] Which structures / technologies allow the 'implementation' of a course online?

5a. Which are the software requirements for the developer / student?

In terms of software, I use a combination.
I just need a server, which is Easy Info here, and Veritas.
I am using Veritas now and I use basic HTML for preparing it but I also use Netscape. Netscape is wonderful: with Netscape, if I find a problem, I just go in and in a second it is fixed, I ftp it into Veritas and the thing is fixed. I like Netscape Developer; I use it a lot, along with HTML when I need to.

In terms of having communication with the students, we are using a café, which is available free from a company that only asks that you let them have some advertisement included in the site. We have one that is called the «Dancing Cat Café» where the students... there is no restriction on what can they can say, when they can come in, who they can talk to, and it is chronological.

I am also using another one called «Act» which is being developed here at IU. It is a very good one because it not only has a café, but also has this ability to have different topics where students can either work as a whole class on a topic, respond to each other and have ideas (there are many things you can talk about, you can have ideas, you can have references, you can have a response, ... There are plenty of possibilities) or we

can create small groups to work separately over certain sections and then bring everything together. I like Act a lot.

I took a course where we were using Altavista, which is not so bad: I think it is more difficult to get accustomed to as a student, but once you have learnt it, it is also very good.

5b. Which are the hardware requirements for the developer / student?

In terms of hardware, one problem I find that a lot of students have is that some have not been able yet to upgrade their computers and therefore sometimes when you are creating a course you forget that ... I am developing a course now, I have an Intel 333, which is wonderful, I can do a million and one things and they come up very quickly, but I may forget that the student who is taking the course probably does not have a 333. What I try to do is in my office I work on a 333 but I also have a much slower PC, with a smaller screen, so what I create, I go check: what comes up, what doesn't come up, how fast does it come up, if I have things being garbled up because of the different screen, ...

One has to take into consideration the different computers that students have.
There is a program called «Bobbi» that lets you ... When you create a course, when you create a page, you send it to Bobbi and it will tell you if there are problems, you have it check your page and it will tell you which parts of the site you have created may cause problems to somebody who does not have a computer as fast as yours.

Q. Do you use video or audio data or else in your online course?

No, I haven't made use of that yet. If I find that it makes sense...
My problem is I am worried about what facilities the students have, because a lot of students do not have this top-of-the-line kind of computer that would allow for that. So, if you are asking them to watch this or listen to this and they have no way of doing it, they really despair! They despair and they drop out, they just disappear. You really don't want that so I think until there is more access to all those things for the majority of the people, you have to be very careful about what you include and what you don't include.

There is a student who sent in his web page for us as a group to check it out (because we ask to know each other, to introduce yourself); I accessed it through my computer (the 333) and it was wonderful, it had all this Java and all kinds of things going on, but when I tried it in my smaller computer ... it knocked it off, I had to restart the computer! And every time I tried, it was so heavy and with a lot of things in it that my computer would just simply say «No way! I am not going to do that, I am not even going to try!» and a lot of people in the class had the same problem because their computers did not allow that.
So I think as a developer, as an instructor, you have to watch out that you are not doing this with your students, that you are not just keeping them out unnecessarily, that is my concern with this kind of things.

6. And which kind of interaction do they support? [synchronous / asynchronous / mixed, one-to-one / many-to-many / …]

The interaction in the one that is a café is mostly synchronous. The «Act» is asynchronous but we can communicate almost at the same time we are there and we can work as groups, so it is really mixed. It has this advantage, that you can do it both ways.

The café that we are using in L501 is not asynchronous, it is basically synchronous and we are thinking of moving, if we can, to the «Act» one which I like a lot, and we are going to try to implement it but it is still being tested. It had a problem last week, we had a paper due and it wouldn't allow us in, so that is a kick, it is a problem it still has, but they were able to fix it and it is back online.

7. [Costs] What are the overall costs of an online course for a student + for the institution? (also compared to a traditional course)

It is interesting: for an international student or a non-state student the online course is much cheaper right now than if you take an on-campus course. The one I am taking as a graduate student allows me to take a course for about a third of the cost that I would pay if I took it on campus. That is why, while I am teaching, I have decided to take two online courses that will lessen my load: I will pay less and will have 6 credits added in because they have not created a separate system for in-state and not in-state.

If you are in-state then the advantage may be that you don't have to rent an apartment to live here while you are takings online course. You pay more or less the same thing but you don't have to pay for living or driving or whatever, you are at home and you make your own schedule.

8. [Benefits] What are the overall benefits of an online course for a student + for the institution? (also compared to a traditional course)

Like I said, benefits for the students, especially older students, I think … I don't know.
I have talked to my younger students about courses like these and I have not seen … Some of them are even very wary and stand off because they feel that they like the social sessions.

But there have been some students that have been home-schooled (meaning that they haven't gone to school, they have been taught at home) and they say that this kind of a course would be a great thing for them; for students who are studying at home, that have been home-schooled by their parents, this kind of courses could complement, so in that sense they said «well for a student that is already studying at home, a course like that can complement what your parents are teaching you», but other students, they like the socialization, they like sharing.

If you are older, married, with a job, then online courses make a lot of sense because you make your own schedule. Unless there is a certain requirement for everybody being online at a certain time, at any time you can do your reading at your own issue, you can do your

reflection at your own issue, you can do your problem-solving at your own issue, and then put your answers in. I think those are the benefits.

For the institution, I think they make money because there is so much more widespread. There are so many universities that have gotten into it that the competition is getting really fierce. Almost every university in the United States right now is offering courses online, I noticed. There is a Web site form the University of Texas that has a listing of all the subjects matters and they try to keep up to date every course that is online. I can give you the URL for it. You will be surprised how many universities are actually actively working on that and there is even a virtual university: Western Governors. The idea is to put online graduate courses, degrees are already being offered and made available so I think the future lies there, there is a lot of the future in education going on in online courses.

9. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class)?

I would have a problem with language courses, I don't know, and I guess it is because I am a language teacher.

Actually I am supposed to work on a proposal next semester for online courses for teaching Spanish to people in the industry of North East Indiana, a group of us are going to get together. And that is one thing I am very concerned about. Even though one can find a lot of very good software, then if they have that software complementing the course itself will they hear, but then they would need very good computers so that they can have CDs and they can hear exercises and they can repeat and be recorded, because in the language classrooms practice is most important, it is not just grammar, it is using the language that is so important. That is what I am worried about in terms of online.

Other types of courses I wouldn't know very much. I imagine a good number of them can work online but I don't dare have an opinion on that.

10. How far do you think a university can go 'online'? (One online course? One program? One degree? ...) Why? Which are the limitations?

I think the way costs are coming up in terms of space and buildings, a lot of universities are going to turn to online courses more frequently to save money. I don't think they should go as far as being exclusively online, but I can see a mixture of courses where students can have the choice of on-campus or online courses. Most people outside of academia have a lot of doubts about it. My husband, who is a lawyer, says «aren't you worried about people cheating?», «don't you think that on their own they will start cheating?» and I say, «well, that is a concern».

And that is why I think so far it has stayed at the upper levels where you have mostly graduate students doing a lot of this because these are people who are professionals and who really, I think, would find no advantage to cheating, they are not really learning, but younger ... I don't know yet, that is why socialization is so important on campus.

I think there is a limitation because you don't really know who is doing the work, you can't prove that so and so is doing for them and that is where the problem comes.

11. How do you evaluate students in an online course?

A lot of the evaluation is done basically on ... they write papers, reflections on readings. They write a paper and they submit it to me either through the program/software that we are using or through e-mail (some of them even have mailed it to me directly); I will grade it and give them feed-back by e-mail.

Another thing is the interaction with each other in the communication software, whether there is a topic going on and do they respond to it, do they help each other, ...

In the course I am taking we are also being asked to evaluate our own work. Today I am supposed to do that: tell how much time I put into it, do I feel I earned a grade, ... I was working with someone else who is a student from Mexico, we worked together on a paper and I was supposed to also give an evaluation of what I feel his contributions were to our project. I guess all of this will be taken into consideration for giving us a final grade.
I haven't done that yet in my course, but I think it is a good idea. I mean, you do that in class, you can also do that online.

A lot of the evaluation basically is paper-based, papers that the students submit either individually or in groups. And then they do self-evaluation also, they get feedback on what they feel they did and what they deserve and I can agree or disagree on the basis of what I see as a product.

12. How can a prospective student evaluate an online course before subscribing?

That depends on the university, whether the university provides a student sort of a test-area. Some universities do that, where the real course is password protected but there is like an example of a lesson that they can actually go into, make use of, see if it is the kind of thing that they want to get from a course and if they think it is useful to them.
So I think providing them this sort of «test-site» where they can see whether it would work for them or not, whether this is the kind of thing that they are interested in.

13. Do you face problems with motivation? (ex: students who participate less, ...)

Yes, of course. It is interesting how people are so different.
It is the same thing in a regular classroom: you will have some student who are more motivated than others, who are more responsible than others, who are more interested in the subject than others and who will do a lot more.

The problem with online is that they can be lost for quite a while and then you don't know what to do: you do have e-mail but they can also shut it up and not respond to you. But then there are the consequences of getting a low grade, like on any other course on campus, the grade will reflect that motivation.

I think the motivation has to come from both: on part of the student there has to be interest, willingness and responsibility and the part of the instructor is to offer things that will make the student be interested and participate and take responsibility.

Q.	...

I have been away from this. I am doing this alone over IPFW. It is interesting how in other campuses this still is not quite as strong as it is in Bloomington. Over there, they are trying to start it and because they know I am working on it they are encouraging me to get together but there was a meeting the other day that was supposed to be shared with Bloomington and nobody showed up, I was the only one there.

Q.	Do you want to add something?

I have experienced not just teaching but also taking online courses. As a student, what I am concerned about when I am taking the course is «am I putting enough time into it?». There is the temptation to put off because you have that control. Sometimes you have to push yourself to sit down in front of a computer and start working because you know that once you do it you may be there one or two hours and not even realize it. That is what happens with online courses: you get so involved in the conversation, you get so involved into writing the paper and responding, that you look at your watch and 2 hours have gone by!

Annex 4

Interview - Ellen Cotton

1. What is your position at IUB?

I am an adjunct profession at Indiana University, Bloomington.

Regarding your experiences with 'Online education',

Online education has been an eye opener for me. It is a different yet effective way of communicating with my students. Generally, Online students are more focused and self-directed than off-line students.

2. Which courses do you give? Which are face-to-face / online / mixed?

Most courses I teach have a face-to-face element...I am designing two courses for next semester that will be completely online and the others will be mixed.... on and offline.

3. Which universities / institutions did you 'analyze'?

At the time I designed the L530 class for IU, I looked at 52 different classes that were offered online. I analyzed their processes to see which was most conducive to my way of teaching. I also wrote to the professors of most of the classes and heard back from only 10. From that research, I then designed my L530 course.

4. Which are the advantages / disadvantages of one compared to the others? Which one do you prefer? Why?

Both types of classes have advantages. What I like about online instruction is the motivation level of the students...they seem to be self-directed learners who want to do more. Disadvantages of online instruction is the amount of reading and writing that one has to do to keep up with the amount of electronic paperwork that comes in. Therefore, one has to really know how to manage time well in the online environment. As for preference...I don't care. Both can be effective means of transmitting knowledge...the bottom line will have to be considered and as colleges and universities start competing for the same "patch" of students, the colleges and universities with an online component of course work are going to the be colleges that succeed.

5. ["Demand" profile] Which kinds of students are interested in taking your course(s)?

Online students are between 30 and 50. The students signed up for my course are working in some type of training position be it teaching, medicine (doctors and nurses have taken the course) or business. The students have used a variety of media in their positions and now want to branch out and use the Internet.

6. [Technology] Which structures / technologies allow the 'implementation' of a course

on line?

Because the students in L530 literally come from all over the world, I have not implemented the latest, best technology in the course. (One student in Africa only had electricity for 1 hour a day...one student in Sri Lanka had to deal with intermittent brown outs and could not count on electricity...stateside students do not have computers at home and have to rely on local libraries for access...each location has a problem it seems.
Therefore the best technology seems to be computer, online connection with a browser and email program. If possible the students use a chat program for synchronous involvement. We use a bulletin board/list server, email messages, a chat line and a Web page with subsequent related Web pages.

7. And which kind of interaction do they support?

Synchronous instruction via the chat is great for discussions about issues and controversial topics.
Asynchronous instruction via the bulletin board/list serve is good for general messages to the class, voicing of opinions online and responding to group questions.

