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STUDY AND DESIGN OF NEW MODALITIES OF LEARNING AND WORK FOR PRE-SERVICE TEACHERS ASSISTED BY ICT. COLLABORATIVE LEARNING AND CASE STUDIES

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ABSTRACT

A joint research including 4 colleges of education (IUFM of Caen, Rennes, Rouen and Strasbourg) and the French national institute for pedagogical research (INRP) has been devoted to the development and the study of new ways of working and learning in teacher development. We focus here on conditions of success and on limits of collaborative work in the hybrid context of teacher training (mixing distance and presence phases). ICT is required for allowing distance communication, managing productions and to keep trace of interactions. Several contrasted examples are been developed, notably in the context of collectively producing learning and teaching resources or the analysis of professional situations (using a specific case study methodology). For research purposes, we have focused on history and growth of working and learning teacher communities, an important place was devoted to the observation of evolution of activity systems (Engeström, 1987). After a two year-research, we intent to present our main results and some lessons learned.

1. INTRODUCTION

For several years, many colleges of education (IUFM in France) have lead experiments of distance collaborative work and learning, for pre-service or in-service training. As far as we know (few colleges give access to written reports of these experiments), the overall results are quite mixed, and even disappointing. Many groupware systems are set up but rarely used. The main or traditionally invoked reasons are linked to the difficulties to involve actors, to technical problems (for example in accessing the platform), to calendar managements... For example, we tried in 2001 and 2002 to design specific training sessions with a case study approach inspired by the CaseNet system (Baron *et al.*, 2001). We intended to involve several colleges of education (Créteil, Versailles, Caen, Rennes). After a promising beginning, we encountered a lot of problems in trying to extend the initial training, and had to renounce (Baldner and Bruillard, 2001).

Despite these difficulties, French colleges of education keep trying distance collaborative work in pre-service and in-service training, notably under the pressure of the ministry of education. If one of the underlying reasons is clearly economical (many people think that distance education will allow saving money), it is also linked to a new view of the teaching profession: teachers have to be able to use on-line resources and to work collectively. For this purpose, the ministry has launched new informatics and internet certificates (called C2i). The C2i level one will have to be earned by each student before entering the colleges of education (<http://www.education.gouv.fr/bo/2002/19/>). It includes items such as “distance exchange and communication”, “production in a collaborative work situation”. So, it put emphasis on new competences for teachers. The C2i level two is specific for teachers and will be compulsory in 2007 for each student at the end of the IUFM training years. It includes items such as “team work and network work”, “numerical working environments” (see <http://www.education.gouv.fr/bo/2004/11/MENT0400410C.htm>, B.O. n° 11 du 11 mars 2004). An experiment has just been decided (December 2004). It involves 23 of the 30 French IUFM during the year 2004-2005 (<http://www.education.gouv.fr/bo/2004/46/MENT0402675C.htm>).

So, according to this institutional context, it appears really important to find good ways of developing collaborative learning. Furthermore, international literature provides interesting hints and examples of networked devices facilitating the link, during practicum, between trainers, supervisors or tutors and pre or in service teachers, allowing to build or to maintain learning communities. But clearly, what is required is a difficult innovation: finding new ways of organizing teacher preservice training, mixing distance collective or individual work and group or individual activities at the training institution.

For that purpose, ICT plays several different roles: connecting distant people, keeping trace of activities, providing production tools... Our research aim has been, on the one hand, to accompany and to inform this innovation process, analysing potential tensions in activity systems, studying activity traces and actors' opinions and feelings. On the other hand, our objective has been to get a better understanding of collaborative learning activities, for example trying to

model discussion processes involved in a discussion forum, to improve general theories and models of collaborative learning. A more operational objective is to explain some success conditions of collaborative work in the context of preservice or in-service teacher development.

