Communities of Distance Education

Lars Svensson

Laboratorium for Interaction
Technology
Department of Informatics
and Mathematics
University of Trollhättan Uddevalla

Department of Informatics
Göteborg University

lars.svensson@htu.se

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Abstract

Distance Education (DE) is the centre of attention for many educational organisations and recently many innovative examples of flexible educational designs that make use of the new information and communication technologies have surfaced. However, these new forms of DE have often suffered from big problems regarding, for instance, student dropouts and low levels of student performance. The thesis is based on a longitudinal action-oriented research project of Distance Educational program at a Swedish University College. The case setting is characterised by a learning-centre based DE-concept where DE uses a web based tool (DisCo) and videoconferencing as the technological infrastructure. This way of organising DE gives the students a social milieu that is a combination of co-located peers at the learning centre and a global and IT-meditated class community. Such a setting provides an interesting context suitable for studies of the social dimensions of DE practice. Consequently, the main objective that guided the research was *to understand and support IT-mediated communities of distance education?* This objective reflects a dual focus on both analysing and supporting DE practices. Furthermore, the longitudinal design has allowed a broad research approach that explores a rich spectrum of practices within the distance educational fabric.

The main conclusions are:

- The formation of a distributed Community of distance education should be understood as a *gathering,* where typified patterns of communication emerge when members become socially acquainted. Communitising behaviour, i.e. activities that draw attention to the existence of the community, supports community cohesiveness.

- Communities change as a result of collective negotiations. Whereas most of these changes are slow and characterised by incremental innovations, it is also important to realise that the strength of the community resides in the collective attention it receives. Consequently, communities should be seen as energies that can fluctuate rapidly.

- IT plays an important part in mediating and visualising social information, and adoption of IT applications are the result of collective processes of negotiating common sense of the use of said artefacts. Consequently, system malleability is important in order to allow such innovation-in-use.

- IT-mediated DE practice has the potential of being more public, thereby creating a social landscape where students and teachers can develop new roles for collaborative learning. This also involves challenges for educational organisations and IT-designers in order for DE practice to free itself from the physical boundaries of school buildings

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All the Love to my wife Titti, and to my children Sofia, Elin, Lisa and Niklas, and to my parents Lars-Åke and Gunnel.

Uddevalla, November 2002.
        Lars Svensson

The papers

Introduction

Communities of Distance Education

1.   Distance Educational Practice

This thesis is about *distance education (DE)*. The choice of using the term distance education, rather than more popular expressions such as distance learning or flexible learning, when framing the topic should be read as a position statement for the research presented in this thesis. I wish to emphasise that the research is concerned with studies of a set of complex *practices* (Wenger, 1998), that contain a multitude of interrelated processes interwoven with, and having impact on students' learning. In addition to 'studying', students also engage in activities such as getting prepared for and taking various forms of exams, reflecting on and influencing the practice through formal and informal evaluations, and administrative routines such as applying for grants and registering for courses. Furthermore, working together with other students also calls for socialising and coordination of group work. These are some of the ways in which students over time develop adaptive structures and routines for coping with everyday educational life.

Similarly, in addition to tutoring and instruction, the teachers plan, design and administer exercises, assignments and assessments, alone or in cooperation with colleagues. They are also expected to develop and improve their professional performance and keep abreast of development within their subject matter.

The adoption of such a broad *practice approach* when doing research on distance education should not be interpreted as an attempt to diminish the importance of learning in this context, but should rather be read as an acknowledgement of the potential bias associated with studying educational practices solely from the perspective of learning.

Firstly, there is a risk of reducing learners to rationalistic and goal-oriented subjects in pursuit of more or less explicitly formulated learning

objectives, thus failing to acknowledge more situated and direct sources of motivation and engagement. Again, this is not to argue that such espoused objectives do not exist, but merely that what guides and motivates situated action could also be found through analysis of other theories-in-use (Argyris & Schön, 1988).

Secondly, much of the previous research concerned with computers and education seems to put rigour over relevance (e.g. Lee, 1999), resulting in pilot-type (quasi) experimental research designs or small scale pioneer projects with extraordinary resources and/or participants. A practice approach invites research that focuses more on relevance in the sense that research settings, involving ordinary students and teachers, can address new issues, problems and questions that surface when dealing with longitudinal large-scale projects (Alavi & Leidner, 2001).

Thirdly, it is important to emphasise that the boundaries of educational practices should not be perceived as containing only organised teacher-designed activities, but also the individual and social activities and processes that are initiated by students and are outside the direct control of teachers.

Finally, a broad and longitudinal practice-approach allows the study of distance education from a number of complementary perspectives including the individual student, groups of students, teachers, the class-community, and school organisation (Alavi & Leidner, 2001).

