EQUEL Position Paper (2004) - Special Interest Group 6

the Theory and Practice of Computer Supported Collaborative Learning

Dirckinck-Holmfeld, Lone; Esnault, Liliane; Gustafson, Jenny; Hodgson, Vivien; Lindström, Berner; Jones, Chris; Ponti, Marisa; Ryberg, Thomas; Tickner, Sue

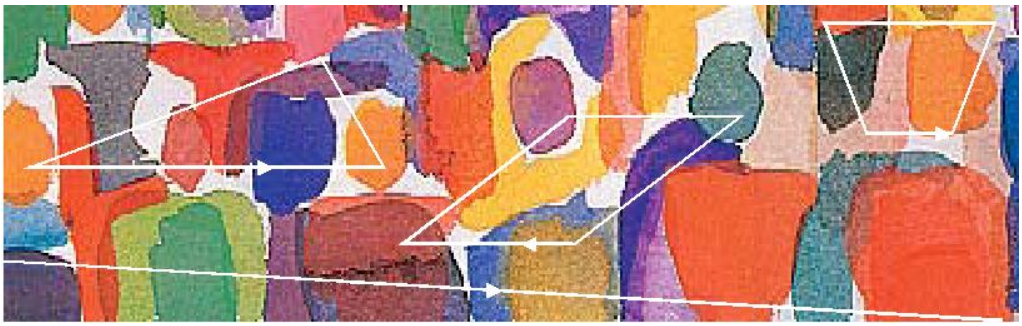
Publication date:
2004

Document Version
Publisher's PDF, also known as Version of record

EQUEL Position Paper
Special Interest Group 6
The Theory and Practice of Computer Supported Collaborative Learning

Coordinated by Göteborg University, Sweden

May 2004



This project has been carried out with the support of the European Community. The content of this project does not necessarily reflect the position of the European Community, nor does it involve any responsibility on the part of the European Community.

EQUEL (e-quality in e-learning) is a EU Commission e-learning initiative supported project to establish a virtual centre of excellence in e-learning. It is coordinated by Lancaster University in the UK and involves 14 partner institutions; further information at http://equel.net.

EXECUTIVE SUMMARY

Networked technologies – the Internet and mobile and ubiquitous computers – have a strong impact on education. The study of current educational practices using networks is important to understand how networks interact with people and the way in which the relations between humans and technology are re-configured.

This position paper concerns the theoretical analysis of the integration between advanced educational technologies and the social arrangements that are implied at the stages of the technologies' design, development and use. To accomplish the purpose, this Special Interest Group (SIG) focuses on investigating whether the "metaphor of network" in learning technology can critically affect the concepts and theories associated with computer supported collaborative learning (CSCL), one of the most popular approaches to the use of computers and networks in educational practices.

Our analysis used two metaphors – the network metaphor and the ecology metaphor – which drew together a variety of theoretical perspectives (ranging from social theories of learning, activity theory, and distributed cognition, to ecological psychology and symbolic interactionism) – to explore some of the critical issues in the field of CSCL. We look at the following key aspects:

- the use of collaboration and communities of practice, which have become two main points of reference in networked learning, with their accent on strong ties and group cohesion;
- the way in which the network metaphor relates to CSCL and communities of practices;
- the importance of the remediation of human activity through networks and computers.

This paper pulls together the main considerations and reflections arising from the articles produced by the SIG's members and presented at the Networked Learning Conference 2004, in Lancaster, UK, during the first EQUEL dissemination event.

These articles draw attention on the impact of networked learning on the development of dialogue, identity and social presence, as well as on the opportunity of developing artefacts that are more social to sustain interactions by reframing people's behaviours around the notion of place.

We see networked learning as a useful metaphor that can help capture the essential feature of technological development – the network – in a way that emphasises the connections among people, between people and machines, and machines with machines. We also see it as an opportunity to connect the social characteristics afforded by networks with a psychological account of learning, far from dualistic positions social versus individual, since it is open to study from different perspectives.

Lastly, we consider the network metaphor as a unifying concept that allows us to link to the broad context in which networked learning occurs, by taking into account, for example, policy, organisational and institutional issues associated with the use of networked technologies.

The audiences of this paper include educational researchers, research-based educational practitioners, and networked learning developers.

KEY WORDS

Collaboration, computer network resources, computer supported collaborative learning, distance education, higher education, networked learning.

Financial Agreement number: 2002-4093/001-001 EDU-ELEARN

SPECIAL INTEREST GROUP 6 - THE THEORY AND PRACTICE OF COMPUTER SUPPORTED COLLABORATIVE LEARNING

SIG DESCRIPTION AND TERMS OF REFERENCE

The importance of the SIG

Networked technologies have become an integrated part of our daily life. Most of our activities are so thoroughly intertwined with networks – Internet and mobile and ubiquitous computing - that we no longer feel comfortable or at home in a place without them. The network society has also a strong impact on education in many ways. The idea of networked learning we are describing in this paper is dependent on the use of networks (Jones and Steeples, 2002). However, we cannot assume that there is a connection between the use of networked technologies and learning. We think that it is important to study current educational practices through networks to understand how networks interact with the human and the social to re-configure human-technology relations. It is through practices that humans and non-humans influence each other and establish their relationships. At the same time, we think that educational practices through networks need to be informed by a sound understanding of some theoretical concepts, especially related to social theories of learning. The contribution of this SIG goes in this direction.

The purpose/focus of the SIG work

The aim of the SIG's work was to conduct – at a more theoretical level – an analysis of the integration between advanced educational technologies and the social arrangements that are implicated at all stages of the technologies' design, development and deployment. The SIG was interested in examining the affordances built into the technologies and the way in which social settings make use of these affordances as resources for action. The focus of the SIG is the result of a compromise between two different stances: one associated with the broad notion of networked learning and its potential for connecting to the wider debate about the implications of the network society (Castells, 1996, 2001), and the other one associated with the concept of Computer-Supported Collaborative Learning (CSCL), which narrows down the perspective to a certain type of human relationship with technology and certain views of learning.

To accomplish the purpose, the SIG focused on investigating whether the metaphor of "network" in learning technology can critically affect the concepts and theories associated with CSCL, one of the most popular approaches to the use of computer and networks in educational practices. Networked learning was assumed to be a useful term, a metaphor rather than a simple description. We thought that the term would help us capture the essential features of technological developments – the network – in a way that draws attention to the connections among people and between people and machines and machines with machines.

