**Collaborative learning in a virtual campus. Allowing future teachers live what their future learners could live about technologies and education.**

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**Abstract**

This paper presents a European project called Socrates LEARN-NETT[1] based on a distance collaborative learning realised with the help of a virtual campus. This one offers functions facilitating the navigation inside the campus, giving access to some information related to the LEARN-NETT community (students, tutors, groupworks, news, etc), regulation and management of collaborative work, communication tools, sharing of resources, …

The collaborative learning activities related to the educational uses of Information and Communication Technologies (ICT) were experimented by nine European universities involved in this project. The goals were to train future teachers in the educational uses of ICT and to let them live distance collaborative activities dealing with ICT uses into their educational activities.

Several actors and roles were identified: professors, tutors, animators, learners, etc whose profiles are illustrated here. Guidelines for communication and collaboration were negotiated and applied. Working in groups at a distance, the learners have developed different kinds of competencies and learning strategies: technical competencies (e.g. use of communication tools, softwares, navigators, …), strategics ones (e.g. communication and collaboration at a distance, work planning, …), dynamics one (e.g. manage their own projects), …

Three years of experiment and regulation led the team to make some recommendations and conclusions about the integration of such activities in different courses at a university level.

**Keywords**

Collaborative learning, ICT, universities, teacher's training, competencies, learning strategies

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# 1. New learning challenges

The importance of education and training is now emphasised at every levels of our society. Education is no more the problem of only school and family. New objectives and new roles for learners and trainers have emerged. According to LECLERCQ & DENIS (1998), learning should be possible everywhere (especially on the job site). It should be available "just in time", (the ideal being "zero stock", ie. pieces of learning that can be used immediately). These three features constitute what these authors have called « a triple explosion of learning needs ». Nevertheless this doesn't omit the necessity to develop competencies of different levels during initial training. LECLERCQ (1987) stresses that *« effectiveness in learning depends not only on the mastery of specific competencies (cognitive prerequisites), but also on a series of demultiplicative, strategic and dynamic competencies »*.

Transmission of knowledge is not considered any more as the only and the most efficient way to train people. Self- learning and collaboration are now considered as necessary innovations that imply cultural, social, organisational and technological levels of organisations (e.g. schools, universities, …) and companies. Many people are convinced that the use of ICT can contribute to the learning process.

Flexibility and the capacity to retrain continually are considered as key competencies for adaptation to our future society which is experiencing deep social, economic and technological changes. The challenge is now to build a knowledge society and to develop the knowledge management (FREYENS, 2001). The principle of sharing knowledge and expertise is now so important that it leads to reconsider our educational principles and methods.

So, how can Instructional Design that *"aims at the systematic choice of procedures, methods, prescriptions or advice in order to bring about effective, efficient and productive ("powerful") learning environments"* (LOWIJCK, 1991, p. 4) and especially Educational Technology that applies or develops knowledge to help to solve practical problems of education (GALBRAITH, 1967) contribute to develop such kinds of environments, answering to the new learning needs and the master of various types of competencies ? The LEARN-NETT project illustrates such a kind of learning environment.

# 2. LEARN-NETT, a collaborative learning environment at a distance

The concept of collaborative learning has been dealt by many authors (see CHARLIER et al., 1999; BALDEWYNS et al., 1997; LEWIS, 1996). We won't develop it hereafter.

## 2.1 PARTNERS

LEARN-NETT is a project based on a distance collaborative learning realised with the help of a virtual campus. First supported by the Ministry of the French community of Belgium, it started in 1997, including at that moment five Belgian universities (FUNDP, ULg, Ucl, UMH and ULB) and the "Service d'Enseignement à Distance (SEAD) of this community. Since 1998, it became an European project (Socrates program) and enlarged the range of partners upon 3 other universities (Lancaster, Geneva and Barcelona) and a research centre (Gate-CNRS at Lyon).

## 2.2 A CONCEPTUAL FRAMEWORK

Information and Communication Technologies (ICT) can have a very important role in the instructional design. Nevertheless, the idea is not to replace everywhere the direct learner's experience by a mediated one.