Methodologically, this practice-approach conforms to the perspectives in the tradition of workplace studies (e.g. Luff et al., 2000; Brown & Duguid, 1991; Suchman, 1987; Orr, 1996), where focus is set on actual and non-canonical work practices, rather than abstracted, idealised and canonical processes (Brown & Duguid, 1991).

This perspective is especially fruitful when studying information and communication technology in practice, Luff et al. (2000) state that the roles and impact of IT could be analysed and understood only if focus is set on *"the work that makes technology work"*. As such, this is a perspective that highlights how IT must be understood in its context of use. Furthermore, the research is influenced by the idea that the use of electronic media has a profound impact on the social situation being mediated (Meyrowitz, 1985; Sproull & Kiesler, 1991). It is obvious that the use of IT in general and Internet technologies in particular has brought such changes to DE-practice. A quick review of past DE-generations, moving from correspondence, through teleconferencing and stand-alone computing (Garrison, 1993), to networked computers, shows how this is a movement from individual to social learning, and from teacher control towards

empowered students with more or less unrestricted access to an infrastructure where a multitude of interactional processes can be mediated.

1.1   Research Questions

The practice approach, outlined above, paints the picture of a complex and perhaps almost unlimited landscape of an emergent distance educational practice that forms and evolves in the clash between the technology being used and the situated actions of participating actors. The particular interest of the research presented in this thesis lies in a subset of this complex landscape, namely the social processes that are primarily initiated by students, (as opposed to being designed by teachers). In other words, the focus is set on the use-patterns that emerge from the way the students (and teachers) over time collectively choose to use IT. These behaviours are understood and interpreted as grounded utterances of the work that makes the emergent practice work. The overall research objective is consequently:

To understand and support IT-mediated communities of distance education.

More specifically the following questions are explored:

i.   What are the key characteristics of text-based social interaction in distance education?

ii.   What processes are involved in the forming and evolution of a distributed community of distance education?

iii.   How can IT systems be designed to support situated social activities in communities of distance education?

iv.   How does the use of IT interplay with the roles for different stakeholders (students, teachers, designers and organisations)?

The four questions reflect a duality between analysis and design in terms of understanding vs. supporting an emergent practice (see table 1.). This duality is reciprocal in the sense that changes in technology affect practice through changes and redefinition of the social situations (Meyrowitz, 1985). Similarly, social processes of negotiation should be understood as innovations-in-use (Voß et al., 2000), that ultimately determine whether a piece of technology is rejected or adopted and adapted by the community of users (see fig 1.)

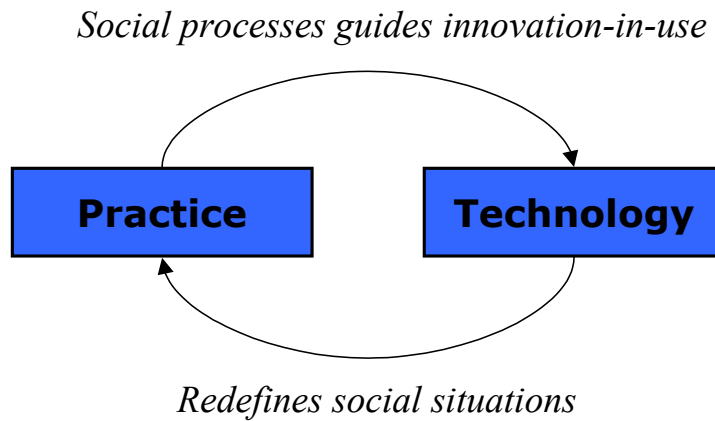*Social processes guides innovation-in-use*

Redefines social situations

Figure 1. The reciprocal relationship
between practice and technology

The questions also reflect a duality between a short term and long term perspective with respect to the time-scale in question (Table 1). In the short time-span the focus is set on activities such as situated interaction, and on the functionalities and interface of the IT-artefacts. The result of these activities relates to the more long-term shaping of contextual and cultural elements including new roles, processes and rituals within the practices.

	Analysis	Design
Situated actions	i. What are the key characteristics of text-based social interaction in distance education?	iii. How can IT systems be designed to support situated social activities in communities of distance education?
Community processes and roles	ii. What processes are involved in the forming and evolution of a distributed community of distance education?	iv. How does the use of IT interplay with the roles for different stakeholders (students, teachers, designers & organisations)?

Table 1. Research questions

In addressing these questions the results contribute to the field of computers and education, sometimes referred to as computer-aided learning (CAL), computer-mediated learning (CML), or computer support for collaborative learning (CSCL). On a more generic level the research also addresses issues relevant for computer support for collaborative work (CSCW) and computer-mediated communication (CMC). The practical importance and potential of computer-mediated distance education is at present widely acknowledged by a growing number of public and private institutions, and many political initiatives are launched with the aim of

using IT to address educational problems. Furthermore, it seems less and less relevant to use the dichotomy of distance education vs. classroom education, since more and more initiatives are mixed-mode (Campos et al., 2001) with blended and blurred borders.

