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# Some Reflections on Learning and E-learning

Cristina Zucchermaglio [♦•], Francesca Alby [♦]

[♦] Department of Social and Developmental Psychology,
University of Rome "La Sapienza", Italy

**ABSTRACT**

Educational technologies' designers always refer to a model, more or less explicit, of the teaching/learning process. Even when not explicit there is always an idea about how people learn behind the design of an e-learning product as there is for every other formal or informal context of learning (school, training classes, working places, etc.). At the same time there is an implicit model of the role of technology: computers can be seen essentially as a 'cognitive tool' which allows one access to a series of information and contents to isolated users or as a 'social tool' which allows one to communicate, share and negotiate competent practices, identities and meanings. In this paper we outline an analysis of the most widespread educational technologies by investigating the nature of such 'theories' that are 'behind' their design and that supports –more or less- learning social practices. Finally, we outline some principles to follow for the design of effective educational technologies following a social and situated learning theory.

Keywords: *learning, e-learning, technology , virtual communities.*

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## 1. Learning as participation

The most recent studies of situated and cultural psychology analyze the ways in which social actors reciprocally coordinate their activities and the relation among human action, activities and tools in working and organizational settings (among the others, Rogoff & Lave, 1984; Hutchins, 1995; Engestrom & Middleton, 1996; Heath, Luff, 2000; Zucchermaglio, 1996; 2002). These studies are ethnographies of everyday working activities during which knowledge is built and shared in social contexts and underline the situated, social, locally constructed character of practices of work and use of technologies (Suchman 1997; 2000). Therefore studying the construction of repertories of meanings and shared practices becomes essential in order to

• Cristina Zucchermaglio
Department of Social and Developmental Psychology
University of Rome "La Sapienza"
via dei Marsi, 78
00185 Rome - Italy
Tel. + 39/06/4991.7657
Fax +39/06/4991.7652
e-mail: Cristina.Zucchermaglio@uniroma1.it

understand the use of technological artefacts inside specific communities of practice. Two concepts are emerging as central: 1) the concept of "mediation" (Vygotsky, 1990; Cole, 1995; Engestrom, 1987): working practices having a meaning only inside a repertoire of meanings shared among a community. An electronic mail system, a word processing system, a database will never be used in similar ways in different communities of practice: they will assume specific meanings and they will sustain peculiar working practices through the mediation of the pre-existing work practices system ( Zucchermaglio, 2000). 2) the concept of "community of practice" (Wenger, 1998; Lave and Wenger, 1991; Seely Brown and Duguid, 2000; Orr, 1990 ): human action is always built through answer to other persons, in social contexts of inter-subjectivity. In fact it is only the interaction among individuals that makes possible the existence of a "discursive world" , defined as repertoire of social and shared meanings ( Mead, 1934). Human action, even that mediated by technological artifacts, is always a social action : an action whose meaning is interactively and discursively built in the social practices that we share with other individuals (Bachtin, 1979).

In such a cultural and situated perspective learning must be considered as a constructive, social and situated process: a process of "enculturation", of entering into a culture of practitioners; learning is a complex social action embedded in historically and culturally defined frames of activity (Vygotsky, 1990; Lave, 1988; Chaiklin &Lave, 1993; Engstrom, 1987). The analysis of learning processes occurring in everyday contexts or those found among traditional populations that have not "invented" a school system, highlights that learning could be mainly described as a process of apprenticeship, that is, as a graded, contextually embedded practice, inserted into a relevant frame of activity (Lave & Wenger, 1991; Hutchins, 1993). Learning about an activity depends on authentically participating in that activity - not in an approximation to it. In this sense learning does not always involve abstract, decontextualized subject matter, but also concerns work practices, social rules and the communicative practices of an organization. In an apprenticeship practice much crucial learning happens without direct teaching. Although there is very little "traditional teaching" - only occasional instructions or pointing out of errors by the tutor - there is much learning through this graded, contextually embedded practice. In this view, learning is in part the process of socially constructing a communal understanding: learning is not individual and receptive at all, but a constructive and social process. In this framework learning is not a specialized activity that should be directed by someone in special occasion, but a

normal feature of the human functioning in everyday and work settings: learning is a social practice situated in other cultural and social practices.

This perspective on learning have definitely overcome the "transfer model", by which knowledge and practice were considered in isolation, proposing a view on learning as “participation” in a social practice, and taking knowledge back in the contexts wherein it is meaningful. In this view, learning to work implies participating as a member of a specific community of practices (Wenger, 1998), and does not mean to acquire abstract concepts and notions of that set of practices.