Questions and areas of inquiry addresses

We have identified the following key issues, which we examine critically in the following sections:

Is all learning collaborative?

CSCL attaches special importance to some particular kinds of relationships, those of collaboration, and to socially oriented theories of learning (Koschmann, 1996). The idea of CSCL or any other form of collaborative learning is that it differs from something that isn't collaborative. However, is non-collaborative learning possible, or is learning a social act that always involves collaboration?

Can collaborative learning take place within individuals?

If we assume a social view of learning and set the individual against the social, can individuals internalize the learning outcome of social interactions and then argue it with themselves? If we accept this premise, should education specifically encourage the development of the capacity to internalise debate and argument, as this learning is transferable while the context of learning is not?

Financial Agreement number: 2002-4093/001-001 EDU-ELEARN

What do we mean by collaborative learning?

This connects to the previous two questions as to how the individual fits in and whether all learning is collaborative. Does it apply to every learning situation, or does it refer to specific occurrences? Is collaboration either necessary or useful to make best use of networked technologies? Do we underestimate the fact that collaboration is a social activity that also serves other purposes than sharing knowledge and creating meaning, even in a context such as discourse?

How does the network metaphor relate to CSCL and communities of practice (CoP)?

We argue that the network metaphor can help to conceive of the broad context in which learning and education take place in a society reliant on computer networks. What indications can this metaphor provide of how to reflect critically on these two very popular approaches to the use of computers and networks in educational settings?

How important is the re-mediation of human activity through networks and computers?

If we think of networks as artefacts that mediate our activities, how do we consider the role of technology in this re-mediation? Do we think in terms of relationship of mutual constituency between humans and machines? Is technology a participant in the interaction or just a means through which we interact with each other? Are Internet and computing as powerful influences in the long term as the emergence of written language or printing has been?

Intended audience

The audiences include educational researchers, research-based educational practitioners, and networked learning developers. Our goal is to point them out to the need of taking into account the wider debate about networks and addressing the theoretical and practical issues raised by advances in the field of networks.

APPROACH ADOPTED BY THE SIG AND OUTLINE OF TASKS AND ACTIVITIES UNDERTAKEN

The members of this SIG identified their respective areas of interest within the terms of reference of the SIG. The map of the areas of interest included: Network learning; Online dialogue and impact of technology from a theoretical perspective; Social affordances; Role of computing in human-machine interaction.

The SIG agreed on pursuing a theoretical analysis of the identified critical issues, whose main output would consist of critical reflections for educational researchers. The group also agreed that they would probably come up with different and intertwined perspectives.

The group met both online and face-to-face to progress the work of the SIG. The group presented three papers at a symposium at the first EQUEL main dissemination event held during the Network Learning Conference (NLC) 2004 in Lancaster, UK. Another individual paper will be presented at the Scandinavian Baltic Sea Conference in Stockholm, Sweden, on June 18-21, 2004.

The SIG was coordinated by Göteborg University and this position paper originated from the contributions of all the members of the SIG: Lone Dirckinck-Holmfeld, Liliane Esnault, Jenny Gustafson, Vivien Hodgson Chris Jones, Berner Lindström, Marisa Ponti, Thomas Ryberg, and Sue Tickner. The draft version of this position paper was presented for peer reviewing at a virtual seminar, held on the EQUEL project web site. Two external experts, Timothy Koschmann and Etienne Wenger, also participated in the e-seminar and commented the paper.

THEORETICAL CONSIDERATIONS IN THE WORK DONE

Financial Agreement number: 2002-4093/001-001 EDU-ELEARN

The work of this group began with an engagement with the research conducted under the umbrella term CSCL. Our engagement has been critical and we particularly engaged with social and situated views of learning strongly associated with research in the area of CSCL, in particular the historical-cultural approach stemming from Vygotsky and the Soviet tradition and social practice and situated views associated with Xerox Park, especially the work of Brown and Duguid, Suchman and Lave and Wenger.

The term CSCL was proposed as a compound term by Tim Koschmann in the mid-1990s (Koschmann, 1996). Koschmann's use was unusual in that he used the term CSCL without identifying the component terms and because he situated CSCL in relation to a sequence of research paradigms. At about the same time, cooperation and collaboration were advocated as ways to enhance learning using computers by a number of significant authors (Kaye, 1992; Kaye 1995; McConnell 1994; Crook 1994; Jonassen, 1996). In the past ten years Computer Supported Cooperative or Collaborative Learning (CSCL) has become a well developed research area with regular international conferences taking place in Europe and the USA and the emergence of social and organisational support structures. Both the first and second European Conference on Computer Supported Collaborative Learning (Euro-CSCL), held respectively at the University of Maastricht, the Netherlands on March 22-24, 2001, and the University of Bergen, Norway on June 2003, showed a wide range of practical implementations of CSCL and of pedagogical practices.

Koschmann returned to his theme five years later:

CSCL research has the advantage of studying learning in settings in which learning is observably and accountably embedded in collaborative activity. Our concern, therefore, is with the unfolding process of meaning-making within these settings, not so-called "learning outcomes". It is in this way that CSCL research represents a distinctive paradigm within IT. By this standard, a study that attempted to explicate how learners jointly accomplished some form of new learning would be a case of CSCL research, even if they were working in a setting that did not involve technological augmentation. On the other hand, a study that measured the effects of introducing some sort of CSCL application on learning (defined in traditional ways) would not. (Koschmann, 2001)

This approach suggests that CSCL is a theoretical lens or paradigm, rather than simply a concern with the practical application of new network and computing technologies to learning. The quotation identifies the paradigm as a general theory of learning as meaning making rather than being specific to the technological setting.

The SIG's position suggests that social and situated views of learning whilst compatible with learning using computer networks are not a necessary pre-condition. The SIG, whilst generally supportive of social and situated views of learning, argue that the field can be open to study from other perspectives.

A variety of perspectives

We suggest that networked learning takes into consideration the rich environmental setting, in which the tools, the rules, the meanings and the actors involved in a situation form a highly complex, interacting system. For this reason, our analysis has incorporated insights and assumptions from a number of theoretical perspectives. They include: network theory (Barabasi 2002; Buchanan 2002), socially oriented theories of learning associated with CSCL (*see* Koschmann, 1996 and Stahl, 2003), distributed cognition (Salomon, 1993) communities of practice (CoP) (Wenger, 1998), Action-Network Theory (ANT) (Suchman, 1998), activity theory (Engeström, 1987), ecology (Nardi and O'Day, 1999), ecological psychology (Gibson, 1978), social presence theory (Gunawardena, 1995), and symbolic interactionism (Blumer, 1969).