8. Which are the software requirements for the developer / student?

Each student needs to have access to a word processing program, a browser program, and email program and of course lots of time.

9. Which are the hardware requirements for the developer / student?

Mac or PC computer with 16 M of RAM (minimum), 28.8 Kbps modem.

10. [Costs] What are the overall costs of an online course for a student + for the institution? (also compared to a traditional course)

The costs for the students are high...at least by California standards where I live. The university does not provide me with any technological support and little office support. I do not know what they provide to the students, except when the students complain and I hear about it. I believe that students who are living far from campus, do not receive much in the way of support but they do get a rather large bill.

11. [Benefits] What are the overall benefits of an online course for a student + for the institution? (also compared to a traditional course)

Time demand is different. Students can pace the class to meet their schedules as opposed to taking the class to meet a university schedule that is quite arbitrary.

12. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class) ?

I believe many courses can be put on line, but not all of them. The interaction between two

people face to face cannot be substituted with a chat line or a white board program.

13. What about putting an entire university online?

I am opposed to this too. The university can be augmented by online instruction, but the community of scholars that a university represents cannot be substituted online. FACE-TO-FACE communication is still the best way to learn some knowledge.

14. How far do you think a university can go 'online'? (One online course? One program? One degree? ...) Why? Which are the limitations?

I've seen just about every degree program offered online. While I question the validity and integrity of some of the degrees, they are out there.
The value of online degree will gain merit IF the colleges and universities offering the degrees have standards in place and the faculty abides by the standards.... If not, then all bets are off.

15. How do you evaluate students in an online course?

My course is somewhat different...it is based on performance. If the students perform, then they get the grade they contracted for...if not, then they do not earn that grade. I have a grading rubric and try to follow it.
I also provide feedback for each student as to how he/she performed. I use a model where there is only correct response--so the students repeat their performance until excellence has been reached.

16. How can a prospective student evaluate an online course before subscribing?

There are a number of ways that a student can evaluate a course. The best is contacting the online professor and asking questions. Students can also read the "promotional" material on the Web site about the class and get an idea about the course. If students have access to the university catalog, they might be able to find information about the course in that venue (but this is difficult to do if the course is coming from Indiana and the person is in Korea!)

17. Do you face problems with motivation? (ex: students who participate less, not at all, ...)

There are problems with motivation but they are not my problem...all motivation problems reside with the student. Students are volunteers, they have volunteered to take courses on the Internet...if after they ask their preliminary questions and settle on a course and pay their fees, then they should be ready to do the work. I cannot motivate anyone to do anything...all I can do is provide an opportunity for a person to motivate him/herself.

18. Can we contact some of your online course(s) students? If yes, do you agree to pass on a message to them or can you suggest some names?

You can contact any of my students, but I cannot guarantee that I have the time to contact them.

Annex 5

Interview - Holly Crawford

1. What is your position at IUB? And at the University of Illinois?

IUB: Visiting Assistant Professor of Information Science (since 1998)
U. of Illinois: Visiting Associate Professor (since 1994)

Ph.D., Library and Information Science, University of Illinois (1997)
M.S., English/Education, Southern Connecticut State University (1994)
B.A., English, Southern Connecticut State University (1983)

Research Interests: distributed education from a social informatics perspective

Related to Distance Education (DE) since 4 years in academic settings and since the 1980's in corporate settings.

LEEP (Library Education Experimental Program) http://leep.lis.uiuc.edu

1M$ project for an entire DE Master of Science in Library and Information Science

Primary reason: most of the students come from at least 2.30 hours away

decision: March 1996
beginning: August 1996

First semester: a MOO for lectures [real-time chat]
+ a Web board [for syllabus]

Problems:
1. the issue of "demonstrations" (the necessity to have "hands-on" student work)
2. the 28800 baud connection was a limit for transmitting media other than text (audio, video,...)

The course: (cf. par ex. http://leep.lis.uiuc.edu/lis404-index.html)

- password protected
- same contents of a traditional course
- main chat window
- real audio lectures
- UNIX script for document distribution (*script*... for teacher & *tail*... for the students)
- syllabus online
- archives (one for the main chat window, one for the real audio lectures, ...)

Problem:
1. the issue of an all Web-based lecture (Telnet for the documents)

→ introduction of slide showing.

Comments, important things

- students should be able to hear her → Real Audio
- postings
- students have to meet in order to gain trust in their instructor and other colleagues
- the technology has to fit the course / curriculum and not the opposite
- focus on **quality** Distance Education

Hints: while looking at Online Courses Web pages, take a look at:

- credentials,
- who is teaching,
- who is the administration,
- who is the board of trustees,
- what are their graduates doing.

2. Which universities / institutions did you 'analyze'?

University of Illinois
Indiana University Purdue University Indianapolis (IUPUI)

3. Which university / institution do you think should be interesting to 'investigate' in our case?

LEEP	http://leep.lis.uiuc.edu
IUPUI	http://www.iupui.edu
University of Phoenix	http://www.uophx.edu
Western Governors University	http://www.wgu.edu/wgu/index.html
Florida State University	http://www.fsu.edu/
Emporia State University - Kansas	http://www.emporia.edu/index.html
University of South Carolina	http://www.sc.edu/

4. ["Offer" profile] Which online degrees / courses is the institution you analyzed offering?

University of Illinois: full degree, Master of Science in Library and Information Science (1-2 years)

IUPUI: not a full degree

5. ["Demand" profile] Which kinds of students are interested in taking its courses?

- para-professionals
- people living in remote areas
- people wanting a good degree

- people whose job requires a degree and who don't have time to go to college
- people changing their job
- women family-raising but willing to go back into work-force
- foreign students

University of Illinois: 130 students at this time; mean age = 33 years (not unusual for a professional degree).

6. [Technology] Which structures / technologies allow the 'implementation' of a course on line?

For the teacher:

- Real Audio server running off an extremely powerful NT box
- A box for the Real Audio mixing board (table de mixage)
- UNIX server
- scanning equipment
- machine for Real Audio archiving only
- machine for chat discussion
- machines for other archiving
- ...

→ total = 9 servers

For the student:

- PC or Mac with 64Mb of RAM (at least a Pentium I - recommended: Pentium II 400)
- 56600 baud modem
- Internet Service Provider
- Browser (Internet Explorer or Netscape) configured to accept cookies
- Real Audio player (free download)
- Telnet client

+ Word Processor, Spread Sheet, ...

7. And which kind of interaction do they support?

Internet-relayed chat, one way Real Audio, posting on a Web board, JAVA.

8. Which are the software requirements for the developer / student?
9. Which are the hardware requirements for the developer / student?

Cf. Answer to Q.6

10. [Costs] What are the overall costs of an online course for a student + for the institution? (also compared to a traditional course)

For a student:

- 14.000$ for full-time (= anything above 6 semester hours or anything above 2 classes)
  → expensive because supporting technology but Yale: 30.000$

For the institution (in this case, the U. of Illinois):

- a professor can give 2 traditional classes or just one online class per semester (because the preparation time for an online class is three times bigger compared to a traditional one)
  → it is necessary to hire adjunct professors [3.000$ per course]
- there are huge costs of software & hardware maintenance
- an administrator is required [45.000$ per year]
- 7 graduate assistants [63.000$ per year]
- faculty from outside the school (professors or adjuncts) [5-7.000$ per course]

11. [Benefits] What are the overall benefits of an online course for a student + for the institution? (also compared to a traditional course)

The online course gave better results than with in-residents because:

- in-residents may lack of motivation
- Leep courses are intensive
- Leep-students are highly motivated
- Leep courses have high standards of admission

The traditional teaching uses the Socratic method (Q & A), seminars, lectures.
The Distance Education teaching is more flexible (no time or appearance constraints), done in a relaxed atmosphere → more funny, also for the students.

Benefits for the institution:

- financial (generates income)
- credibility (fore-front program)
- visibility (a DE course is more visible -ex: Web search- than a traditional class)

12. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class) ?

"I doesn't believe so; having an online component yes, but not all of a course online."
"Some things are best done in a classroom."
"University is life for the brain", not the same if «online isolationist».

The future of DE = a balance.

13. What about putting an entire university on line?

"No. Changes in University are driven by money, skill necessities but also research and quality."
It's of no use putting courses on line if it is just for the first two reasons.

Annex 6

Interview - Joy Egbert

1. What is your position at IUB?

I am an assistant professor. I taught for 2 years here as an adjunct professor. Starting this fall I am assistant professor.

2. Which courses do you give? Which are face-to-face / online / mixed?

I started developing the L530 («Computer Assisted Language Learning»), a distance course, when I was an adjunct faculty member.
It has been going on for a year and a half, maybe: the first semester we offered it, we had one student distant and the rest of the students were on site; the last two times it has been offered, all of the students were off site; this spring it is about half-and-half. It is mixed (face-to-face and online) depending on the semester and what my teaching load is and who else we can find to teach the course. Two of my Ph.D. students have taught the course and one is currently teaching it now. So I am not teaching this semester.

3. Which are the advantages / disadvantages of one compared to the others? Which one do you prefer? Why?

The advantage of distance education is that students really take more time to reflect on what they are doing because they don't want to appear stupid in front of their peers, especially when you use online conference. It depends on, of course, how the course is set up, but ours is very interactive and students have to post not only their opinion but also assignments for other people to come and add on those kind of things.
So they are very careful about what they do, which they may not be in a face-to-face classroom, I think it is more kind of more rushed maybe and there is not as much time for that kind of interaction.
The disadvantage of online courses is that it is very hard to build a community with people that never see each other and know they never going to meet, they won't even see each other's faces. What we do in the beginning of my class is have each student post a picture so that at least we can get an idea. I think that that makes them feel more like «Ok, people know who I am, so I have to be careful».
I have to say that I prefer face-to-face class with an online component because I like to see my students, know who they are and get a social interaction going on, but I also like using Alta Vista Forum or another kind of conference to get them thinking beyond the class, reflecting more and doing things out of the class, where I don't have any control over them or where I can't tell them what to do or what to think.

4. ["Demand" profile] Which kinds of students are interested in taking your courses?

The kinds of students that take this course are usually people that are already ESL or EFL teachers. Some of the on-campus students are going to be French or Spanish teachers too,

so it is any kind of language teacher or someone who is going to be a language teacher, and it is about half-and-half (people who are teaching and people who want to teach).
They are from different countries: we have students from Japan, China, different states in the USA and a couple of other countries, depending on what semester it is.

5. [Technology] Which structures / technologies allow the 'implementation' of a course online?
   5a. Which are the software requirements for the developer / student?
   5b. Which are the hardware requirements for the developer / student?

I think the most important thing is some kind of conferencing software because that is what most good courses or interactive courses are built around.
The hardware requirements, it depends. If you are using a Web-based browser, of course, a lot of people in the world can't join your class because they don't have that kind of connection, they can't get Web-based or graphics-based information on their computer so they can't join your course.
Right now, in the course that I have and in most of the other courses that I have seen, you need pretty state-of-the-art hardware and usually the latest version of Netscape, because people are using CGI scripts, other kinds of plug-ins and Java-script that otherwise you can't use, which is too bad because you can also do the course using a listserv with people who have text only.
I think most people are saying: «Oh, technology combined with a distance class, see all the cool stuff you can do on the Web» instead of saying «what we really need to do is communicate using this forum, whatever the forum is, and talk about the content of the course». So it is a kind of flash thing. Hopefully it will go out of vogue after a while or people will get the kind of technology that they need to be able to join those kind of courses, because we are really leaving out a lot of people.

Q. Do you develop the course you give?

No, I developed the content and the way I wanted the pages to look, then I hired a graduate student to help put it together, because it is big, it is a really huge site. Two Ph.D. students who have taught it have kind of messed around with the site and some other things too, but it is still generally there. There is no way. I wouldn't have time. It is huge and they have to keep checking the links because all of the readings are online too, so that everyone can have access to them. So actually it takes a lot of time to keep the site in order.

Q. What about conferencing software? Do you prefer Alta Vista Forum?

I absolutely do not. The one I like is WebBoard, for the way I learn it seems more useful, being able to see all the things in index and then see the message. In Alta Vista Forum when you click on a message, you only see that message and you don't know where you are in the whole scheme of things, that doesn't work for my mind. But I am not sure, I would have to poll the student and see what work better for them but I don't like Alta Vista Forum.
I've also used Lotus Notes conference, but what I really like is First Class because it seems just more logical having a little suitcase, a little filecase and click in on those, but they stopped supporting that so I can't use that anymore. So I actually asked Rob if I could use

WebBoard in the spring somehow, he hasn't answered me yet. Right now, I am using Alta Vista Forum just because that is what the school supports, unfortunately.