2. THE ACTION-RESEARCH CONTEXT

In our research, each IUFM has chosen a specific training situation, leading to contrasted examples (disciplinary secondary teachers, documentation teachers, primary teachers). Before presenting them, we will just explain some characteristics of the French context concerning preservice teacher training. Other examples have been studied (in service training concerning ICT projects in Rennes, a distance master program in Amiens...); we only report here what is linked to initial teacher training.

2.1 Some particularities of preservice teacher development in France

In France, teachers have to pass a competitive examination at the end of the first year at IUFM. If they succeed, they become civil servants and gain access to the second year at IUFM. During this second year, preservice teachers are part time in the training institute, part time in classroom with a teaching position. At the end of the year, the training institute (IUFM) has to decide if they can at once become tenured or not (some preservice teachers, have to make one more year of probation). This decision is mainly based on the behaviour of preservice teachers in front of students in the schools. So, these teachers, aware of the situation, try to be the best as possible in front of students.

This situation leads to a difficult articulation between preservice experience in classroom and what is exchanged during the session at the training institution. One potential problem is the lack of synergy between the courses at IUFM and the view of teacher profession built during the contact with the school experience field. Many preservice teachers translate this tension in a simple and naïve opposition between theory and practice. So, what is at stake is not only to use communication technology to keep a contact between teacher trainers and trainees, but to go beyond this opposition in a more accomplished professionalizing process.

According to this view of professional development, new modalities of teacher development, aiming at changing representations of the teacher profession and to find a new balance between school experience and activities at the training institute, lead to question what we call the *professional identity* of future teacher and the building of this identity. This identity has very specific characteristics according to teaching level and disciplines, that is why we wanted to study and analyse very different situations.

2.2 The preservice teacher contexts considered in the action research

Three main training contexts, involving different kinds of preservice teachers, have been elaborated and studied. This section briefly describes these different cases at the beginning of the research. One important point to mention is that, even if all concern preservice teachers that share their time between schools and IUFM, there are indeed differences between the cases. In the first one, secondary disciplinary teachers are responsible of one or two classes all over the school year. Usually, they spend each week two days in classroom and two days at the IUFM. Documentation teachers are in the same situation, but they work in a school documentation center and most of their school time is devoted to the management of this center. Teaching to a group of student is only a minor but important activity; they have a lot of other things to do. Concerning the third case, the year of primary school teacher is organized in successive periods (of three or four weeks). During each period, they are full time at the IUFM or full time in a primary school.

2.2.1. Science and English teachers (Rennes)

This project, leaded by Yves Kuster, initially aimed at reinforcing preservice training in natural sciences (e.g. sciences of life and earth), without extending training duration at IUFM. It therefore introduced a component of distant collaborative work. This work was devoted to some specific subjects: emergence of representation linked to the practice of the teacher profession; confrontation of these representations with research works in science education (didactics of science); sharing resources and pedagogical experiences between trainees; confrontation of school practices.

In order to facilitate the use of technical systems, the IUFM of Rennes has designed a kind of e-learning platform which contains two spaces:

- A space for shared resources or mutualisation space stores documentary resources produced by trainers and/or trainees about various themes: prescribed school curricula, pedagogical methods, assignments, didactical research papers and so on. This space is completely open, each trainer and each trainee can upload any type of document at any moment.

- A communication space with synchronous (chat) and asynchronous (webmails, forums). Forums are thematic and reserved to groups including only trainees or trainees with their trainers.

At the beginning of the research, it was decided to extend this project to other preservice teachers. Françoise Helary was responsible of the case of English (as second language) teachers, with similar organizational ideas.

2.2.2. Documentation teachers (Caen and Rouen)

The second example is a joint project of two teacher training institutions in adjacent regions: IUFM of Caen and IUFM of Rouen. It began a year before in Caen (2001-2002) and consists of a case study which methodology is inspired by CaseNet (see above).

The work unwinds in several steps. A descriptive narration of a professional problem is given online. A guided analysis is proposed. The first step consists in identifying context, facts and issues. The preservice teachers have also to present points of view, values and perspectives of the main actors of the case. These analyses are uploaded on a e-learning platform (Quick-Place for the two first year and then BSCW). During a four week period, a discussion forum is open and the preservice teachers have to confront identified problems and their respective experiences. In order to nurture the discussion themes with theoretical and practical knowledge, a specific space assembles links and bibliographical references given by trainers and trainees.

