A Swiss Experiment in Distance Educational Technologies

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A Swiss Experiment In Distance Educational Technologies

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1.1. General Findings

Switzerland is a relatively small country with a population of just over 7 million, yet in 1994 it had the world's highest per capita Gross Domestic Product ($33,572) (3) and the International Telecommunication Union (ITU) indicators single it out as one of the most developed telecommunications countries in terms of equipment in the world. Only Sweden, Denmark, the USA and Japan have a higher main telephone line density per capita and 92.5% of all households have at least one telephone - bettered in Europe only by Belgium, Germany, the UK, the Netherlands and Italy. There are an estimated 2'050K PCs in Switzerland which represents a penetration of 28.8 per hundred inhabitants. Only the USA can boast a higher level. As for the Internet, there were an estimated 283'320 users in 1994, representing 3.98 users per 100. Only Finland, Iceland, Norway, Sweden, the USA and Canada have a higher ratio.

According to a nation-wide survey carried out by the Swiss Federal Statistical Office, during the period from April 92 to April 93 more than 2 million people aged between twenty and seventy four living in Switzerland took part in some form of continuing education in an institutional context 4, representing 40% of that age group. If we limit ourselves to professional training, some form of course was taken by 23% of the adult population (1.25 million people), of which nearly three quarters did only one. The length of time spent by an individual on taking courses varied in the following way: 28% spent 20 hours or less, 23% spent from 21 to 40 hours, 23% spent from 41 to 80 hours and the remaining 26% spent over 81 hours. The total number of hours taken was around 200 million.

In such circumstances one might expect to find a high level of use of information and communication technologies (ICT) in education and training in Switzerland. There is extensive use of ICT in education and training in medium and large companies and to a lesser degree in administrations. At the same time, the perceived barriers to efficient use of these tools have more to do with social, cultural and economic factors than with technological considerations (5).

1.2. Use of Technologies in Higher Education

A recent study (6) - carried out in the context of a National Research Programme called The Effectiveness of Swiss Education Systems - presented a detailed analysis of research work in the educational use of new technologies.

The authors note that most research in the field of learning technologies in Switzerland is carried out in universities and in small pedagogical research centres run by local authorities. The latter are dependant on local educational authorities and often suffer from a lack of exchange with fundamental research work going on in universities. As for universities, there is little research on learning technologies done in the Humanities. There is however a great deal of in-house R&D in multimedia educational software in university departments scattered all over Switzerland. A
wide range of research themes related to learning technologies are covered in Switzerland with
the result that none of the areas really attains the critical mass necessary to be viably present on
an international level.

The authors studied seven different areas of research in Switzerland:

1. Software evaluation, based on long-standing methods and requiring very little
   infrastructure, was the most developed of all research areas.

2. Testing learning and teaching models was an underdeveloped area of research probably
due to the high cost involved in creating and testing models. However this area produced many
publications.

3. Changing educational practices and contents - a traditional educational sciences research
theme related to pedagogical innovation and a psycho-sociological approach to school
phenomena. The authors attribute the relative lack of research publications in this field to
difficulties in finding reliable, controllable fields of experimentation.

4. Design and development of computer assisted learning (CAL) software - the authors
found a large number of groups scattered all over Switzerland working in this field, few of whom
however came from educational sciences. The authors found this state of affairs symptomatic of
the split between software developers and potential users. As a result of this situation, those
working in R&D set up workgroups about specific problems unaware that these had already been
treated elsewhere by educational sciences.

5. Computer Mediated Communication (CMC) and distance learning - a relatively
underdeveloped area in Switzerland although some research is being carried out on applications
at a university level.

6. Problems related to the introduction of computers - mainly involving studies carried out
on a local basis for local educational authorities. The large number of studies carried out in this
area is due to the federal system in which each canton is responsible for its own educational
matters.

7. Specialised educational use - a certain amount of research work is being done in the use
of new technologies in the field of learning by the physically and mentally handicapped.