1.2 Thesis Structure

Sections one through seven constitute the introduction of the thesis, which is followed by six individual papers (Table 2). The next section presents the theoretical background, and section three describes the case setting. Section four presents and discusses the methodological approach. Section five presents the research contributions, including summaries of the conclusions from the six papers, a discussion of the implications of these findings for the understanding of educational communities and a discussion of the implications and challenges for distance educational practice. Section six concludes the introduction and points at further research.

Paper 1.	Svensson, L. (2002a) Interaction Repertoire in a Learning Community, : In *DVD-Proceedings of Computer Supported Collaborative Learning,CSCL 2002*, (edited by G. Stahl), Boulder, CO, USA
Paper 2.	Greenbaum, J & Svensson, L. The Story of an Educational Gathering: Part One - Getting Acquainted. Under consideration by *International Review of Research in Open and Distance Learning*.
Paper 3.	Svensson, L. (2002b), Discursive Evaluation in a Distributed Learning Community. *Australian Journal of Educational Technology*, 18(3), pp. 308-322. A previous version appeared in the *Proceedings of European Conference on Information Science, (ECIS 2001)* Bled, Slovenia
Paper 4.	Svensson, L. & Sørensen, C. (2002) Designing Community Atmosphere Barometers, *Proceedings of European Conference on Information Science, ECIS 2002* (edited by S. Wrycza), University of Gdansk, Poland
Paper 5.	Svensson, L. & Magnusson, M. Crowds, Crews, Teams and Peers: A Study of Collaborative Work in Learning-Centre Based Distance Education. Accepted for publication in *e-Journal of Instructional Science and Technology*.
Paper 6.	Svensson, L. Less is More in Distance Education: The Contradictory Relationship Between Rapid Adoption and Radical Innovation. Accepted for Publication in *Journal of Educational Technology and Society*.

Table 2. Papers included in the thesis

2.   Theoretical Background

A broad practice approach that aims at both understanding and supporting DE-practices, both on the level of situated activities and on the level of community processes needs an equally broad range of theoretical approaches that separately and in combination can be used to discuss Communities of Distance Education. The following subsections briefly review and outline the theoretical perspectives on practice, learning, technology and interaction that underlie this thesis.

2.1   Practice

A practice approach to research is "bottom-up", in the sense that it is concerned with exploring activities as they actually occur, as oppose of studying abstract process described in normative documents, strategies, policies and plans (Brown & Duguid, 1991; Orr, 1996). Practice is multi-facetted and consists of all processes and activities of participants' everyday life. Consequently, the boundaries are not sharp and static but rather blurred and dynamic, constantly changing and evolving over time. Practice is also inherently social. Wenger declares that:

> The concept of practice connotes doing, but not just doing in and of itself. It is doing in a historical and social context that gives structure and meaning to what we do (Wenger, 1998, pp. 47)

This also points to the local and situated nature of practice. Heath and Luff (2000) defines 'situated' in this context as:

> ...the emergent, moment-by-moment, production and co-ordination of workplace activities, and the ways tools and technologies feature, in their ongoing and collaborative accomplishment (Heath & Luff, 2000, pp. 21)

This definition also demonstrates that studying practice means focusing not only on people but also on the artefacts and technologies interwoven into practice.

Wenger (1998) also argues that at the core of any practice is the meaning that is collectively produced. Meaning is, according to Wenger, negotiated through *participation* and *reification*. These two concepts define a complementing duality that, like the river and the mountain, both shape one another and at the same time have their own shape.

The different traditions within workplace studies all prescribe to the idea that learning is inseparable from practice (Lave, 1993). Consequently, Lave and Wenger (1991) argues that learning should be understood from the perspective of communities-of-practice, (see also Brown & Duguid, 1991; Wenger, 1998). Wenger (1998) identifies three central processes or activities that are characteristic for communities of practice: (1) *Mutual Engagement*, where members in various manners pays attention and give interest to whatever is in common in the community. (2) The *Negotiation of Joint Enterprise* stresses the fact that available resources and boundaries must not be perceived as static, but rather as objects of constantly ongoing debates, interpretations, and change. Finally, a community is characterised by its (3) *Shared Repertoire*, where the mutual history constitutes the foundation for knowledge of shared norms, tools, language genres etc. that distinguishes the insider from someone outside or in the periphery of the community.

Similarly, Agre (1998) speaks about "people who occupy analogous locations in social or institutional structures", when defining a community. He argues that members of such a community are tied together by institutional bonds, and may or may not interact when pursuing a core of common goals. Furthermore a community in Agre's terms will have typified "forms of association" guiding their potential interaction.