At the end of this distant phase, two days in presence at the training institute are organized, taking into account the trace of online exchanges. Trainees are invited to underline the main questions discussed during the forum leading to a more general issue illustrated by the initial case. For example, beginning with the problem generated by a student with the school internal network and the reactions of the pedagogical team (including documentation teacher and network leader), they end in the question of the collective responsibility of educative community and of the integration of ethical issues regarding information mastery. These general issues are then discussed in small production groups who have to design tools (situation analysis or problem solving tools), profession rules or to discuss ethical rules. These productions are shared by students of the two IUFMs via the e-learning platform.

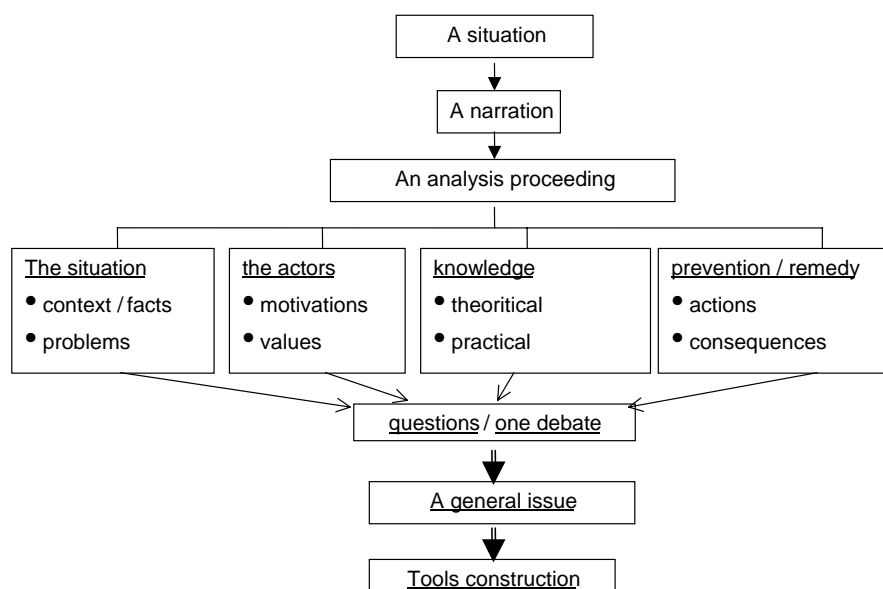


Figure 1. The case study methodology for documentation preservice teacher (Caen and Rouen)

This activity, alternating online exchanges via a discussion forum and syntheses in presence, aims at helping trainees to design analysis tools and to work via distant networks in a collaborative way.

2.2.3. Primary teachers (Strasbourg)

The module "Pedagogical uses of ICT" is organized for 500 preservice primary teachers and consists in a presential phase of computer tools presentation and a distant collaborative work with the ACOLAD platform (see for example <http://acolad.u-strasbg.fr/>). The trainees have to design a learning situation using ICT (a kind of scenario) and to experiment it in a primary school. At the end of the presentation phase, the trainees are divided in small groups and have to negotiate their work theme. During their practicum, they have to collaborate (using the Acolad platform) with the help of an online tutor, providing some facilities for collaboration. Before the end of the school year, the group

work has to be presented by each group with their tutor. Intermediate reports are required, showing projects advancement and reflections about collaboration, to allow tutors to decide to intervene, especially when he is not solicited by trainees.

3. RESEARCH QUESTIONS AND METHODOLOGY

In our cooperative research model, each IUFM team was responsible for its own experimentation, setting up their training situations and choosing the means they wanted to use to study them: Caen (Nicole Clouet, Marie-Laure Compant La Fontaine, Dominique Lachiver); Rennes (Françoise Hélyar, Yves Kuster, Geneviève Lameul and Dominique Prévité); Rouen (Françoise Chapron, Agnès Montaigne); Strasbourg (Miloud Benayed, Marc Trestini, Alain Verreman).