1.3. Distance Education at the University Level

Swiss universities have been very slow to make wide-spread use of new learning technologies in
university-level teaching. A recent parliamentary motion led the Swiss University Conference to
set up a working group to investigate the possibilities of co-ordinated integration of new
technologies in Swiss Universities in the form of distance learning. The findings of the working
group, if accepted, will be taken into account in recommendations made to the Federal Council
of Ministers about orientations and investments for the period 2000 to 2003.

Despite the absence of any coherent policy or satisfactory co-ordination on a regional or nation-
wide level in the field, a number of one-off experiences point to exciting possibilities (7). One
such project is the development of Internet-based collaborative design in the field of architecture under the impetus of the architectural department of the Federal Polytechnic of Zurich (ETHZ) in collaboration with universities world-wide.

Another such project is ARIADNE, in which the University of Lausanne and the Federal Polytechnic of Lausanne (EPFL) are taking a leading role in a European-wide project, partly financed by the European Union's Fourth Framework Programme. ARIADNE aims to create an infrastructure and appropriate methodologies so as to structure distance learning material in order to capitalise on material by reuse for other courses. In the field of high-band transmissions, video conferencing is being used for courses in technology-related sciences between the Federal Polytechnics of Zurich and Lausanne and in the field of medicine between the Universities of Lausanne and Geneva. The University of Basel is also participating in the European project, TESUS, about high-band network use to develop and share expertise in distance medicine, in particular during operations.

From a quite different point of view, the recently launched campaign of awareness amongst university teachers in the field of distance learning on the part of the University of Fribourg is also very interesting. Building on experience gained from a number of in-house pilot projects as well as information collected from experiences elsewhere, the Rector's office seeks to overcome the lack of knowledge in the use of such technologies on the part of university teaching staff and to establish a wide basis of know-how on which staff will be able to develop future technology assisted courses.

Another promising experiment is the setting up of a postgraduate course on the integration of communication technologies in the field of education. Designed and implemented by TECFA, the course called STAF mixes in-house seminars and distance working using e-mail, World Wide WEB and MOO technologies. Because it is closely linked with the general theme of this CIIME Report and it is the only Swiss experiment in training technologies in distance education, the main part of this paper.

2. The STAF Diploma

2.1. Objectives and Professional Profile of Audience

The STAF diploma is a third stage diploma dedicated to educational technologies. It is aimed at people who are already integrated in the professional or academic world. The professional profile at which the diploma is aimed is that of a person capable of participating in the design and evaluation of training, learning and communication software. More specifically, the general objectives were defined in the following way: "Make the students capable of associating technological solutions to specific cognitive and social functions, notably for the dissemination of knowledge and general information." (8)

The very design of the diploma reflects the multidisciplinary character of the Unit and its members, but also the disciplinary and institutional interests and contradictions linked to the development of ICT. According to the designers, only training associating knowledge in the humanities and the mastery of technologies makes it possible to reach this objective: psychology, pedagogy, communication theory, information management, artificial intelligence. Consequently
the STAF diploma is constructed and develops at the intersection of these fundamental disciplines.

2.2. Empirical Objects and Theoretical Objects

More concretely, we could define the domain of the diploma on the basis of the empirical objects on which students and teachers work but also of the theoretical objects delimited by the different subject points of view. This difference is fundamental to the understanding of the multidisciplinary approach. Technological objects are defined and constituted as produced by the logic of business - as is the case for example with multimedia, but they lend themselves to several interdisciplinary approaches, on the basis of the frames of reference and of particular theories, each one thus constituting a singular theoretical object which can integrate several empirical objects or aspects common to several of them. In the first category let us quote ICT, or toolbox to use the old expression of J. Cloutier (9): the didactic material for distance learning, multimedia, educational software, the Web, etc. In the second, one would find human learning, learning environments, collaborative work, mediated pedagogical communication, interactivity and man/machine communication, machine/machine communication, etc. (cf. below 4.2.3.)