Most of these approaches present aspects that *afford* each other – a word used from Gibson's ecological psychology (Gibson, 1977). For example, social theories underlying CSCL, activity theory, distributed cognition, and interactionism are all concerned with the idea that knowledge and meaning are not primarily "inside" people's heads, but "stretched over" between people, computers and their environment. By bringing together people, the artefact of technology, and the environment, these views make possible to see how these elements are being influenced by and influencing each other in a dialectical and not deterministic relation.

This variety of perspectives also allowed us to address the richness of the environment where interactions occur, and examine the range of issues that influence the relations among people and between people and technology.

Financial Agreement number: 2002-4093/001-001 EDU-ELEARN

In this paper, we are presenting our points by two metaphors that afford each other to a large extent: the network metaphor and the ecology metaphor.

The network metaphor

The Centre for Studies of Advanced Learning Technology (CSALT) group at Lancaster University has been associated with the following definition of networked learning:

Networked learning is learning in which information and communication technology (C&IT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources.
While both networked learning and CSCL suggest a non traditional way of using technology in education, as they both point to a social understanding of learning rather than an individualistic or a transmissive view of learning, the two terms also encapsulate deep differences. Networked learning emphasizes connections and does not privilege a particular kind of relations. CSCL explicitly implies the value of collaborative or cooperative relationships to create meaning (Koschmann, 2001). Likewise, networked learning differs from communities of practice, since it draws attention to the potential strength of weak ties, while one of the fundamental elements of successful communities of practices that technology can affect is community membership through belonging and strong ties (Wenger, 1998).

The ecology metaphor

The use of an ecological-biological view is useful to think of the learning environment in a broader sense than a situation in which learners work alone or with others, and use resources to pursue their learning goals. The idea of ecology of learning comprises different levels of organisational complexity - from random to highly organised patterns - and different levels of cognition - from individual to social (Visser, 1999). Following Nardi and O'Day (1999), the learning ecosystem allows for different types of learning participants, who co-exist and interact within and between each other, as well as with artefacts, technologies, and content. The emphasis of the ecological metaphor on the relations and dynamics among the disparate components of the environment make it consistent with both the notions of networked learning and distributed cognition (Looi, 2001), and provides a lens for an analysis of human-technology relations that includes context.

These two metaphors draw together threads from all the above-mentioned theories and share some central aspects. For example: the importance of the relations and interdependencies among different participants in the learning process; the recognition of different types of learners, either an individual, a group or a community of practice, or any component part of the network and/or the network as a whole; the idea of information and knowledge being distributed among different agents in the network.

SUMMARY OF CURRENT POSITION AND IDEAS

The use of collaboration in networked learning

Is all learning collaborative?

In the CSCL debate, the centrality of collaborative approaches derives from the profound importance of shared meanings to build knowledge and seems to assume that learning is essentially a social practice. In networked learning, collaboration is often considered an ideal social arrangement to exploit the potential of networked technologies.

In this paper, we have intentionally avoided “playing with word definitions” in the attempt to provide our meaning of collaboration. Collaboration is used in a variety of ways and can be taken to mean simply working together. In this loose sense, collaborative learning points to learning as a social activity, and if we assume that this is what we mean by collaboration, then, perhaps, all learning can be thought of as collaborative. This links closely to the use of cooperative alongside collaborative. Etymologically, both terms have similar roots, but in educational use, they have taken on different flavours with collaboration perhaps having a stronger sense of

Financial Agreement number: 2002-4093/001-001 EDU-ELEARN

joint work and cooperation often indicating a division of labour. Even though this is the trend of use, there are overlaps.

We also want to draw attention to the different conceptions and values that underlie the use of the term collaboration. Research from another Special Interest Group within the EQUEL project has highlighted both pedagogical and ideological differences between what it is said in the literature about "participative" approaches to learning, and what it is done in practice (Reynolds, Sclater, and Tickner, 2004). As Reynolds *et al*. said (p. 252), collaboration may be adopted for twofold reason: as an optimal pedagogical way to support learning, and as a way to transmit the same social and political beliefs that are considered necessary to support a democratic society. While collaboration scores high in educational agendas, the same may not be said for students, who may perceive participative approaches as something that "must be done" to fulfill the requirements of a course and not necessarily as a genuine learning experience (Reynolds, Sclater, and Tickner, 2004).

Indeed, some literature provides evidence that not all students benefit from collaboration and unanswered questions remain as to whether "students participating in classroom discussions are changing their concepts… or are they merely expanding their repertoire for participating within a social setting" (Limon quoted by Caravita, 2001). This point is crucial since social discourse serves purposes other than the externalisation and exchange of ideas with others and factors like perception of control and power mechanisms may influence engagement in collaborative learning (Harris, Bolander, Lebrun, Docq and Bouvy, 2004). As we will address later on in this paper, social discourse is also used for negotiating social roles and identities and it is constrained by many factors as, for example, self-perception (Caravita, 2001).

Lastly, the focus on the group as a significant cognitive unit in collaborative learning seems to neglect the role of the isolated learner, which indeed exists. Is it collaboration when we read, interact with a computer, interact with agents in a network without the direct interaction taking place with others? While this situation may be considered a case of social mediation of individual learning, as the computer or the agents in the network can act as facilitating agents of the primary learner (Salomon and Perkins, 1998), what remains unclear is whether the dialectic process of internalization and externalization that arguably occurs in this social mediation can lead to some form of collaboration within the individual and make it 'transferable' to another setting with the same person.

Individual learning and social learning: Not a contraposition

Far from taking a dualistic position, it is more plausible to think of individual learning and social learning as the ends of a continuum of degrees of social mediation. In this view, social and individual aspects of learning interact and strengthen each other in a "reciprocal spiral relationship" (Salomon and Perkins, 1998). The thorny issue seems to be, however, a lack of full understanding of how individual and group learning influence each other and the need for a perspective that allows us to analyse this interplay.

Theories of learning tend to stress either individual or social cognition, by focusing either on the individual or the group as the unit of their analysis.

