An On-line Cooperative Learning Environment

Mario Allegra
Antonella Chifari
Giovanni Fulantelli
Simona Ottaviano

Abstract: The purpose of this paper will be to discuss a project, carried out in collaboration with two secondary schools in Palermo, with the aim of experimenting with and evaluating a cooperative learning environment based on telematic tools.

Firstly, we introduce the theoretical framework of the Virtual Classroom that we have designed; then, we present the different phases of the reported experience; specifically, we focus on the structure of the communication process which has been implemented in order to make the learning process extremely efficient. Finally, the benefits and drawbacks of the Computer Mediated Communication which have arisen during the experience are discussed.

Resume: Le but de cet article est de discuter d'un projet mene en collaboration avec deux ecoles secondaires de Palerme en Sicile (Italie), pour evaluer et experimenter un environnement d'apprentissage cooperatif base sur des outils telematiques.

Premierement, nous exposons le cadre theorique de la classe virtuelle que nous avons concue; puis nous presentons les differentes phases de notre experience. Plus particulierement. nous portons notre attention sur la structure du processus de communication qui a ete implanle de maniere a rendre le processus d'apprentissage tres efficace. Finalement. nous montrons les avantages et les difficultes de la communication par la mediation de l'ordinateur rencontres lors cette experience.

Introduction

In this context, our intention is to underline the theoretical framework of cooperative learning. According to Kaye's definition (1992), cooperative learning can be considered as the individual acquisition of knowledge, skills or attitudes as the result of interaction between the members of a group: In other words, it can be referred to as individual learning as the result of a group process.

Even though the question of whether the learning strategies based on individual approaches are more efficient than learning strategies based on cooperative approaches is unresolved (Ausubel,1990), many theoretical considerations which emphasise the importance of cooperation on learning activities exist.

Bruner (Bruner, 1984) describes the learning situation as a process which occurs inside a group, and which involves the social construction of knowledge and according to Vygotsky (Vygotsky,1978), cooperation amongst peers facilitates the development of specific skills and strategies for problem solving through the interiorization of cognitive processes which are implicit in interaction. And, communication.

By introducing telematics into cooperative learning activities, some important considerations must be made: Firstly, interaction modes between the actors in communication process are different from a face-to-face context; then, the setting where the group process takes place changes as well; and finally, it is possible to handle some aspects of this process more easily than in a traditional context [Berge and Collins, 1995]. According to the previous consideration, while on the one hand, telematics permits the implementation of extremely efficent cooperative learning environments, on the other hand, it is necessary to evaluate carefully those aspects of Computer Mediated Communication (CMC) which should be stressed and those which should be controlled in order to exploit the potentialities of telematics for didactics.

The Project

This study focused on a primary goal that is: the definition, development and evaluation of on-line cooperative learning environments using information technology for communication. In particular, we have adopted the Bulletin Board System (BBS) technology, with graphic interface, to create the on-line learning environment. Communication and file exchange occur through the tools available on BBS system: e-mail, newsgroups, shared file areas, chatting rooms.

The experience in the first year involves four classes (20 students each) of two secondary schools in Palermo (students aged between 12 and 13). The students, subdivided into groups according to sociometric criteria, are gradually encouraged to experiment with telematic communication and then with the different communication paradigms, thus creating a concrete experience of a Virtual Class. Moreover, the groups are led through different interaction schemes, as specified by the communication models, which have conveniently been designed to stimulate different cooperation strategies and to favour inter communication and communication between the groups.

During the experience the groups exchange ideas on various themes of special socio-cultural interest, concerning the different geographical areas they come from and have concentrated on the study of two Villas in these areas, which are part of the National heritage.

The Learning Environment

Defining the communication models

It is well known that, in a traditional communication setting, people can use coded as well as uncoded communication rules to establish a dialogue with other people. For example, grammatical and semantical rules can be augmented with gestures, voice intonation, stress and facial expressions. In addition, conversation is extremely flexible, since it depends on the different subjects emerging during the conversation.

In a virtual communication environment, such as a Virtual Classroom, all the communication rules must be made explicit - in a precise, but yet flexible way - before the beginning of the communication process.

Consequently, defining the communication model has been central to our work and, at the same time, very useful. A communication model is an essential tool for understanding the organization and relationships between the different stages of a planned communication process.