## 2. An ‘educational’ classification of e-learning technologies

Technologies, also educational ones, are never neutral: their different educational conceptions are defined by differences at the level of quantity of initiative and autonomous building allowed to novices, their transparency/visibility, their representation of expert knowledge, the role assigned to social interaction and more in general by their epistemology and learning model. Educational technologies designers always refer to a model of the teaching/learning process. Behind the design of e-learning products, as for every other formal or informal context of learning (school, training classes, working places, etc.) there is always an idea, also a common sense one, about how people learn. At the same time there is an implicit model of the role of technology: computers can be seen essentially as a “cognitive tool” which allows one access to a series of information and contents to isolated users or as a “social tool” which allows one to communicate, share and negotiate competent practices, identities and meanings.

Trentin (1998, 2002) presents a classification of educational technologies in the model of the three generations of the distance learning systems. In this model the first generation includes the early courses through post mail of the ’50s and ’60s , which were followed by the multimedia distance learning systems, the second generation based on printed materials, television’s programs, audio tapes and later didactical software. The systems of first and second generations share the same conception of learning as an almost exclusively individual process: learners study the materials and, at the most, can ask for help from their trainers. The key idea of the third generation of distance learning systems is to reproduce, even if with the inevitable mediation of technology, learning as a social process, in which the major part of the training process takes place on the web, through the interaction of participants in a learning community. Also on the basis of this preliminary analysis we can propose an ulterior distinction

between ‘empty’ technologies (simulation environments and virtual communities) and ‘full’ technologies (lessons, books, hypertexts) (Zucchermaglio, 1992), which we will now analyze in further detail, through the illustration of some e-learning products or contexts considered prototypical examples of such technologies. These examples are collected through a wide navigation among e-learning web sites and are quoted only to illustrate typologies and without any supposed completeness.

### 2.1 The ‘full’ technologies

The ‘full’ technologies -among which are all the technologies born for subsequent developments from the machines built in the ‘60s (as CAI, CBT and ITS)- remain the most widespread and are designed thinking that learning is essentially a process of information transfer from the system to the learner’s head. Even if the systems differ for different variables (typologies of users, contents, technological instruments, etc.) nevertheless we believe that they can be compared for the more or less explicit learning model which guide their design and allow to start to reflect upon the crucial and often ignored role of such model in the realization of effective e-learning systems.

#### 2.1.1 The mediated lesson

Eurolearning defines itself as “the first European portal of distance learning” and is an Opera Multimedia production (www.eurolearning.it; Deplano, 2001). After the registration, you can access a free version of an introductory course in how to use a computer. When the course starts a screen appears containing a teacher who is speaking in a window at the left side, an animation in the central part of the screen and below a brief text summarizing the more important concepts; everything with an excellent speed of use and synchronization of video, text, animation (cf. fig.2).


**Fig. 1:** Eurolearning.

The didactical metaphor implicit in the design of Eurolearning is clearly a lesson in classroom, with teacher who explains and students who listen possibly without interrupting. That is an only individual use (learner in front of the screen), passive and specially predetermined in its development by designers, who fill the technology (which therefore is 'full') with the knowledge to be learned. Training is here considered as an enterprise of "knowledge distribution" (Eckert, 1993) and learning consequently as a decontextualized and individual process completely independent from every form of social involvement in meaningful practices. In this case the traditional model was directly moved to training on-line, which is not surprising if we think that the model of transfer continues to be the dominant model not only for school contexts but also for educational contexts in general (cf. Zucchermaglio, 1995). However the problematic question is: if this is a model that doesn't work really well "in person", why transfer it on the web where there is not even the opportunity to raise a hand and ask a question

### 2.1.2 The mediated book

A site of e-learning by Somedia, training company of L'Espresso group, offers for free a complete course named 'Guide to Internet Use' (www.somediaeasy.com/corso_free/tot_corsofree.htm). After the instructions, there is a ten items test aimed to evaluate the initial preparation whose negative result however doesn't limit access. The learner can therefore approach to the course which starts with a list of options on the left side (index, report, refresh, exit, etc.), a navigation bar in the center, the content of the selected unit on the right (cf.fig.2). The unit consists of a text articulated in a list of chapters which contain boxes for further investigation and exercises inserted through hypertextual links.

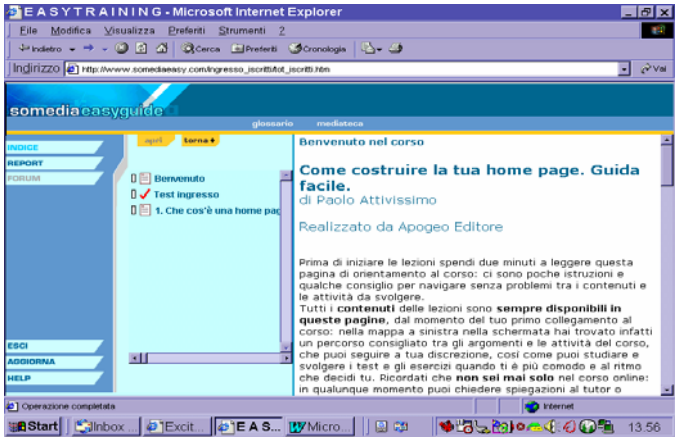


**Fig. 2:** Somediaeasy.

After four lessons there is another check, again with 10 multiple choices questions. A communicative environment supports the course in which there is a tutor with whom to talk privately and a forum where participants can post ideas and comments to discuss among themselves and the tutor.