Within CSCL, given the influence of social theories, there is an attempt to think in terms of group cognition (or in terms of group knowing, which, far from being just a linguistic change, denotes a foundational shift toward the importance of creating knowledge), and to focus on the group as a whole in terms of unit of analysis, as this unit is considered as significant in collaborative learning (Stahl, 2003).

However, if we think in terms of networked learning, learning as social and individual should be dealt with as a single item. In an ecological perspective, the focus should be on recognising and developing synergies between the social and the individual, even though, as Salomon and Perkins (1998) said,
This in one sense complicates the challenge of instruction by introducing more choices to be made. But it also enriches the instructional palette with which we attempt to paint our own future selves.

The mediation of human interactions and relationships through network technology

Networked learning cannot refrain from the analysis of the relations between a human activity like learning and the *medium* – intended as a physical environment and social context in which conditions that support

Financial Agreement number: 2002-4093/001-001 EDU-ELEARN

connections are created. This medium includes designed artefacts such as computers and fixed network technologies, but also mobile and ubiquitous computing.

The theme of the last CSCL conference held in Bergen in 2003 pinpointed the importance of the link between technologies and human activity (Wasson, Ludvigsen and Hoppe, 2003). The kinds of artefacts we produce and use strongly affect what we do and the way we do it. In his conference keynote address, Säljö (2003) argued that new technologies, like the Internet and computing, were powerful influences in the long term, but that their general impact on learning was not as powerful as the emergence of old technologies, such as written language or printing. In his account of the general relationship of artefacts and humans, the salience of new technologies is not in their improvement of learning in a linear fashion, but in changing the way people communicate knowledge and organize information. This view seems to downplay the role of digital technologies, which although important, are simply means that support human activities, while agency remains a uniquely human property.

However, the growth of computers and network technologies as extraordinary powerful means that connect all of us brings with them the rediscovery of the interaction metaphor (Suchman, 1998).

Drawing on Actor Network Theory (ANT), Suchman threw light on the relationship of mutual influence between humans and technologies. In this relationship, humans and machines are not passive in relation to each other, but influence one another. In terms of ANT, they are both "actants", as they act upon each other. If we accept the idea that networked technologies are reconfiguring the way humans and non-humans interact with each other, it follows that we may need to rethink a number of aspects of learning theories, regardless of their focus on the individual or the social (Fox, 2002). In the actor-network theory perspective, the learner is not simply an individual nor is it necessarily a group, but can be "any component part of the network and/or the network as a whole" (Fox, 2003, p. 85). Likewise, the learning process can occur at any point in the network. In this account, the learning process, in turn, both transforms and is an outcome of the network.

Towards and ecology of networked learning

We acknowledge that human interaction and communication as well as technological tools are key factors to developing an *ecology* of collaboration, in which social and communicative processes and mediating technology integrate into a uniquely situated learning context.

However, in our opinion, a key challenge is that this integration is often assumed to occur naturally, when in reality the process of arriving at an ecology that supports collaborative leaning is far from being straightforward.

In the SIG's symposium we presented at the fourth Networked Learning Conference in Lancaster, UK, we focused on exploring the following issues:

- The use of the network metaphor as a unifying concept that allows us to theorise the broad context in which learning occurs in a society reliant on computer networks (Jones and Esnault).
- The impact of network environments in mediating human activity, particularly the development of dialogue, identity and social presence (Gustafson, Hodgson and Tickner).
- The nature of "space" and "place" in networked learning (Ponti and Ryberg).

Our purpose was to develop analysis and reflection upon the use of the network metaphor in learning technology and the idea that developing dialogue, online identities, and social presence is an essential activity that learners have to undertake to knit the learning network and avoid the risk of reducing humans to individual "nodes" or "agents" in the network.

The following sections summarise some specific theoretical perspectives and issues addressed in the three papers given at the Networked Learning 2004 conference.

The use of the network metaphor

At a simple level, the analysis of networks concerns itself with the description of phenomena in terms of nodes and the links between them. Basic techniques focus on the ways in which transfers can take place across a network, for example whether the network is traversable or not. In recent years a number of texts aimed at lay

Financial Agreement number: 2002-4093/001-001 EDU-ELEARN

readers, originating in mathematical and physical science traditions, have begun to examine phenomena from a wide range of areas, including social and biological domains (Barabasi 2002, Buchanan 2002). Network analysis examines systems through the links between nodes in a web like structure. The nodes can be Web documents, individuals, groups, publications or language.

Work reported by Barabasi has argued that advances in the characterisation of complex networks that focuses on scale-free and hierarchical architectures demonstrate that a wide range of complex networks including the Web and Internet share these properties (2002). Without attempting to develop the mathematices involved in a proper description of scale-free networks, it is important to state that these networks differ from random networks in which nodes are connected without any organising principle. Scale-free networks show a degree of organisation; in particular, they display a power-law distribution. Those nodes with only a few links are numerous, but a few nodes have a very large number of links. The power law distribution is radically different from the familiar bell curve distribution with the distribution tapering off towards both margins. The rationale behind this kind of distribution rests on some simple propositions. Firstly, networks grow through the addition of new nodes and these new nodes link to pre-existing nodes. Secondly, there are preferential attachments within the network such that the probability of linking to a pre-existing node is higher if it already has a large number of attachments.

As well as being scale-free most networks also display a high degree of clustering. This clustering is consistent (with the predictions of the scale-free description of networks with a power law distribution) if a hierarchical organisation is introduced into the network model. The presence of the hierarchical structure helps to re-interpret the role of hubs in complex networks. The theory predicts a modular topology with self-nesting groups of nodes in clusters with dense interconnections. The overall suggestion is that networks are:
far from random, but they evolve following robust self-organising principles and evolutionary laws that cross discipline boundaries (Barabasi et al, 2002).

The interesting nature of these networks is that they retain some of the advantages of random networks, such as a few steps between any two nodes, with the features of organisation.

