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A Methodology for Joint Design, Co−Operation and Decision−Making for On−Line Collaborative Learning

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Introduction

Processes of on−line collaborative learning generally take advantage of platforms offering communication dedicated environments, which henceforth we shall call *virtual conferences* or, simply *conferences*. Each of these environments is characterized by a specific pragmatic and communicative function. Therefore, participants, who are sometimes split into groups, may happen to communicate within different areas of activity. Besides a conference dedicated to socialization (i.e. one−to−one and one−to−many communication, concerning project topics, or for introducing tutors and learners and their interests), they can find conferences for engaging in discussions about specific topics or participating in the collaborative production of project texts (Midoro, 1998).

Generally speaking, electronic mail can be seen as a suitable tool for supporting on−line training courses; nevertheless, communication management should be carried out using specific products, which offer actual advantages in terms of accessibility, information handling and ease of use (Manca, Persico, Sarti, 1998).

Among the many different products now available on the market, one of the most commonly used in on−line training courses is *SoftArc FirstClass* ®. This CMC (Computer Mediated Communication) software package is based on the BBS (Bulletin Board System) model and offers a hierarchically structured work environment. Learners are given the possibility to access one or more discussions and, through messaging activities, contribute to their development. This is done within an organized, structured and tutored context.

In this paper we wish to describe the experience undertaken within the European *Netschool* project, focusing on our effort to provide the CMC environment of FirstClass with specific tools and methodologies for on−line *co−decision.*

Netschool

From 1998 up to the end of 1999, the Institute for Educational Technologies of the National Research Council (CNR) in Genoa took part in the project *Netschool − Multimedia Flexible and Distance Learning Network for Schooling*. The project centered on vocational schools, and its aim was to develop a support system for teacher training, mainly based on interaction with telematics tools and on the exchange of experiences at a distance between different schools in Europe. The project focused on problems linked to the supply of "core competencies" to students at vocational schools.

During the first year of the project, we worked on the design and set up of the communication platform, made up of a web site and a virtual collaborative environment, FirstClass. Providing participants with access to telematics tools, we were able to introduce a first stage of activities dedicated to familiarization with technological tools and with the other members of the virtual community. We also organized face−to−face meetings, in order to reach a common position about the disciplinary boundaries and collaborative strategies to be adopted in the second year of the project.

During this last phase, the idea arose of creating a specific environment to enhance distance cooperation using some particular and innovative features of our CMC system. This was brought about by the need to increase participants' involvement and motivation in interacting with each other. We wanted to give learners the possibility to recreate the classroom environment virtually, so that they would have a context to which they could "transfer" a part of their net−based group and collaborative activities rather than bringing them to the physical classroom setting as they had done before. This virtual context would present a number of opportunities, such as interacting with another class up to 200 km away. This idea proved to be a strong motivational incentive. It was on this basis that we defined and applied a methodology we call *Cybercreativity*.

Cybercreativity

Cybercreativity is a methodology whose aim is to enhance and support on−line group activities of co−operation, design and decision−making.

The actual added value of the learning process activated by a virtual community of learners comes from the sharing of knowledge and know−how generated by the community itself.

On−line learners are requested to co−operate in identifying models, approaches, points of view. The learning process must be seen as a shared effort to produce new knowledge, rather than being the mere acquisition of external information. As with processes of epistemological validation within the scientific community, knowledge generated within on−line courses also needs a validation process; this process may be more or less legitimized inside the community itself and represents the relevant issue which pushes on−line learners to share knowledge generated during the development of an on−line training course.

From this perspective, co−decision processes become particularly significant in the development of an on−line course, and therefore it is easy to understand the need for specific tools and suitable support methodologies.

The effective exchange of information requires a *semantic agreement*, made between the transmitter and receiver about the significance of symbols.

But when can we state that a communication is really effective? Watzlawick pointed out that a communication can be considered as effective only when the rules (both implicit and explicit) of communicative pragmatics are observed.

We focused on a particular aspect of communication: dialectical argumentation (or structured discussion). The primary aim of *Cybercreativity* is first to facilitate decision−making between people interacting with one another on the net, and then to make both the structure and the sequence of each communication act "visible". In order to do this, it was necessary to design a rigid structure of interaction paths. *Cybercreativity* provides learners with pre−defined message typologies, each having its own pragmatic function (which is represented by visualization and message features like shape and color). These message typologies are intended as a resource to help the discussion. Participants have at their disposal different message formats, each corresponding to a different category of opinion and each bearing the atomic components on which the whole co−decision process is based.