2.3. Bi-Modal Functioning

Open since 1994, this training, which lasts two years, is designed according to bi-modal functioning, presenting an alternation of classical face-to-face courses on campus (one week out of five) and distance learning periods during which learners work from home (four weeks out of five). During these periods they benefit from review and assistance organised through the network and telematic means. Face-to-face work periods which take place every fifth week are devoted to information (seminars/courses), to manipulations and hands-on technical know-how whereas the weeks of distance work are occupied by mandatory reading, writing and composition work, projects, developments, etc.

The work accomplished (personal presentation and curriculum, reading records, conceptual records, analyses of documents, etc.) is published electronically on the Web. As to tutoring, it is organised through the electronic mail and distribution lists, and in certain cases through real-time communication such as MOOs.

2.4. The Technological System

The technological communication set up naturally constitutes one of the key points of this type of training. It includes, on campus, classical installations including several course and seminar rooms which can be equipped with conventional multi-technology audio-visual equipment (overhead projectors, video recorders, etc. 11). Moreover, the unit owns a computer room equipped with eight work stations (PC and MAC) connected to the university network (PC/MAC/UNIX). The general architecture of the network illustrates clearly the four stages of development proposed by Shimabukuro 12 (1995): LAN -Local Area Network -, WAN - Wide Area Network -, RAN - Remote Access Network - and finally GAN - Global Access Network. Each student of course has an Internet address, access to e-mail, and owns his or her own disk
space on the network in order to be able to manage his/her own home page, work and research, and electronic publications on the WEB.

At home, each student must be equipped with a personal computer - PC or MAC -, a modem and client software necessary to allow regular activity on the University network. If in the majority of cases they access Internet services and the Web in text mode, some use communications protocols such as SLIP or PPP which allow graphic interfacing of the Web via standard clients (Netscape, Mosaic). Finally, in order to lower the high costs of interzonal communication, each student looks within his or her telephone zone for an Internet access company managed by an institution (University, Department of Education, research organisations, etc.): in that case there is only the cost of the local zone call. As to the students living in Geneva and nearby cities (notably Lausanne), they occasionally come to work on the site, in the TECFA computer room, to access machines more powerful than theirs.

2.5. Teachings

The curriculum comprises ten mandatory course units. Among these eight are mandatory and have to be followed during the first year. The final two units are optional and can be followed during the first or the second year. The students must also participate in a research seminar, a seminar on the preparation of the dissertation, accomplish a professional internship in a business or in an institution (one month full time), deposit a report on the internship, and finally present a research dissertation.

The courses which we will not describe in detail here bear essentially on the design and the evaluation of software and learning environments, the realisation of interactive software, the impact of computer science on school practice, man/machine interactions, communication techniques mediated by computer and multimedia, theories of educational communication including audio-scripto-visual languages, methodology of distance learning, evaluation of technological innovations in teaching systems, and finally computer science and programming.

The work load of such a program corresponds to at least a real half-time, which does not go without posing some problems of organisation and management to students who for the most part are employed half-time but sometimes even work full-time.

2.6. The Audience

It is early yet to claim to present statistical data representative of the audience of the diploma: indeed, the diploma is only two years old. We nonetheless possess some interesting indications.

Most of the students possess a second stage diploma in psychology or in educational sciences, or else practical experience of teaching; in this case some are teachers in the secondary schools or are assistant professors in other University departments. Others have basic training in computer sciences. Finally, we have a graphic designer who through her work has been made familiar with computer tools and with graphic processing. It is important to point out that during the recruitment of the second class (in October 1995), the assistants of other departments and faculties (history, geography, medicine, educational sciences) were privileged. It seemed
important to us to create a spiral effect and to set up a relay structure which could contribute to the development of this type of technique within the University.

If the training can include a maximum of 12 students - depending on human and technical resources - 50% of those signed up should finish the diploma, even if some of them decide to accomplish the first year in two, bringing the total training time to three years.