The electronic book seems to be the most widespread e-learning model on the web, which consists in well-done notes with some hypertextual links. In the major part of the cases the socio-interactive dimension (usually represented by forum, mailing list, chat, bulletin boards) though present is clearly accessory and ornamental compared to the different didactic units.

As with 'the lesson', the model of 'the book' suggests that learning is almost a process of transfer of information (all explicit and predictable)from an expert source (teacher in a video or book) to students/novices. The computer is also in this case only a repository full of information to transfer and the individual use is the only one easily supported[1]. Learning is conceived again as an individual process and as an ability that should be practiced and evaluated in a decontextualized way: without the help of others and the signs of context. In some way the belief is that people learn better when concentrated on books or listening to a lesson without being disturbed by other people. The social context is conceived as a disturbing variable, whose consideration creates only troubles for a formal, orderable and technical architecture of training on-line. Besides also in this case the fundamental support for knowledge creation coming from social interaction is neglected, as is the consideration of social interaction as a central component of any meaningful knowledge acquisition.

### 2.1.3 The hypertext

An example of courses following a hypertextual architecture (and not only calling hypertext an index ) are those developed by the department of Training and Educational Sciences of University of Turin in the FAR project- Formazione Aperta in Rete (Open Training on the Web; http://hal9000.cisi.unito.it/wf/DIPARTIMEN/Scienze_de/FAR/Gruppi-di-/). The undergraduate courses available are in Educational Sciences, DAMS, Medicine (cf.

[1] It is somehow possible imagining social usages of such full technologies. Though in general the learning model embodied in their design supports mainly an individual type of usage. The rigid connotation of the knowledge transmission process implies a correspondent rigidity also in the educational uses of these technologies. Even in the best of the contexts, uses will be 'closed', of the 'right' or 'wrong' kind, not allowing a constructive activity by learners and social uses of the tool.

fig.3). On the website didactical paths for primary and secondary instruction are also available.

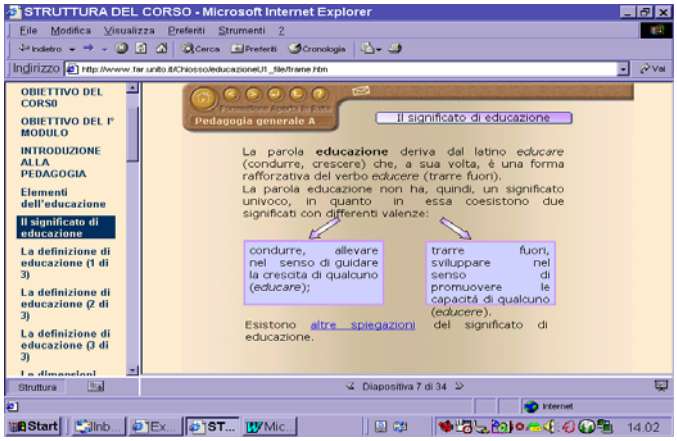


**Fig. 3:** FAR Project- Educational and Training Sciences University of Turin.

The primary characteristic of the hypertextual architecture is represented by the modularization of information. That means that contents are divided in autonomous portions of information (nodes) connected among them by logically meaningful links. The elements of a hypertextual system are the database (the base of knowledge) and the windows. The database is a network of nodes containing information linked together. The windows are graphical objects which appear on the screen and have one to one correspondences with nodes; in general they can be moved inside the screen, resized in relation to necessities and closed when not used. Even a linear text can be viewed as modular if considered in accordance with the different parts in which it could be divided: chapters, paragraphs, beginnings of lines.

However there is a fundamental difference: paragraphs of a book are inserted within a continuous flow which represents the path followed by the one who 'thought' and organized the contents showed; nodes of an hypertext instead allow one to personalize the reading of the text, moving from one information to the other, from one idea to another one.

In practice that means that a text can be connected to its own explication, the values of a chart can be connected to their comments, different parts of the same text can communicate even while maintaining their modular organization. The hypertext seems to be a useful tool to make more flexible information's usage paths and render explicit the logical connections among contents; it remains anyway inside the previous paradigm considering learning as a process essentially 'mental' and 'individual' and the

user still not very autonomous, even with some concession to the composition of the studying path.