In networked learning the focus for research displaced from the particular device, the computer, to the non-specific location of the network. The network is non-specific because it does not reside in any particular device or location. The network can be illustrated by pointing to particular elements within it but the network is a collective term expressing a set of persistent relationships over time and analytically situated above any of its component parts. The term CSCL not only draws attention to the computer, but it identifies particular kinds of relationship, those of cooperation or collaboration. These terms are not neutral, and although they draw on etymological roots that simply indicate working together, they suggest a moral imperative for close forms of coordination and cohesion rather than looser relationships. A network understanding of learning draws attention to the potential strength of ‘weak’ ties. The network metaphor does not privilege the close bonds; rather it serves to encompass all kinds of links and relationships. More generally the form of networked society in which networked learning takes place has been described by Castells as one of ‘networked individualism' (1996, 2001) not one of close community.

Network theory would suggest that the strong notions of community contained in communities of practice might ignore the importance of the 'strength of weak links'. The idea of weak ties has recently been applied in relation to communities of practice (Rosson, 2003). Rosson argues that the social nature of Internet use by people who act as weak links, in her terms ‘bridges’, suggests that the Internet is used by them for maintaining relations and increasing face-to-face interaction. Weak ties in this view are an enabling factor in social activism and the building of ‘social capital’. The educational focus in networked learning has often been on strong links and the emphasis on community may have made less visible the many necessary but weak connections that make the network idea so powerful. The nature of networked learning is such that whether the network is used for distance or largely place based learning the participants do not have to be co-present. The student cohort in a networked course may well have weaker ties with each other and with their tutor than might be expected in terms of a community of practice. Student cohorts often do not have a common history and may never become cohesive units. For these reasons we argue that a network analysis might be more appropriate.

Another key issue in communities of practice and social practice theories of learning has been knowledge sharing (Osterlund and Carlisle, 2003). Osterlund and Carlisle claim that relational thinking lies at the heart of social practice theories. They claim that subjects or social groups only develop their properties in relation to other subjects or social groups. In particular “social objects derive their significance from the relations that link

Financial Agreement number: 2002-4093/001-001 EDU-ELEARN

them rather than from the intrinsic features of individual elements." (Osterlund and Carlisle, 2003, p. 3). This relational view borders on a network description that privileges the links rather than the properties of individual nodes.

Brown and Duguid comment that communities of practice can seem to be a "social monad – a fundamental building block" (Brown and Duguid 2001, 203). This atomic view of communities of practice obscures the social heterogeneous nature of communities of practice. For Brown and Duguid a particular reason for the importance of this issue is that it touches on the question of 'disembedding' and 'reembedding' of knowledge moving between social groups. Central to this account is the need for conditions at both ends of an exchange to allow for a flow of information and knowledge and the disembedding or export and reembedding or import of discourses and repertoires originating in one practice to be incorporated in another. This issue, in another tradition referred to as transfer, is central to education and networked learning. It is the difficulty of dealing with this in the classic articulation of communities of practice that suggest the adoption of the metaphor of networks. Brown and Duguid use the term networks to indicate loose epistemic groups and note that most people in such a network will never know, know of, or come across one another. We suggest that the term should have a more general currency, that networks should cover not only very distant relationships but also relationships that have varying degrees of proximity but do not have the degree of cohesion required for a community. The use of the term network allows for scalability in analysis as networks can have a nested character. Each node in a network can itself be a network; the atomic nature of the community metaphor can be replaced by a fractal geometry allowing for an infinite repetition of similar but not exact forms in various scales.

The impact of network environments in mediating human activity, particularly the development of dialogue, identity and social presence

"Collaborative learning is predicated upon dialogue" (Harasim, 1989, p.57). Vygotsky (1978) stressed the importance of the medium of language for knowledge sharing and communications of ideas and reflections, which are central to all kinds of learning. In collaborative learning in virtual online environments, written dialogue is the primary mediator of learning, since participants mainly communicate with each other by exchanging written messages. Over the years, establishment of effective dialogue and interaction has proven to be a much more complex task than anticipated, even though this exchange of written messages has been the essence of communication software systems such as Computer Mediated Communiction systems (CMC) of the past and today's various communication software on the World Wide Web (Sorensen and Tackle, 2001).

Despite the fact that written dialogue is considered to have the potential of being a more democratic communication form - for example, it is free of visual status cues (Yates, 1997) – some difficulties associated with online dialogue result from the fact that written dialogue has to perform many of the socialisation functions that occur naturally in face to face settings. Social signals in face-to-face interaction such as facial expressions, gestures and intonation of speech are crucial for collaboration, as they act as keys for turn taking and as points of reference of the content of the messages (Lipponen, 2002). Successful collaboration is not likely to take place until affective relationships have been established between the participants, which occur in the social interaction. Therefore, in CSCL, where these non verbal cues cannot be represented in the virtual environment, different aspects of the written dialogue need to replace them.

In order to create a social context where collaborative learning can occur, participants in virtual learning environments first need to perceive each other as real and distinct individuals. Learners need to get a sense of each other's proximity and be aware of the other learners' identities and perceive these as authentic and reliable before social or task-oriented interaction will take place (Kreijns & Kirschner, 2001).

How a person becomes a distinct individual in a non visual environment, where the only form of communication is written dialogue, relates closely to online identity construction. Different ways of expression projects different identities, especially when it comes to the way that an individual positions him- or herself towards others in the dialogue. There are various ways in which a person can take a position in written interaction with other people. Messages that include connections to other people's ideas and reflections come across as open, approachable, and inviting further discussion, but language that is more assertive and assumes common ground instead of leaving the discussion open for negotiation reflects a person's identity that is more confident, authoritative and absolute (Fairclough, 2003).

In a virtual learning environment, it is to a large extent the combination of different identities that decide what kind of dialogue arises. This, in turn, influences the social climate of that environment, which affects the conditions for collaboration. In an open social climate where participants use an approachable language style

that invites other people to negotiate matters on equal terms, a democratic dialogue genre is likely to arise. In contrast, if participants use a style of language that is based on unequal roles, in adopting an authoritarian identity, the virtual learning environment may be dominated by a Magistral dialogue genre (Cheyne & Tarulli, 1999), which is characterised by asymmetries in knowledge and power.

The social presence theory (Gunawardena, 1995) stresses the importance of creating fruitful learning conditions by providing the environment with a sound social climate and intimacy and immediacy between learners. The asymmetries between identities in the Magistral dialogue is likely to influence the learning conditions in a negative way, as it distances the interlocutors from each other and divides them into one authority figure and one weaker party. On the other hand, where the participants take on more equal identities, there are better chances of fulfilment of the social presence conditions and for the learners to perceive their learning environment to be based on intimacy, immediacy and trust.