Dropping out is often linked to the family context - small children or birth - and/or to professional constraints: several students (directors of private schools for example) dropped out because the workload was too time-consuming while the learning acquired did not appear to be of direct use in their immediate professional practice. Others were faced with the impossibility of responding to several different academic constraints simultaneously: for example a second cycle dissertation to finish while they were beginning a third cycle diploma. Others still, assistant professors at the beginning of their careers, chose other directions because of institutional opportunities and personal interests. Finally, some of our older students already heavily involved in their professions do not want to commit themselves to long-term diploma studies: they are on the contrary looking for mastery of skills indispensable in their continuing professional education in the area of technology through certified studies.

3. Design of the Technological Environment

It is difficult to give an operational definition to the term of information and communication technology for several reasons. Although the term technology is largely polysemous (see in particular Scholer 13), it applies also to a panoply of technical objects through which it is sometimes difficult to distinguish a taxonomic principle. It is therefore important to distinguish clearly between technological characteristics and characteristics of use (Peray 14) which should, as a classifying principle, permit freedom from strictly technological logic or from business logic for which novelty constitutes a marketing argument as much as a form of technical determinism.

3.1. Technological "Bazaar" or Pedagogical Uses

The notion of "ecology of communication" suggested by Moles (15) is not far from that of "niche" suggested by Perriault (16). Let us recall that to be accepted an innovation must present a relative advantage for the user over both the concepts and situations that exist. This advantage could be defined as a combination of and economic advantage and an advantage of usage (Punie 17).

The economic advantage may be direct (cheaper service) or indirect (more rapid service). We think however that it is important to go further and extend this strictly economic definition to that of generalised cost suggested by Moles which includes symbolic parameters such as reliability and accuracy of the communication and its pregnancy, the safety and stability of the link, the modification of self-image of the actors themselves, etc.

As to the different uses, we would like to propose this first classification in the pedagogical domain which seems pertinent.
<table>
<thead>
<tr>
<th>AIM</th>
<th>OBJECTIVES</th>
<th>EXAMPLES</th>
</tr>
</thead>
</table>
| Diffusion/Distribution Consultation | • Make available on a large scale  
• Enlarge the reception zone  
• Search for Information | • TV DBS  
• Filmed class/course  
• Database  
• Internet, email, distribution lists, etc.  
• Robots & Search Engines derecherche (Ways, Veronica, etc.)  
• WEB | |
| Communication   | • Exchange  
• Tutoring & monitoring  
• Debate | • Internet, email, news, forums  
• Audioconference  
• Videoconference  
• MOOs/MUDs, etc. | |
| Learning        | • According to psychopedagogical reference Models:  
  • taxinomic  
  • constructivism  
  • distributed cognition  
  • action theory  
  • etc. | • Electronic books  
• Educational softwares  
• Shareware, groupware  
• etc. | |
| Profession      | • Professional tools and/or professional training tools | • Office Automation  
• CAD, DPD, etc.  
• Groupware  
• Medical imaging  
• Flight simulator  
• etc. | |

3.2. The Technological Niche of STAF

According to the proposed model above, and as a temporary hypothesis, we could describe the technological, pedagogical and communication niche which is constituted by the technological framework set-up for the creation of the diploma. The following table proposes this analysis from the point of view of use by the teacher, but one could easily make the same analysis from the learners' view point. The differences would in fact be minor, proof of the symmetry of the communication system set up.
<table>
<thead>
<tr>
<th>Technology</th>
<th>Function</th>
<th>Use</th>
<th>Communication pole</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEB</td>
<td>Diffusion, dissemination, &amp; information</td>
<td>Presentation of diploma and curses</td>
<td>Emitter</td>
<td>public</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Presentation of Self</td>
<td>Emitter.r</td>
<td>public</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Presentation of research within the Unit</td>
<td>Emitter</td>
<td>public</td>
</tr>
<tr>
<td></td>
<td>Consultation</td>
<td>Thematic research on the Network</td>
<td>Receiver</td>
<td>public, regulated by the host sites</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
<td>Graphic visualization of the TECFAMOO</td>
<td>Emitter and/or receiver</td>
<td>public regulate (login as guest)</td>
</tr>
<tr>
<td>Email</td>
<td>Dissemination, Information, Information OTM</td>
<td>Operation notice</td>
<td>Emitter and/or receive</td>
<td>private</td>
</tr>
<tr>
<td></td>
<td>*Communication OTO, OTM, MTM</td>
<td>Tutoring, support work</td>
<td>Emitter and/or receiver</td>
<td>group</td>
</tr>
<tr>
<td>“News”</td>
<td>Communication OTO, OTM, MTM</td>
<td>Exchange between peers</td>
<td>Emitter and/or receiver</td>
<td>public or private</td>
</tr>
<tr>
<td>“Forums”</td>
<td>Machine/machine communication</td>
<td>Downloading/uploading of files</td>
<td>Emitter and/or receiver</td>
<td>regulated</td>
</tr>
<tr>
<td>“FTP”</td>
<td>Man/machine communication</td>
<td>Distance work, teleconsulting</td>
<td>Emitter and/or receiver</td>
<td>regulated</td>
</tr>
<tr>
<td>TECFAMOO</td>
<td>Communication OTO, OTM, MTM</td>
<td>Synchronous communication, “real time” all of the above roles (except FTP)</td>
<td>Emitter and/or receiver</td>
<td>public regulated (login as guest)</td>
</tr>
</tbody>
</table>