This short analysis of the most frequent 'full' technologies present in the e-learning market, shows that the major part of technology's designers are still immersed in an "old-fashioned" paradigm**,** which guided the first attempts of education through computer; the major part of them believe that "knowledge is a fluid that should be transferred inside the student-recipient" (Kay, 1989) so following a learning model that is mainly outdated and surpassed by the recent developments of cultural and situated psychology. Traditional didactical procedures are in these cases simply transferred inside technologies with a sort of technological determinism according to which technology is only a neutral container/dispenser of information to isolated individuals in cheaper and faster ways than traditional classroom's situations.

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## 2.2 'Empty' technologies

E-learning environments which intend to support collaborative learning are designed considering the social and constructive nature of the learning process. "Empty" technologies allow flexible, explorative, social and open uses, able to embody at the best those principles that define human learning and support processes that include and imply metacognition and reflection, cognitive apprenticeship s practices, situated knowledge, cognitive complexity, social construction of cultural knowledge (Resnick, 1987; Lave e Wenger, 1991; Lave, 1993; Hutchins, 1993; Wenger, 2000; Gherardi, 2000). Users actively participate in a group whose interactive and collaborative practices are technologically mediated. This allows the simulation of real working settings and dynamics, the preparation of interdependent tasks, defined with the participation of the users themselves. 'Empty' technologies in fact are not really 'empty': their design –as we'll see- must embody some fundamental principles of human learning. We will briefly describe simulation environments and virtual communities through the illustration of some systems considered prototypical examples of such typologies.

### 2.2.1 Simulation environments

The multimedia systems of self training built by Mafrau, a distance training company (www.mafrau.it), follow a methodology defined MUST (Models of Simulated and Tutorial Universes; cf. Deplano, 1997). One of their main products is 'Act as a

manager', a course realized for Telecom Italia (Fig. 4). Once the system is started, a lady explains the structure of the course, the possible paths and the different types of use interrupted sometimes by videos taken from a Woody Allen movie in order to illustrate parts of her presentation. Afterwards the user enters in the core of the system and receives the assignment of general manager from the executive committee of the company Granonostrum. Then he can choose among some tasks available in a list. Once chosen his own mission, the user can move autonomously inside the whose company to search for information: clicking on 'sensitive' objects he can access different types of documents inside the offices.

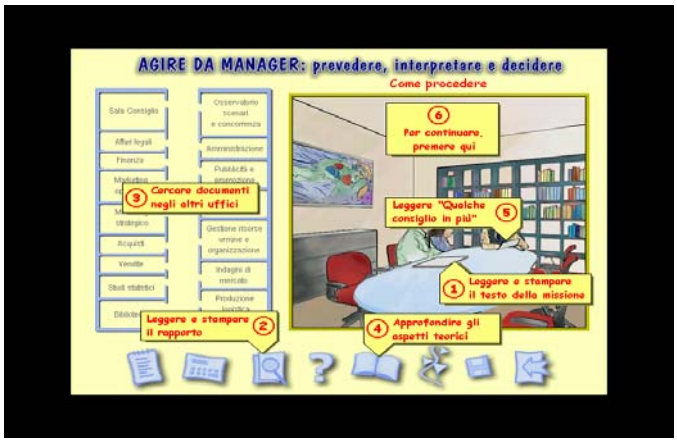


**Fig. 4:** Mafrau's course "Act as a manager".

On a structural level, the system includes a simulated environment and a tutorial subsystem, as well as a certain number of service functions. The user must conclude one or more missions such as, for example, compiling a document by navigating among different environments represented as offices of a company which contain every kind of organizational information (organization chart, production data, budgets, etc.).

In every moment the user can access the tutorial function constituted by hypertexts made of texts, graphical elements, interviews, videoclips. The user can navigate inside the two systems (simulation and tutorial) without any limitations of time: when he believes the mission is concluded in a satisfying way, he can submit it to evaluation and, based on his score, go on in his work or ask for another mission.

In such a simulated environment the user has the chance to face a series of 'realistic' events (as well as access to expert sources) acquiring new knowledge in the meantime. As in everyday working life, learning knowledge is linked to working objectives (for instance the editing of a final document). In addition, simulations are

particularly useful for acquiring competencies needed to face all those situations in which it is difficult to have a direct experience, such as risky or rare ones[2].