6. Do you use video or audio data? If yes, how do you hand it out to students?

We don't really have video or audio data that we are using now. In the future, I hope to. I earned a grant to be able to film classrooms actually and use the video, we don't know how we are going to hand it out. But there are a lot of new technologies that make it a lot easier to do, so we'll see if that happens.

7. And what kind of interaction do the above mentioned structures support? [synchronous / asynchronous / mixed, one-to-one / many-to-many / ...]

We use a MOO in our class, for one thing, and that of course is synchronous. The conference is asynchronous and it is both private teams and then up to the whole class. We rarely use e-mail but sometimes, if it is personal, if somebody just needs to go back and forth very quickly, because it is a lot easier for my students and for me from home to use e-mail than get a PPP connection, dial up and get on the conference to talk to somebody. For private or personal things, we use e-mail.

8. What is the environment of your online course(s)? (syllabus, library, café,...)

It is not really any of those things. It is more like an academic conference, like if you go to a conference, sit around in a room and you are having a seminar. It is kind of more like that, a seminar, I would say.

9. Do you face problems with motivation? (ex: students who participate less, ...)

There are definitely problems with motivation with some students; usually that is when e-mail comes in saying «is there something I can help you with, do you have any problems with this?»
Actually I took an online course just to see what it was like this spring. I hated it. I just did the very minimum that I had to do so I have some idea of why students might be there. But the thing that we do in our course is give a lot of choices of kind of projects, activities and things students can be involved in, so they will find something that motivates them instead of the course I was in: «Here is the thing for this week. Here is the thing for the next week. That is exactly what you need to do».

10. How do you evaluate students in an online course?

The evaluation is almost the same as it is on campus. Participation, then having to do projects which are graded, just as the papers that they write. I don't give tests but I think it is mostly those three things, so more or less the same.

11. How can a prospective student evaluate an online course before subscribing?

We give students who ask what the course is about access to the whole course because they can look, we don't care, read all the readings if they want to just learn about it.

Unless they pay, they don't get credit so there is no harm in them being in the site; so far there hasn't been any harm so we let them go look and see all the activities, what the time-out is, the schedule, the syllabus, all these kind of things.
It is password protected. I am not sure if there is a good reason for it, I don't know why we did that, really, maybe just to make sure that we didn't give any «secrets» on what we are doing, I am not sure! There are a lot of other courses like ours at other institutions and they are pretty different actually.

12. [Costs] What are the overall costs of an online course for a student + for the institution? (also compared to a traditional course)

It is hard to say what the costs are. The School of Education currently doesn't reward or doesn't acknowledge that it takes a lot longer to teach an online course in man-hours being at the computer than it does in a face-to-face course where you are there three hours a week. I was in a distance education task force in this School and we talked about that. We made a list of recommendations for the Dean saying that we need to consider that it takes so much longer and how many students there are, etc. But so far they haven't worked those kinds of things out. They are giving money for... for example they gave me a three thousand dollar grant to hire the graduate students to get this course online.
In fact there are five online courses in our Master's Program we are paid for by «Continuing Education» or whoever pays, but the are much more expensive initially than traditional courses, just because of the teacher time spent in development: you can make a syllabus and it's done, but to get it online, to make it looked at, to make it readable, to add the links takes a lot longer, so the costs are higher.
The other thing is that off-site students, for example from Pennsylvania, pay a lot more money then in-site students to come to a course. All of our distance courses are at in-state tuition so there is a cost there for offering out-of-state students the same tuition as in-state students get.

13. [Benefits] What are the overall benefits of an online course for a student + for the institution? (also compared to a traditional course)

The benefits are: (1) publicity for the institution; (2) wider audience; (3) in our department anyway, one of the benefits has been that teachers who are traditionally not very good teachers or who have one single mind set on how teaching is done really had to re-think that. Learning new skills, it is a kind of professional development for them and it is supported very well in our department: the Dean in the department said «ok, we really want to do this, this is great, we value this» so people are doing it, that is a benefit for us.
I think those are the three main ones.

14. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class)?

I think that most courses could be put entirely online if everyone had the best technology that is available to be able to access them.
Have you seen that model, «Oncourse» that they did at IUPUI ? There are things done on labs that can be done online, but at this point if we did that without an adjustment period by students (expecting to be with the teacher here and then here and telling them what to do) I

think that it wouldn't work well, it wouldn't be received very well, so it is possible, but I don't think it is a good idea at this point.

15. How far do you think a university can go 'online'? (One online course? One program? One degree? ...) Why? What are the limitations?

Well there are universities that are totally online: the Open University, for instance. Other places have many complete degree programs online.
Some people learn well that way and some people don't, that is the limitation: if we are not reaching the student population then we are not serving the people that are supposed to be serving.
I think we could go all the way online, I think we shouldn't and I don't think we will. We already paid for the buildings! Also, some people want to come to school, that is the point at least for undergraduates: get out of the house explore the world around and do something new. Online courses can work with certain kinds of undergraduates, those who are self-motivated and see the worth of doing that, maybe who have jobs and don't have another way of going to school. But with a lot of them... That is not what college is for, it is not really to focus on just the academic stuff, it is to go and have fun too: meet friends, go to the bars and that kind of things.
I can see that it wouldn't be motivating to a eighteen or nineteen years old, that is the problem. But if the courses were really fun and offered a lot of other things, which I don't know how it could be done but I am sure there are ways, then it may be slightly more motivating. But that is a hard crowd! Even on campus it is a hard crowd.

Q. Do you want to add something?

One of the things that I think is important to think about is the differences between how online courses are designed and what features of the course itself are the critical features that all courses maybe should have or should think about.
We already talked about that, because I said that a lot of them are conference-based, but some of them are not, they are just like correspondence courses where the instructor mails the information to you and then you mail the information back.
Some of those things about how to motivate students and all those other questions center around «what does the course do» or «how do you participate in the course», which that is an important design consideration.

Q. Do you know about recommendations or guidelines for developing an online course? Is there some form of control over one creates?

No, not at all. No one checks. As long as you have the students and you say that you meet the requirements of the course and you give the grades and fill out all the paperwork correctly, no one checks. Ask in the Dean's office for the «Distance Education Task Force Report» and that gives the recommendations that we have made for at least the School of Education's distance courses. That answers also a lot of these questions because we talked about a lot of things, about trying to make something standardized. That might help.

Annex 7

Interview - Hope Elkins

1. What is your position at IUB?

I am an assistant professor part-time.

2. Which courses do you give?

Right now, I am teaching 2 courses.
One is X400/L504 («Diagnosis in Language Difficulties»), which is both taught on-campus and online. It is rather interesting because my on-campus students are corresponding via the e-mail with my distance students. So we have this conversation going and last week, one of my distance students came in and presented to the on-campus class. That was really interesting.
The other class I am teaching is X425 («Practicum in Reading») and right now it is basically a distance course. Students send me paper and I observe the ones here in Bloomington. By next semester, that one will also be online.
And I teach L525 («Practicum in Language Education») in spring. That is another reading methods course for advanced students. That one is an on-campus class but by the summer it will also be online.
I have both undergraduates and graduates in class.

Q. Don't you see a difference between undergraduates and graduates in class?

Yes, but it is really nice because the graduate students usually are much more experienced than the undergraduates and so they tend to help the younger ones and then the younger ones usually add a lot of interest to the class because they bring in all these experiences they are having. It works out beautifully. All together I have sixteen students.

Q. Do you think it is possible to do that with a large group, like thirty persons?

I hope that I'll never have that! I like the size of this group.

3. Which are the advantages / disadvantages of one compared to the others? Which one do you prefer? Why?

With on campus classes you really get to know the students face-to-face. Any questions and comments can be made right there in class, if somebody has a question, you can address it immediately, get it out of the way and it is over with. If you need to meet with somebody for a conference, they can just come in and you can conference. Another thing that I found as an advantage to on campus classes, we can do a lot of creative class activities, like hands-on strategies, that sort of things that you cannot do at a distance.
But advantages to distance are... I have students from really different countries, all over the US, so we have a really wide perspective of ideas and locations coming into the class. Even though it takes longer, everything has to be addressed over the e-mail. I think some

of the conversations are really more in-depth than in class because not only I have to think through what I am saying to my students, they have to do the same to me. So, there are trade-off, advantages and disadvantages, to both.

4. ["Demand" profile] Which kinds of students are interested in taking your courses?

Almost all of my students are school teachers who are trying to get their Masters and they are not close to a college, so they are taking the class over the Internet. I have one person who is a high-school administrator taking the class. I think everyone of my students right now is a teacher.

5. [Technology] Which structures / technologies allow the 'implementation' of a course online?

5a. Which are the software requirements for the developer / student?

I took a workshop last spring. The Center for Educational Excellence offered this course and we learnt just the bare bones of HTML editing. We learnt how to use the programs that translate HTML to word-processing, we learnt the theory underlying online courses, that sort of things. Basically it was just giving you hints on how to organize your course, how to put it online, how to be sure you have everything that is supposed to be on there.
The basic issues are related to distance courses and that was all great information. And of course for myself, I have to know how to use word processors, which I think everyone here does.
But usually I use a consultant to actually put my courses on the Web.
And the students would have to know how to get to the course though the Internet, how to register and that sort of things, how to send assignments, just really basic kinds of information.

Q. Don't you use any video or audio?

Not with this course. The one that I am developing for the next summer will have video.

Q. And how do you plan to hand out video data?

I'll probably have it on the Internet, but probably I will also have it that I can send to students who might have more difficulty. Some students have more difficulty than others using the Internet, so I try to adapt it to their needs.

5b. Which are the hardware requirements for the developer / student?

Actually, all I use is a computer and disks and then my consultant has all of the other equipment that is necessary, so very little is necessary for me.
The students will need a computer that has the Internet, basically that is it.
At this time in the courses I am teaching now I don't need anything extra. We did have to have extra power added to our computer for the Internet. The course I am developing might take some extra. I am not sure.

6. And which kind of interaction do they support? [synchronous / asynchronous / mixed, one-to-one / many-to-many / ...]

Right now, my course is asynchronous. The one I am developing will be synchronous, at least parts of it will be. Mainly I do one-to-one, I talk a lot to individual students using e-mail. Sometimes I send something to the whole class, but basically, in this particular course, it is one-to-one. Even if we want to discuss something, we do it via the e-mail, I have a distribution list.

7. [Costs] What are the overall costs of an online course for a student + for the institution? (also compared to a traditional course)

I think students who take my course have to pay a 90$ technology fee, and of course they have to get their textbooks, which is just the same as the on-campus class, and they would need the extra... I mean, they have to have the Internet and there is a cost related to getting to the Internet for the course.

Q. The textbook is not online?

No, they actually get a book. You get into a lot of legal trouble when you try to put the whole textbook online, it is very difficult. If I wrote the textbook, it would definitively be online but I didn't.

For the institution, I really don't know what their cost is like, there must not be enough though to... I mean, they still encouraging people to do online courses so they must be making money somewhere or they wouldn't do that!

8. [Benefits] What are the overall benefits of an online course for a student + for the institution? (also compared to a traditional course)

The most immediate one that comes to my mind is... I have a student in China taking this course, so anywhere if you have the Internet you can take a course like this.
I think another advantage that I found for my students is that they get a lot of individual attention. I mean, I am constantly e-mailing them, I respond to any papers they send, they get much more attention from me than if I were teaching a class with thirty people in it.
For the institution... well, I am not sure. A lot of course hours are now in this department alone, I think our department chairman said «at the beginning of the semester we have one thousand credit hours coming from our department online», so that is a lot of money, a lot of exposure for the university.

9. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class)?

That is a hard one to answer since I am not in that field. I think it is possible to translate almost anything online but I am not sure if that will be effective. I think the class I am doing is very effective online because it is a «practicum», which means my students are working with learners out in the field, and so I am constantly advising them and that sort of thing. It works beautifully, I mean they are happy, I am happy, everybody is happy!

But I am not sure about some courses. For very large classes, I think that it would be too hard unless you hired a lot of extra help because there is no way, I mean, I have a really nice manageable load of students, but if I had twenty-five or thirty students, it would be really hard for me to manage that. So the size of the class would make a big difference, whether or not it would be possible.
And I think some information doesn't translate as well to the Web as other kinds. I am trying to think of something in my field that might not... And right now, I can't think of it.
I know several people in our department are doing online courses, and other than managing so many students I haven't heard any complaints. The one complaint I have heard is the people who do a lot of group conferencing, that sort of thing, they have a lot of difficulty getting people to discuss topics with other people in class. If you had a class with a lot of that kind of things, it would be a real challenge, I think.

