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The numerical knowledge of reference in E-learning: the example of the students in a master's of documentation program

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Abstract— This longitudinal study from 2007 to late 2010 consisted in observing and interviewing "Documentation and information systems' masters students working remotely in a digital work environment. The work structure was based on a virtual desktop coupled to a lesson generator. The survey identified five forms of digital knowledge required for successful course completion. These modes of organization and knowledge production also imply rethinking the role of university teachers.

Index Terms - Community of Practice, Training Documentation, Mutual Distance Training, Digital Knowledge

I. INTRODUCTION

A. General background

This research, and the experimentation undertaken to reinforce the e-learning tool, began in September 2007. At that time, even though our university had made a rich technical environment available for distance learning, it already seemed, as underlined by Christensen [1], that the tool should not constitute a "disruptive technology" and could not be imposed by the university or by those responsible for teaching within the university. Our idea was therefore to observe the actual practices of students and the patterns of sociability among them in order to design an e-learning tool as a training space negotiated between the stakeholders, ensuring pedagogical continuity and reinforcing links with the future professional sectors in which the students would work. Before joining our university, the students had completed three years at university and obtained a degree, mainly in the humanities and social sciences or in information and communication sciences. The training covered by this study concerns two years of study in a professional masters entitled "Documentation and information systems", which allows students at the end of their course to seek employment in the documentation departments of libraries, universities or schools, or to become a manager of documentary information systems in the corporate world¹.

B. Context of the study and observation

The survey was conducted longitudinally and cross-sectionally among three groups of twenty students during the years 2008, 2009 and 2010. To better understand the individual and collective construction of knowledge among the subjects, we surveyed the students three times during their two years of masters study. Three methods were used:

- Semi-structured interviews on representations of their expectations and on the final evaluation of the e-learning tool;
- Analysis of student productions, both those meeting the requirements of teachers-tutors and those co-constructed between students without any recommendation from the university;
- Assessment of the use of information resources and e-learning during internships in companies or institutions.

As suggested by the approach of Wenger, Mac Dermott and Snyder [2], we particularly considered the socio-cultural dimension of learning in e-learning, where communities of individuals are organized as collective human resources invested in "mutual engagement" aiming at a form of social cohesion, embracing a "joint enterprise" in which actions are collectively negotiated between peers, based on a "shared repertoire" that combines a complex and multidimensional set of resources. We consider resources such as e-learning products as both learning objects and cultural objects, i.e. they are based on a set of routines, tools used and / or diverted from their primary function, as procedures for accessing and sharing, as symbols and beliefs shared among peers. This gradually leads to the construction of an informational approach that differs from the existing institutional and / or professional situation, forcing us as researchers to account for the implicit and informal forms of the "ordinary" production of resources, which themselves are not necessarily innovative but ensure group cohesion and learning. On this point we agree with Tough [3] for whom ordinary social information practices are effective in terms of the satisfaction that they provide on a daily basis and are structured in terms of sociability.

C. The e-learning environment offered to students

The technical environment made available to students is mainly organized around the university's intranet, which is accessible by identification / authentication.

¹For overview of studies online, see <http://iufm.u-bordeaux4.fr/accueil/formation/Formation+Documentaliste+Presentatio>

Three technical areas are available:

- An area of communication using the university's bulletin board with access to forums, thematic or customized mailing lists, and focusing on the asynchronous dissemination of organizational information related to monitoring of the Web;
- Access of all university stakeholders to a virtual office running under Contact Office, allowing every student access to containers of documents, providing various resources in various formats (PDF resources, Power Point, textual and graphic material, etc). There are also communication tools including the synchronization of messaging, sharing schedules, access to resources for teachers, establishment of chat groups on invitation, etc.

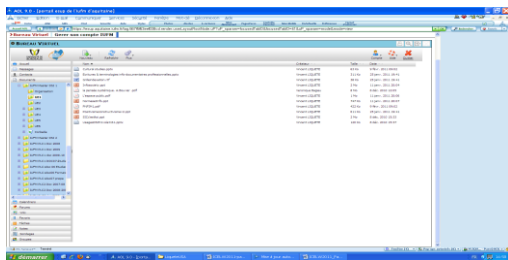


Figure 1. Homepage of students' virtual office

- A lesson editor running under Dokeos², allowing teachers to make elaborate resources in the form of multimedia podcasts, synchronous seminars, conferences, live workshops, assessment types, etc.