The learning model in this case is much different than in 'full' technologies: even if an individual use is preferred (also if the tutorial system simulates experts' participation in the realization of activities), learning is considered less 'mental' and therefore more connected to actions to realize, as actually happens in developing expert working practices (Scribner, 1984). Further, the path to the solution is declinable and diversifiable in relation to the user's competencies (also the initial ones): this last characteristic, typical of 'empty' technology, allows flexible, explorative, social, open and diversified uses by different users. Also the role of the expert is different: in this case he designed the simulated environment and the 'missions' ('empty' technologies in fact are not really empty) instead of simply 'filling' the system with units of information to be learned. Design assumes a role of scaffolding which is realized in building characteristics and limits of the simulation's environment and designing different courses of actions (missions) rather then simply exposing decontextualized contents. A limitation is their technological complexity, which makes it difficult to put these systems on the web (sometimes they are on cd also if connectable to the web). Another relevant aspect of these systems is the presence of a playful dimension (humoristic videos, crosswords instead of tests, a Star Wars robot which zaps you if you make a mistake, etc.) which, for some aspects, makes the system resemble a videogame, breaking the historical association between boring moments in which one studies and learns and moments in which one plays and has fun.

### 2.2.2 The development of virtual communities for learning

All the e.learning situations that explicitly aim for the constitution of a virtual community focusing on the interaction among participants. In this typology are the training experiences that principally aim to create interchange and interaction among participants and are centered specially on sharing practices (also conversational) rather than on only informative contents, using both asynchronous technologies (such as e-mail) and synchronous cooperative environments (such as CVE- Collaborative Virtual Environments). These latter are technologies particularly useful for building virtual communities. CVE are environments that explicitly aim to build a virtual community based on textual and synchronous communication on different levels

[2] The flight simulator is a very effective training method and can be considered a forerunner of all educational technologies.

(public and private). Besides textual interaction, some typologies allow a visual interaction on two or three-dimensional worlds.

CVE are similar to self-training simulated environments for the representation of a simulated universe but are different in two main characteristics:

- a larger space for processes of communication and negotiation among participants aimed at building/developing a community;
- an initially less structured virtual environment, with more space for the co-construction of objects, situations and meanings by users.

Examples of such systems can be found at www.activeworlds.com. Active Worlds is a kind of three-dimensional CVE, which contains a universe with educational aims, besides a playful/social one (cf. Fig. 5). The learning model behind its design is constructivist, situated and collaborative: users can explore, communicate among them, build their own identity choosing an avatar and a nickname, build objects, problematic situations and the same environments in which they are moving (cf. Talamo, Zucchermaglio, Ligorio, 2001). Through using these systems, e-learning has the opportunity to move the center and control of educational activities from the teacher to the learner, facilitating creation of objects and materials by participants and designing activities that require the interchange and negotiation of knowledge and experiences by the members of a community.


**Fig. 5:** Activeworlds.

The project on professional communities' network -realized by a consortium guided by Cuoa Foundation- is an example of training which aims to develop a community,

although not using CVE environments but other web based technology (www.comunitaprofessionali.it; Fig.6).

The project involved about a hundred professionals divided in the following communities: 1) ALEA – Strategy and Marketing Expertise Center; 2) CLUB BIT – Computer Backup; 3) AICQ – Quality Control Italian Association, section of Veneto; 4) LOG IN – a group of professionals in logistics. While the first three communities represented groups with their own organizational structure, a mission and a defined and shared program of activities, the community on logistics (LOG IN) was built inside the project.

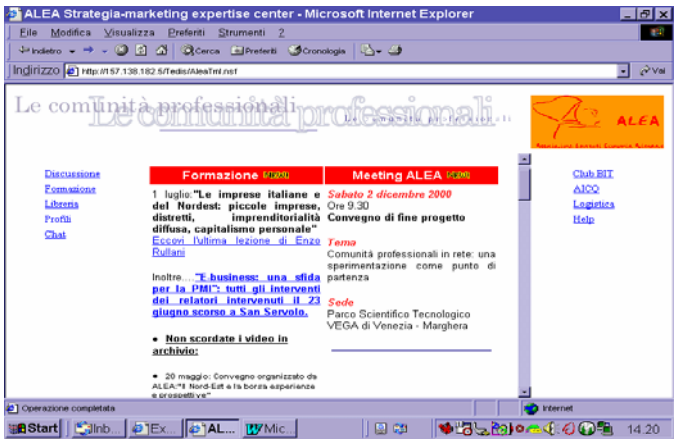


**Fig. 6:** Professional Community Network Project.

The project provided virtual and 'face-to-face' meetings (possible because all the participants came from a close geographical area) on specific themes connected to the same common professional interest that characterizes belonging to each community, despite belonging to different companies.

Face to face meetings have a fundamental role in community life, being the moments in which are built virtual 'objects' to be published on the website of the community.