The dialogue model shown in Figure **1**, follows previous studies on structured decision−making methodologies, and in particular, draws its inspiration from the *Metaplan* technique; it shows the main steps that activate a co−decision process on a common issue undertaken at a distance:

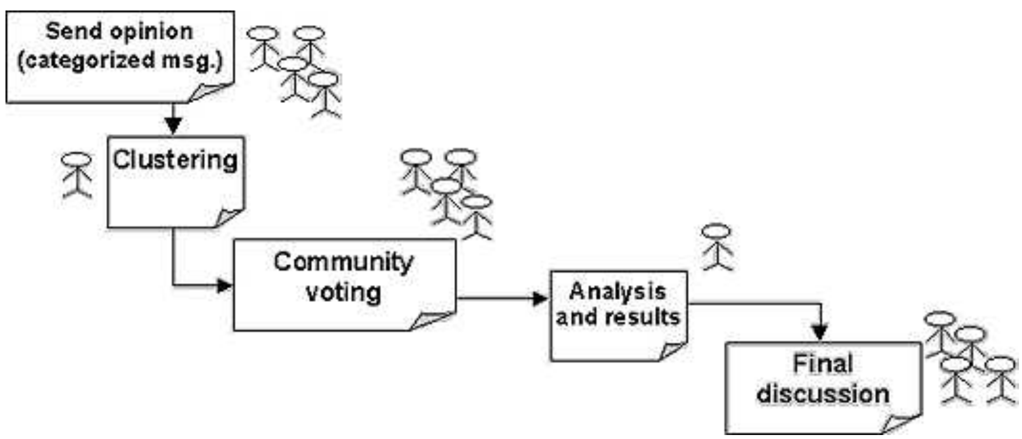

Figure 1: A dialogue model for co−decision purposes

Step 1: ***Send in your opinion***

In this first stage, learners are asked to express their opinion on a common topic. In order to focus learners' attention and facilitate their communication process, we identified four categories of opinion, each covering most of the possible situations: *news, pros, cons, proposals*.

The typology, and the use of color−code and a recognizable shape (like Post−it notes) help us to identify precise pragmatic message functions; these functions then make the classes of typology explicit.

The text field to be filled in for each message has been deliberately limited in order to encourage learners to use short terms and keywords, thus making the subsequent clustering stage easier. Examples of categorized messages are shown in Figure **3** and Figure **4**.

Step 2: ***Clustering***

Once all the messages have been sent, tutors cluster them according to their opinion category, deleting doubles and repetitions. The shared messages are then put to a further community vote; in this case, the community is responsible for the co−decision.

Step 3: ***The community vote***

Members of the community are invited to express their preferences (one for each category) about the opinion they feel is the most meaningful. As at previous stages, *Cybercreativity* allows learners to use a predefined message typology: after the clustering stage, tutors create a voting form, where learners can find a synthesis of all the contributions of the community. Only one preference is allowed for each opinion category. A sample voting form is shown below in Figure **5**.

Step 4: ***Analysis of results and final discussion***

On the basis of the voting form results, tutors identify the most meaningful opinion in each category, which represents an expression of the idea shared by the community. The co−decision process ends when the community has reached the identification of a common idea, which is the product of the interaction of the community itself.

Participants are then invited to interact with each other and reflect collaboratively upon the results of their voting. This may happen during synchronous workgroup sessions at a distance (*chat*), which tutors program and moderate (Bianchetti and Sarti, 1999).

During the co−decision process in *Cybercreativity*, tutors are called upon to act in a merely managerial and operational manner, while the community has sole responsibility for each stage leading to co−decision.

The Experience

The application of the *Cybercreativity* methodology involved two classes at two Italian vocational schools ("IPPSAR N. Bergese", Genoa and "IPSIA Ponzone Cimino", Cremona). Teachers and students were asked to interact at a distance on a common topic: "*My experience of practice*". We wanted to give teachers and students the chance to express their ideas about this topic, allowing them to do so following a structured path.