Our role (the authors of this article) has been to organize and synchronize these distributed teams, find common goals and methodologies. To get a more in-depth study of the work organized between Caen and Rouen, we had the help of two researchers Michelle Harrari, Jean-Luc Rinaudo who have lead interviews with preservice teachers and trainers. Two master students (Cédric Fluckiger and Stéphane Fouénard) have also been involved for the analysis of two successive case studies (year 2003-2004).

First of all, it was important to agree upon common research questions. The most important common challenge was to understand conditions of success and limits of collaborative learning in preservice teacher development. It directly leads to the question of how to install learning communities, how they can live and what is their evolution. For that purpose, we decided to study the interactions between actors and visible effects of collaboration: task sharing between trainees, between trainers and trainees; tools designed and tools used; evolution in organization; which induced changes for the trainers and the trainees?

One more practical goal was to improve the design of learning environments in the IUFM, to ease collaborative exchanges, notably to help trainees to learn what cannot be transmitted by disciplinary formation (professional problem solving, building a professional identity or profile...). Learning, in the context of preservice teacher training is also viewed as a personal and social transformation.

According to Lipponen (2002), exploring the foundations of CSCL can rest upon no unified and establish framework, no consensus about objects of study, methodology, analysis units and so on. So, deciding a common methodology is not so easy. Interested in activity systems and their evolutions, we logically chose Engeström (1987, 2001) as a major reference for the research. Each team had to describe its learning environment using the classical categories of Engeström triangle model and to highlight underlying tensions. They also used standard methods as interviews, questionnaires, observation and analysis of computer traces.

One specific interest was focused on forums, in connection with other research projects (Baron & Bruillard, 2003). Many researchers underline the role of writing in the process of reflection on practice (e.g. Hoel & Gudmundsdottir, 1999). According to Fottland *et al.* (2002), with ICT, the possibility of writing during all the phases and to save dialogues positively extends the classical presential teaching. As noticed by Lipponen (2002), distant collaboration is mainly based upon written language. Beck *et al.* (2002) have underlined a specific profile in discussion group, the reflexive communicator: source of great quality observations, engaged in frequent and interesting bi-directional communications. They notice that group communication facilitate multiple perspectives sharing, often leading to the opportunity for a member to produce examples and interpretations that otherwise could not be considered.

We will briefly present the evolutions of the learning environments (in a rather descriptive way), some results coming from the analysis of forums linked to case studies and then discuss some lessons learned from the action-research.

4. EVOLUTIONS OF THE LEARNING ENVIRONMENTS AND SCENARIOS

Each IUFM team had to analyse the working context and the evolution of the learning environments they chose to design and study. It can be considered as the first result of our cooperative research.

4.1 Primary teachers (Strasbourg)

The foreseen scenario faced several difficulties when implemented. Many students did not perform the intended task. They were not interested in collaborative learning while their time was fully occupied preparing and managing primary classes. Many tutors did not play their expected role. Some argued against the e-learning platform considered as too rigid.

These different problems led the designers to modify their scenario. Some trainers chose another collaboration tool with a less ambitious goal: the trainees had to collaborate but only to produce a common document about ICT integration in pedagogical practices. For others, the goal remained the same (design a learning scenario using ICT with primary students and test it if possible), but with an extended duration (during the whole year). Designers also began a specific reflection about the tutor roles, which seemed not have been clearly understood.

As some problems remained the second year, preservice teachers facing many difficulties to negotiate problematic learning situations at distance, it was decided to reinforce the training concerning the e-learning platform and more detailed contracts were given to tutors and a more precise calendar for preservice teachers (to facilitate feedbacks).

What can be observed here is that engaging primary preservice teachers in an activity mostly in conflict with their prior objectives and complicating what they were required to do was not a big success. The situation is quite different with secondary preservice teachers, where collaboration is better integrated in their overall activity.