Table No 2: Attempt at systematic definition of the "technical-pedagogic-communication" niche of the STAF diploma.

*Note:
1) OTO: “one to one”; 2)OTM: “one to many”; 3)MTM: "many to many".
4. The Main Problems Encountered and the Solutions Planned

It is hard to draw up an inventory of the difficulties and different positive aspects because they are so numerous and belong to different levels: institutional, organizational, human resources management, communication, technological, pedagogical, scientific, epistemological, etc. Moreover, the diploma is still young and has only two years behind it: the first cohort will finish its course of studies next September and its numbers are small. Finally it is well known that in experimental phases the degree of motivation linked to the effect of novelty constitutes an important bias...

We will therefore present only a partial account and we will concentrate on developing the most important aspects, principally those which determine the evolution of the diploma and will allow the progressive modification of the diploma, certain forms of its organization and finally its "technical-pedagogic-communication" niche". Certain of these aspects have already been described incidentally in the presentation of the diploma; we will attempt to avoid repetitions to the extent possible.

4.1. The Format of the Diploma and the Needs of the Audience

As we said, the studies are time-consuming and each learner must agree to spend at least a half-time during two years to satisfy the requirements of the curriculum and the certification. The diploma was indeed designed in the perspective of academic training in the strictest sense. It is an important investment which demands enormous availability but also strong motivation, taking into account the family and professional commitments of the students. These constraints forced nearly half the students to present the first year in two years. Therefore this year, at the graduation of the first class, few students will obtain their diploma. Finally, certain students are more interested in a partial course of study with an eye to certification; the dissertation and the internship for example bring neither qualification usable in their professional environment nor added value negotiable in the context of their career plan.

The current format of the diploma therefore seems to discourage part of its audience: interested people hesitate or decide not to sign up while an important part of those signed up runs the risk of dropping out along the way, considerably reducing the graduation rate. For these reasons the requirements of the curriculum render it partially unsuited to its audience. Therefore we are heading for an important restructuring: the present diploma will be divided into three distinct tracks:

1. short isolated cycles of continuing education, aimed at the environment of businesses and of institutions (introduction to the WEB, electronic publishing, mediatisation of teaching contents, etc.);

2. units that can be credited in the framework of continuing education university level certification: these credit units could possibly lead to a post-graduate diploma;

3. the present diploma for the students involved in the world of research or in an academic career.

Such a reform will of course require time since the modification of the program implies official procedures through various faculty and university authorities. However it seems to correspond to a real need as well as to the tendency generally observed in distance learning: in the context of continuing education, there is an ever stronger demand for training with certification (18).
4.2. Teaching Education Technologies

4.2.1. Status of ICTS

The objectives of the diploma, its organizational mode as well as its field of research assign to ICTs a complex status. They are indeed considered as:
- professional tools: the students will have to use these technologies in their professional practice (design of software or interactive stations, within a mixed team made up of technologists, technicians and pedagogues, creation of teaching software, development of systems or material for distance learning, graphics and computer graphics, etc....)