The design of the *Cybercreativity* environment entailed two phases: firstly, activities were scheduled and structured, according to a methodology used for face−to−face decision−making processes, and secondly a new interface was set up for FirstClass. We wanted to recreate a metaphorical idea of a classroom: to do this, we chose one of the classroom's most distinctive elements, the blackboard, and used it as the background for the new virtual environment.

At the project website, participants could find a short reference guide explaining the procedures for proper use of the "virtual blackboard" (http://ls−p5.itd.ge.cnr.it/netschool).

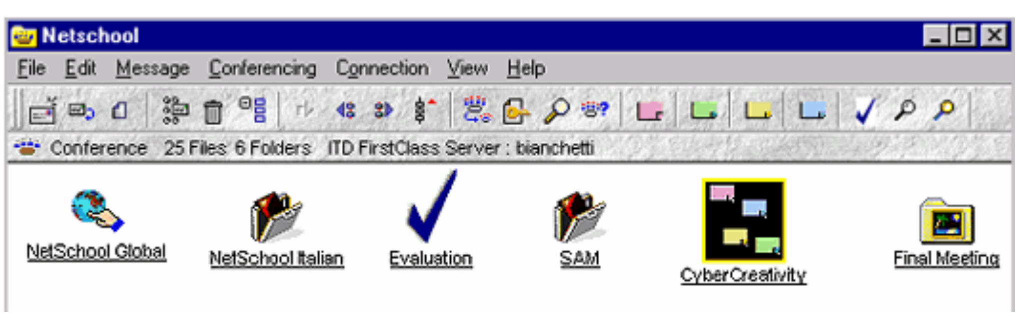

Figure 2: The Netschool collaborative environment in SoftArc FirstClass

Activities were then undertaken in accordance with the four stages mentioned above:

1. Send in your opinion: learners posted their contributions on the blackboard "virtually". *Cybercreativity* offers four message typologies, each assigned a different color and associated with a specific pragmatic function. Learners could open the messages just by clicking the new buttons on the FirstClass toolbar. In all the conferences within Netschool CMC environment, message typology and structure (i.e. sender, receiver, text field) resembled those of the most commonly used e−mail applications.

The structure and the shape of the new kind of message in *Cybercreativity* was quite similar to the common Post−it notes (see Figure **3**). Participants had to fill in the text field according to the following criteria:

- limited text field extension (35 characters − more or less 7 words)
- use of the proper color−code (each color corresponds to a specific semantic feature: *pros/green − cons/yellow − news/pink − proposals/blue*).

Figure 3: A message endowed with *emotional function*

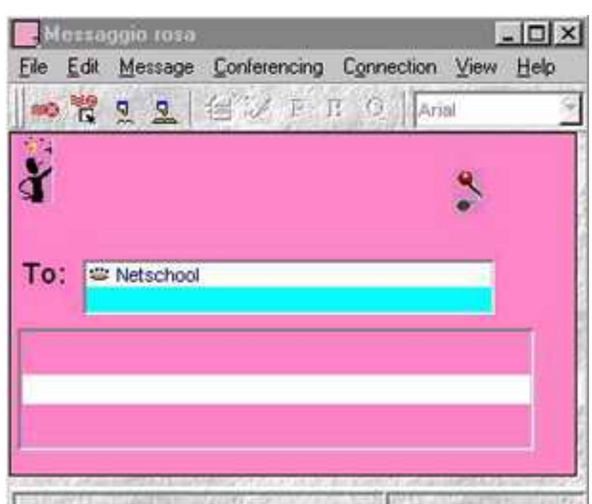

Figure 4: A message endowed with *informative function*

Looking at the use and meaning of messages in greater detail, we see that each message typology corresponds to a specific question and bears in itself an explicit pragmatic function.
Participants were asked to answer the following questions:

OPINION	OPINION CATEGORY	COLOR
News	"What did I learn?"	PINK CARDS
Cons	"What problems did I encounter?"	YELLOW CARDS
Proposals	"Next time I'd like to "	BLUE CARDS
Pros	"What did I like most?"	GREEN CARDS

Apart from the standard e−mail message typology, it is important to note how in *Cybercreativity* the structure enlarges the significance of the message and adds a specific pragmatic function to it:

- *emotional function*: centered on the *transmitter*. The aim is to let learners express their feelings. Green and yellow messages ("*What did I like most?*" − "*What problems did I encounter?*").
- *informative function*: focused on the *context*. Learners are asked to express their opinion on a given topic. Pink message ("*What did I learn?*").
- *persuasive function*: centered on the *receiver*. The transmitter suggests something, such as the fulfillment of given tasks, or the taking on of certain "behaviors". Blue message ("*Next time I'd like to* ").