2.2 Educational Practice

The characteristics of work practices in general, can in most aspects be applied to the specific practices of educational institutions. The point is however; not to argue that education and schooling is a work-practice like any other, but rather to argue that education can be studied using similar approaches as when studying other practices. In fact, there are a number of highly relevant aspects that makes formal education unique in comparison to other forms of labour. It is probably fair to argue that there are several elements that are shared among most forms of higher education, regardless of differences in educational culture and traditions, elements that in each specific setting has great influence in shaping activities and behaviour of teachers, students and other participants.

Examples of such more or less globally shared educational characteristics are the power-relationship between students and teachers, methods for instruction, and structures and methods for examination. Previous research, where schools and other educational institutions have been studied, both on the organisational level

and the classroom level, describe how processes such as these heavily influence educational practice. It is often argued that what is learned in schools is only to a limited extent regulated by the explicit curriculum, and that a hidden curriculum (e.g. Whitty & Young, 1976) where students, through socialisation, learns more implicit values, norms and structures, such as learning to compete, be punctual, know one's place etc. In this sense, schools can be argued to mirror the surrounding society, and changes in society will eventually be echoed as smaller or larger and more paradigmatically changes in schools. (See for instance Bowden and Marton (1998) for a discussion of how society's perception of universities changed over time, moving between a focus on teaching and a focus on research)

Specifically, the system of examination can be argued to be especially instrumental in the shaping of such a hidden curriculum (Kvale, 1977; 1993), and methods of examination and grading are often criticised as fostering superficial learning. Furthermore, all the way through school, pupils and students are socialised by teacher's directives in classroom dialogues (Minick, 1993), and even by the way many classrooms are furnished as spaces where students should sit-and-listen. Together all these elements and processes contributes to the rich fabric of any educational practice, with profound implications for students' motivation, engagement and learning.

2.3   Learning and IT

In the behaviouristic tradition, learning was perceived as a more or less generic biological process (e.g. Skinner 1964). This notion was challenged by research that showed how learning processes must be understood as being dependent on content (e.g. Marton & Säljö, 1984; Ramsden, 1992); i.e. how we learn depends on what we learn. Based on studies of how students approach a reading assignment, different *approaches to learning* were identified. The research also showed how design of educational elements such as examination, assignments and teaching methods together with students' past experiences influenced whether students would adopt a deep approach oriented towards understanding, or a *surface approach* where students are typically occupied with memorising facts.

In the 1990s a growing body of research in the socio-cultural tradition (e.g. Lave & Wenger, 1991; Säljö, 2000; Brown & Duguid, 1991; Wenger 1998) showed that learning is also dependent on the context of learning. Such emphasis on the situated nature of learning brings to the fore social, communicative and cultural aspects. It also highlights the importance of the artefacts used to mediate

interaction (Säljö, 2000; Hutchins, 1995), and that problems and exercises are likely to be framed differently depending on the context (Säljö & Wyndham, 1993).

Similar to the way focus has shifted from learning as a generic process, to content-dependent process, to context-dependent process, the role of information technology in educational context has changed over time. Skinner's (1964) view on learning subscribed to a mechanistic epistemology of IT-support for learning. The computer was perceived as a *teaching machine* that through the development of systems with artificial intelligence could evolve into an *intelligent tutor* (Berg, 2000). When focus shifted towards content and pedagogical methods, the perception of technology shifted towards a discussion of adaptive and interactive *tools* (Laurillard, 1993) that could support experiential and constructivist learning (e.g. Nuldén, 1999; Leidner & Jarvenpaa, 1995).

The socio-cultural perspective on learning implies that technology should be seen as a medium for social, cultural and interactive processes. Even though a growing body of research from the CSCL community (computer support for collaborative learning) is acknowledging learning as a social phenomenon, (see for example Baker et al., 1999; Lipponen, 2002; Koschman, 2002), there is a lack of studies that adopt a broad perspective reaching beyond studying the use of IT in designed settings, (see Hara & Kling, 1999 or Wasson & Mørch, 2000 for exceptions).

2.4   IT mediated Communities

The term *Virtual Community* has traditionally been used to describe a variety of aspects where a social dimension is present in computer mediated communication. The fact that scholars from many disciplines (e.g. Sociology, Cultural studies, Informatics etc.) give attention to social aspects of cyberspace contributes to the heterogeneous image of what this concept encompasses. Many of the definitions depart from how communities are perceived in real life and typically include elements such as 'people', 'social interaction', 'belonging', 'membership', and 'trust' (Kapoor, 2001). A frequently cited definition, covering a wider spectrum of social activity is provided by Rheingold (1993)

> Virtual communities are social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace.

Many prefer to talk about online (rather than virtual) communities. Baym (1998) focus on how the nature of computer mediated communication in online communities is shaped by factors such as external context, temporal structure, system infrastructure, group purposes, and participants' characteristics. She states that these factors together influence the way the online community emerges, and the way participants imagine themselves as members of that community. Others avoid the blurred contours of the community concept and replace it with other notions such as online discourse (Erickson, 1997).