4.2 Science and English teachers (Rennes)

The Rennes research team, inspired by Meirieu (1997), has identified four levels of groups:

- Communication and information exchanges groups (corresponding to diffusion lists).
- Mutualisation groups (a need has been identified or negotiated by the group).
- Production groups
- Learning groups mixing collaborative work and learning

Their goal was to help groups to reach the fourth level. For that purpose, they analysed profiles of preservice teachers towards the proposed collaborative environment, studying dimensions of utility, usability and acceptability ([Tricot & Plégat-Soutjis, 2003](#)).

Concerning SVT (sciences of life and earth), according to the first results, the idea was to multiply distance activities, mixing presence and distance. A new e-learning platform had been built, in an *ad hoc* way, just for science preservice teachers. About the theme ICT and SVT, trainees had to produce, by group of four people, a learning scenario using a hypermedia product. The production process has mixed presence and distance (tools appropriation). Four steps had to be followed. The first one consisted in establishing a project (2 months). Then, the four propositions had to be transformed in only one. They then had to design a scenario of the product (most of the time a practical work activity), to realise and to implement it. Five groups made a product, judged interesting by the trainers.

A forum has also been used, notably about the theme of evaluation in classrooms. Confrontations of ideas have been observed (e.g. during a discussion about surprise interrogations), even conflicts between trainees, but not real construction allowing to go beyond initial conflicts. The trainer keeps the role of providing synthesis. Similar results have been obtained for English preservice teachers (with a different platform), showing that groups can easily reach the third level of their taxonomy; it appeared difficult to reach the fourth level.

4.3 Documentation teachers (Caen and Rouen)

During the first year, with the integration of Rouen trainees, the results were a bit disappointing. The participation was low and the quality of production was considered not so good (compared to the preceding year). The Caen group of trainees ignored their colleagues from Rouen. The lack of investment in the exchanges has been associated with a non respect of the rules of work organization and with an insufficient depth of reflection. Nevertheless, the experiment was positive, reflections in presence and elaborated tools designed in groups were of good quality. As many problems were encountered with the platform Quick-Place, they choose a new one (BSCW) and operate a profound transformation of the year of formation.

A new approach was taken by the Caen team. Engaging the students to perform a maximum of collaborative tasks (they call it a “collaborative bath”), favouring different forms of interaction – mutualisation, common productions, exchanges, collective reflection – they aimed to develop habits and skills of collaborative work: to give oneself shared objectives, organise oneself, communicate, negotiate, auto-evaluate oneself...

The new platform became really a development tool for many aspects of the training year, not only for the case studies. New rules were defined concerning documents upload and documents themselves (reflection about standardisation, indexation and grouping). The commentaries about these documents were born at IUFRM (around the coffee machine!), at least in a synchronous way. Having access to a shared memory (trainers and trainees) has important incidences upon the modalities of the training and upon the perception of trainers of the work done by the trainees. Questions arose

about competencies required for collaborative work or developed by collaborative work and learning. A paradox linked to the autonomy taken emerges: when trainees are too autonomous, the role devoted to the trainer is not clear.

4.4 General remarks

To summarize, the first year, some technical problems were faced by the different teams. It is not only due to inadequate e-learning platforms (just partly true: Quick-Place for example certainly requires fast connections and is sometimes *heavy* to use), but a lack of appropriation by trainees and trainers. The implementation of general principles in a new situation, and then not mastered by trainers is problematic. Between what was intended (or dreamed) and what really happened, there was a gap. To overcome this problem, trainers had to change the rules. To adapt either the platform, either the overall organization, leads to including collaboration as an integrated part of the school year. It was not possible to do that in the first case (Strasbourg), due to the general constraints and the necessity to have the same rules with a lot of different actors, most of them not really convinced of the interest of collaboration.

The other cases were more successful. On the one hand, they dealt with secondary teachers and year organization is quite different. On the other hand, the trainers can adapt the organization to their objectives, they can operate profound changes without requiring the agreement of many others stakeholders. They have the opportunity to pilot along the year their experiment.