How these notions of dialogue influence identity construction, social presence and conditions for collaborative learning may also have implications for practitioners. For example, teachers and tutors may use this insight when forming groups and also when monitoring groups engaging in written interaction in virtual environments. With awareness of how different expressions of language construct identities and affect the learning atmosphere, teachers and tutors can be more observant of individuals using a style of language that dominates the dialogue and influences the learning conditions negatively. Steps to improve the collaborative learning conditions, to open up the dialogue and equal out the power relations between the identities, can then be taken by the teachers or tutors, for example by intervening and showing the participants that negotiating and questioning is allowed and even encouraged.

The impact of network environments in mediating human activity and the development of a sense of place

Individuals think and learn in a social and cultural environment that includes, among the many other things, a physical and/or virtual place. Contrary to what is taken for granted, a place is not a hollow container, but a major factor in influencing socialisation and cognition, as its design and layout influences the development of human activities. The classroom place, for example, (as well as the whole institutional setting in which the classroom is located) with its size, design, features, equipment, and physical gatherings affects the socialisation process. The classroom is the "formative context" (Ciborra and Lanzara, 1994), where both teacher and students, routinely and from their first encounter, interact, observe and interpret the behaviours and actions of others, as well as construct the activities and the rituals that define their daily lives (Weade, 1992, p. 94).

Many designers have failed to consider how to create a virtual place that fosters and sustains a social context (Kreijns and Kirschner, 2001), despite the fact that in computer-mediated communication (CMC) failures tend to be more frequent at the social level than they are at the technical level (Gunawardena, 1995). We focus here on the tendency of designers to exploit properties of space (e.g., provision of identity, orientation, a locus for activity, etc.) to frame human behavior, which is necessary, but in everyday life, the appropriate behavior framing comes not from a sense of space, but from a sense of place (Harrison and Dourish, 1996). As Harrison and Dourish nicely put it, "space is the opportunity, place is the understood reality". It follows that a space is a given, but a place must be forged by users, as it is not inherent in the system itself.

We "create" our place by selecting and arranging the space in which we live to support our activities, including learning. It is a process of adaptation and appropriation that applies to both physical places and technological ones. Symbolic interactionism (Blumer, 1969) offers a perspective that allows to understand the process of making sense of where we are and who we are both in physical places and online. We shape and give meaning to our environment which, in turn, shapes and gives meaning to us.

Contrary to the relatively major predictability of physical spaces, however, the great flexibility of virtual spaces, with their potential sense of transience and impermanence, requires people to engage in a complex process mutual adjustment to cope with the involved uncertainties (Gaver, 1999).

We argue that the new situation requires participants to engage in a process of place-making, which is necessary in order to appreciate the online environment (Lee, Danis, Miller and Jung, 2001) and develop conditions for sociability meant as the intensity and frequency of the need for social contacts. This process of place-making is neither automatic nor straightforward, as participants may not know or easily figure out what to do.

A general concern is to develop more social artefacts that may help learners organise their virtual place in a way that is meaningful to them and helps foster their social presence. What we propose here is increasing the playfulness of the virtual space.

A good example of what we mean by that is the analysis of the experience of *Bubblez*, a mini- game played by students in Denmark within a project group based on problem oriented project pedagogy. Following Wartofsky's classification of artefacts (1979), as a primary artefact, the game was not productive in the sense as e.g. an axe; rather the product of the game was "fun" or "relaxation" for the individual player. However, the game also became a secondary artefact as the game entered the shared repertoire and initiated a discourse based on friendly competition that was sustained and constantly negotiated throughout the project work. The game became a mode of belonging, participating and affirming membership in the virtual group. Although the game in a sense was counter-productive, considered that it took time away from writing the project, it was at the same time very productive in sustaining and constantly renewing a social practice. In part, the game also became a tertiary artefact for construction of imaginative and fictional 'articles', which functioned as a creative writer's playground far from ordinary academic language and discourse. The game was an important part of transforming the online environment from a space to a place.

SUMMARY OF RECOMMENDATIONS AND/OR CONCLUSIONS

Networks are porous by nature and can maintain both weak and strong ties at a distance. In education, the discourse has often privileged the idea of strong ties and a cohesive view of community. However, we argue that the idea of communities of practice communities finds practical realization only in some specialised "interstices" of modern organizations, which revolve around specific occupations or interests (Fox, 2002a).

We suggest that networked learning can be a good metaphor for technologically enhanced learning, as it captures the rich setting for learning in a networked society and using computer networks. The term CSCL privileges collaboration above other relationships and directs attention to the computer itself and not the network. We argue this is something like a category mistake, as for example when pointing to a campus building and asking if that is the university. The network may be accessed through computers and other devices, but it is a complex self-organizing system that cannot be identified as one of its component parts.

Networked learning holds the promise to become part of a hegemonic discourse not simply in educational terms but as part of wider debates concerning the nature of social processes, power and culture. As Hodgson and Reynolds (2002) made clear, networked learning offers the kind of potential to support participative approaches to learning that allow for recognition and appreciation of differences or differences of interests, while traditional approaches tend to reflect a notion of collaboration that encourages conformity.

A final claim made in this paper is that the use of the network metaphor in learning technology helps us connect ourselves to wider social debates about the networks and helps us think about the fundamental nature of the network and the patterns of activity associated with it. Networked learning is concerned with policy, organisational and institutional issues that are associated with the use of network technologies. This aspect is crucial since, as a recent overview of the recent CSCL research in Europe made clear, school culture creates great challenges on the successful implementation of CSCL practices on many levels, including pedagogical, cultural and organisational (Pyysalo, Livonen and Lallimo, 2001). Most often, bringing substantial changes at these levels cannot be achieved by individual teachers or researchers, but requires the concerted effort of all the stakeholders involved.

BIBLIOGRAPHY

Barabasi, A.L. (2002). *Linked: The new science of networks*. Cambridge, MA: Perseus Publishing.

Barabasi, A.L., Dezso, Z., Ravasz, E., Yook, S.H., & Oltvai, Z. (2002). Scale-free and hierarchical structures in complex networks. Retrieved from: http://www.nd.edu/~networks/PDF/Proceeding%20Sitges2004.pdf

Blumer, H. (1969). *Symbolic interactionism: Perspectives and method*. Englewood Cliffs, NJ: Prentice Hall, Inc.