Starting from a meeting, an audio-visual film and several didactical units related to the theme are realized. A discussion on emerging questions is made using on line tools such as a mailing list and a forum. Each face to face meeting connects to virtual meetings, where the discussion and reflection on the same themes continue facilitating more contextualization to each company's reality and promoting interchange of experiences among participants. For example in Club Bit community, arguments were discussed such as: AS/400 systems (subject also of a "face-to-face" seminar) were compared to other operational systems with which some members of the community had experience, raising a series of comments, perplexities, questions and answers

between who had already used the system and who had not; the impact of the Euro's introduction inside companies from a computational point of view, with reciprocal suggestions of books and documents on the argument; Unix and ERP systems, with related difficulties found by participants in different companies and of who "is not on the train yet"[3]; the début of Windows 2000 and its implications.

The space of the website is so organized:

- a discussion area: an asynchronous forum (on the Newsgroup model) within which one can insert messages that can be read by all the members;
- a training area: a space organized in order to contain knowledge units dedicated to specific themes of the community;
- a library area: a sort of archive for interesting materials like newspapers, bibliographies, case studies, etc.;
- a profile database: a database containing data on all the participants to the community; a short presentation of each with the possibility to search more data via keywords;
- chat: a discussion area in real time that also provides on line appointments.

Analyzing the different phases of this e.learning methodology, a process of integration and complementarity emerges as the following:

- organization of "face-to-face" educational-informative sessions in order to increase participation by members of the community. Some examples of arguments treated during seminars are: Internet Marketing (Alea community), E-commerce Assessment (AICQ community), Security on ADSL or HDSL Internet Connections (Club Bit community);
- each meeting realized by each community is video and audio recorded, transferred into digital format, edited and finally transformed into a multimedia document in streaming technology. These tools aim to guarantee replicability, duration over time and asynchronous use of "face-to-face" meetings;

[3] Quoted by Club Bit forum, www.comunitaprofessionali.it

- the multimedia document so realized is published on the community's portal, in a proper section. Tutors and the knowledge manager promote the interaction of the community on these materials. Feedback during virtual meetings, spontaneous comments on seminars, are used as moments of evaluation of the same seminars and as indications for future seminars. The tutor often tries to stimulate a discussion on arguments of future "face-to-face" meetings using the virtual space as a moment of shared design of seminars.

The e.learning methodology is based on the effective complementarities between the 'face-to-face' dimension (meetings, seminars, etc.) and the virtual dimension (through on line discussions, interchange of documents, training units, chat, etc.) and on a particular attention to the experts' role.

Principal roles of experts inside the web community are: knowledge manager, tutor, leader (cf. De Pietro, 2001).

The *knowledge manager* plays a key role in organizing and certifying knowledge inside the community. On the one hand, in the role of organizer, he suggests new arguments of discussion, proposes interesting case studies, furnishes explanations and answers to questions posted by community members, configures and edits materials available on line, constructs didactical material for the training on line section; in the other hand, in the role of certifier, he establishes times and procedures for the validation of the knowledge acquired by the community. The knowledge manager needs the trust of the community in order to perform these functions and must win it directly 'on the field'.

The *tutor* is a networking figure to which members can turn to for organizational, managerial and technical aspects. For instance the tutor organizes meetings, helps members to face technical problems, verifies the right functioning of technologies. He also mediates between the community and the knowledge manger. As expert of didactical methods, the tutor participates in converting the materials selected by the knowledge manager to the new multimedia format available on line. He also plays a fundamental role in animating the community. He tries to involve members in discussions, facilitate discussions on new arguments and the need for new services. He designs and edits contents of the web site, records "face-to-face" meetings with a video camera, produces and publishes the related multimedia movies.

The community *leader* legitimates the new on line environment as the usual tool to interact among community members, as vehicle to access information and training. The leader represents therefore the ideal partner in the activities of both knowledge manager and tutor, embodying the driving force of the community and promoting participation in online activities. He can be distinguished for his industriousness in terms of observations and interventions inside the new on line environment. The leader is usually an influential member and a deep connoisseur of the community, characteristics that allow him to be a point of reference in determining themes that can concentrate participation and interest of the whole community.

The educational model followed in projects like those presented, beyond their differences, sees learning as a process of participation in a community of practice in which are built and shared rules, languages, knowledge, values, ways of doing and thinking. Such systems reproduce therefore a lot of the principal conditions of the apprenticeship, intended as a situated and social learning process inside a community that realizes a specific and meaningful project (instead of simply following a training course) and in which experts members have specific and differentiated roles (leader, tutor, knowledge manager). This model at the moment seems to be the less widespread among e-learning typologies, although results of some experimentations are promising (cf.Talamo, Zucchermaglio, 2003) and indicate this typology of educational technology as the more promising among those able to realize forms of knowledge acquiring which respect principles of situated, social and cultural learning.