5. SOME RESULTS

Concerning forums, we learned a lot from the forums used during the case studies. In this text, we just want to elaborate about an apparently strange phenomenon, very interesting to analyze.

The figure 2 shows the number of messages sent during a forum of the second case study (December 2003). Trainees sent 106 messages during the five weeks of the case study, a little bit more than 3 messages by participant. We can observe very classical individual disparities but even more temporal disparities. Indeed, the number of daily messages varies from 0 to 7, except the 27 November 2003, with 44 messages. In only one day, it corresponds to 42% of the total number of posted messages.

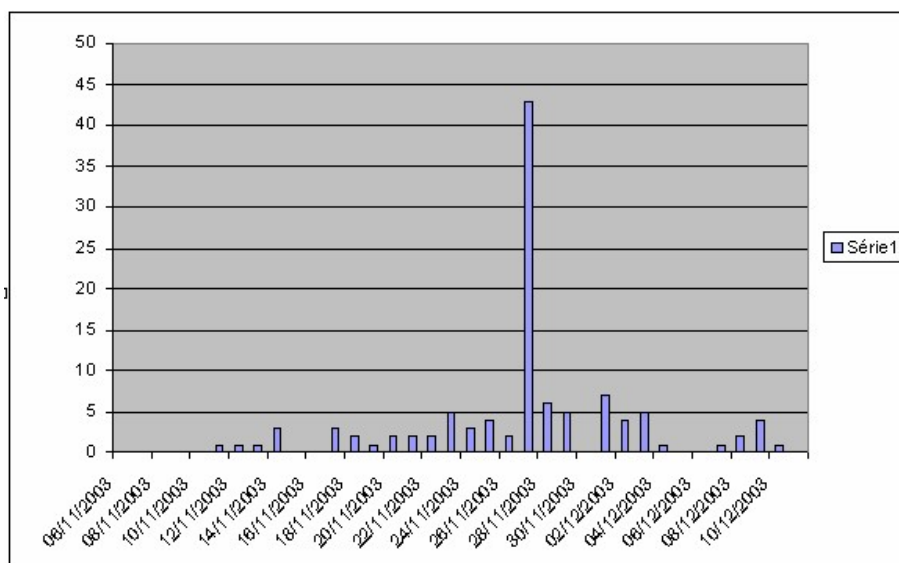


Figure 2. Number of messages per day (second case study; Fluckiger, 2004).

To complete the story, Thursday November 27, the preservice documentation teachers were present at the IUFM. The trainers recalled during the morning that some time has been liberated in their training program and this time had to be devoted to the forum, not, for example, to the term of probation. During the afternoon, most of the students stayed in the classroom, where they had access to computers and internet. All the students, except one, intervened on the forum. For several hours, exchanges were very nourished and, for some of them, this work continued during the evening.

To interpret this phenomenon, we can invoke several reasons. First of all, the system of forum used for the case study is BSCW. If it is a very good product for distant collaboration, it is not well suited for forum discussion. There is no possibility to access directly to the whole arborescence of messages, only the title of each thread is directly readable. So, students had to open all the threads to be informed of the different messages.

Another explanation can be found in the perception of the scholastic feature of the forum. Some students took the opportunity to participate minimally to get rid of an imposed exercise. Nevertheless, the interviews confirmed that the students really appreciated this afternoon and the intense activity with the forum. So, the interest may come from a quasi synchronous functioning: you take time to read and write messages, but you are sure that some people will respond quasi immediately, like in a dialogue. It is lively and exiting, and it is worth to take time to participate. We can see that as a kind of pedagogical instrument “presence discussion forum”. It has some advantages: the necessity of writing and the fact that a trace of exchanges are kept by the system. But the reflection time tends to disappear.

To confirm this last interpretation, the observation of the following forum (third case study) revealed another interesting feature. The users tend to optimize their time, posting several messages the same day in several discussion threads, coming again to the forum only later. Stéphane Fouénard called it *punctual pluri-participations* (see figure 3).