10. How far do you think a university can go 'online'? (One online course? One program? One degree? ...) Why? Which are the limitations?

In this department we are not offering a Master's degree online yet, because some research courses such as Statistics are not yet available online.
The NOVA University, the whole thing is online, so you might read up about that in your project.

11. How do you evaluate students in an online course?

My course, as I said, is a practicum and my students actually work with learners out in the field, then they turn in papers (they can send them through the e-mail or through regular mail, whichever is most convenient to them) and then their final project is a case study. All of their assignments are accumulated in this case study, which is a summary of all the data they have collected.
So basically how I evaluate them is how well that they have collected their data, how logical the data is, how it connects with their instructional plan and what their recommendations are. And also whether or not, of course, they have completed all the assignments. I also look at their writing quality and professionalism... basically what I look in classes here.

12. How can a prospective student evaluate an online course before subscribing?

That is a good question. I don't know. I have an evaluation module in my classes, but it is at the end of the course. Actually, they can look at my course, my class is not password protected, so I suppose that they can look at it if they want to evaluate it.

Q. How can you tell a course with a nice interface but not really well from a good course?

I suppose if you search through all of it and read it, you would know, if it were presented in a way you could understand. A lot of students who are potential members of my class e-mail me, then ask me specific questions about the course, and that is a way. Of course, some of them get to the course word to mouth. Our department chairman recommends the course to people who call about getting a Master's degree.

But honestly, unless they want to look at it or talk to some... Sometimes I say «e-mail so and so and they can tell you about the course», you know, students who have had it before, but other than that, I can't think of any way that my students could evaluate my class before they actually began working on it.
All I could say is «walk through it and read it by yourself».
Usually when people e-mail me they ask: «what is that your course is aiming at?», «what am I going to learn?», I also have that written out on my top page, so they can actually see the kinds of things that they will be learning in the course.

13. Do you face problems with motivation? (ex: students who participate less, ...)

I won't say I face problem with motivation. It usually takes my students online longer to finish than the ones on campus, it isn't motivation, it is just that most of them work full-time as classroom teachers. And, since this course is a practicum, they are also completing a lot of assessment tools, making a case study.
Sometimes, especially if a crisis comes up in their lives, they have to put off the course for a while, but I haven't really run across anyone who seems unmotivated yet.
Since most of them are teachers, the course may be really related and personally relevant to them, because they are dealing with kids with reading problems in their classes everyday. This course deals directly with that, so they've been so far very motivated, but they do get behind for one reason or another.

Q. The course you give online is it a choice or is it required?

It is required for the Master's program, I think. Our Master's program is like we have an ESL and we have Adult Literacy, I think, and it is required for some people but not for the others.

Q. Do you want to add anything?

I discovered right away that a traditional grade book doesn't work with something like this. So what I have done is I created a note book and all I do is I put the assignments, I write notes, like when people send me e-mails about a problem they are having with their learners, I jot that down and it works out much better than a grade book. You were talking about assessment, I take really careful notes about everything that comes to me rather than just putting down A's and B's and that sort of things.

Annex 8

Interview - Steve Malikowski

1. What is your position at IUB?

My position at IUB is graduate assistant at the Center for Excellence in Education. That role is very flexible. I help give workshops and I find new resources for Education, but my scholarly interests are in the area of online learning and I have been working in there for about three years now. Here I am able to apply my interests in my work; for instance, we give workshops for faculties on distance learning issues, then I will give a presentation on the online learning things. We also work with K-12, for instance, and that is less common for online learning, however that is also starting up, there is something called The Virtual High school here in the US. It is a start, it probably will take some time to get going.

2. Which hardware do you know is needed for the development and maintenance? What software?

The hardware that I have seen is basically a Web server and that can be as bigger or as smaller as you want, depending on how many users there are.

The software, I will show you a Web site: I have been keeping up a Web site of Web course resources for about the last three years. It is grown to the point now that people look at it and they just send me information so it sort of maintains itself that way. There are several very good Web courses development systems or even online university systems available. I also just got back from a conference in Vancouver that was dedicated to online learning: Tom Landour was there, Linda Harasim, Leo Teles, they have all been doing this for ten years and one of the books that I highly recommend is by Linda Harasim, "Learning Networks: a field guide to teaching and learning online" (ed. MIT Press, Cambridge - 1995), a very good book. Another very good book is by A.W. (Tony) Bates, who was also at the conference: it is "Technology, pen learning and distance education" (ed. Routhledge, N.Y., 1995). He reviews a variety of distance learning technologies and then compares them to each other. The executive summary is particularly good in that book, he speaks quite highly of computer-mediated communication for distance education.

3. Which are the software/hardware requirements for the students?

A Web browser, hopefully one that ... I prefer browsers because I have also done technical support and I find that if you require more advanced or sophisticated hardware and software, you are going to lose people and so I would prefer not to use Internet-based video or audio, I prefer to use asynchronous text, very simple but very effective tools as Harasim & Co. point out in their book.

I am working with Walden University right now on my dissertation and they just started requiring an orientation course for one of their programs, it is a course dedicated to help students become familiar with the online environment, because they really need that.

4. Which other media can be used (video, audio...)? How do you think it is possible to

make it available for students?

With the advent of streaming video, streaming audio, dynamic HTML, Java, with all those technologies you can do a lot sophisticated multimedia.
Personally, I have developed a lot of that multimedia; before I came here I worked for Northwest Airlines where I created computer-based instruction for pilot training. So I have done multimedia development: it is expensive to develop, at Northwest Airlines I believe it was either four or five hundred employee-hours for one hour of training. You get your graphics in there, your subject matter experts, your reviewers, you do usability tests etc. So if you are going to do it, in my opinion, you'd better have a clear cost justification for it.

My field is Instructional Systems Technology and Instructional Design is a big part of that. If you design your lessons carefully, an asynchronous discussion about a book chapter can contain a lot of learning. If you are going to do something that requires a visual element like producing a video, talking about producing a video doesn't accomplish much, maybe you have to see some video then. Anyway, I am quite selective and very careful about picking higher media. Even when Internet 2 comes out you will have to base your priority levels on Internet 2 and so that also runs up costs. I acknowledge that there are a lot of resources available but I am cautious with them.

5. What environment do you think is needed for an online course? Which one is available here at IUB?

I think you need a class Web site and a means for interaction but then again some courses are offered without class interaction at all, it is basically a correspondence course, which I think is very unfortunate, pedagogically it is very weak: you could just go to the library and read something, except in this case you get some credits for it.

So, I would say a Web site and some means for communication. Some courses still use e-mail lists because they have the advantage of people being familiar with it; the disadvantage is they don't manage a lot of postings very well and they are cryptic: "How do I subscribe?", "How do I unsubscribe?" and this kind of things.

I would say that the class Web site has also to contain a café. I think a café is important because of two reasons: (1) it brings the class numbers together and (2) it takes the "social chit-chat" out of the classroom.

In considering which media to use for resources, whether it is going to be a book or a Web page, I guess I would have to see which resources are most convenient and most effective. If sending a student a videotape works then I wouldn't do streaming video; if a textbook contains the information then I am not going to write it up again. A sort of counterpoint to that is ... a class I have been working with for the last 3 years, it is really exciting class, it is called "Grief in the family context", so counselors from all over the world are in this class and we always have students form all over the world (Israel, Hawaii, Ireland, Canada, U.S., etc). the get roughly two hundred postings per week to the class discussion, three thousand in a semester. The teacher has carefully designed the class: she has 3 students from previous classes moderate student groups so she never reads every posting, but that is not part of this class preparation.
The instructional design for any distance education technology, video, audio, I think

becomes much more important because you can't walk to the class and say "I am going to change things today", it is not that easy, but she has carefully set her class up, it is not rigid either, she's built in flexibility, it is a very successful class.
Anyway, a problem she has is that she is using books in her class like any other class but when she first thought offering the course, she talked with the people at the IU Bookstore and she said "My students haven't received their books yet and it is the second week of the semester" and they said "Oh, don't worry about it, just put a copy on reserve at the library". The student in Israel couldn't make it to Bloomington so they had a problem!
There are institutional issues but that is also part of the change process here. If I were in that situation, I would have contacted the author, explained the situation and then requested permission to either photocopy it and FedEx it or put it on a Web site, but a lot of authors aren't going to let you do that because if it is on the Web, even if it is password protected, it is much more at risk for copyright.
Anyway, I guess I would look at which materials I need and then find the simplest cheapest solution.

6. Do you know about any institutional guidelines to follow as someone develops an online course? Is there some control over what one creates? (Templates, standard results,...)

I don't know of any institutional guidelines at IU at least. I believe Walden has some guidelines.
Have you heard about "Webcourse in a Box" tool or WebCT"? A simple way to describe them is to say they are templates, sophisticated templates: you can modify them in many ways, yet they are still templates and all templates have limits in how far they can be modified by definition.

There is no control, not that I know of. Again, I always compare this to a resident course: no professor here is going to let anybody else come in and tell them how to design their course.

We have workshops here, I think about once a month there are presentations on how to most effectively use distance education, recommendations. The person who does this is right across the way, Chris Essex, we can meet him on the way out, he can give you a list of what we offer.

There is something I wonder about: I try to be always sort of careful in looking at online education at its own issues; personally I think a lot of the issues we look at here apply to all distance education technologies. For instance, are there such resources for a video-based course? Are there such resources for a correspondence course? They change a little bit but a lot of them the same principles apply; one thing I am sure they say in those little seminars is to always have a syllabus. Well there is always a syllabus in a video-based course, there is always a syllabus in a correspondence course, and there is always a syllabus in a resident course. But that is just my point of view. Right now, I would say those workshops are the closest to it, at least in the School of Education.

7. How can a prospective student evaluate an online course before subscribing?

That is challenging!
If I were a student, I guess... I am always comparing to other things, so if I wanted to buy a car I would probably go to the car dealer that has a nice showroom and quite a few cars on the lot and if one of them looks like it is in a pretty tough condition, I probably wouldn't buy a car there, it is a matter of experience and variety. If I saw an institution that had been giving online courses for a while (I could probably find that out) and the course I wanted to take had been offered for a while (and I could probably find that out as well), then I would probably take the course there.
Interestingly enough, that is similar to how we pick resident courses: I picked Indiana because I knew it had been around for a while, it is the best program in the country for IST and so forth, so it is surprisingly similar to picking other courses.

What I would do is that I would actually find those institutions that have... if I am a student, there is a particular field I am interested in so than I would figure out which schools are rated the best in that field and then I would call the school and ask "Do you offer these course through distance education?". Some schools are doing so well that they turn students away, and that is really what an Admissions Office is for, it is to only let in students they want. If they are doing fine, they are making up enough money to get by, they are probably not too anxious to let new students in for distance education.

Anyway, I would call to find out which courses were offered, how long they were offered and so forth, but the information "behind" is hard to find.

8. What are the overall costs of an online course for the institution (implementation, maintenance,...) and the student?

Tony Bates covers that very well, his primary area is cost analysis, price performance sort of things regarding different distance education technologies, so I'll refer to that book. I can say in general that correspondence courses with audio tapes are the most cost effective because you can hear the lectures and so forth. Interactive video is the highest. Tony Bates also scales that out over how many students you are going to enroll, so if you are going to enroll only fifty students a year the cost-performance is going to be different than enrolling five thousand.

9. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class)?

No, no. It is not possible to put all courses in a classroom either because people can't always come to a classroom. This class, "Grief in the family context", they might be able to fill the class here if there are enough students interested but if there aren't, they can't offer the course.
I am turning the question around in saying that no way of offering a course works for all courses.

I believe that we are still in the process of learning what online education can do and more and more courses are being able to, at a pretty fast rate. It takes quite a few changes in perspective, I think, because for instance if you are used to lecturing it doesn't work so well because if you are doing a lecture over text, that is complicated too. So you have to change

you mindset to maybe student groups sort of things, so no, I don't believe.

In this conference I saw an interesting online class that was about dance. They used dance animation software to create a routine and they shared the routines they made so they still had the grace and what worked, what didn't work and they shared them, critiqued them... It was quite interesting. So some innovations like that can happen, not always, but there are still many unexplored innovations.

10. How far do you think a university can go 'online'? (One online course? One program? One degree? ...) Why? Which are the limitations?