The students must therefore acquire mastery of these tools:
- teaching contents: ICTs are considered study objects to the same extent as media were and still are, be they essentially or partially pedagogical (19).

The students must therefore acquire psychological, pedagogical, communication, sociological knowledge relative to ICTs:
- teaching means: ICTs are an essential element of the learning environment in which the students work, on campus and at a distance. Distance tutoring is entirely founded on and structured by the technical set-up: STAF teaches with the very means on which it's teaching bears. The students must therefore also adapt their learning strategies to the technological conditions but also to the constraints of self-teaching imposed by distance learning;
- intellectual technologies and techno-semiotic set-ups: the systems of representation and communication constitute forms of objectivation and of representation of reality, which structure our knowledge and guide our action.

The students therefore develop cognitive behaviors and aptitudes - representations and communication of knowledge for example - which relate directly to these set-ups:
- means of research: the computer and information management systems constitute a very good instrument for observation, measurement and treatment of data in the context of a great deal of experimental research.

The students must therefore learn to integrate this tool into the frame of experimental structures, which they set up:
- research object: ICTs are the object of a great deal of research to which a large body of literature attests.

The dissertations presented by the students necessarily pertain to aspects which current research has not yet elucidated.

This relatively classic situation (which applied to conventional media in their day and then to the computer in the first days of CAL) is moreover determined by:
- the rapid evolution of technological equipment (20);
- the need to participate in the development of the objects which one is analyzing.

This situation has numerous repercussions on the organization of teaching and course contents. We will develop two particularly important ones among them.

4.2.2. Between the Technology and the Concept

The technical element plays an essential role: a sound understanding of information technology is a prerequisite for the students and even though the aim of the Diploma is not to make programmers or systems analysts out of the students, they will need to develop their computer
literacy and competence. How in these circumstances to maintain the distinction between technological and hands-on learning on the one hand and theoretical or conceptual learning on the other? How to distinguish between the learning for example of psychological knowledge of technologies and the learning of the technological know-how? It is sometimes difficult to see the difference between academic knowledge - conceptual analysis - and indispensable technical know-how and skills - the tricks of the trade, the ropes, higher-level competence - which allow us to make the hardware work, or even to participate in its development.

A good example is that of the STAF (14) course which addressed mediated communication. Originally this course offered two distinct but interrelated objectives:

1. Mastery of techniques of computer-mediated communication: communication protocols, description and use of the Geneva University network, practice with Internet services, HTML language and creation of WEB pages, mastery of Netscape, use of TECFAMOO and programming base;

2. Pragmatics of mediatised communication: analysis of the participants’ interactions and of the influence of the technical equipment on the conversational forms, etc.

Finally, only the first objective - mastery of technological skills - could be reached satisfactorily while the course lost a large part of its conceptual content. It is true that technological immersion is for more than one student a major difficulty at the start of the year. Moreover the difficulty of organizing the technical equipment for communication for each student form home had been underestimated: this operation took five weeks, that is to say a full teaching period ad a third of the hours of this course, before each person was equipped to work at a distance. Finally, the technological initiation of the students closely follows the evolution of this technology, which occurs rapidly: neither the technology nor the knowledge has the time to settle and stabilize. Between the time to learn the tool and its management and use, it is important to find a tolerable balance for the learner.

For all these reasons, an initiation workshop for techniques of management and communication of information mediatised by information systems has been organized since last year, before the beginning of classes. Its objective is to give all the students mastery of basis skills that are indispensable to the teaching and distance learning such as they are used in the Diploma. Although this initiative was warmly welcomed, it still seems insufficient, and as of next year programming (adapted to the environments used) will take a larger place within the curriculum.