Thus, the offer of content and functional tools is quite extensive because, as underlined by M. Bernard [4], an e-learning tool is a training system for managing all or part of resource centers, communication tools, and digital media coupled with networks. On a human level, all university professors involved in the masters are involved in the production of resources. In particular, two teachers ensure the coordination and monitoring of resources placed in the virtual office, and undertake the role of tutor-facilitator in exchanges with the students. The more ambitious production of specific resources via Dokeos is conducted on a voluntary basis. Nearly 40% of the members of the teaching team are currently participating in this venture.

II. THE PROCESS OF PRODUCTION BETWEEN ACTORS

A. Organization of learning between teacher-tutors and students

As suggested by M. Connolly, N. Jones and D. Turner [5], our students surveyed at the beginning of their first year of their Masters would like to receive a "hybrid" form of training in which the dissemination of online content is reinforced with traditional teaching methods and regular courses with teachers scheduled within the university. Therefore, our e-learning courses complement regular time spent in class, extending training offered in situ with problem-focused learning, the solving of

² Cf. as an illustration, <http://dokeos.aquitaine.iufm.fr/index.php>

exercises, production *per se* and the preparation of professional internships. In our view, the student does not become so (Liquète and Maury [6]), especially during phases of work-sharing and exchange with peers. Therefore, since 2008 we have reduced course time and tutorials by a third, focusing through the platform on modes of exchange, production and written correspondence between students. Currently we believe that a master is divided into two equivalent periods: one where the students are present, and the other involving distance learning according to the requirements and specific work instructions and free time of the students in which they mutually organize their learning.

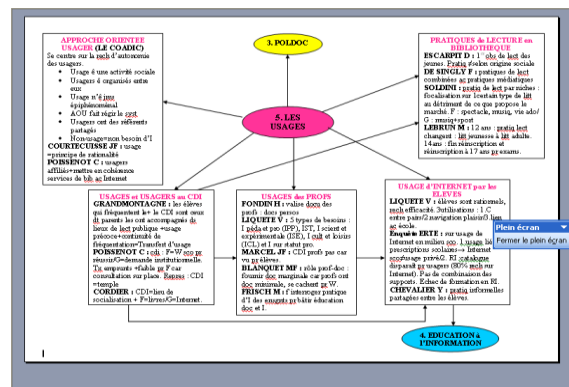


Figure 2. Example of notional mapping in connection with the course on the epistemology of information developed by a group of 4 students, without any specific instructions from the teacher in charge of the course (2009).

B. The process of production by and between students: building a learning community

Over the months, our longitudinal survey has shown that groups of students who are gradually acquiring autonomy organize their productions in the form of collective work intelligence (Delamotte [7]), where the question of the use and mastery of technical environments takes second place to the fundamental focus on the negotiated construction of knowledge among peers. Our data collection shows four main modes of work preferred by students, since they find them structuring and reassuring:

- First, the main documents produced, organized and stored in the digital e-learning environment are based on forms of collective writing strongly influenced by the knowledge formats that they are accustomed to in their professional documentation. These formats available on the Web have a structuring effect with regard to pedagogical, cognitive and (ultimately) professional issues.

- Second, in the groups we observed and interviewed, the students have organized themselves in such a way as to watch for information to appear on the net. This task is strictly divided between the members of a group and characterizes forms of work-sharing and collective and sophisticated network monitoring procedures.
- Third, there are the activities of re-appropriating

documents originally issued by the teachers. The documents concerned are essentially methodological documents issued in connection with courses or tutorials, then reclaimed and reused freely by students, in particular to produce accounts of reading, exercises or thematic presentations. This constitutes an informational processing of the re-appropriation type, as the methodological approach and initial intentions of the teachers are diverted and re-appropriated by students in order to organize their own working strategies and knowledge production.