2. Clustering: tutors gather messages.

All the participants' contributions have been analyzed and then split according to the following criteria:

- color/typology of message;

- similitude/content affinity.

<u>3. Community Vote</u>: teachers and students vote on the opinions.

Evaluation of clustered and organized messages during work sessions held at a distance (more than one) and face−to−face (one session). The result will be the identification of a concise concept, that represents each opinion category. When voting, learners had at their disposal a form with a check−box list containing all the contributions, already clustered according to category.

Learners could only select one opinion for each category, ticking the box next to their chosen opinion.

<u>4. Analysis of results and final discussion</u>: After clustering and voting, we obtained a single concise concept representing the common and shared decision of the community.

Here are four examples, one for each category:

- **"What did I like?"**: *I could wake up later*

- **"What problems did I encounter?"**: *Spare time only on Sunday*

- **"What did I learn?"**: *To fill in travel documents*

- **"Next time I'd like to..."**: *Learn something more practical*

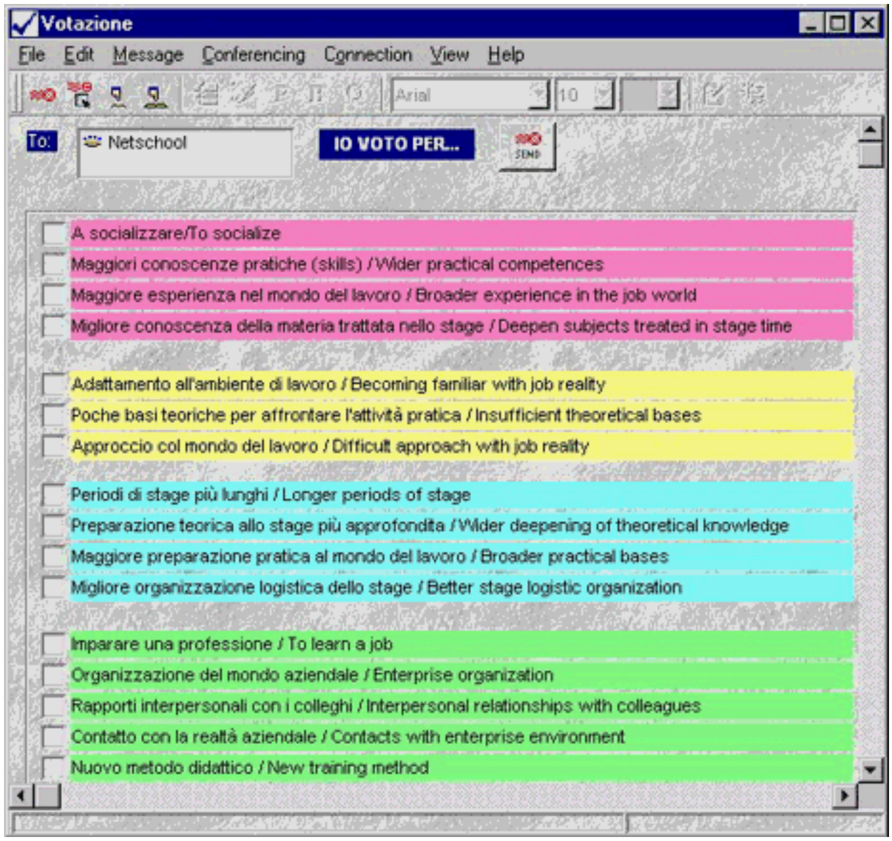

Figure 5: A sample voting form

The Tool We Use: Firstclass ;

As previously mentioned, *SoftArc FirstClass Intranet Server* ® is a software tool used to support CMC activities. Further information about *FC* is available at the following website: http://www.softarc.com.

In designing and developing both the *Cybercreativity* methodology and environment, we wanted to facilitate and automate interaction procedures. For the user interface settings, we used *Softarc FirstClass Designer* ® , a software application that makes it possible to edit and modify the layout and visualization of all the elements (e.g. toolbar, message forms, windows, etc.) that make up the *FC interface*.