However further studies on educational virtual communities are necessary to better define their characteristics, ways of functioning and indications for design and educational use. Among the critical aspects are the following:

1) Presence. “face-to-face” meetings seem still to be fundamental in the creation of a community. Virtual interactions recorded after participants in a virtual community have met face to face, show an evident communicative jump: a more direct and informal language and a different quality of contents that indicate a major opening and availability (Talamo, Zucchermaglio, Ligorio 2001; Zucchermaglio, 2000). It seems there are dimensions of a community that are negotiated more easily in presence (like for instance the “common enterprise”) and others also through technologies (like the “shared repertoire”, cfr. Wenger, 1998).

2) Dimensions. A minimum number of participants is needed to create a community (the project on professional communities' network started with 25 participants but this number has progressively increased until 70 in order to maintain a continuous level of interaction). However overly large communities can also hinder an effective communication. The variable 'dimension' must be put side by side with the level of interactivity of participants, because sometimes registered members are not active members of the community. For instance some communities require at least one or two interventions in a forum to demonstrate participation. In these cases there is a large number of registrations at the beginning and later a dramatic resizing of community's members. Situations like this hinder the development of a sense of belonging and make more difficult and artificial the creation of a community.
3) Time. Time necessary to activate a community in terms of both quality and intensity of interaction is not short. The CUOA project needed about 6 months to let the community acquire legitimacy and be the point of reference of participants. Therefore adequate activation periods should be planned in advance in projects that imply a community's development.
4) Interdependence. A relevant aspect in building an on line community is the activation of some form of interdependency among participants, supported by tasks assigned to members or embodied in participants' common interests and objectives and opportunely stimulated by facilitators. 'Real' and not formal links with everyday problems and practices of members are particularly useful.
5) Facilitation's roles. Supporting figures with their various functions of assistance are crucial, especially at the start of a virtual community. Successively the community concretizes a need of self-regulation, deciding and developing new paths, perhaps following one or more emerging leaders. Community has a life cycle during which subjects, rules and activities change but experts' roles are a constant reference from the beginning during the whole development of the community. For example in the process of animation and management of a virtual community ( Talamo, Zucchermaglio, 2003) practices of reciprocal tutoring should replace the traditional single teacher: learning from each

> other is a characteristics of the collaborative and social learning contexts. As regarding group"s tutoring, the tutor"s role should develop with the developing phases of group. There is a lack in our knowledge about the process of develop of these phases in real learning on line contexts and also about the realization, more or less efficient, of tutoring functions in relation with these. Collison, Elbaum, Haavind and Tinker (2000), however, argue convincingly that the roles of human e-learning tutors differ from those of face to face tutors in at least three respects: a) They have to function as a guide-on-the-side instead of as guide-in-the-center, deepening the conceptual level of participants and training them in new conversation skills; b) They have to be project leader designing a regular, manageable feedback loop; c)They have to be leaders of the group processes, gradually building a community.

We believe therefore that virtual communities are a very good example of 'empty' technologies, in the provocative sense we defined before. However speaking about 'empty' and 'open' technology doesn't mean leaving users free to be lost in the communicative space provided by the system; at the contrary the system (and the educational project around which the cooperation of community's members is realized) must embody (also through the experts' mediation) a trajectory defined also by users and should maintain the complexity of the task as integral part of the meaning that they are going to construct. The system should provide bonds that allow users to co-build their own knowledge and prevent from getting lost inside the socio-communicative space provided; tasks, indicators and roles (like those of experts but not only them) that support and guide learning should be designed in advance, like in the best educational contexts independently from the presence of technologies. In fact effectively constructive educational contexts are those that seem 'empty' but instead embody inside of them a lot of analysis, organization and prediction of possible and effective educational interactions (Zucchermaglio, 1992).

A fundamental distinction between 'empty' and 'full' technology is in fact *being part of a real and meaningful learning project*.

'Full' technologies, like courses on the 'book' or 'lesson' model, are self-referring systems, closed in themselves and rigidly predefined (needs' analysis surveys on the web or a tutor who is only a technical help-desk don't influence so much the predefined path or the interactivity of the system).

At the opposite, 'empty' technologies (and especially virtual communities) don't exist as single systems but always as technological mediation inside meaningful projects. For instance in the project on professional communities' network, virtual moments integrate with "face-to-face" seminars inside the project's overall objective of developing and supporting a community of professionals coming from different companies. Furthermore the technological mediation allows a continuous contextualization and negotiation of considered relevant training activities showing a system's flexibility which 'full' technologies don't have.

Such analysis suggests anticipating social and open uses of technology in the design phase, substituting the task of working with given and fully organized by others materials, with instead the task of building something in interaction with others, selecting and organizing the appropriate material to reach learning objectives, working on meaningful tasks 'inside' and 'outside' technology.