Orlikowski and Yates (1994) focuses on how electronic interaction within an organisational community is typified into *genres* with characteristic purpose, structure and form. A genre is defined as:

> Typified communicative act having a socially defined and recognised communicative purpose with regard to its audience (Orlikowski & Yates, 1994).

In addition to the definition, Orlikowski and Yates (1994) make several clarifications that are helpful in order to grasp the genre concept. Firstly, they emphasise that the purpose referred to in the definition should be recognised and shared within the community/group/organisation, and not to be interpreted as the purpose of individual community members. Secondly, they state that a stable substance and form should be connected to such a shared purpose in order to constitute a genre. Substance refers to the topics and the discursive structure of the interaction, and form has three sub-dimensions: structural features, communicative medium and language. In a similar manner, Shepherd and Watters (1998) define a *Cybergenre* to be characterised by content, form and functionality.

Furthermore, Orlikowski and Yates (1994) states that a collection of genres can constitute a *Genre Repertoire*, i.e. the complete set of genres used for interaction within a community. They say:

> Both the composition as well as the frequency with which they are used are important aspects of a repertoire. When genres are heavily intertwined and overlapping it may be useful to talk of a genre system, where genres are enacted in a certain sequence with interdependent purpose and form (Orlikowski & Yates, 1994).

Similar to the way Wenger (1998) sees the shared repertoire of a physical community as an important element in the definition of that community, Orlikowski and Yates (1994) underscores how electronic communication genres frames and indirectly defines the community space by serving as a "social

template" for work. However, it is important not to perceive genres as inherently static. Instead, genres evolve over time, partly as a result of technology adaptation and innovation (Shepherd & Watters, 1998), and partly as a result of community negotiations (Wenger, 1998).

2.5   Computer-Mediated Social Interaction in Educational Settings

In previous research on interaction within an educational setting, the focus is often set on interaction processes directly relating to the technology-mediated collaborative learning activities themselves. For instance, Baker, Hansen, Joiner and Traum (1999) explore how students need to engage in processes of grounding, i.e. the interaction necessary to establish a sufficient common understanding to complete a collaborative task. Wasson and Mørch (2000) present collaborative patterns expressed by small groups of students using various types of groupware.

Leh (2001) concludes that existing research on computer-mediated social interaction in educational settings can be divided into two categories. The first category consist of researchers advocating that the lack of social cues in text-based interaction is profoundly problematic in terms of mediating social, emotional and personal information. As a consequence, text-based interaction becomes less personal and more task-oriented (e.g. Rice & Love, 1987; Cummings et al., 2002). The other category provides research that demonstrates how participants' activities can compensate for this lack of non-verbal and contextual cues, resulting in communication that is perceived as personal and beneficial for learning. Such perceptions of being *socially present* (Gunawardena, 1995) in mediated communication can increase over time, supported by a use of so-called para-language and emoticons as means of verbalising social information that is non-verbal in face-to-face communication (Utz, 2000). Krejns and Kirschner (2001) focus on the role of the IT-artefact in this context. They advocate that IT-mediated social interaction must never be taken for granted merely because it is technically possible. Instead they argue for the need of systems with social affordances that stimulates participants to engage in social interaction, and that subsequently complement and support general awareness and group cohesiveness in an educational community.

Rovai (2002) argues that the building of a sense of community in a DE-group, to a large extent can be promoted by teachers through for instance creating small size communities, designing small group activities, and carefully attending

issues such as social equality, group facilitation, social presence and dialogue. Oren, Mioduser & Nachmias (2002) also stress that the teacher's behaviour should be facilitating, rather than dominating, in order to create a relaxed social climate with rich student-to-student interaction.

2.6   Communities of Distance Education

Wenger's (1998) deconstruction of the concept of a community-of-practice provides the fundamental analytical perspectives for studying DE as a social practice. In addition to focusing on the collective nature of DE, this also points to the multitude of activities and processes within educational institutions. Such a community must not be understood as inherently harmonious, but rather as harbouring both consensus and conflicts (Wenger, 1998). Furthermore, in order to unfold the true nature of a community one must attend closely to the details of the practices of that community. By focusing on the situated activities, i.e. what participants actually do over time, behavioural patterns (or genres) can be detected (Orlikowski & Yates, 1994), and the mere existence of such typified patterns/genres can be interpreted as analytical evidence of the existence of a community (Wenger, 1998).