I think they can do any one of those, depending on their interests. Why? Some universities have no reasons to it at all. I believe IU could get by without giving any online courses, we would do just fine. Even though I like the concept, it is just another tool in the toolbox and they have many tools here, students come here from all over the world just to sit in the same classroom and learn from professors like Rob Kling: in SLIS they are happy if he gives two or three classes a semester because he will fill it up with students.

That also ties to the limitations: I have talked with some professors and heard from some departments that they want to offer the courses over the Web so that they can make a lot of money. In a market economy that is the first thing we all think of: "put some money in, get more money back". Harasim describes this very well and other professors described it to me very thoroughly that it takes a huge amount of time to set a course up.

As mentioned earlier, you have to do the preparation beforehand, more so in any distance education courses including online learning. That preparation is the media development, it might be having to change the way you are used to conducting a class and the latter is probably a lot harder than the former; if a professor has been teaching for five to ten years and happens to be good at lecturing and he can do that in a moment's notice, how do you do that online? Audio? That is hard. Text? That is hard.

So those are some limitations but there are some virtual universities right now (Walden University, University of Phoenix) and they seem to be moving forward in countries like Canada that has strong distance education needs. Australia I understand is more interested in letting students work at their own pace and so they haven't got as much into Web sort of things, they are more interested in correspondence courses because of the flexibility.

I am trying to think about some other issues. Sometimes the history of a University is a major burden because they have to change the way they have been doing things for a very long time, like the Bookstores. For example: the bookstore used to tell the professor "we can't get the books so put one on reserve, we'll have them for you in a couple of weeks". Also a lot of department Chairs saw this as a chance to make more money so they told their professors "put this course online, now we have the whole world available and we can fill up courses". They forget that they have to get that professor time off to do that, so they have to lose money first and most of the time they are not ready to lose money before they gain money. Then they also have things like marketing the course: I have seen courses with only four or five people in it. So it gets really kind of messy that way.

At any rate, those are some challenges. That is a whole arena filled with unexplored

challenges: resident universities have to do some changes that they are not aware of to be able to do virtual classes and it is difficult. There are more examples.
Dr. Kathy Gilbert teaches the course "Grief in the family context" and when she first made the course she called it "the monster that ate my sabbatical". She had a whole semester off and this project consumed it, but she carefully prepared it and now it is paying off.

Q. How long does it take to reach pay off time?

Personally I would say that it depends on the course, on the way you market the course, on the life of the course (how long is the course going to be worthwhile), on who is offered to, etc. There are a lot of variables: is it for post-doctorates, doctorates, masters or undergraduates, is it required or optional. I think Walden University and the University of Phoenix have this sort of information.

11. What are the overall benefits of an online course for the institution and the student?

Let's just presume that it works.
They expand their reach in terms of credibility, they are more recognized also internationally. They do have whatever level of income when it does pay off.
For the student I think ... There is an article called "I got my degree through e-mail" and it says that there are currently one million students in virtual universities and thirty millions students in resident universities. I believe the number of students in virtual universities is supposed to triple by the year 2000 and I think the reason why is (and this is a benefit for the students) since most of these courses are asynchronous, they are working as a group (like with an e-mail list) and so they can interact with the group and do their group projects at their own pace. So if I am working full time and I have kids or whatever, it is easier for me to make time from midnight to one in the morning than it is to meet a class at 6 p.m. I can take the course at my own pace, I can get the financial rewards with having more education, maybe I just enjoy learning.

I think convenient access to additional education is big pay off for the student, and there is a social element there too: in Dr.Gilbert's class when students are travelling around the country for the needs of whatever business they are in, they stop and see each other even though they have never met face-to-face.

Q. Any advantages of online?

It is a lot of work for both teacher and student. For instance, for a group project done asynchronously (maybe you have experienced this with e-mail) just setting up the time to meet is difficult because you almost have to say "we have to decide on when to have the meeting within two days, so read your e-mail in two days" but that may be asking a lot because one student might be on a business trip or all of a sudden the kids get sick or whatever.

Anyway, the discipline involved in asynchronous learning is different and it takes some getting used to. It is a lot of reading: I heard constantly that students are surprised on how much reading they do in an online class. Like I mentioned, in Dr.Gilbert's class there are two hundred postings a week and three groups, so that makes seventy postings per group.

Seventy postings a week you have to read, it is a lot of reading, but then you also have to do your class readings and to interact in your group you have to read what they said, think about it, put it in terms of the book and then post a reply. It gets to be a challenging process but apparently people find it reasonable, not all people, this is not for everybody.

Self-discipline is an important element. When I first came here, I have heard about a student who dropped down an online course saying "I can take this class in a classroom, sit in the back with my sunglasses on and take a nap throughout the class". It is a lot easier so he dropped the online course. I intentionally selected this for the message that is underneath it: maybe learning self-discipline is a part of college experience. I wouldn't force anybody to take courses this way.

Regarding self-discipline and other students' characteristics in her course, Dr.Gilbert says she is troubled sometimes about having mostly women taking her course, which is unfortunate, but so far it is the case. When they come to the conclusions in the course they think they have the answer but it is the answer that twenty-year old women come up with and not people with more experience with family issues. When you are twenty you think very differently from when you have had a family for five or ten years. Dr.Gilbert has a flexible course, she gets a mix of resident students taking her online class with older students and all of a sudden some of the differences in discipline and so forth make for a fun educational mix.

I don't want to make it sound like I am not aware or not responsive to the problem of student discipline, because for some students it won't work and there is no sort of test to be taken at this point to see which works, which is more effective. For some students it could be better: for example suppose we are in the same class and I am a tall guy with a loud voice and I don't mind raising my hand in class and saying "Hold it! I think this is the answer". You may be more timid or quiet and you don't want to go up against that, we have all been in some class where there has been that difference. In some Asian cultures, Asian women won't argue with an Asian man or disagree with. Well, you have a little bit more social comfort when you are sitting at you own desk, so it isn't for some students but it might be even better for others.

Q. Do you want to add something?

About Harasim's book, the first section is not so relevant, but the second section, the "guide", is just outstanding. If you ever have a chance to see Linda Harasim, do: she is one of the most animated and lively speakers you will ever meet. I have met with her a couple of times now. Tony Bates: so much solid experience and also a very good writer. There is a lot of good work going on that way.

Annex 9

Interview - P. S.

1. What is your position at IUB?

I am first of all a graduate student working on a Ph.D.

2. Which courses do you give? Which are face-to-face / online / mixed?

Currently I teach two online classes: one is L530 («Teaching Adults to Read») and one is X152 («Reading Effectiveness»).
I developed both of these classes: X152 basically by myself, L530 was sort of a committee effort.
This is my third semester teaching L530.
X152, I have taught it just one semester, it is an undergraduate course. It is not working out and we are not going to continue it with undergraduates. Basically, so far at least, the undergraduates have not... But let me give you the numbers: eleven people signed up, six people dropped and, of the five who remained, two were turning on assignments. We just feel that perhaps some undergraduates are not self-disciplined enough. Maybe to handle an online course they need the discipline perhaps of a face-to-face course.

L530 is a master's level class and everybody who takes it is distant. X152 students are mostly on campus but it is strictly online.

Q. Don't you require people to meet at any time?

I have occasionally met with the students from the L530.
One of the most difficult things I find about teaching distance education is what to do when you want to give feed-back, when you feel it is necessary to give feed-back, that is fairly strong.
When you want to say to somebody «You are not getting it», then you have to meet with them because I find really hard to do that online. So far it has never come up that I had to do that with somebody who was so far away I could not meet.
I have met with one student that way and I have an appointment with another student.

Q. Don't you require the whole class to meet?

I do not. It is impossible: my farthest student this semester is in Mexico and I have students in other states so it wouldn't even be feasible.
They are required to participate in an online conference, it is not optional. In fact, the structure is so that they must accomplish tasks together online so that they must talk and share expertise and knowledge with each other.

3. Which are the advantages / disadvantages of one compared to the others? Which one do you prefer? Why?

The advantages of online compared to face-to-face? I can't think of any.
Well, no, the advantage is you can reach an audience from a farther distance but I don't think it is the best form of education. It has not worked out for the undergraduates at all, and for graduate students, who are already fairly committed and who can articulate in a written language, they can handle this because they are just committed to it even if they struggle with it (they struggle with not knowing each other, you can actually see them negotiating relationships with people they have never seen). I think it is hard for them and it is sometimes frustrating because, in order to force the interaction and get some of the elements of collaborative learning, I have to give them a task together and they have to deal with learning how to do that. So I think it takes time away from content, time, they could be learning content, so if I had the choice, I would teach face-to-face.

The other thing that I think is really important is that in both cases, in both classes, I am teaching a skill, not a theory, and so it is very hard to evaluate whether or not somebody is getting a skill if you can't actually watch them do it. It is very difficult, I have to do a lot of guess work.

But I am going to be doing it because there are those people in places like Mexico, Alaska, and now they have an opportunity to take this class that they would not otherwise have.

4. ["Demand" profile] Which kinds of students are interested in taking your courses?

The kinds of students interested in taking my courses? The ones in the X152 were undergraduates basically who thought that their reading skills were not up to speed for college level work, and generally they are right. If people perceive that about themselves, they self-select into that class.

The other class tends to be professionals in the field of adult literacy: some of them are people who want to be professionals in the field, and some of them are prepared to do it on a volunteer basis, but for the most they would like to work. They are often teachers, people who were teachers in the past and now work in adult basic education, GED programs.

5. [Technology] Which structures / technologies allow the 'implementation' of a course online?

I use the Internet, of course. I require them to have an e-mail account.
The problem I have been having this semester is about the whole process of submitting papers. The e-mail and the conferencing system tend to work, but all of a sudden my software will no longer translate their attachments and everybody is using real up-to-date software, because I have asked those questions.
Therefore, I am looking for other ways to get papers from students so that I don't have to spend hours re-formatting in order to see what they are trying to say!
That has been the biggest hurdle of the semester: to get papers, I spend time I should be spending reading and responding to it just trying to get it so I can read it.
I am a Mac user and most of my students use IBM so that can be a real problem.

6. And which kind of interaction do they support? [synchronous / asynchronous / mixed, one-to-one / many-to-many / ...]

I set my class up so that I don't accept people into the class after the first week, whether it has three people, or five or however many.
I try to make a small group because I require interaction at every step along the way and furthermore I tell them that if they have to choose because their lives have been busy, they can turn in papers when they like, but they must participate in the conferences as they go along, so that they don't get out of step with the class. Basically, I try to get everybody finished on time, and so far I have, everybody is finished either on time or within a week.
It's asynchronous, small group discussion.

Q. Don't you need to motivate people?

No, I have never acted as if they had a choice about the tasks.
It is clear from the way it is set up that if they are going to do the class, they must do them. It has never been a problem.

7. . Which are the software requirements for the developer / student?

For me, I needed to learn how to use a program that converts to HTML, that does HTML, because I didn't want to take the time to learn HTML.
I use Claris Home Page but I could use Netscape or any of those, I just happened to buy it. I can create my documents, it puts the color in, it does all that stuff, and I find it easy to learn and use.
Learning it gave me a lot of freedom: the first semester I had somebody else put it up for me and I didn't like the way the course looked, I couldn't make changes, ...
The nice thing about having it put up myself is that I can actually adapt the course as I go along. So I do, I use that.

The things they need to be able to use is they need to be pretty effective with a word processor and they must have a browser, and e-mail.

Pretty much I am in touch with all my students, at least once a week. I get e-mails probably from everybody, maybe on the order of once or twice a week, but they are also very active in the conference. I think on average they are on three times a week, there is a lot of interaction. I have a conference right now which is three weeks old and there are more than a hundred messages on it, four or five people, so I think the discussion is pretty active.

I think that my course pretty much demands more recent browsers. I think they would have problems if they were trying to use lynx or something.

8. . Which are the hardware requirements for the developer / student?
9. [Costs] What are the overall costs of an online course for a student + for the institution? (also compared to a traditional course)

I don't know.
I don't know what it costs either, I have never looked into the costs, honestly I don't know, I'll have to check that.

10. [Benefits] What are the overall benefits of an online course for a student + for the institution? (also compared to a traditional course)

For the students, I think it is basically that it enables them to take courses they wouldn't otherwise have access to.
I think access is the big issue. And I think that is an important consideration in terms of justice, overall justice.
I like that about it and that is part of why I am willing to do it.

Q. But to have this kind of access, they have to have a computer and an Internet connection. Not everybody has that.

Yes, that is true, but what I am saying is that it is better than nothing.
I think it does broaden access, I mean I had a student in Alaska, and another one is down in Mexico, that is as far as I have gone, but others have students overseas.