The technical and educational LEARN-NETT device is based on a complementary approach between presence and distance. Learners participate to some local activities, especially during the phase of training concerning the acquisition of technical prerequisites (e.g. the use of communication and collaboration tools, …). When the collaborative activities start, the groups work at a distance and are coached by dedicated tutors.

Since we are working with groups that have to collaborate (it is one of the goal of the project), it could be interesting to refer to the ENGESTRÖM model (http://www.helsinki.fi/~jengestr/activity) that enriches the tridimensional model (subject-artefact-object) mentioned by several authors (e.g. RABARDEL, 1995) and based of VYGOTSKY's activity theory (1962).
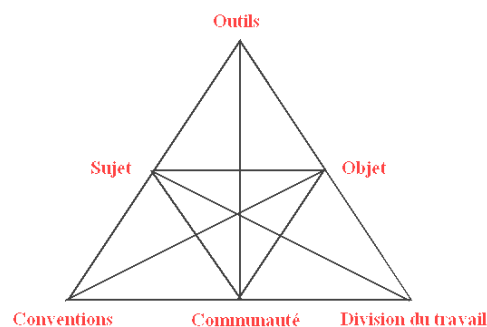


- Target public

The target public (**subjects**) are future teachers in different domains (sciences, education, …). They belong to nine European universities. When the project starts, they create a web page to introduce themselves. After, they work in groups of 4 to 5 people coming from at least two institutions. The constitution of the groups is based on the choice of a topic among those proposed by the tutors.

- Community

These teams form a **community** of users of the tools provided in the LEARN-NETT campus. Those artefacts permit the interaction between them and provide opportunities to learn from each other, interacting about the chosen task. As the knowledge of the community is deeper and larger than the individual one, each one can contribute to the cognitive development of the group helping to (re)structure knowledge (LEWIS, 1998; DOISE et MUGNY, 1981; PERRET-CLERMONT, 1979).

- Objectives

The main objective (**object** of learning) of the instructional designers is to enhance the teachers' professional development by letting them live a learning experience based on collaboration and the use of ICT. The principle of isomorphism - let the teachers live what they could let live by their future learners - or in other words "teach as taught" should help

them transfer the methodology encountered into their practices (LECLERCQ & DENIS, 1998). We also want that the learners reflect upon their own learning practices, so they will have to write down an individual report on their learning activity and to keep a diary ("carnet de bord").

Different topics are offered to the learners to support their collaborative work. They deal with ICT and education, for instance: the quality of educational multimedia softwares, the educational uses of the Internet, ICT and self-learning of a foreign language, the tutor's role in the use of a collaborative learning environment, navigation tools, the teachers' representations of ICT, … As far as it is based on a project shared by a group, this work implies to use learning/teaching paradigms focused on learners' initiative: creation, exploration and experimentation (LECLERCQ & DENIS, 1998).

- Division of labour

Working collaboratively on an activity implies to divide it. The members of the group will play different roles (e.g. secretary, interviewer, technician, …) that contribute to the realisation of the project.

- Tools

The **tool** (artefact) is a virtual campus especially developed to answer the learning needs (http://tecfa.unige.ch/proj/learnett). It is an excellent illustration of up to date distance learning environments. Its modularity and the automatised management of the information make it flexible and evolutive (PERRAYA, 2001).

The organisation of the virtual campus has two characteristics. The first one concerns the distinction between 3 types of spaces, each one being accessible and particular to a kind of public: a public environment, a student world and an organiser one. The second characteristics concerns the interface that is the same for any users, but where the tools differ from a kind of users to another (cf. Figures 1 et 2).