       The fact that communities of distance education to a large extent are IT-mediated is also important since the properties of the medium itself restage the social situation it is mediating, through changes in audience and participants' roles (Meyrowitz, 1985). Meyrowitz sees social situations as information-systems consisting of all information that we can find out about ourselves and others in acts of communication (verbal and non-verbal communication, pace of activities etc.), and he states:

> To include mediated encounters in the study of situations, we need to abandon
> the notion that social situations are only encounters that occur face to face in
> set times and places. We need to look at the larger more inclusive notion of
> 'patterns of access to social information' (pp. 37)

In summary, a *community of distance education* is a collection of people that are mutually engaged in understanding and participating in a rich fabric of processes and activities within the frames of shared DE practices through constantly ongoing negotiations of meaning. In doing so the community develops typified behavioural patterns that shapes, and are shaped by, the properties of the technology that mediates them. In any given DE setting such communities are

likely to exist on several levels ranging from smaller groups of students to larger more global communities which may or may not include teachers and tutors.

3.   Empirical Background - The SYDUB Case

The research presented in this thesis was conducted as a longitudinal action-based research project within the SYDUB project. Sydub98 was a development project sponsored by the University of Trollhättan Uddevalla (UTU), six participating municipalities located in the nearby region of UTU, and the European Union (structure funds 2 and 5b). The project enabled 58 students in six municipalities[1] to study full time the first two years of a bachelor programme in Systems Analysis as a distance education.

The project was launched in January 1998, and ended two years later in December 1999. After the end of the project the university continued to enrol approximately 40-60 students from four to six new municipalities each year. The project was partly triggered by the fact that the participating municipalities were all located in a region of Sweden with poor traditions of higher education. In this respect the project aimed at visualising higher education and to strengthening the relationships between UTU as a regional University and local high schools. Other motivational factors for municipal and regional politicians as well as for the management at UTU was the fact that a majority of the municipalities in this region already had made substantial investments in ISDN-based videoconferencing (VC) equipment. These investments were believed to enhance the networking capacities for local business organisations and facilitate modern initiatives for competence development and education. However, at the time of the SYDUB-project these videoconference studios were, with a few exceptions, infrequently used. As a plausible consequence, pressure was put on local politicians to envision activities that to the public justified these investments. The generic objective of contributing to regional development was also a prioritised and explicit goal for all regional universities, including UTU. Other incentives from within UTU were to develop sound educational methods and IT-support for a new generation of computer-mediated distance education. Finally, it should be noticed that, prior to decision from the structure funds to approve the project,

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[1] The original municipalities in the Sydub98 project were Dals Ed, Åmål, Bengtsfors, Tanum, Sotenäs and Lysekil.

there were very poor efforts made by management to anchor the project among the members of staff that would be directly involved. Consequently, not many teachers were actively engaged in formulating objectives, plans or technological specifications for the project.

3.1 Learning centres

The existing VC-studios in the participating municipalities and at UTU constituted an important and tangible element of the project concept. The context and location of these VC-studios varied greatly between various municipalities. In some cases the studio was hosted at local elementary schools or in the town hall where someone, typically the local dean, became responsible for the project more or less without extra resources. At other sites the VC-studio was a central part of the establishment of new centres for adult education and professional training, often with a management and a budget of its own. Over time these more ambitious settings were presented as role models for other municipalities to follow, and the term learning centre, or knowledge centre gradually came to be a label that was associated with a collection of facilities and services surrounding a videoconference studio.

To some extent such minimum demands were enforced through the contracts that surrounded the Sydub98 project. For instance, these contracts stated that each participating community should provide a certain number of computers complying to a certain minimum standard in terms of processor capacity, memory size and speed of connection to the Internet. Furthermore, the contracts between UTU and each municipality regulated how a local coordinator should be at the service of the SYDUB students (on a 20% basis). During the duration of the project it quickly became obvious that these initial regulations were not sufficient in order to guarantee decent conditions for the students. Consequently, it became essential to engage in negotiations that regulated, for instance, the number of hours per week that students could occupy computers with Internet access. Furthermore, due to the rapid pace of hardware and software development, it became clear that contracts that aimed at covering a period of two years could not be formulated in terms of absolute hardware capacity. Instead more open phrasing such as: "provide computers with modern operating systems, processors and memory capacity that can cope with all the necessary software" were used.

There are several more examples of how roles and the relationship of UTU and the learning centres have evolved and matured over the years. In the

initial phases much of the efforts in terms of design and planning where directed towards the pedagogical problems when delivering each individual course module. This focus on course contents pushed other aspects of a successful educational environment in the background. For instance, the routines surrounding distribution, installation and configuration of software at the computer labs of each learning centre quickly became a serious problem. Partly this was due to the fact that the responsibility for these tasks was not clearly stipulated, and the variations in network configuration and competence of IT-staff at the various learning centres further added to this problem. Similarly, routines for taking written exams at learning centres and organising more generic supporting resources that fell outside the scope of the individual course, such as remote access to library, study counselling and student union (Svensson & Östlund, 2000), had to be dealt with as problems concerning these issues occurred. The channels for communication and negotiations between SYDUB students and staff at UTU included text based discussion forums (Svensson & Östlund, 2000), but there were also several occasions where active engagement from local coordinators at the learning centres played an important role in negotiating new routines and extra support for their students.