Firstly, it was extremely important to get models which would be both precise and flexible. Secondly, the models had to exhibit a very high degree of communicability and comprehensibility, since they had to be understood by people with different pre-skills, competencies and experiences: student and trainers. Finally, the students, but they should be able to guide all the people involved in the communication process (teachers and trainers) in the discussion of the organizational problems, didactic programming and evaluation.

In particular, both the teachers and the trainers discussed and examined the following problems:

> hypothesis about the on-line learning process;
> hypothesis about the modifications which occur, in the students and in the teachers, involved in the on-line communication experience;
> how to improve the exchange of didactic material and ideas related to a specific subject;
> the needs for tools, strategies and evaluation methods, suggestions about the scheduling of the activities, and so forth.

In conclusion, the model defining phase has produced many interesting ideas for each actor in the communication process and, as a consequence, it has been possible to reduce the difficulties during the Virtual Classroom experience.

Description of the communication process and the first results

Let's analyse the communication models defined in this experience.

The first communication model is based on the presentation of students, using a telematic identity card or "home page", created according to their fantasy. This allows each student to get to know on-line companions and enables them to understand and use telematic tools.

Once they have acquired the necessary skills, the group from each school are helped to learn and cooperate telematically using a second communication model, as follows.

The group communication process was organized according to the plan show in Fig. 1.

Remote groups are paired so that two corresponding groups gather information about the same subject: The first group of the pair deals with the general aspects of the subject, while the corresponding remote group analyses a specific case regarding the subject.

In the first stage, the bidirectional communication, between pairs of corresponding groups, takes place horizontally regarding common subjects from general aspects to specific aspects and vice versa. In this way, the material is

collected gradually by the remote groups and is then integrated, discussed and elaborated cooperatively in order to carry out a thorough study of the scientific and architectonic aspects of the chosen Villas. When the group had completed its part of the research, using BBS, it is comunicated to the remote group.

Following this approach, the student understands which information he needs to request the from remote group, in order to complete his task. He can also develop learning strategies based on the collection of specific information which enables him to go from a general view to a particular one and vice versa. In this case, cooperative learning is achieved by means of certain expedients such as: the exchange of results with other groups, by means of telematic forum in order to stimulate   comparison; communication, by e-mail, of the partial results of the research to the teachers. In the same way, using e-mail, teachers answer giving them adequate feedback.
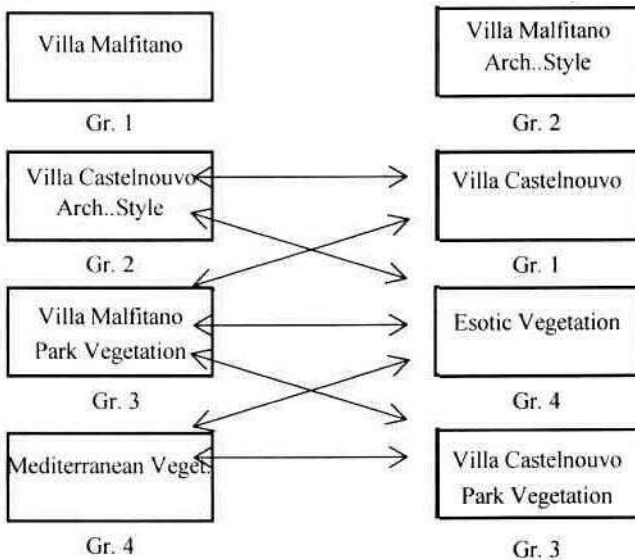

Figure1. Organization of interaction between remote groups

Beside the horizontal interaction between remote groups, as described above, during the second stage diagonal interaction was used. This helped to produce more effective cooperation between the groups which had studied the subject from a general point of view, and those which had considered specific aspects of the subject. The meta-cognitive aim of this kind of interaction is to find analogies and differences in order to integrate all the information. These interactions are indicated by the diagonal lines in Fig. 1 As hypothesized, the cooperative learning is stimulated by the comparison between the information obtained and, then, by the identification of common features of the material (i.e. an architect who designed several buildings in the different areas of the city).