4.2.3. Inevitable Redundancy

Through the divisions of the curriculum and the distribution of subject-matter throughout the eight courses of the first year, certain overlaps have been observed linked to the nature of ICTs, but also to the multidisciplinary character of the TECFA team which we mentioned earlier. The design of the curriculum must take into account almost unavoidable overlaps between:

a) subject field (membership and theoretical context): psychology, education sciences, theories of communication, etc.

b) community and areas of research (theoretical object): man/machine communication, artificial intelligence, communication pragmatics, etc.

c) empirical study objects: educational practice, teaching systems, CMCs, etc.
d) commercial products: multimedia, software, etc.

Students do not seem preoccupied by this redundancy especially as the teachers who each bring their point of view and personality are harmoniously complementary. But here too the balance is delicate.

4.3. Distance Teaching: Mediated Communication and Pedagogical Relationship

Tutoring via e-mail is very efficient in its two forms: OTM (teacher to all learners) and MTM (generalized exchanges); it has no doubt contributed positively to the process of motivation and emulation. Our experience is thus globally in conformity with what the literature reports. Moreover, each person seeing the work and corrections of the others, the sum of information received is much greater. However this practice also comprises numerous difficulties which sometimes perturb the process of pedagogical interactions:

1. It is trivial to recall that writing takes much more time that saying and explaining orally... Let us simply think of the time needed to transcribe a one-hour conference. It would therefore be necessary to win back the time invested to rapidly have FAQ's or databases available allowing capitalization on acquired experience: corrections, explanations, etc. The development of specific information management tools would be a considerable help in this direction.

2. The physical lag between the response and the document being commented on forces the contextualisation and quotation of everything, the description or repetition of everything... which makes the whole procedure cumbersome for the writer and also for the recipient. Everything must be explained to reconstruct the common reference statement. All those who have studied from near or far communication problems on linguistic pragmatics know that the statement's context makes it possible to clarify and remove ambiguity from statements.

3. Mediation through writing causes the loss of all the relational and non-verbal aspects of communication, all "analogue" communication: written e-mail communication is no doubt from this point of view one of the most disembodied forms of communication that exists. Consequently misunderstandings are multiplied, and we noted extraordinary examples of acute relational conflicts entirely attributable to these two reasons.

4. Experience shows an important rate of loss of information: the recipient often doesn't answer all the questions asked, and the configuration of the technical set-up for reading/writing of electronic mail (simultaneous opening of several windows, use of "cut and paste") could be one of the variables responsible for the variations observed.

5. Participation in the discussion forums and in e-mail exchanges is very fluctuating: while it is part of the explicit constraints of the course, it is relatively regular, but otherwise the rate of participation declines rapidly. Between the course periods on campus, students tend not to communicate either with the teachers or with each other unless they have precise technical or organizational questions. But rare are the general questions, requests for clarification concerning the subject matter reviewed or on the assigned reading, etc. Perhaps the tasks should be organized in such a fashion as to make this cooperation indispensable: this tendency to individual work remains still too strongly anchored in university mentality.

These difficulties make it easier to understand the interest and the stakes of research in the field of mediated communication whose modes of regulation we know poorly as yet. But we already know the importance of all the processes of textual marking and identification which constitute a meta-language or a meta-code which make it possible to structure this flow of communication, to master it to permit research, classification, response and quotation functions.
Finally it is to be hoped that new information management tools better adapted to the needs of tutoring and correction of electronically published work will be developed.

4.4. Motivation and Emulation

The students were subjected to important emulation partly due to the public nature of their work, which was visible not only for the other members of the group but "world-wide" on the WEB. Intragroup emulation was very strong and was experienced from the outset by some as a very difficult constraint to handle; some are always on schedule, respect deadlines, produce high quality work and so on. It seems however that this stress develops at the beginning of the training, during the first reports. In other words, when the students do not know each other well, when they have not been able to appreciate each other otherwise than through this public image of themselves. They must be given the time to find their position within the group before the process can become entirely positive.