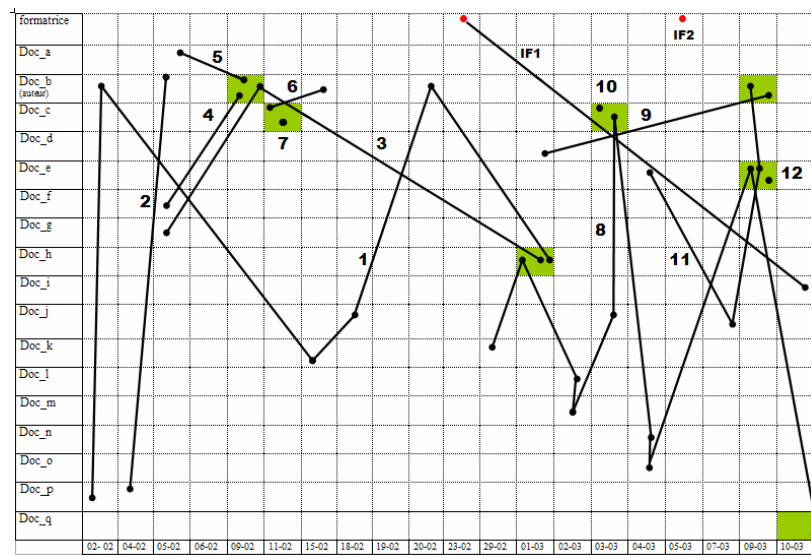


Figure 3. The phenomenon of punctual pluri-participations (Fouénard, 2004).
In green, we can see moments when some participants sent several messages.

This observation is coherent with general principles of economy and efficacy that characterises human activity. It is linked to the functioning of forum with a rather small community. In-depth analysis of forum content has been conducted, revealing the *filter* function of this asynchronous activity and characteristic behaviours of participants (associated with 3 categories of messages).

6. LESSONS LEARNED

Developing collaborative learning activities in the context of preservice teacher training is not straightforward. General principles (e.g. Dillenbourg, 1999) provide some hints but to put them into action requires pedagogical inventions. We observed that document sharing (mutualisation) is not really an issue, high participation is ascertained. Extending it requires to define new rules for document design. Offering the opportunity to share document with peers is an important factor for instrumental genesis (Rabardel, 1994), i.e. for a good appropriation of the provided networked environment.

But collaborative production or construction remains difficult. Just adding some collaborative tasks at an existing curriculum seems to lead to a failure. The examples we studied suggest that it appears necessary to more deeply re-organize curriculum, integrating collaboration as an important part. As we already noticed, having a shared memory (trainers and trainees) has an important influence: trainers can observe many traces of trainees' works can be more confident and let them more autonomy. The multiplicity of traces raises also a new problem as the trainers will not be able to read everything: new regulations have to be created. In the French context, tensions remain between the probation field (the schools) and the training institution (IUFM), developing a learning community is a challenge. A shared networked environment can be a mediating tool.

We noticed the pedagogical interest of forum in presence. It seems paradoxal at first sight but even with new forum systems, some lisibility problems will last. Taking into account the constraints of such activity, the idea of forum in presence has to be deepened.

7. PERSPECTIVES

The main issue we are considering in this text is how to learn how to collaborate in preservice training. Is it sufficient to collaborate during training? The answer is not straightforward. Collaboration is not as easy as one can imagine and to be involved in collaborative activities is certainly essential. This year, several preservice documentation teachers, now in tenure position in different schools, have opened a shared platform to keep contact and to have online discussions. It is a good indicator of success of the formation, but we certainly have to continue our reflections and experiments.

Concerning research, we now want to address a new agenda: using Engeström model, we want to study, on the trainers' side, changes in work division, in role repartition. On the learners' side, we want to explore in depth instrumental genesis, moments of active cooperation, negotiation of shared representations...

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