3.2 Technology

3.2.1 Disco

DisCo (Distance Courses) is a system for web-based education developed in-house at UTU. It originated as a cooperative development project between UTU and the School of Arts and Communication in Utrecht, the Netherlands. A first prototype (called Web-ED) was launched in the spring of 1997, and later that year, after a debugging phase and a redesign of the user interface, the DisCo version 1.0 was released as an open source application[2]. Since the start DisCo has been used in over 300 courses involving over 4000 students (both campus-based and distance courses) at all three campuses at UTU. The DisCo system has also been used in modified form in other research projects (see fig 4, p 19).

DisCo provides the possibility to publish course material and supports interaction learner-instructor, learner-learner and learner-content interaction (Moore, 1993). It

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[2] The source code and documentation of the DisCo server application could be downloaded for free from www.udd.htu.se

is designed to overcome obstacles such as lack of computer/technology skills and maintenance overload. The teachers can publish course information such as description of the course, its content, goals and methods for examination, presentation of involved teachers and help for student's browser-configuration. The interaction between all users is primarily facilitated through a structured email function and a threaded discussion forum. For small-group collaboration the system provides possibilities to share files and hyperlinks within project groups. In figure 2, the functions and features of DisCo are presented according to the two level navigational structure of each course. All course maintenance is conducted via the Internet and requires only a standard web browser. The administrative part of DisCo is located in a password-protected area of the web-server with a start-page containing links to maintenance-pages for all ongoing courses and some shared resources for all course-providers. This page also provides the possibility to create a new course. In doing so a small configuration file is created containing names and email addresses for all teachers as well as format specifications or file-listings. The teacher can alter these settings at any time. Furthermore, the creation of a new course triggers a small Perl-script that among other things is responsible for creating a predefined directory-structure on the web-server to which all files used in the student interface are copied.

First level categories
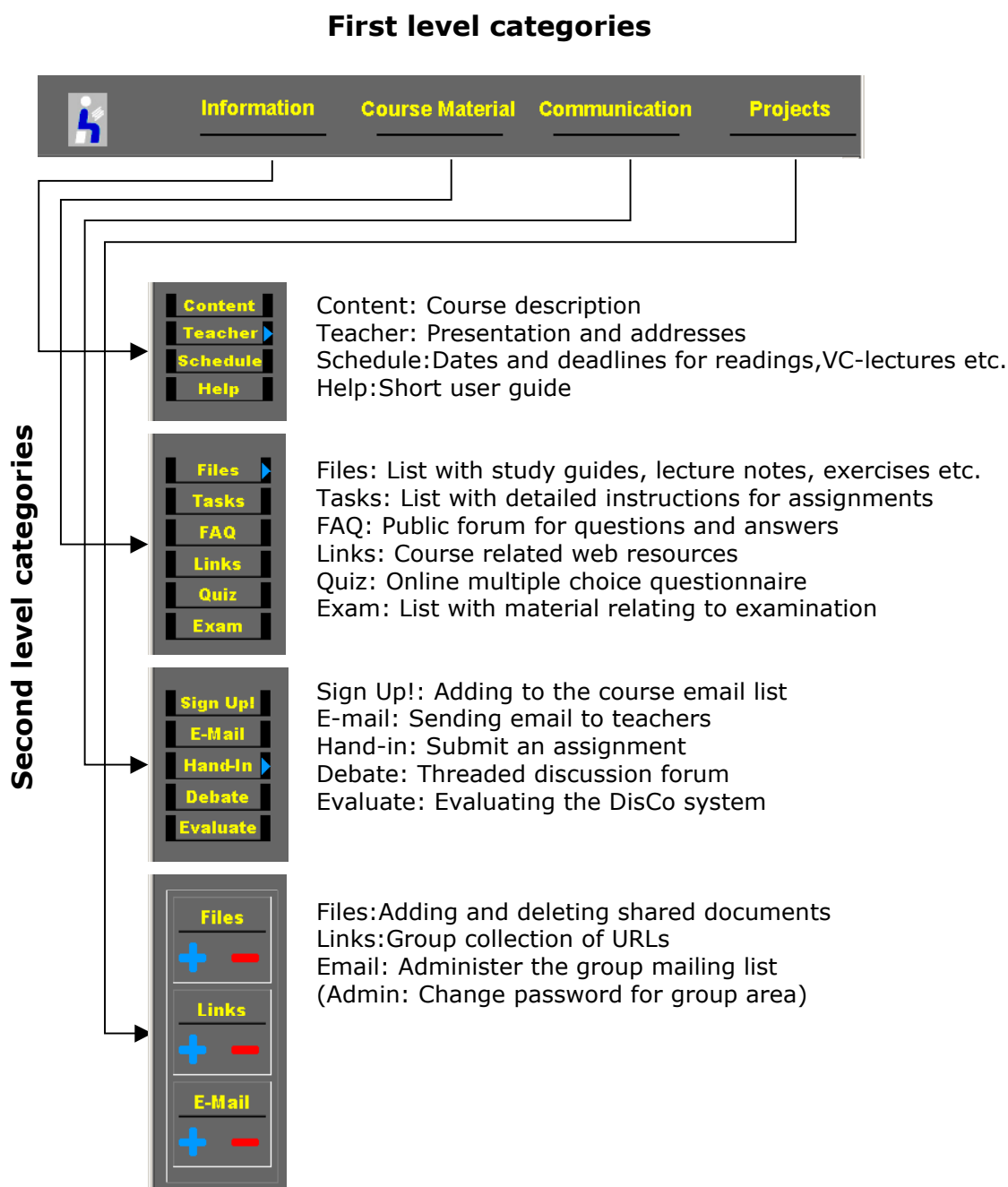
Figure 2. Schematic interface and functional description of the DisCo system