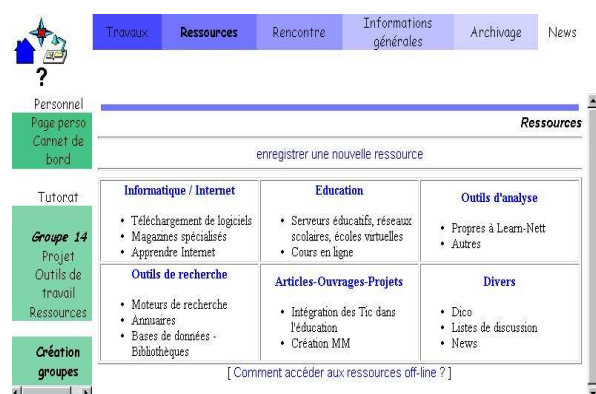*Figure 1 : student's environment (working tools)*  *Figure 2  Organiser's environment (resources)*

*Available tools in those 2 spaces (green menus at the left side of the screen) are different depending on the kind of users). Other functionalities are also available to the organisers from the blue menu at the top of the screen ; add resources; record archives or add News.*

Those tools aim at facilitating navigation inside the campus, providing access to resources concerning the LEARN-NETT community (e.g. students' and tutors' personal homepages, group works, guidelines, archives, news, …), favouring the management and the regulation of the learning environment  (e.g. students' "diary", task manager, …), helping synchronous communication (MOO) and asynchronous communication (café-forum, dedicated forum for

each workgroup), favouring the sharing of educational resources (general ones and specific to the groups) (JOYE,F. et al, 2001).

The reflective activity is instrumented by the diary ("carnet de bord") that the learners fill in during their learning and the report they write at the end of the collaborative project.

To help the users to have an idea of the structure of the virtual campus, a map is available. It is made with the NESTOR software that is a special tool designed to build conceptual map and navigation maps (ZEILIGER et al, 1996; see http://www.gate.cnrs.fr/~zeiliger/nestor/nestor.htm).
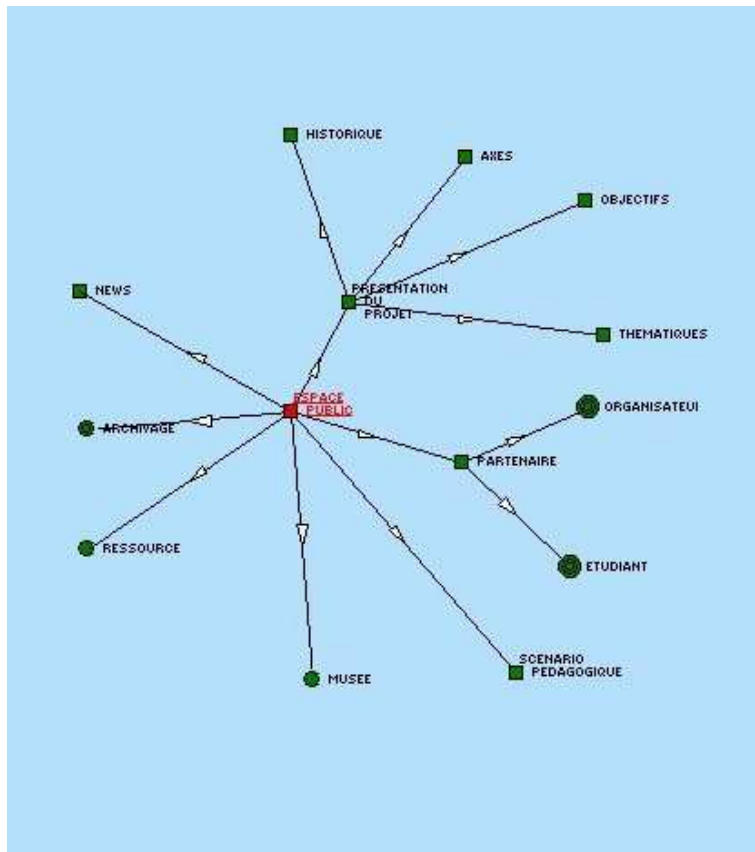


- Rules

Some rules to favour the communication between the actors have been negotiated. It led to charts concerning the way to send and answer to an e-mail, to intervene in a forum, … We hope that the rules and recommendations for the use of communication tools will help those artefacts to become real learning tools (RABARDEL, 1995).

Those rules are available in " Le guide des intervenants du projet Learn-Nett" where the roles of the tutor and the animator have also been described.