Brown, J.S., & Duguid, P. (2001). Knowledge and organization: A social-practice perspective. *Organization Science, 12 (2)*, 198 – 213.

Buchanan, M. (2002). *Small world: uncovering nature's hidden networks*. London : Pheonix

Caravita, S. (2001). A re-framed conceptual change theory? *Learning and Instruction, 11*, 421-429.

Castells, M. (1996). *The information age: Economy, society and culture. Volume1. The rise of the network society*. Oxford: Blackwell.

Castells, M. (2001). *The Internet galaxy: Reflections on the internet, business, and society*. Oxford: Oxford University Press.

Cheyne, J.A., & Tarulli, D. (1999). Dialogue, difference, and the "third voice" in the zone of proximal development. *Theory and Psychology, 9*, 5-28.

Ciborra, C., & Lanzara, G. (1994). Formative context and information technology: Understanding the dynamics of innovation in organizations. *Accounting Management and Information Technology, 4 (2).*

Crook, C. (1994). *Computers and the collaborative experience of learning*. London: Routledge.

Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Konsultit

Fairclough, N. (2003). *Analysing discourse: Textual analysis for social research.* London/New York: Routledge.

Fox, S. (2002). Studying networked learning: Some implications from socially situated learning theory and actor network theory. In C. Steeples & Jones, C. (Eds.), *Networked learning: Issues and Perspectives* (77-91). London: Springer.

Fox, S. (2002a). Networks and communities: An actor-network critique of ideas on community and implications for networked learning. In S. Banks, Goodyear, P., Hodgson, V., & McConnell, D. (Eds.), *Networked learning 2002: A research based conference on e-learning in higher education and lifelong learning* (110-118). University of Sheffield, Sheffield, UK.

Gaver, W. W. (1996). Affordances for interaction: The social is material for design. *Ecological Psychology, 8 (2),* 111-129.

Gibson, J. J. (1977). The theory of affordances. In R. E. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications, 1 (2/3),* 147-166.

Harasim, L. (1989). On-line education: A new domain. In R. Mason & Kaye, A. (Eds), *Mindweave: Communications, computers, and distance education*. Oxford: Pergamon Press.

Harris, R., Bolander, K., Lebrun, M., Docq, F., & Bouvy, M. T. (2004). Linking perceptions of control and signs of engagement in the process and content of collaborative e-learning. In S. Banks, Goodyear, P., Hodgson, V., Jones, C., Lally, V., McConnell, D., & Steeples C. (Eds.), *Fourth International Conference on Networked Learning* (245-250). Jointly organized by Lancaster University and the University of Sheffield, April 5-7, 2004, Lancaster University, UK.

Harrison, S., & Dourish, P. (1996). Re-place-ing space: The roles of space and place in collaborative systems. *Proceedings of CSCW 96*, 67-76. New York, NY: ACM.

Hodgson, V., & Reynolds, M. (2002). Networked learning and ideas of community. In S. Banks, Goodyear, P., Hodgson, V., & McConnell, D. (Eds.), *Networked learning 2002: A research based conference on e-learning in higher education and lifelong learning* (119-127). University of Sheffield, Sheffield, UK.

Jonassen, D. H. (1996). *Computers in the classroom: Mindtools for critical thinking.* Englewood Cliffs, NJ: Merrill, Prentice Hall.

Jones, C., & Steeples, C. (Eds.). (2002). *Networked learning: Perspectives and issues*. London: Springer

Kaye, A. R. (Ed.). (1992). *Collaborative learning through computer conferencing: The Najdeen papers.* Berlin: Springer-Verlag.

Kaye, A. R. (1995). Computer supported collaborative learning. In N. Heap Thomas, R., Einon, G., Mason, R. and Mackay, H. (Eds.), *Information technology and society.* London: Sage.

Koschmann, T. D. (1996). Paradigm shifts and instructional technology. In Koschmann, T. D. (Ed.), *CSCL: Theory and practice of an emerging paradigm* (1-23). Mahwah, NJ: Lawrence Erlbaum Associates.

Koschmann, T. (2001). Revisiting the paradigms of instructional technology. In G. Kennedy, Keppell, M., McNaught, C., & Petrovic, T. (Eds.), *Meeting at the Crossroads. Proceedings of the 18th Annual Conference of*

the Australian Society for Computers in Learning in Tertiary Education (15-22). Melbourne: Biomedical Multimedia Unit, The University of Melbourne. Retrieved on January 28, 2004 from http://www.medfac.unimelb.edu.au/ascilite2001/pdf/papers/koschmannt.pdf

Kreijns, K., & Kirschner, P. A. (2001). The social affordances of computer-supported collaborative learning environments. Paper presented at *Frontiers in Education: The Future-Impact on Engineering and Science Education*, Reno, Nevada.

Lee, A., Danis, C., Miller, T., & Jung, Y. (2001). Fostering social interaction in online spaces. In M. Hirose (Ed.), *Human-Computer Interaction (INTERACT'01) – Eighth IFIP TC.13 Conference on Human-Computer Interaction* (59-66). IOS Press.

Leont'ev, A. N. (1978). *Activity, consciousness, and personality*. Englewood Cliffs: Prentice-Hall.

Lipponen, L. (2002). Exploring foundations for computer-supported collaborative learning. In Stahl, G. (Ed.), *Proceedings of the International Conference on Computer-Supported Collaborative Learning* (72-81). Retrieved on October 25, 2003 from http://newmedia.colorado.edu/cscl/31.pdf

Looi, C. K. (2001). Enhancing learning ecology on the Internet. *Journal of Computer Assisted Learning, 17*, 13-20.

McConnell, D. (1994). *Implementing computer supported cooperative learning*. London: Kogan Page.

Nardi, B., & O'Day, V. L. (1999). *Information ecologies, using technology with heart*. Cambridge, MA: MIT Press.

Osterlund, C., & Carlisle, P. (2003). How practice matters: A relational view of knowledge sharing. In M. Huysman, Wenger, E., & Wulf, V. (Eds.), *Communities and technologies* (1-22). Dordrecht: Kluwer.

Paavola, S., Lipponen, L., & Hakkarainen, K. (2002). Epistemological foundations for CSCL: A comparison of three models of innovative knowledge communities. In Stahl, G. (Ed.), *Proceedings of CSCL 2002* (24-32). Hillsdale: Lawrence Erlbaum.