This application is included in the *SoftArc FirstClass Intranet Server* ® bundle, and allows the system administrator and tutors to operate directly on the software settings, managing its functions or changing the appearance of windows, documents, menus and user interface components.

Each element of *FC* (in the case of *Cybercreativity* the standard e−mail message, for example) may be edited, modified and customized. New buttons can be added to the main toolbar, and these will open new sample messages purposely created with *FirstClass Designer* ®.

Since *FirstClass Intranet Server* ® also allows users to connect using browsers, we customized the FC browser with the new *Cybercreativity* features.

It was possible to integrate new sample of messages and forms in *FirstClass* ® by customizing its HTML templates.

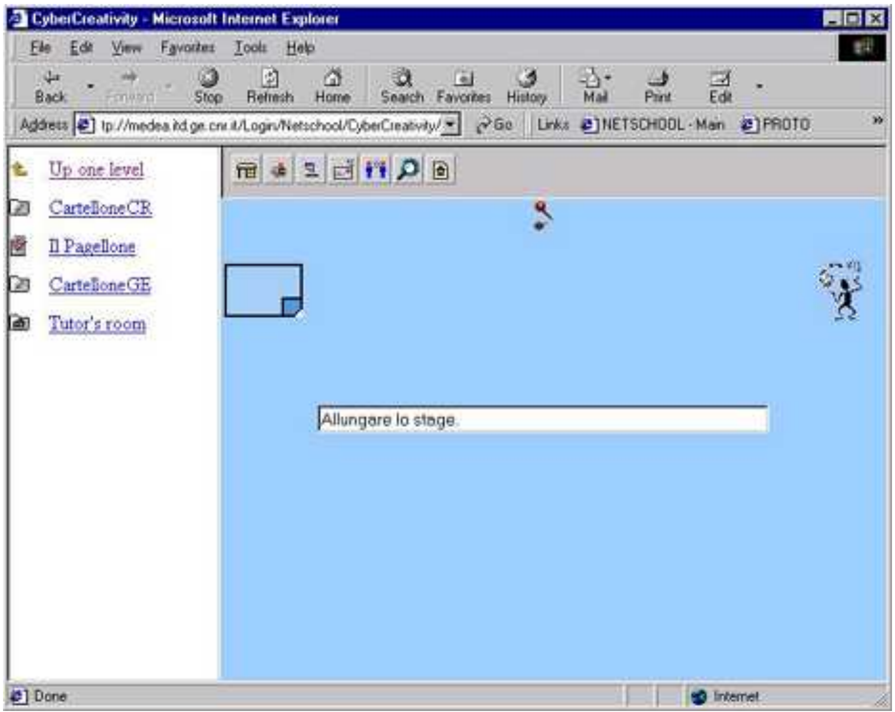

Figure 6: Reading a customized message with a web browser

Conclusions

While computer conferencing augments learning opportunities in many ways, there are also important limitations to more effective use of the on−line medium by learners and teachers. One of the major issues that needs to be addressed is the productive organization of on−line collaborative activities. Although computer conferencing increases our ability to interact with each other, the medium provides only limited tools for organizing and managing group activities. For example, computer conferencing does not readily facilitate group problem−solving or decision−making (Harasim, 1987a). Asynchronous communication can in fact hamper decision−making, particularly in situations which are time−dependent. Such situations may require a synchronous group communication facility. However, as Stefik et al. (1988, p.361) point put, more serious problems exist: while computer conferencing provides file sharing, archiving, electronic mail, voting, and editors, the conference structure these systems provide is not based upon any models of group problem−solving processes. Computer conferencing facilitates information exchange but lacks a model for supporting decision−making. Newly developed group−decision support tools may be useful in this respect and could perhaps be incorporated or interfaced with computer communications systems.

In our opinion, FC proved to be a very useful and practical tool for supporting and managing on−line courses activities. However, we must point out that each time there was a need for course customization and further modification of particular message typologies, the system demonstrated little flexibility (with a strong need for external intervention).

Evaluating the impact of Cybercreativity on learners' activities, we can state that, in terms of course objectives and requirements, the application of this new methodology has achieved notable results. Motivation and participation increased, and the technological corpus used for supporting collaborative activities proved to be greatly effective.

In conclusion, it is our hope that the positive results we obtained from the testing of Cybercreativity may in the near future be the premises for the systematic application of this methodology to other collaborative learning contexts.

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