- Some questions …

Interesting questions emerge  from the relations between the different poles. For instance, we can consider the classical triad "Subject-Tool-Object" and study how a learner appropriate the different tools proposed in the virtual campus to attain the learning objective. How does he/she use these tools ? Do they become real cognitive tools (cf RABARDEL, 1995) ?  Which tool is the most adapted at the different collaborative learning phases -e.g negociation of the objectives, repartition of the tasks, planning decisions, discussion of the results, … (cf LEWIS, 1996) ?  As the use of the tools has to be considered referring to a group of people that is going to use them, focus on the triad "Subject-Tool-Community" would help to study the social process by which the uses of these tools are built. Other questions including the pole of "rules" or "division of labour" could also been examined.  Some of these questions are presented in DOCQ & DAELE (2001).


## 2.3 THE ACTORS OF THE LEARN-NETT PROJECT

The learning environment includes several actors different than the learners: local animators, tutors, professors, learners and coordinators (cf PEETERS and WILLEM (2001)).

- Local animator

He/she trains the students of his/her university in pedagogical aspects (educational uses of TICs, collaboration concept, …). He provides technical  prerequisites and a hot line during the project, works in collaboration with the professors and the tutors, contributes to the regulation of the process. At the end of the project, he/she organises an evaluation session with all the local actors.

- Tutor

A tutor has in charge a group of learners from different universities and interact at a distance with them. Referring to DESCHRYVER (2001), the tutor's roles in such a distance collaborative learning environment aim at:
- building a community of users,
- clarifying the project,
- organising work and ideas,
- helping to choose the right resources,
- evaluating the work (task and collaboration process).

It appears that it was necessary to train the tutors before starting the collaborative work (CHARLIER et al, 1999).

- Professor

The professor is the responsible of the course at the university. Officially, he/she defines the objectives, number of hours to credit to this work in the curriculum and the evaluation criteria. He/she can ask information to the animator and/or the tutor.

- Coordinators

The coordinators manage the project, are the interlocutors between all the partners. They animate the forum and are responsible of publication and upgrading the "News".

## 2.4 FIVE MAIN STEPS IN THE PROJECT REALISATION

The activities necessitate different steps. Since we work with many partners, we have to synchronise the agenda.

- Step 1: preparation period

Step 1 deals first with the information on the project. The Professor clarifies the objectives, the roles of the actors, the planning and the evaluation criteria. Learners say what they expect from the project. The local animator organises the practical modalities and presents the "guide des intervenants" to the learners.

As some competencies are prerequisites to work collaboratively at a distance, the animator trains - if necessary - the learners. The technical training also includes a familiarisation with the LEARN-NETT campus and its tools where the learners will have their own space work.

- Step 2 : constitution of the groups and first contacts

The inscription of the students via a standardised form will generate automatically their home page (a standard one) and provide them an access to a personalised space including an individual one (e.g. for a personal homepage and the use of their logbook) and a collective one (for groupwork activities).

After having chosen  their project topic, the learners subscribe to a group (maximum 5 students) including students from two institutions. Each tutor controls the process (no more than two groups can choose the same topic) and take some information from the Web site about the members of the group that he/she is responsible. The interactions start between the participants.

- Step 3: clarification of the project, division of tasks and negociation

The group starts to collect information about the chosen domain and decides what they are going to do (interviews, questionnaires, experiment,  …). A description of the project is put in the space work. The roles are decided into the group.

Regular interactions between the group and the tutor are then necessary. The animator also assists the learners.

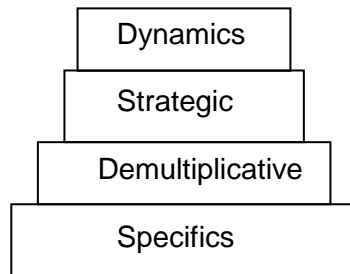- Step 4: Realisation and evaluation

The learners inform the tutor on the evolution of the work. The tutor helps them, gives counsels, provides feedbacks, … At the local level, the animator regulates the process if necessary.

- Step 5: Finalisation of the project and individual reflexive report

At the end, the learners publish their work in the virtual campus space and write down a report on their learning process. Those will be evaluated by the professor. The tutor and the animator also write a report.