Another benefit is that I think that the way the students work with each other just requires a greater level of analysis and thoughtfulness.
The tasks require them to work together in a whole new way and I think they must be more focused. I don't know, because I haven't done it as a student.
It isn't always successful either but I think that is a potential benefit at least.
I haven't figured out what the institutions are getting out of it yet. I keep hearing talk about «it is cheaper», and there is a part of me who says «it's cheaper because they are not paying us enough». But it is hard to know.

I think that the institutions... personally I feel like they are getting into it because it is the rage and they are afraid of not participating, but I could be wrong with that.

11. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class)?

No, I don't think it is possible to put all kind of courses online. I think that even my own class would be better if I could ... Since I am teaching people to teach people to read, it would be better if I could see them interact with their students, if I could give them ongoing feedback when they are working with their students, (because I do ask them to work with their students), so that means that they are really unsupervised. In the case where they are professionals and experienced, that is probably not a big deal, but when it is somebody who is brand new at it, I think it is kind of questionable.
So I don't think it is desirable for all courses to be online.

I think that answers number twelve too.
I think the limitations are what can be done.

12. How far do you think a university can go 'online'? (One online course? One program? One degree? ...) Why? Which are the limitations?

See Q. 11

13. [A] How do you evaluate students in an online course?
[B] How can a prospective student evaluate an online course before subscribing?

[A]
Evaluating my students? That is a really difficult one!
As a teacher, especially in what is basically a professional development course, I feel that since I can have somebody in my class who is a master's degree student in some program somewhere (like in Language Education, for instance), and I can also have somebody like a housewife who has never taught anybody to read, since they are clearly coming from very different backgrounds and very different perspectives, and even though I can teach them the same course, I cannot evaluate them using the same criteria.
And so I don't even try!
I let them do different kinds of projects, more geared to their needs and backgrounds.
I also have a different take on their papers, what they turn in, I expect a lot more from a master's level student because I figure they know how to write (they should!), whereas a housewife maybe hasn't taken a class for ten years, but I would still give her feedback.

This is what «evaluation» means for me, sort of trying to know enough about them to know what is a reasonable level at which to evaluate them. That is one of the places where I start: «who are you?», «where o you come from?», «why are you taking this course?» and «what do you want o get out of it?», ... And then I try to evaluate them in terms of their own expectations.

In addition, I also outline criteria for every single project : I say «when I look at this, I am going to be looking for this» and so they know exactly what I want them to address and then I generally try not to evaluate their opinions, just to evaluate whether or not they did that reasonably and rationally.
I mean, if I think they have made a real mistake, then I tell them but I try not to get into changing people's opinions too much.

In evaluating students, there are two things: I get papers and I also have the online interaction. One of the things I do differently than I think so many of my colleagues do is that I do not attempt to evaluate the online interaction, at least not for the first 3 times. There are five units in my course, so for the first three units I don't really try to evaluate «did they do a good job at that?» because I feel that they are trying to learn how to do it and I think that it necessitates a period of adjustment, maybe being chattier rather than more academic and things like that. Towards the end, I might at least request (if I think the group is up to it) that they adopt a more academic tone, and then if I ask them to do that, I will look at that while I'm evaluating it, but generally what I'm looking at is «did they participate?», «did they participate meaningfully and regularly enough to be a real part of the group?».

There may be some feedback from students going on, I always ask my students at the end of the semester, but they don't always answer, sometimes they do, sometimes they don't.

Q. Evaluating an online course form the prospective student point of view.

I guess I don't know, and the reason is I don't let anybody have access to my course unless

they are signed up, so they couldn't see it anyway.

I will say this: I think that interactivity is important, if you don't have interactivity, then all you have is a correspondence course, so I wouldn't consider taking a course in which I wasn't expected to collaborate with other students. To me that's a pretty high value.

And then my other experience of students is that they need the expectations to be clear; all students need that, but I think online student need it even more because they don't know you, they can't see you, they can't evaluate anything about whether you have a nice face, they can't get a feeling about you, so I think, and I have seen evidence from my own students being uncomfortable, not knowing what the expectations were, and also my feedback to them has to be quite clear. But of course they wouldn't know that ahead of time.

So I would say the only thing they need basically to evaluate is: «do the expectations seem clear?». I think you have to be able to presume the person who is teaching the class has the background to do so.

Annex 10

Interview - Sharon Pugh

1. What is your position at IUB?

I am an associate professor in Language Education in the School of Education and I am director of the Student Academic Center, which is this place.

2. What courses do you give? Which ones are face-to-face / online / mixed?

Here we have quite a number of courses that are at the freshman level basically for students who are just into college and in Language Education.

I teach "Critical Reading" for teachers and sometimes a graduate seminar and I also teach a course that is for instructors at the Student Academic Center.
So I am involved in a mixture of graduate courses in the very basic level courses, but I don't teach the courses here, I "direct": mostly it is associate instructors who teach them.
I am personally involved in two online courses: one is L501, "Critical Reading in the Content Areas", it is on the Web now and people take it every semester; the second course is one I am still developing, L506: "Providing Academic Support in Post Secondary Education", that will be available next semester.

Somebody else here at the center also developed a 100-level (freshmen level) reading efficiency course. We are temporarily taking it away because graduate students are fine but we found out that freshmen are not ready yet to take courses this way. They sign up for the course and then they are not self motivated, they get pro-grade and tail.
We don't want that to happen so we are not going to offer the course till we figure out the right audience for it.

L506 is under development but we do have a Web site for it that we are using. I can show you...
I am using a Web site already in the mixed way with the class that I am teaching, the same class teaching it to a small group of people who work here. The way we are using it, namely the way I am setting it off, is that we will have a number of modules that people can choose from when they take it online, it is that way I am teaching.
And so, what I am doing now is involving the students who are in the course and helping them find links for different modules, what is it they are interested in.

Right now we have about 15 students, each one will have some links, critically selected links, and also some contents that we provide and some questions we have.
That's one way that the students in the class now are involved and might be able to actually contribute to course on the Web (they will have their name on it).
Then we also have a lounge or café (but we call it lounge), and people are using it now for putting up some of the work they do in the class and communicate. They're not using it much because they see each other at other times.
But I do ask them that they put something up. For example, in an assignment they just had each one had to reflect on what the university looks like from the perspective of an

undergraduate (because they teach the undergraduate). Then they all had to put what they wrote up on the Web and then people could respond to what they said.
So that is the "mixed way", I did that with L501 last time I taught it but I am not teaching it to students here now.

3. What are the advantages / disadvantages of one compared to the others? Which one do you prefer? Why?

The advantages of face-to-face obviously are that you really get to know the people and they may be all more engaged. It creates a live community, it helps students pace their work.

For freshmen who take our courses, we find that it is really important. They are in an enormous university here so part of the whole purpose is to give them a small group and a person that they can interact with personally.
That's why this kind of thing doesn't work too well in our courses for them. Even for the graduate students this is true to a degree, maybe to a large degree.

The advantage of the mixed is that it enables people to have contact, communication beyond the classroom, a way to put up their work in a kind of a publication. But so far the students aren't taking to it really: one or two do mind, but most of the students don't take very full advantage of having the extension. But it does have a lot of advantages, I think, that would develop as people become more used to it, it is pretty new.

Then you can also put up the syllabus and the information and whatever.

The advantages of online are primarily for people who aren't here. Most of my online students now are not at Indiana University, sometimes I don't know where they are, but there is one right now in Japan. There was one in Mexico, she finished, Texas, New York, ...
These are people I most likely never meet face-to-face. I set up this course to be like a correspondence course in that it is completely asynchronous. I let people just start and work at their own pace and that works pretty well, but not a hundred percent well with graduate students.

It is also writing intensive and it is mostly communication between me and them, although they do have a café: they don't use it a lot, but it is a way for students to get to know each other in the class. In fact I haven't looked at it myself for some times, so I should check that.

I get papers from them (I actually have like fifteen or sixteen assignments in the course now), so I read a lot from each student. There is one assignment for each students (it makes fifteen or sixteen short papers) and four of them are plans.
When I write back, it is a completely different way of interacting with an individual student, it is a very rich instructor-student interaction.

People who like to read and write, they really like the course because I let them pick some of the things they read and compose a discussion. My response to them isn't really evaluative, it is a response, it is a conversational- or discussion– kind of response where I

bring in things that I think are relevant, the points that they raise. This is a different kind of interaction and sharing among students from conferences or cafes.

Towards the end of the course they write four teaching-plans and then they put them into an "idea bank", a resource for the teachers, so they also contribute to the course for future people who take it.

I like the way the course is set up, but it is kind of traditional in the sense that it is more distance learning. The kind of courses a lot of my colleagues are setting up have a lot more discussion and conversation among students: I am going to try for more of that in this course but I am not sure how it would work, so we can wait and see!

Those are the advantages and disadvantages. I deal with them differently so I don't really prefer one to the other, I just do them differently. I think that maybe actually I am better at online courses because I tend to express myself more in writing and I like the discussions when I am one-on-one with the students on their issues, like on an ongoing conference.

4. ["Demand" profile] What kinds of students are interested in taking your courses?

So far, there have been teachers looking for certification, looking for something that will meet certification requirements of where they are.
I have had a few who are in degree programs here, people on campus who take this version of the course, but as a graduate course it is pretty much a kind of professional education and people, as I said, are in other locations, not here.

5. [Technology] What structures / technologies allow the 'implementation' of a course online?

I don't know too much about the technological side because I always have people working with me who do that. We simply get an account and set up the Web site.

Q. Do you use Video Conferencing? Video or audio data?

No, it is just on the Web.
Although as you can see I have a few visuals in it, I try to keep it very simple because my students might not have as good equipment as we have here in IU.
Because it is a course that people can sign up for and take at their own pace, it all depends on the Web, I use the Web and that's it.

Q. You mean Web Composer?

Yes, and e-mail.
As I said, we also have a simple café in each course for support.

6. And what kind of interaction do they support? [synchronous / asynchronous / mixed, one-to-one / many-to-many / ...]

We don't have chat or synchronous discussions. I have decided that I wanted my course to be accessible and usable anywhere and synchronous is hard when you start crossing time zones!

7. What are the software requirements for the developer / student?

For me, everything that we have at IU that supports Web development.
I could give you the name of one of the doctoral students who works with me [micthoma@indiana.edu], he would be able to answer that.

8. What are the hardware requirements for the developer / student?

Well, we need a good computer, like a Pentium.
Students go to their labs or they can just get into their accounts and work, we communicate by e-mail.

9. [Costs] What are the overall costs of an online course for a student + for the institution? (also compared to a traditional course)

I think it is the cost of a credit hour for the students.
My understanding is that right now an online course is always at in-state credit, so it could be cheaper for an out-of-state student than a course taken on campus.

Costs for the institution are probably really high because, first of all, they are supporting all of the technology, but I have no idea of how to calculate it.

I have one student who is working on a tiny grant that I have and she will get just under five thousand dollars but she will work way beyond that.

Then there is really a lot of my time every now and then, lots of time go into this.

There are also the technical experts in the School of Education or in the university at large who have to be there to troubleshoot.

I think it is really hard to calculate that, but I would say if you were comparing it… For the development of a course, compared to a faculty member just sitting down, putting together a syllabus, a reading list and a bibliography, it is pretty terrific! On the other hand, once it is up then maybe the payoff comes.
After I created this course, the one that I am now teaching, it is relatively easy for me to just maintain it and, in fact, I sort of do it for nothing because it is not part of my teaching load or whatever. We do have the opportunity to hire a reader for two hundred dollars per each student, if they finish the course.

It is a hard question to answer as far as the teaching is concerned. There is one argument I have heard, that it could actually become a way to make teaching cheaper because once the course is up and the faculty members have done all the development then everybody can maintain it or respond the students, like getting student readers or whatever. I don't agree with that for a graduate course, I don't think a graduate course should be that way. I really

can't comment much on undergraduate, but I see that that could happen, it could be misused in attempts to save money, and it would be a disadvantage.

10. [Benefits] What are the overall benefits of an online course for a student + for the institution? (also compared to a traditional course)

For the students it would be the accessibility, the one-on-one communication with the instructor, … It depends on how the course is designed, but it could also provide far more individualization.

I am aware that there are a lot of good features that could be built in, I know how some other people are doing it. The collection of resources that can go into a course like that can be organized so that students don't have to do these big horrendous Web searches for interesting Web sites, which of course could also be true if you mixed Web-based and "live" teaching.