5. Conclusions

The experiment of teaching distance educational technologies which we have just outlined seems to us to be, in the Swiss context, interesting in more than one respect. Although other experiments in distance training or other cases of use of the network for training and research, this is the only case of a complete course of training designed and managed on a bi-modal mode, neither face to face nor at a distance. It is entirely organized with the means and the technologies, which it teaches, and finally it bases its pedagogy on the principle of "learning by doing". Within the University, recruiting its audience from the assistant professors, it could also play the role of motor for the pedagogical development of the WEB and of distance teaching and learning in the context of a traditionally face to face University.

But this Diploma, like all innovative experimentation, poses quite a few pedagogical problems as well as opening numerous research themes: didactics of technology must still be invented, failing which "make old things out of new ones", to play on the French saying, the pedagogical practice requires the adaptation of communication and information tools since informing is not training, the mediatised interactions must progressively find their own rules, and so on. These constitute both its wealth and its potential which only ongoing evaluation, designed as a real regulation process, will be able to channel.

Notes

1 Pages 1 to 3, under subtitle 1 are quoted from MacCluskey. (under the scientific responsibility of D. Peraya, TECFA), (1996), Learning Technologies In Companies And Administrations In Switzerland,. A follow-up to the OECD study "New delivery systems and changing demands for education", Bern, To be published. The second part of this paper is a updated translation of excerpts of a talk 3 Formation à distance et travail en réseau ², L'enseignement en réseau, Séminaire formation à l'IST, CNAM, Paris, 29 September 1995. Thanks to Pierre Dunand (TECFA, Humanities Project) for the translation.

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3 All the following figures unless otherwise stated are for 1994 and taken from World Telecommunication Development Report, ITU, Geneva, Oct. 1995.


5 For more details, see MacCluskey A, op. cit.

6 Les nouvelles technologies de l'information appliquées à la formation, Mendelsohn P. & Jerman P., NRP33/TECFA, Bern/Geneva, To be published.


9 Cloutier J. (1975), La communication audio-scripto-visuelle à l'heure du selfmedia, Montréal, Presses de l'Université du Québec à Montréal.

10 The Anglo-Saxon terminology generally opposes "real time conversation" to "time-delayed conversation". This dichotomy seems more adequate to us than the opposition between "communication synchrone" and "communication asynchrone" frequently used in the French language literature. This last opposition refers to a technical criterion: on line vs. off line. The concept of real time conversation implies more precisely the conscious construction by the communicating subject, in the context of the realisation of a task, of a pragmatic and discursive sequence. Such a oneness of communication can only be situated in a time frame experienced as real time, like a subjective conversational oneness, despite certain real discontinuities. In these conditions e-mail classically considered as an asynchronous form of communication can be used for real time exchanges and conversations.

11 We adopt this term to designate the diversity of technological means available to the teacher, regardless of the type of symbolic representation or of language (fixed or animated analogue image, graph, diagram, tables, text, mathematical formulae, etc.) or carried by these different means. See on this point D. Peraya, P. Mendelsohn and D. Giezendanner (1994), Rapport de recherche sur l'utilisation d'un logiciel multimédia en situation réelle d'enseignement, Contribution of TECFA to the University of Geneva's multimedia plan, TECFA, and Multimedia Board of the University of Geneva.


18 Peraya D. & Hassig C. (1993), Conception et production de matériel d'enseignement à distance. Etude comparative des pratiques de la FernUniversität (D) et de l'Open Universiteit (NL), Cahiers de la Section des Sciences de l'Education, 75, Genève, FPSE.

19 This distinction tallies with the one we make between socio-educational and didactic communication.

20 To such an extent that the usages never seem to have enough time at their disposal to crystallize into stable practices. There do exist certain isles of culture which seem progressively to take shape and assert themselves, but they seem to stay limited and located within extremely specialized communities. Secondly, the relation to ICTs resembles - it is a constraint of development - a sort of headlong rush forward, a desperate pursuit of the latest innovation, or the last version of such and such a product. One of the possible responses to the problems born of this situation consists, let us repeat it, of giving oneself an analytical frame of reference which escapes all market oriented product logic.
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A report produced for the International Council for Educational Media presented at the ICEM Media Week in Berlin, Germany

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University of Central Florida
Orlando, FL, U.S.A.

March 1977