Pyysalo, R., Livonen, M., & Lallimo, J. (2001). Overview of the recent CSCL research in Europe. In M. Lakkala, Rahikainen, M., & Hakkarainen, K. (Eds.), *D2.1 Perspectives of CSCL in Europe: A review*. ITCOLE Project. IST-2000-26249

Reynolds, M., Sclater, M., & Tickner, S. (2004). A critique of participative discourses adopted in networked learning. In S. Banks, Goodyear, P., Hodgson, V., Jones, C., Lally, V., McConnell, D., & Steeples C. (Eds.), *Fourth International Conference on Networked Learning.* Jointly organized by Lancaster University and the University of Sheffield, April 5-7, 2004, Lancaster University, UK.

Rosson, M. B. (2003). Weak ties in networked communities. In Huysman, M., Wenger, E., & Wulf, V. (Eds.), *Communities and technologies.* 265-286. Dordrecht: Kluwer.

Salomon, G. (Ed.). (1993). *Distributed cognitions: Psychological and educational considerations.* Cambridge, UK: Cambridge University Press.

Salomon, G., & Perkins, D.N. (1998). Individual and social aspects of learning. In Pearson, P. and Iran-Nejad (Eds.), *Review of Research in Education. 23*, 1-24. Washington DC, American Educational Research Association.

Sorensen, E. K., & Takle, E. S. (2001). Impacts of putting requirements on dialogue in distributed CSCL. In Dillenbourg, P., Eurelings, A., & Hakkarainen, K. (Eds.), *Proceedings of the EuroCSCL 2001 conference "European Perspectives on Computer-Supported Collaborative Learning"*. (694-695). March 22-24, 2001 in Maastricht Exibition & Congress Centre (MECC), Maastricht, the Netherlands.

Stahl, G. (2002). Contributions to a theoretical framework for CSCL (62-71). In *Proceedings of CSCL 2002*. Boulder, CO.

Stahl, G. (2003). Building collaborative knowing: Elements of a social theory of learning. In Strijbos, J.-W., Kirschner, P., & Martens, R. (Eds.), *What we know about CSCL in Higher Education*. Amsterdam, The Netherlands: Kluwer.

Suchman, L. (1998). Human/Machine Reconsidered. *Cognitive Studies*, 5 *(1),* 5-13.

Säljö, R. (2003). Representational tools and the transformation of learning. In B. Wasson, Ludvigsen, S., & Hoppe, H. (Eds.), *Designing for change in networked learning environments. Proceedings of the International Conference on Computer Support for Collaborative Learning 2003*. Dordrecht, The Netherlands: Kluwer Academic.

Yates, S. J. (1997). Gender, identity and CMC. *Journal of Computer Assisted Learning*, 13, (4), 281-290.

Visser, J. (1999). *Overcoming the underdevelopment of learning: A transdisciplinary view*. Symposium on Overcoming the Underdevelopment of Learning at the Annual Meeting of the American Educational Research Association, Montreal, Canada, April 19-23, 1999. Retrieved March 11, 2004 from: http://www.unesco.org/education/educprog/lwf/dl/visser_f.pdf

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

Wasson, B., Ludvigsen, S., & Hoppe, H. (2003). Introduction. In Wasson, B., Ludvigsen, S., & Hoppe, H. (Eds.), *Designing for change in networked learning environments. Proceedings of the International Conference on Computer Support for Collaborative Learning 2003*. Dordrecht, The Netherlands: Kluwer Academic.

Wartofsky, M. 1979. *Models: Representation and scientific understanding.* Dordrecht: Reidel.

Weade, G. (1992). Locating learning in the times and spaces of teaching. In H. H. Marshall (Ed.), *Redefining student learning: Roots of educational change* (87-118). Norwood, NJ: Ablex.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press.

ACKNOWLEDGEMENTS AND PROJECT URL

The authors acknowledge the contributions of Timothy Koschmann and Etienne Wenger as external experts during an e-seminar. This position paper is available at 'equel.net'.

APPENDICES

SIG 6 members

Lone Dirckinck-Holmfeld	Aalborg Univeristy, Aalborg	DK
Liliane Esnault	E.M.LYON, Lyon	FR
Jenny Gustafson	Göteborg University, Göteborg	SE
Vivien Hodgson	Lancaster University, Lancaster	UK
*Berner Lindström	Göteborg University, Göteborg	SE
Chris Jones	Lancaster University, Lancaster	UK
*Marisa Ponti	Göteborg University, Göteborg	SE
Thomas Ryberg,	Aalborg Univeristy, Aalborg	DK
Sue Tickner	University of Glasgow, Glasgow	UK

*SIG 6 Coordinators

External Participants

Timothy Koschmann is Associate Professor in the Department of Medical Education at Southern Illinois University School of Medicine, USA. Dr. Koschmann's research involves studying how people learn in collaborative settings and he has been an active and prominent member of the CSCL community since the start of this area of research.

Etienne Wenger is an independent researcher and consultant, and globally recognized thought leader in the field of communities of practice and their application to organizations. Wenger's work is considered seminal to both research and practice in several domains, including business, education, and government.

List of contributing studies, investigations and papers.

Papers presented at the SIG Symposium at the 4th Networked Learning Conference at Lancaster University, Lancaster, UK, April 2004:
Paper 1:
The metaphor of networks in learning: Communities, collaboration and practice
Chris Jones, Lancaster University; Liliane Esnault, EMLyon

Financial Agreement number: 2002-4093/001-001 EDU-ELEARN

Paper 2:
Identity construction and dialogue genres – How notions of dialogue may influence social presence in networked learning environments
Jenny Gustafson, Göteborg University; Vivien Hodgson, Lancaster University;
Sue Tickner, University of Glasgow
Paper 3:
Rethinking virtual space as a place for sociability: Theory and design implications
Marisa Ponti, Göteborg University; Thomas Ryberg, Aalborg University
A fourth individual paper will be presented at the Scandinavian Summer Cruise at the Baltic Sea, June 18-21, 2004, organised by Karolinska Institutet, Sweden, EARLI SIG Higher Education, and the Institute for Knowledge Innovation and Technology (IKIT), a worldwide virtual institute:
Constructing knowledge as a system of relations
Romain Zeiliger, Centre National de la Recherche Scientifique and Université Lumière Lyon 2; Marisa Ponti, Göteborg University; Liliane Esnault, EMLyon