## 2.5 EVALUATION OF SOME TARGET COMPETENCIES

According to LECLERCQ (1987), the trainer has to influence four levels of competencies: **specifics** (knowledge of a given vocabulary, of specific skills, of facts linked to a specific domain), **demultiplicative** (such a reading, asking questions, note taking, data base searching, etc. that enable to learn some more specifics by oneself), **strategic** (i.e. adapt one's behaviour to unique situations) and **dynamics** (i.e. the pleasure one has in doing things, in learning, etc.).

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           ┌─────────────────┐
           │     Dynamics    │
        ┌──┴─────────────────┴──┐
        │       Strategic       │
    ┌───┴───────────────────────┴───┐
    │        Demultiplicative        │
┌───┴───────────────────────────────┴───┐
│               Specifics                │
└────────────────────────────────────────┘
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Referring to that classification of competencies, we observed and participants to the LEARN-NETT project say that they have acquired some of them.

- Specific competencies

A check-list of technical competencies was proposed to the learners at the beginning of the action to let them self evaluate their  competencies related to different categories of use of the computer: surfing on the Internet, use of electronic mail, forum, chat, … Since the last years, we observed a better master of those competencies among the university students at the starting of the activity. Nevertheless, some training sessions are still necessary to become familiar with the virtual campus and the us eof Internet. Progresses were observed concerning the ability to use the different tools during the participation to the project. The learners used a large range of tools offered by the virtual campus (cf DOCQ & DAELE, 2001).

The learners also acquired specific competencies linked to the topic they chose (e.g. the criteria of evaluation of educational software, different scenarios of educational uses of the Internet, …). They learn to use Web pages creation tools, first to create their personal homepages and secondly to make their project results available on the Web via the virtual campus.

- Demultiplicative competencies

The use of search engines, of distance communication tools, of a wordprocessor (to write down a report), …have helped the learners to access and develop new specific competencies.

*"We have found interesting Internet sites using search engines and specialised magazines" (C.D, 99-00, p. 44)*

- Strategic competencies:

Complex competencies such as collaboration, metacognition (reflection upon the learning process, self evaluation, …), planning (time management, division of labour, …), problem solving, … have been observed.

For instance, in their reflexive report, the learners analysed their learning activities. Some of them referred to the six teachning/learning paradigms described by LECLERCQ & DENIS (1998). They estimated they had learned by "Creation/confortation-Confrontation" as they build questionnaires, web sites, evaluation grids, they realised interview and their synthesis. Some considered learning by "Imprintingation/modelling" as some behaviours were imitated (e.g. behave like the animator to open a file and print it). They often used "Exploration/feeding" to learn: read the LEARN-NETT guidelines, search information, …The "Reception/transmission" paradigm was also observed, for instance when information wasprovided by the animator or the tutor, ...

They mentioned collaboration at a distance to be possible: *"Starting this project, distance learning had no signification for me … I associated this project with the expression "far from the eyes, far from the heart", how could we be able to favour the development of our objectives without meeting our partners ? (…) I realised that it was really possible to build a team spirit, a team work, at that at a distance. We quickly go into he game, we like it and we try to reach all the target objectives". (BS, 99-00, p.5)*

Sometimes, difficulties emerged, for instance to plan synchronous meetings:
*"… since the use of the MOO or of the Newsgroup is a learning that represents an evident interest , its practical use was often a problem. The choice of the moment to meet - often taking place at a different moment than previously decided - and the availability of good computers are two constraints that were an obstacle to the good way of work." (V.B, 99-00, p. 2)*

- Dynamics competencies

The fact that everyone can work on a topic he/she has chosen favours the motivation to work on this project shared by a small group. The participation to an innovative experience also contributes to enhance the learners' motivation and their self esteem.