Finally, using a third model, we have stimulated 'free discussions', by means of telematic forums, or of topics examined by pairs of remote groups. The purpose

of this is to give all the groups an overall view of the work and so allow each student to cooperate "with and between" groups. In particular, the aim is to balance the contribution of each group and the communication flow between groups, thus allowing the students to became familiar with all the work developed. Learning is stimulated by the cooperative reconstruction of the 'concept mapping' which links the various parts of the research. Morover, in the context of this work it is necessary to underline the role of teachers and trainers. This consisted of the supervision and continuous assessment of the level of learning and participation between the individual groups, where necessary modifying the assigment of task or the communication flow between groups.

The communication in the described models, was synchronous (chatting) or asynchronous, (e-mail, file transfer, ...) as the work required.

Consideration of the experience

There were some research problems of interest to the present study:

1. the use of the computer in the interaction between the actors in the communication process allows students to improve logic cognitive skills which come from writing and reading textual documents; for example, the increase of vocabulary and the organization of the process of acquisition and transmission of knowledge;

2. because of the modification of the setting, the members join together, exchange information, establish the rules, plan the activities and organize themselves: In other words, the group cooperates in order to reach a common result;

3. in specific situations, the telematic tools simplify the management of the group processes, such as the activities of observation and feedback which are necessary to evaluate the group as a whole and the contributions of each member and in addition, telematic tools improve and encourage a self-evaluation process;

4. from a socio-affective point of view, the use of telematics aids and improves the network of relationships among peers; this is due to the fact that telematics provide new and diversified study situations for the students These situations are based on play aspects and on the cooperative value which are intrinsic in the use of the Telematics;

5. stimuli and motivation to learn are increased by the appeal typical of a new tool and of an innovative communication mode.

Besides the didactic potentialities of Telematics, some drawbacks which might arise during the Virtual Classroom experience must be taken carefully into account.

Amongst them, we report those which have arisen during our experience:

- the impact with something new and the resistance to going outside the boundaries of the own class;
- the difficulty in organising the activities of the groups in a synergetic way;
- the unfamiliarity of interacting in an indirect way;
- the difficulty of learning about the new technologies and their didactic potentialities;

As mentioned before these possible drawbacks have been carefully taken into account at the project design stages as well as during the whole experience, by performing a constant evaluation process.

Conclusions

In this paper we have discussed how cooperative learning environments based on telematics imply significant changes in the communication process among students as well as amongst their teachers, in comparison with traditional settings. Consequently, significant changes occur in the learning process.

Telematics enable teachers to guide students towards new creative learning strategies; in order to achieve this goal a key role is played by the design of the structure of the communication process and interaction.

The integration of telematics and multimedia is very effective, since it allows the transmission of complex and meaningful information - organized according to various perceptive and semantic levels - overcoming space and time constraints without breaking the interactive relationship among users.

This experience is the starting point of a wider project that seeks to enhance the potentiality of telematics as a tool to improve the sharing of experiences among different situations and participants, interdisciplinarity, the development of socio-cognitive skills and, last but not least, the recovery of school motivation in pupils with particular educational needs.

References

Berge, Z. L. & Collins, M. P. (1995). *Computer Mediated Communication and the Online Classroom.* Hampton Press Inc.

Bloom, B. S. (1983). *Tassonomia degli obiettivi educativi, Giunti Lisciani Editori.* Teramo.

Bruner, J. S. (1984). *Actual minds, possible worlds.* Harvard University Press: London, 1984.

Cohen, V. (1996). The effect of technology on student learning, *Proc. of ED-MEDIA 96.* Boston, MA, June 17-22, 1996.

Kaye, A. R. (1992). Learning together apart, in collaborative learning through computer conferencing. *The Najaden papers (A.R. Kaye, ed.), NATO ASI Series* (Vol. F90). Springer-Verlag, pp. 1-24. Heidelberg

Kaye, A. R. (1994). *Apprendiniento collaborativo basato su computer.* TD n.4, pp.9-21.

Rogers, C. (1970). Encouunter groups, *Alien Lane.* London: The Penguin Press.

Vygotsky, L. S. (1978). *Mind in society.* Cambridge: Harvard University Press.

AUTHORS

Fulantelli Giovanni, Simona Ottaviano, Mario Allegra and Antonella Chifari are affiliated with the Italian National Research Council in Research and Distance Education.