## 3. Some conclusive reflections

Design of technologies should be explicitly centered on communication and social interaction processes: technologies should be conceived as cultural systems that mediate and support distributed and shared social construction of new knowledge. A technological system shouldn't simply show itself to the user, but rather be viewed as a tool that helps to reflect upon his own learning process and control it in an active and aware way and supports communication and negotiation processes among members of a social community inserted in a 'rich' learning and working context.

Such design will benefit from the analysis of the complex process of negotiation among novices and between novices and experts. Technologies in fact shouldn't try to substitute experts but to the contrary should be the tools that mediate among experts, novices and practices to be learned. The 'quantity' of teaching done by the expert doesn't decrease but change; in this sense educational 'empty' technologies require experts to rethink their roles, which will be more related to things like designing environments and managing the community than to traditional teaching.

On the basis of our analysis we could propose, as conclusion, a list of indications for design that are usable by a wide range of educational technologies and try to bring 'inside' the system the characteristics of social and situated everyday learning. Let's try to list some of them.

1. Arranging meaningful and complex situations, which allow users to understand the objectives with respect to the acquisition of knowledge. In this way users can prefigure characteristics of the situation, analyze possible relations with already known situations, consider which new knowledge is required to participate in productive and less peripheral ways to the new activity, establish meaningful relations with experts and other novices variously 'incompetent'. From the point of view of design that means creating contexts of apprenticeship in which knowledge can develop through experts' scaffolding in the social and collaborative realization of an 'authentic' task, meaningful also to novices, in a similar way to what happens in extra-scholastic contexts, facilitating therefore social sharing of tasks and contextualized use of tools.
2. Arranging situations in which knowledge is connected to conditions of its usage and application, considering that to be expert in a field means essentially knowing how to move inside it and how to use the resources of the community (among them for instance artifacts, physical characteristics of the environment, competent people): allowing therefore an instrumental use of knowledge, creating contexts for a meaningful and situated learning and not only for a passive transmission of information.
3. Arranging situations in which is made possible visibility and social modeling of knowledge through participation in a community of apprentices. In this case a strong characteristic of the training context is making visible the process of knowledge acquisition by novices, so that it can be examined, criticized and realized as an object of construction and reflection also by other novices. The correction can be made by the experts but also by other novices inside a 'horizon of observation' shared among members of the learning community (Hutchins, 1993). The novice who is wrong is not the only who benefits from the chance to be immediately and effectively corrected; also the other community members can observe practices of correction of mistakes and in this occasion of observation "knowledge of the whole activity's system can increase" (Hutchins, 1993:57). In a socially structured activity's system, correction of mistakes therefore can be a learning occasion for all the participants in the activity, not only for who is wrong. From the point of

view of design that means designing learning contexts focused both on collective comprehension of phenomena and on performances and learning of single individuals. In this way otherwise obscure processes become transparent and less expert members are allowed to participate in activities, providing different levels of participation (differentiated but always meaningful) which respect different initial competencies of members. As for example thinking of activities in which each groups performs tasks differently connected to the central problem and one must plan division of work among members. Such sharing tasks among members and experts allows facing more complex tasks and situations and working on the area of 'potential development' of novices.

4. Arranging situations that increase integration among different knowledge areas and fields of activity through building learning contexts that allow exploring more or less complex arguments without a clean field's distinction. Examples are projects that allow an educationally interesting usage of previous experiences and knowledge of members: projects with a concrete and clear objective (writing a document, finding a solution to an organizational problem, planning a new management of working activities, etc.) which allow involving novices in meaningful practices of building and interpreting knowledge and avoiding the risk of decontextualizing and impoverishing of meaning the usage of symbols, artifacts and tools; wide and long term projects, proposed and supervised by experts (but not only by them), which involve novices in building and experimenting new working and organizational practices (cf. Zucchermaglio & Colazingari, 2000). Such projects favor social interaction among community members which is a major source of informal learning: for instance through the organization of small design groups on specific projects, transversal, distributed over time, situated in real contexts and with an authentic aim. These contexts – in which it is easier to reflect upon activities with an aim intelligible also to learners- allow to emerge the initial representations which every novice carries and can become explicit in the encounter with those of others (experts and other novices): in this essentially argumentative and constructive process learning emerges as absolutely natural.

5. Arranging situations that support development and usage of meta-cognitive and self-regulative abilities of learning to learn. An essential objective is in fact increasing novices' ability to be active agents of their learning. That means considering developing an autonomous ability of knowledge acquisition, practices and capacities as an important result of learning's activities. From the point of view of design that means creating learning contexts in which an important portion of control of the learning objectives is the responsibility of novices allowing them therefore an autonomous, collaborative and constructive activity.

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