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Face to Face Computer Mediated Communication

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Abstract

Over the time the use of computers and the spreading of computer networks have become a reality in every aspect of the life. In particular, the spreading of computer networks in working environments has originated an increasing interest into studies aiming to develop new methods and systems to use computers to support the collaborative work. The related research area is the Computer Supported Collaborative Work and involves not only computer scientists but also sociologists and psychologists, since the interactions among the users and the use of cooperative systems (groupware) influence each other, and only from the integration among social and technological studies it is possible to achieve new effective means to support the collaborative work.

A well known classification of groupware systems concern the time-space scenario for which they are developed. The four basic situations define co-located versus remote space organization, and synchronous versus asynchronous time management. It is a common belief that the computer support collaborative work concerns prevalently scenarios where the users cannot share the same room at the same time. Indeed, since from early 90's several studies and projects were interested in co-located situations. In this context the Electronic Meeting Systems (EMS) have a particular relevance; they aim to provide support for face-to-face meetings, to improve the structure and organization of the discussion, as well as to speed up problem solving and decision making processes.

The use of technological systems to support collaborative processes has attracted pedagogists and educational psychologists interested in collaborative learning. The collaborative learning refers to methodologies and environments in which learners engage in a common task in which each individual depends on and is accountable to each other. Groups of students work together in searching for understanding, meaning or solutions or in creating an artifact of their learning such as a product. The Computer Supported Collaborative Learning is the research area which studies the methods and systems to use computers to support the collaborative learning. It is necessary to remember that the goals of CSCL systems (sharing and building knowledge) are different from the aims of the CSCW systems (business and production oriented). This implies the necessity to integrate in the CSCL systems pedagogical methods and principles to drive the learners interactions and the collaboration evolution toward learning aims.

As the CSCW systems, also the CSCL systems follow the space-time classification, but in CSCL area there are few studies about the face-to-face situation: most the existing systems concern remote or asynchronous situations. The point that we want emphasize is that the prevalent learning context is the school, where the learning happens in face-to-face setting. Our focus is about designing and developing a networked environment to support collaborative learning in classroom, following the pedagogical and technological requirements originated from the specific face-to-face context. We have identified functional and non functional requirements influencing the design and development of a CSCL system for face-to-face setting.

A functional requirement specific for learning environments is the necessity to drive the collaborative process following well defined pedagogical models. Usually, the pedagogical models define a sequence of activities with tasks and goals (*script*). The software for educational setting should support the creation, customization and execution of scripts. Another important functional requirement concerns the kind of services provided by the system: they should offer to the learners a space and the means to structure their discussion and knowledge. Moreover, it is fundamental driving the

learners interactions so that they go toward the desired learning results. So, the system should support means to regulate the interactions, such as labels or sentence openers that the learners should/could use to identify the kind of their contributions.

Besides the functional requirements, there are also non-functional requirements to consider in the design of a system for collaborative problem solving in the classroom. Given the face-to-face setting in classroom context, a consideration is about the easiness of system configuration. In such situation there is no necessity of heavy hardware and software infrastructure to ensure remote communications. On the contrary, the system should be easy to configure and start-up since the users may have no experience to face complex setting procedures. This requirement concerns the initialization phase of the system, while another important non functional requirement concern the flexibility of the system over its life cycle. The usage scenarios and the user needs change over the time, and it should be possible to adapt the system to new situations. This property of a software system is known as tailorability and has several shapes of increasing complexity. The tailorability is the property that ensure long life to the system and guarantees to the users the possibility to achieve the desired functionalities over the time.

Our contribution has been focused on developing a Collaborative Face-to-Face Educational Environment (CoFFEE) trying to address the requirements previously described. CoFFEE is a suite of applications and each one provides a specific service to the users.

The Session Editor is the application that allows the users to create and customize collaborative scripts defining many details of the system configuration. The Lesson Planner provides a simplified process to create collaborative scripts starting from existing templates, so that the users can focus just on the customization of the script for their specific aims instead of facing every possible configuration detail. The choice to provide two separate applications to create and customize scripts addresses the necessity to find a balance between the high system configurability (offered by the Session

Editor) and the possibility to get quickly a script from pre-existing models with the desired characteristics.

The Controller and Discusser are the applications used by teacher and learners in classroom during the collaborative session. The teacher chooses the desired script and the Controller will use that sequence of activities to drive the collaborative process. The script manages the arrangement in steps and groups of learners, and indicates which collaborative tools will be used by each group of learners in each step.

The main collaborative tools provided by CoFFEE are a structured discussion tool (the Threaded tool) and a shared graphical space (the Graphical Tool). Both of them offer the possibility to the learners to structure their discussion and knowledge and create a representation reflecting their reasoning and conceptual schema. Both of them offer also many configuration options to be flexible and adaptable to several usage scenarios. Moreover, they offer also the possibility to apply labels to the learners' contributions, to drive the interactions along predetermined channels. However, the labels are configurable so that the teacher can define its own specific labels, on the basis of the subject matter or of the expected collaborative process.

The CoFFEE applications don't require special procedures for the installation and configuration, the users have just to install them and they are ready to start. To make the start up as simple as possible, we have designed the system so that there is no necessity of network configuration: the Discussers 'discover' automatically the Controller on the same network. These characteristics ensure a low cost deployment that should help the usage of the system also by users with few technological skills.

Besides to offer an easy start-up, CoFFEE has been designed and developed to offer fully tailorability. CoFFEE allows to *customize* the system behavior through the tools configurability; it allows to *compose* the set of tools to use during a collaborative session; it allows to *integrate* new CoFFEE tools in the system, and provide support to *extend* the system with third part tools. To achieve an high level of tailorability we have designed CoFFEE as a component based system leveraging on the plug-in based

architecture of Eclipse.

CoFFEE has been developed within the European project “LEAD: Technology-enhanced Learning and Problem-solving Discussions: Networked Learning Environment in the Classroom”. LEAD is a three year project began in November 2005, funded by the Sixth framework programme priority IST. Within the LEAD project, several experimentations have been carried out with CoFFEE , involving around 30 teachers and 400 students from four countries. Overall the research has found that CoFFEE meets its original objectives of supporting face to face technology mediated discussions. It does this through being a flexible environment that can be customized to the needs of specific contexts, by enhancing student participation in debates through parallelism and anonymity and increasing the productivity of those debates by providing persistent representations.

The results achieved as effectiveness, flexibility and productivity are strictly bound to the design of the CoFFEE architecture: we have designed it to achieve *a system with an extendible set of independent tools in a well-integrated environment*. The independence of tools from each other allows to integrate any kind of tool within the system, giving the possibility to extend the set of CoFFEE tools indefinitely. This allows to make the system flexible. However, the architecture has been designed also to provide to every tool a set of common functionalities to enhance the overall integration so that the system is perceived by users as seamless.