- Finally, there is the organization between students of procedures that represent the more or less implicit validation of content learned within groups and based on forms of leadership. Thus, the "*communities of practice*" that students develop in the form of micro-groups at the beginning of their curriculum are gradually transformed into "*communities of professional interests*" (Wenger [8]). What happens is that the older students and those who are the most experienced in the field of documentary information come to speak with an authoritative voice across groups and decide to select or not select the content co-produced by the students themselves, in addition to the e-learning content proposed by the teachers.

C. *The organization of learning around digital reference knowledge*

As suggested by F. Morandi [9], a set of skills and reference knowledge are increasingly utilized by students for educational purposes in the digital work environments offered to them. Most of the proposals and pedagogical scenarios offered by the teacher-tutors are based on specific acquisition targets and the realization of planned activities by students. The knowledge that we present results from a detailed observation of student practices, and is not just an enumeration of the functional intentions of the designers of e-learning programs. Five forms of digital knowledge seem to form the backbone of our digital learning tool.

- **KNOWLEDGE WITH TEACHERS PRESENT:** time spent with teachers who have technological assistance constitutes a strategic moment designed by teachers to optimize the transmission of future documents and content via the digital e-learning environment. Contrary to what one might assume, gathering students physically and geographically in one place not only helps in the transmission of essential knowledge in the program, but also makes it possible to explain and justify future mailings via the platform. Knowledge with teachers present helps in anticipating and projecting future scenarios. This form of anticipation is given substance by following up the students and their questions through their portfolio.

- **TECHNICAL OPERATIONAL KNOWLEDGE:** This is essential for accessing resources and accompanying documents. Each student must master the offer of information proposed by the teachers by promptly validating the technical certification procedure during the

first 3 months of training. He/she must demonstrate a real instrumental ability to modify and activate the various features and potential offered by the e-learning environment. This certification is in line with national certification that exists in all university courses in the form of the C2i certificate, which is the current French benchmark for Computer and Internet Certification.

- **SITUATED KNOWLEDGE:** the objective is not only to strive simply for the acquisition of content and the search for performance in these environments but also to work with the student by analyzing the structure of environments, work situations, and identifying the critical limits of available environments. The purpose of this situated knowledge is to develop gradually the critical skills of students as librarians, who are themselves distributors of environments and administrators of documentary information systems. Situated knowledge is based primarily on the semiotic and ergonomic analysis of environments and on the digital tools of the documentary information sector.

- **DOCUMENTARY KNOWLEDGE:** the aim here is to design a pedagogy of resources, where documents placed within the e-learning space not only play a traditional role of content transmitter in connection with an educational issue, but must also be analyzed as social objects, by deciphering editing contexts, sources, editorial and authorial intentions, etc. In our opinion, the acquisition of knowledge is based not only on documentation but also on the creation of documents, in the sense that there is an intentional process of documenting thought and / or an enunciative register (political, ideological, activist, etc). Such documentary knowledge is basic knowledge, as it gradually gets students to question themselves about their own ability to "document"³ information within and outside an e-learning environment.

- **KNOWLEDGE DIDACTIZED REMOTELY:** placing some of the lessons at a distance in both the synchronous and asynchronous mode means that resources must be didactized, making sure that for each resource, and apart from the working instructions, it is made clear how the document is to be used and read and what is expected by the teacher. Our investigation and monitoring of students show that these methods of didactization are then reused by students themselves in their collective group work. The stakes are high, because gradually our students report that they incorporate the notion that an information resource is not limited to the mere transmission of content, but that it also provides an intended usage and a scenario for subsequent use.

These five forms of digital knowledge do not compete with each other. Rather, by interacting, they constitute an economical e-learning framework where the aim is not only to acquire knowledge but also to develop the capacity to analyze, to criticize, to rewrite, to rethink how

³ We refer here to the act of placing information within a document, a core skill for any documentalist.

information is received and to organize it as part of their future professional environment. The very notion of distance learning makes us better assess the requirements for the communication, appropriation and the creation of information by our students.