For the institution, the ability, I guess, to deliver education to people beyond its boundaries. They have to do it to be competitive with other kinds of institutions that are pretty much doing education that way: there are so many learning kinds of institutions that can compete with universities that universities cannot just be traditional, they have to go into the lights of other kinds of learners that can't necessarily come to a campus. A lot of people can't afford the luxury of coming to Bloomington, some have their jobs or whatever, so they benefit from opportunities to take carefully designed courses from qualified faculty via their home computers.

11. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class)?

Probably not, but I just can't imagine that everything can be done well in a given medium.

All kinds of courses maybe, yes, but I don't know how I would defend that answer because I don't know that much about all kinds of fields. It seems to me that, given the resources of technology and how things develop so quickly that… yes. I think there would always be some things that would be better done in other ways, but that virtually any field could put courses successfully online.

I don't see why labs couldn't be done around a computer. I wouldn't want to have to do it and I don't know anything about chemistry, but the principle would be that you could set up that environment the same way you do with real stuff.

12. How far do you think a university can go 'online'? (One online course? One program? One degree? …) Why? What are the limitations?

We have a Master's degree program in Language Education now that is online. I don't think anybody has ever done it, but we have all the courses online to offer a Master's degree. We are not sure whether that is something we should let people do, I don't know if they can really do it, we have sort of debated it.

I think it is possible. Probably not a doctorate, because I still think that here is so much mentoring involved there, there needs to be. Well, there should be in any level, but it would be very cheap in a Doctoral degree not to have people actually in the academic environment and working among other people, experiencing new concepts, challenges and possibilities in the company of others.
For a Bachelor's degree or an Associate degree I am sure it is happening.

It is going to be a long time before it happens at IU but I think we will see it happen. I might not, but somebody will, here. It is going so fast and so far that I don't think the university can avoid it.

13. What do you know about evaluating online education?

[A] How do you evaluate the students of your online course?

Because mine is a graduate course, I evaluate students on the basis of their writings and their projects, not on tests. I don't do tests on graduate courses because I think it is more of a natural situation for undergraduate students, but graduate students should be evaluated on authentic performance.
In the class I teach, the students are creating materials to go into the Web course, so that is how I evaluate them, when they get something ready to put on, then they have met my standards.

[B] How can a prospective student evaluate an online course before subscribing?

That is a good question, I never thought about it and I don't know why students select my course, except they think it is a topic that could serve their purposes for certification.

I guess if I were trying to choose a course, I would look at the syllabus, see what the requirements are, what kind of things I would be doing, the readings, the content, I would look at the way the course is set up.

For example, some courses are probably more like traditional graduate courses than mine in that you do a lot of reading and discussing and at the end you write a paper. I don't do that in my course, I have reading and reflection going on and short papers all the way through, so there is always interaction. Instead of a paper, they design teaching plans.

The student can decide whether it is more useful for him/her to be engaged in this kind of discussion with the instructor and/or with other students. But there would also be writing to do, not only chat or just talk: composing a reflection all the way through, designing plans, having access to other people's plans,...

I think that choice would have to do with what somebody wants to get out of the course and how they think they can learn faster what they prefer, in the situation.

Q. Do you want to add something?

I think we are at an early point of development and there is a whole continuum of degrees to which the faculties of the institutions are adapting themselves to the technology and what can be done.

I am not a very technologically inclined person and yet I got involved in it, but more from trying to conceptualize how a course like that might work. I hired people to help me then because I really don't like to get on the computer or search the Web or things like that. Maybe I am a sort f a "test-case" of a faculty member in transition, a faculty member who has done things for quite a long time in a more traditional way.

A lot of the "new people' are coming in with a different mindset about teaching and learning and the possibilities of technology. I think this is going to change the character of learning at universities, continuously from now on.

Annex 11

Interview - Gail Rathbun

1. What is your position at IUB? And at TLTL?

I am technically called an Instructional Technology Consultant which is an administrative support function for the university. I work in Instructional Support Services (ISS - http://www.indiana.edu/~iss/), which is located within the Dean of Faculties which means it is on the instructional side: we work with the teaching side as opposed to the Dean of Students, or as opposed even to Computing Services (UITS - University Information Technology Services - http://www.indiana.edu/~uits/). So I am not technically part of that and I am not part of the Dean of Students, I am on the faculty side. I support teaching and through teaching learning on this campus.

Something that is unique about my position within the organization is this TLTL (Teaching and Learning Technologies Lab - http://www.indiana.edu/~tltl/) idea: it is something that we call a cross-functional organizational design, it is a partnership between the UITS (which supplies the hardware and software infrastructure not only for the students but for the entire university in all its capacities) and my unit within the ISS which is called "Instructional Consulting and Technology". My unit provides the direction for the TLTL and the UITS group provides the money and a lot of the staff, particularly technical lab consultants.

Within that partnership I do project management, I provide consultation with faculty and with other units, I work on special committees (like I did last year on Distance Education working with the School of Continuing Studies - http://www.indiana.edu/~scs/) and then I do what I call "odd" things, not odd because they are strange but because they do not fall within my job duties especially. For example, I am going to be working with a professor in the Physics Department to help him figure out how to use the Web so that he can attract interest and hopefully funding for an innovation that he is making on the curriculum and for which he has sought funding from our National Science Foundation. That doesn't directly impact instruction but it is a kind of support function.

What I do is I work with faculties who will contact me if they want to use technology, almost any kind of technology, in the classroom. I deal mostly with computer-based technology but the value-added that I bring to my position is that I have a considerable amount of experience in doing video primarily in computers and in graphics, I was a free - lance artist, I have done animation, I have taught and I have training and education in Instructional Systems Technology (IST). Probably you have met a lot of students from the IST department, maybe not; in SLIS a lot of people come from my department to take courses and a lot of them will also take Computer Science courses as well.

So that is my background.
Right now, I am working on a program in support of French Literature, it is a website that is almost entirely in French (which poses some challenges in terms of display because of the different accents): we are incorporating audio, we have native speakers reading poetry, we have music, we have interactive activities, etc. All of this I have designed with the

instructor (who is the Chair of the French and Italian department) and with another consultant who also happens to speak French. I guess I can say I speak French, that is the only way I could work on this! She will be using this course this spring and she will be asking the students to go there, to prepare for class discussion, etc.

I do a lot of things on the Web now, another one is a project to try to raise the level of awareness of India and the sub-continent in four universities in Southern Indiana. Right now, this involves (1) putting on the Web notes and information that a teacher can read so that they can become familiar with the subject area and also (2) providing them with presentation material that they can copy or download and use in their courses.

Another project that I am doing is with a teacher in the School of Health and Physical Education (HPER): he is in Therapeutic Recreation, that is where people who have physical disabilities or psychiatric problems often will undertake a program of recreational therapy. He wants his undergraduate students to have more experience of interviewing people of this kind, learning to pose the questions so you get the maximum amount of information. These people are often very difficult to interview so what we are doing is: on the Web the students will have a video of an interview and the interviewee is a person speaking; we just did one, she would provide the answers and then the questions are written and the students can chose from among twenty or more questions the ten that they would ask; then the person will respond and they will see what the result is.

Teachers here really see the use of the Web, in particular as a way to get students doing more outside of the class and to attract the students to do more extensive preparation so that when they are in class there is more time for discussion and less lecturing. I spend a lot of time supporting that kind of idea. The other part of it is supporting teachers so that when they do lecture it is clearer, it is better organized, it is illustrated well, it is more interesting, hopefully.

I think I have given you a kind of background of what I do in general and you can see that a lot of these things are what people are trying to do online.

About online courses,

Right now here at IU we are trying to think in terms of "Distributed Education". One way in which it is distributed is in the ways that I have just enumerated. What I was just talking about was "Distributed Education" as in support of a face-to-face class, a residential class; I think you see extensive use of that idea here in IUB campus. Then there are the courses that are almost totally online, Web-based courses; I suppose you could even have a correspondence course on paper and then have all the class discussion via e-mail...

There is a very broad construction of the definition of online, which is good for you: you can pick and choose, you can say "It can mean all of these but what we mean by it is this".

2. What hardware do you know is needed for the development and maintenance?

Actually almost any computer Pentium and above you could use to develop. If you want to, you can purchase the computer the most you can afford. The bottom level might be a

Pentium and it might be a G3 on the Mac side, I am working with a G3.

If you are going to be doing a considerable amount of development on the Web, for example, you'll want something that is very fast, the fastest thing you could buy. Working with the Web, I find it very tedious because I have to put it up there, keep testing, and so back and forth, back and forth, reload, reload, reload ... When you are working like that you have get to have something pretty fast.
Maintenance? I can't answer the maintenance question because I have people who do that for me and that is highly recommended, that you have staff, some persons who can devote themselves entirely to maintaining and updating the hardware and the software, particularly with the software, particularly understanding how to load/manage/update Web server software. That is something I do not understand at all, I leave it to other people.

I am principally on the designing and using of this whole operation and I have wonderful support people for the technical part of it.

3. What software is used for the development?

Right now I am using very simple tools and staff-wide; for online development we do use fairly simple software tools, basically because, especially if you are thinking of delivering this off-campus or at extreme distance, you do not know what your users have. So the tools are simple and we try to design for the lowest common denominator, which is still pretty low actually.

What I am using is:
- Netscape Composer;
- simple text editing software like Simple Text (a lot of us use BBedit);
- Dreamweaver, occasionally, not for its dynamic HTML but because it is really easy to set up frames and the code is really clean, it doesn't "gunk" (add proprietary code to basic html) up your code, so I will rough out some frames, get them set up and then I'll just continue to work with them by editing them using a text editor;
- PhotoShop, extensively;
- we are starting to use Image Ready, or to experiment with it, it is a kind of stripped down version of PhotoShop;
- QuickTime 3;
- some of us are using Director, although we have made limited use of anything with Director because, the more plug-ins you make somebody to download, the more stuff you make them do before they can use something, the less likely they are to use it or they are going to find another avenue (metaphor based on taking another driving route). In other words, they won't bother to use your materials, they will find others to use, or they simply will not have the experience you intended them to have.

I am having the same problem: to use the Disney site for my son it took at least one half an hour, he wondered away, to set the whole thing up. With passwords and getting Shockwave on there and then trying to figure out what was wrong with it... I have never been able to load Shockwave and have it work at the same time, ever. This is the sort of stuff I am perfectly happy to do without, so that is just the kind of attitude that you have to plan around.

Other software?
- The FTP software;
- I use Premiere for developing movies;
- my colleague has used Q-Design to process the music that we put up on the French website; that is very promising because it has excellent quality, excellent compression;
- we have also used RealPlayer, RealAudio, for that purpose: we have another big website up in the Afro-American Studies Music (it is a course that is cross-listed as a Music course, too), so we use RealAudio for that. Again, we made a decision early on with that website: that we were aiming at delivery on-campus because we just knew that if we tried to do it for the lowest common denominator, the music would sound terrible and it would probably even then take a long time for people to download so we simply said "this is for on-campus". Now, if I were designing a course and I have designed a course with somebody in HPER, people in Australia and England might take this course so I would not put any AV (audio-visual) components on it other than pictures and ways of communicating links to a Web-based bulletin board or using e-mails or this type of things, so then it gets very simple.

4. What knowledge is needed for the development?

The kind of knowledge that I value most, and I think that brings the most value to the development of on line courses, is:
(1) the knowledge of instruction, (2) teaching and (3) an ability to work with faculty at whatever level of understanding that they are at, to put their teaching objectives as first and to get the pedagogical issues out there first. Sometimes this is difficult because the faculties are very interested in the technology and that is not the thing.

It is not really a knowledge that is needed in development, it is a skill dealing tactfully and effectively with people who are extremely intelligent, who are most often very driven, who are intensively interested in their content, at the same time they want to be cutting-edge. So people's consultative skills are really very important to development.

When we hire someone to a position like mine we are more interested in how that person interacts with other people and how quickly they can deal with a variety of different contents than in their technical knowledge per se because we figure that their technical knowledge, if they are as intelligent as they need to be, can be learnt quite easily. Although we do expect a certain level of technical knowledge, we want someone that understood at least one authoring environment and probably a graphics program and, actually, someone who is very comfortable around computers.

But perhaps even more important than that straight technical knowledge is Design: (1) Interface Design, (2) Graphic Design, (3) Instructional Design. A person has to have not a complete knowledge in all those three "Ds", but some knowledge in all of them. We have people who do primarily multimedia development and they interact a lot on a day-to-day basis with our clients, the faculty. Those people are obviously more advanced in Interface and Graphic Design. I am more advanced in... Actually I have studied Interface Design and Instructional Design.