The use of a tool such video-conferencing is important for the team building. That is what LEWIS (1996) calls a rich media. It is very important for mediating group activities.
*" … I really became conscious , with the help of this conference, that I was going to participate to a project with "real" persons (not only virtual one) : each tutor presented his/her topic and ourselves introduced ourselves. It was important to see the reactions and attitudes of each of us. For me, motivation and need of collaboration really start to develop during this videoconference." (C.G., 99-00, p.10)*

## 3. Conclusions and perspectives

### 3.1 LEARN-NETT: AN INNOVATIVE PROJECT

First the LEARN-NETT project was a research device whose aim was to stimulate educational and technological innovation in real learning contexts and to evaluate the impact of the implementation of a distance collaborative learning environment. Some tools were especially developed to contribute to these goals (e.g. the virtual campus, the NESTOR software, the logbook, …). This project took place in the existing courses given to future teachers in nine universities. That innovation implies several changes. For instance, the actors are different than in face to face activities. The training roles are distributed among animators, tutors and professors. The trainer's role evolves: he/she becomes a learning facilitator (DENIS, 1990), a regulator of learners' interactions. The tutors' role is very important and includes for a large part the learners' interactions management (PEETERS et

al., 1998 ; CHARLIER et al., 1999). It is recommended to train the tutors before starting the collaborative work with the students (CHARLIER et al, December1999).

Considering four years of experiment of the LEARN-NETT project, we conclude that it is a rich environment that offers innovative practices. LEARN-NETT can be considered as an innovation device at a triple point of view: technological, educational and service (BONAMY & CHARLIER, 2001). It is a technological innovation since ICT tools are used to access to knowledge and to communicate. It is a pedagogical one since there is a reflection about why changing and what, and a service innovation since a new way to organise the teaching and learning is developed.


## 3.2 ARE THE OBJECTIVES ATTAINED ?

At the learners' level, target objectives are attained: they lived a distance learning collaborative activity, concretely used ICT, developed a collaborative work about a topic related to educational technologies and had a metacognitive reflection about their learning process (DAELE & LUSALUSA, 2001).

The design of this device is based on a reflection that place the users at the centre of the process. The structure of the virtual campus takes into account the users' (professors, tutors and learners) roles and needs: particular tools for communication, access to information, navigation, project management,…were especially created and integrated into the virtual campus. The creation of metaphors to talk about it or to situate the user in the learning environment (here the virtual campus) are analogies to existing university campus among the different partners.

Learners' prerequisites concerning technical competencies, their representations and expectations are always considered at the beginning of the activity. Their evolution is evaluated through the learners', tutors' and animators' reports. The professor is still present and plays the "academic" role: he/she decides what are the relations of the activity with his/her course/curriculum and evaluates the final products.

The results are positive: the learners developed competencies at different levels: specific, demultiplicative, strategic and dynamic competencies have evolved (DAELE et al, 2000). Different tools of computer mediated communication were experimented and the learners had the opportunity to consider which one is the more adapted to the different phase of their work. The virtual campus offers a great deal of functions and resources that favour the collaborative learning activities. This work space aims to be a real mediator tool between the members of the LEARN-NETT project, permitting the development of communication and collaboration activities, contributing then to create a virtual community of learners (LEWIS, 1998). Some of those tools became real cognitive instruments, others not (DOCQ & DAELE (2001). Moreover, all the tools are not used at the same frequency by all the learners.


## 3.3 PERSPECTIVES

LEARN-NETT is a learning device among others that articulates presence and distance. It contributed to the creation of an interuniversity network. Even if the Socrates project is finished, the partners still continue to work together. This year, students from the different universities collaborated through the LEARN-NETT campus and this activity is always integrated into the courses of the professors that participated to the project. The success and the durability of this innovation is probably due to the fact that the process was built with all the actors of the project: they worked together to the adaptation of the instructional design, the integration of new tools and of the new educational concepts into their existing practices.

This experiment answered to a need. "Bridging tools" helped to enhance the new actions (CHARLIER, 2001): actors made explicit what happened: they talked about the experience, described case studies, ideas were shared inside the community of users.

Some progresses were made regarding the integration of ICT in the teaching and learning practices. A reflection on the curriculum of training future teachers led to the take new kinds of competencies (social competencies, technical, metacognition, …) into consideration. This experiment provides some new useful ideas, concepts and tools that can help the integration of ICT into the training curriculum of future teachers (cf the project FORMAHETICE, http://bigbox.det.fundp.ac.be/%7Etice/ )

The results of such experiments should be disseminated and presented to future teachers. Adapted to other contexts, the use of the existing device and campus could help to develop collaborative learning at a distance and to create a network between all the people concerned by the implementation of such activities.

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