III. TOWARDS NEW HUMAN AND INFORMATIONAL POSTULATES IN E-LEARNING SPACE

A. *Postures of Mediation revisited by faculty tutors*

While teachers gradually adopt new positions in terms of their pedagogical relationship with students, and while they remain teachers who transfer content and knowledge, they also play the role of mediator, tailoring the space to the e-learning needs of their students by mediating contents (Liquète [10]). As pointed out by I. Fabre, C. Gardiès and V. Liquète [11], the mediation of actions undertaken in e-learning should be reconsidered from three points of view:

- Mediation by the PROCESSING of documents, a component central to learning the trade of a documentalist. Educators in e-learning should consider mediation in terms of the systematic processing of the various resources available, rather than as offering the processing of exercises and objects of specific lessons. Among other things, this systematic processing involves the management of metadata and the analytical indexing of resources filed on the digital education base. Each e-learning resource becomes an object of analysis and training for the student.
- Mediation by documentary PRODUCTION. The appropriation of knowledge, especially technical knowledge, cannot be achieved only by way of reading, training and problem-solving; it is also necessary to create a set of professional products. The products thus created by students become the subject of mediation, discussion, and understanding between teacher and student.
- Finally, there is mediation by documentary COMMUNICATION. As suggested by C. Gardiès [12], mediation makes it possible to analyze and provide a context, and to develop awareness of the need for information and communication. Documentary mediation is no longer limited only to the most comprehensive analysis possible of informational offers and situations, nor simply to the listing of content. It also involves understanding situations and the intentions to communicate that educators, documentation professionals and the authors of resources may have. To do this, we have launched micro-seminars so that participants may collectively seek to explain the communication strategies adopted by the cultural and documentary industries.

B. *Future trends in digital learning*

In view of our experience and the results we have obtained to date, we have focused our attention since September 2010 on accompanying e-learning students in three areas that we had previously dealt with inadequately. First, we regularly update our methodological resources focused on helping students to analyze documents and on providing assistance with traditional editorial issues and matters concerning the web. Our aim is that by analyzing the strengths and weaknesses of resources, students should gradually reach a level of critical analysis of resources that will allow them, once they have found a job, to increase their own level of requirements before providing documents to users of the documentation system for which they will be responsible. Second, we insist on the provision of information writing formats to enable them to be able to produce attractive and professional resources for end users, so that they can share documents among their peers that are easily identifiable, with common writing and display forms that allow fruitful exchanges between students and teachers. Finally, we have set up joint activities between our two tutors and students with regard to accompanying the writing processes of the latter during their curriculum. There are three types of core target material for this process of accompaniment: their professional report⁴ allowing them to validate their diploma at the end of their course, their documentary analysis of resources that they have produced with their peers, or which have been selected by them; and finally, the editorial support they receive for their portfolio.

CONCLUSION

Our work piloting a university training course in professional documentary skills, which is based in part on accompanying e-learning and a survey to analyze and understand the practices actually undertaken by students (student experience according to Thorpe [13]), shows a real gap between the rhetoric, institutional intentions and the actual practices of students (Benchenna and Brulois [14]). In his experience at the Open University of Israel in 2006, S. Guri-Rosenblit already referred to a set of paradoxes [15].

Our data show that students gradually go beyond the prescriptive framework laid down by the teaching staff and focus on individual and collective approaches that both teachers and / or tutors do not necessarily witness. These informal study practices are meaningful to students. The challenge for teachers is to devise ways of harnessing these informal practices in order to capitalize on them, rather than to continue to provide resources based on a too rigid and preconceived pedagogic scenario. A further challenge is to account for the informational and editorial logic that students may still be unaware of in their thought process. Helping them to index resources and to analyze widely used editing

⁴ The professional report consists in a document of about 50 pages that states a problematic issue and attempts to solve it by using readings, survey data and thinking undertaken during the second year of the Masters program.

formats, to understand the policy issues of traditional and digital editing, getting them to take users' requests into account, i.e. skills that they will need to implement in their future profession: these are the major issues for us in the future. E-learning tools should ultimately enhance the flexibility of pathways to knowledge, rather than reinforce systemic gridlocked approaches in highly developed technical frameworks.

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