So we are different balances in different people in our unit but if you are going to be an online developer working with a faculty member, you need to have something in all three

of these areas. I would say I weight Design more heavily than technical type of knowledge.

5. What are the hardware / software requirements for the students?

As you know, we have all these clusters on campus and students do heavily use them. There are still a considerable number of students (I am speaking of undergraduates) who come to the university not owning a computer. They rely heavily on the equipment that is provided and each student pays nearly one hundred dollars per academic year in a technology fee to support the facilities.

For online, again, I believe we still think in terms of designing for as low as Netscape 3.0, more and more. I just finished adding Java to something I was doing, I try not to use Java Script or anything like that because I know there are folks out there who do not have a browser that will support it. So I work around it, I do work around very simple kind of things.

For our students on campus we have Netscape 4.0, Internet Explorer 4.0. The computers are all at least Pentium in those classes, they all now have audio capabilities. The Macintosh machines I have noticed are still of the Power Mac 71000-76000 variety and I think in terms of someone at home having at lest PowerMac, at least a Pentium. Right now, those are becoming our lowest common denominators, also the browsers I just mentioned and probably some kind of e-mail account, although they can easily, if they have to, do e-mail within the browser. Also for audio, a sound card. Some people have machines that don't have a sound card.

When you are talking about online education, I think those are the minimums for hardware/software.

6. What other media can be used (video, audio...)? How do you think it is possible to make it available for students?

Yes, video and audio.
When I want students hear an audio clip, for example in another language, or I want to add some kind of realism or immediacy that just looking at a blank screen doesn't give you, then a lot of time I would make a QuickTime movie audio only because, again, the QuickTime plug-in is one that is more universally available, on both platforms, I think we have beaten that problem, I remember when QuickTime was totally Mac based.

So that is what I use and, if I may add, in video a lot of times I will make a little movie that is a slide show, that has stills and audio under, just to avoid the extra bandwidth that is required in order to download or view or stream a moving picture. That is still a barrier.

7. What environment (syllabus, café, library, ...) do you think is needed for an online course? Which one is available here at IUB?

If you are talking about a course that is being given completely online, then you would have to work really hard to make a rich environment because there is no richer environment for me than to sit in a room with you and have a TV over here and to have

books. The main thing is that when I am in a room with you it is very efficient communication actually because you can see my expression. So for a totally online course you do need to work harder at creating a complete environment.

It also depends on what kind of course you are teaching, what is the content, what is the purpose of the course. Some courses do not require, for example, a cafe, some courses do not require extensive interaction nor is it desired. It depends on what is appropriate.

I think at minimum you do need to have:
- a syllabus,
- some kind of description of what the course is about,
- a calendar (what is going to happen when),

and to know:
- what are your assignments,
- what are your grading criteria,
- when are the assignments due,
- expectations about conduct
- ...

Those are all the things that need to go in there.

I think that for an online course you also need to build in some kind of communication device and there needs to be communication about the course itself and what is happening on the course, there needs to be a faculty for students to interact one-on-one with the instructor in private and depending on the course, the subject and the objectives of the course and the instructor's mindset, then you should also have some of way so that people interact, so that students interact with each other.

Students, I think, respond much more favorably and they move through the course if they know that there is a cohort of people out there and that they can talk with them, and it could be either true conferencing or it can be simple e-mail; there are so many ways to do it, it is really not the point, the point is to have students interact with each other.

I would say the minimum is to have the syllabus, the course description, the materials that I outlined and some kind of communication device that allows one-to-one, one-to-many and many-to-many. And then you could make a course from that, you can use other things: you could use mail, you could have people purchase videotapes or send them videotapes, whatever, it depends.

8. Do you know about any institutional guidelines to follow as someone develops an online course? Is there some control over what one creates? (Templates, standard results, ...)

No. Here at IUB it is pretty wild and wooly, everyone does what he or she wants, within the guidelines set by the IUB webmaster.
There standards and guidelines published by the IUB webmaster as to what kind of footage you put on the page, about copyright, those kind of things can be found at http://www.indiana.edu/~wmhome/. Those are general guidelines and they don't necessarily apply to instructional uses of the Web as an online course implies.

There is no control over what a faculty creates other than the usual, whatever control exists usually for course creation and development. Some of these are institutional, procedural and stated, some of these are very cultural: faculty conduct, development, research, use of their creativity and how they should do it is really dictated by their discipline, the culture of their department and their personal style. We try hard in academia to preserve that situation.

We do have templates for creating a syllabus and what we call course websites: at http://www.indiana.edu/~tltl/webpages.html you will find three standard templates that people can use, as well as resources and suggestions as to what makes a good instructional website. These are not standards, they are not guidelines, they are "helps" for people.

Technically at IUB and throughout the entire university (nine campuses), the School of Continuing Education is traditionally the place for correspondence courses; they are developing and encouraging other faculty to develop completely online courses. The School of Education has a whole section. It is very decentralized, there is some attempt to centralize it however we have issues like money: "I give this course through the School of Continuing Studies. Who gets the money? Who pays me?"
There are these larger organizational issues, especially the way we are organized here where each School is responsible for showing a profit or their productivity and the Schools that have most productivity receive the most resources. It is an attempt to run this like a business and so that impacts very much standardization, quality control in terms of online courses because everybody wants to keep it for themselves.

9. What are the overall costs of an online course for the developer (implementation, maintenance, ...) and the student?

For the developer, who knows?
For the student you may be aware that, starting on the next semester, students are going to be charged for the paper that they use to print things out. We find that this is a very big issue with Web-based courses because students [by a large will ???] go to the site and print it out and take it home. Now, if they only have five hundred sheets of paper free, then that is going to impact how much they print out. We will see how this works out.
This is a cost because, as I said, many students do not have computers at home and the only way they are going to see the material and use it and study it is by getting it on paper. Departments have had cutbacks in their copying and there is this copyright deal that goes on with the copying places in town like T.I.S. or Copy Central and teachers are reluctant to make people buy these big readers so there is a cost.

I really can't answer that question about the developer, implementation and maintenance because it is a very diffuse ... I am working at three or four projects at a time and I don't keep close track, I am not billing my time out. I am an overhead cost, the university pays me to be on staff to do whatever. If I were working for hire I might be able to tell you a little bit more about my costs, what I charge and that kind of things. And of course the faculty are intimately involved in the development so there is a cost there. Faculty would tell you that they think twice about developing those online innovations because they don't know what is in it for them, they are not being paid extra, in some cases they are being paid less to develop and administer online courses, I guess, because they are not making a physical appearance in a classroom, that is why, they are not making a performance. Other

faculty would say that they would not attempt doing this because, particularly if they are coming up for a ten-year or a promotion, because this kind of activities are not considered as part of the criteria for receiving a promotion or getting ten-year status. We find that this is a significant block for people doing this, because it takes too much time away from these other activities that they can be promoted on.

It is a very problematic question, it is a political question actually. It is not as a straightforward "how much does this cost?" type of question.
People in the School of Continuing Studies they have hired a very fancy/elaborate/costly business consulting firm to tell them about how to set up a business model to explore the costs of developing online courses and I don't think they found out anything. It is not a silly situation, it is a question that everybody wants to answer and I have seen the question asked on my listserv.

On this continent, the Canadians are the ones who have been doing Distance Education and who have jumped with both feet into Online Education, one reason being that, like the U.S., their country is vast and its climate is more rugged actually. So they are a kind of like Australia, which has the same things: vast with this huge desert in the middle that is very rugged so they had to develop and they are much more experienced in these things.

At a university, time is not money, time is a medium. Time is cheap here because people instead of buying something (a tool or a piece of software or something to save time), if somebody knows a little bit about how to do that or make it then they will make it themselves, customize it and adapt it. We are not going to spend forever at something but time is just not the same idea as in business because we are not charging people by the hour. The quality of the time and creativity is much more important, so that is one of the reasons in an academic setting, especially one like this one, much more ambiguous in terms of what people are doing or ought to be doing, we have so much freedom with how we spend our time. In other institutions, I am thinking right now in terms of Community Colleges in this country, there is much more rigid set-up in use of time and how to spend your time, but in this setting there is a lot of flexibility until now so that makes it hard to pin down the costs.

10. Do you think it is possible to put all kind of courses entirely 'online' (without meetings or labs; for instance, a chemistry class)?

Well, it is possible to put many kind of courses entirely online, anything is possible, but is it desirable?
I am on a listserv called www.dev (the Instructional Web Developers' listserv) and somebody just reported doing a study where they try to scientifically determine what is most beneficial for student learning. Of course, they found that some kind of face-to-face interaction combined with support on the Web resulted in the richest learning experience and the most significant improvement in outcome.

What universities have to decide here is are they looking at online as an income stream (at the same time attracting students who wouldn't ordinarily be attracted, a source of additional income) or are they looking at improving the quality of education.
If they are interested in improving quality and fixing some of the things that are wrong in the system that we have set up, I think that the only conclusion they could come to is that it

is desirable to combine the technologies that we have, to integrate them and adapt them to different subjects, different styles, different students.

I tend to think that to many schools just have dollar signs in their eyes and they have a certain notion of what university teaching is. The notion that they have is that it is a lecture: the guy standing up in front of a class giving lectures and giving tests, and that is not really what it is all about. But if you use that model then you would say "What is the problem with putting the course online? You write down the lecture, you have them read it, you give them a test and that's it, you are done!" But that is not what it is all about.

11. How far do you think a university can go 'online'? (One online course? One program? One degree? ...) Why? What are the limitations?

Well, probably farther than IUB has gone!
I wouldn't say that we are in the vanguard of online. Part of the reason is that our institution is one of the top research-type schools in the country.

We tend to think in terms of research schools and teaching-focused schools, actually I would say most of the rest of the campuses in the IU system, which is actually a state school, are focused more on teaching and on professional training and development. This school (the IUB campus) is more classically oriented towards research.

I think more clearly in terms of the dual system in California, for example, where you have the state university system, which is a series of what we called "normal" schools (which were a long time ago where teachers were trained), and so the emphasis has remained there on teaching and on preparing teachers. The emphasis there is also on providing a point of entry for non-traditional students into the university system. The other track in California is called the U.C. system (U.C. standing for University of California) and that is U.C.Berkeley, U.C.Davies, U.C.L.A., etc. Those Schools are research oriented.

IUB is a heavily residential campus in the middle of the countryside, we are really in a rural community. People come here, they stay, they study and then they go. City campuses, for example the San Francisco State which is where I come from, completely urban campuses, people do not live there, there is only a very small dorm.
So, I think the orientation towards research and the residential factor push one more towards doing things off-line, on the IUB campus.

How far? Again, it is a question of desirability. You could have, and there are, universities that are online. At Stanford, their Electrical Engineering program (a kind of correspondence-online program) has been online for some years now: you can get a BA in Electrical Engineering from Stanford, which is a nice thing to have in a resume, without setting foot on campus. Now, I happen to think that Engineering is a very good subject to teach online, I could not feature enjoying an Engineering class, going to an Engineering class. Maybe Computer Science is the same way, so I shouldn't say it! But I can see that that discipline lends itself to online delivery. I don't think you would want to put a practical Nursing course online, just to go to another extreme.

As I said, it is a question of desirability, you can't go really far, it's like when I look at a project with a faculty: I ask "What is the instructional problem you are trying to address

here? What is the opportunity you are trying to take advantage of and why? Must be honest about that! Let's see if what I have to offer is appropriate to what you are trying to do." And sometimes I say "I think you ought to do that with a videotape" and then I will go and I will help them find the people and resources they need to make a videotape, for example. Or I say "Put it on paper, distribute it as a text".

I think you are going to see schools going very far online; then you have to look at and evaluate what the outcomes are, you also have to decide what kind of measurement is important to you. Is it the number of people served? Is that the standard you are going to measure by? And does everyone agree that the number of people served is fine? Or are you going to use the standard of "retention" (number of students that came in their freshman year and stayed)? Or are you going to use the standard "everyone who really enjoyed their courses" and develop an "enjoyment factor"? It all depends on how you evaluate, how you see your institution and how you decide to evaluate the success of your institution. If you want to use the cost-benefit ratio, that is another way of doing it. For example, it costs us ten thousand dollars per person to have them graduate, which is lower than the fifty thousand dollars we used to spend, so we think that is good. If going online helps you meet that goal... It just depends on what you value. These are not actual, not even approximate costs, they are just numbers I use to illustrate the point.