There are basically two different techniques or actions that a teacher needs to master in order to maintain a DisCo-course. Firstly, a number of the categories in DisCo contain static text/html documents. These files are created and updated through a web-form that shows the current content of the file. After choosing what file to update, the present content of the file is uploaded to a text-box where it can be edited by the teacher, and then re-submitted to the server. The more experienced teacher can choose either to hardcode html-tags into the text-boxes,

or create complete html files in an editor of his/her own choice. Example of files that can be edited this way are the headers for the dynamically generated file-listings of the Course Material category, the static files of the Information category but also more dynamic documents like the FAQ (Frequently Asked Questions), and the news bulletin board that serves as the default starting page for a course.

Figure 3. A schedule page and a multiple-choice quiz in DisCo

The other basic technique is used to maintain the content of the generated file-listings of the Course Material category. For each of these, the interface has three buttons to serve this purpose: One to show the present content of the listing, one to add a file (plus-sign), and one to remove a file from the list (minus-sign). In the add-file dialogue, the teacher marks the file to be uploaded and writes a short text description of the content. If the format of the submitted file matches the specifications in the course configuration file mentioned earlier, it will be included in the listing. The dialogues of adding a file or updating a text document both contain the functionality to check an option that will generate emails to all persons that have registered their address on the mailing list of the course. The message consists of information on where the new file is available (with complete URL) and the short description-text on the content.
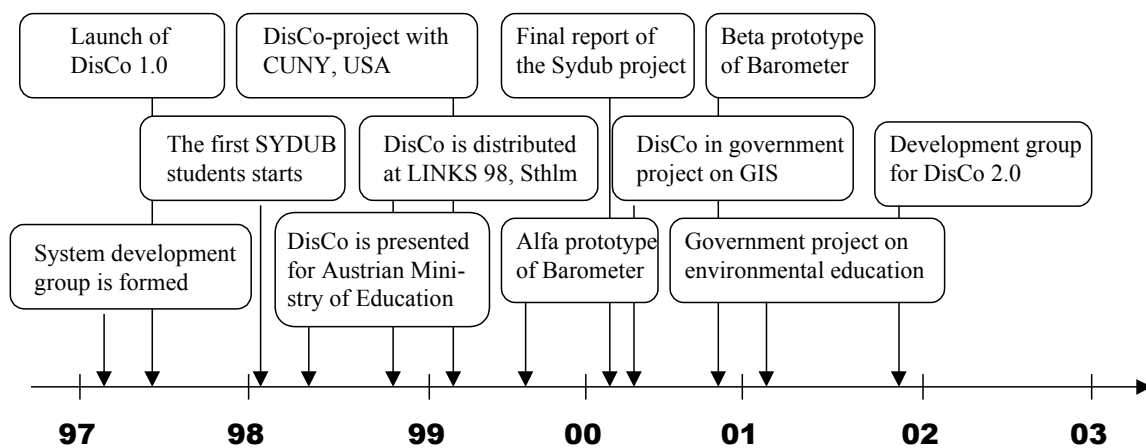
Figure 4. Some milestones in the DisCo Lifecycle

3.2.2   Videoconferencing

The technology used for the lectures is multiparty videoconference (VC) sessions. Apart from lectures, VC is also used for student presentations of project work and group assignments and sometimes tutoring of smaller groups. The multiparty VC sessions are voice controlled in the sense that the monitors at each studio display the video stream from the studio that is currently speaking. There are differences with respect to size and quality of the equipment and the media space supplied at the different learning centres. The equipment used during the sessions is; monitor, camera, microphone, document camera and a so called "codec" (coder/decoder) that compresses and codes the digital sound and the images during the

transmission and accordingly decodes the information at the recipient's end. Monitor, camera and codec are usually assembled in a "rollabout" (see fig. 5 - 7).

Fig 5. Rollabout with codec, monitor & camera	Fig 6. Remote-controlled video camera	Fig 7. Document camera
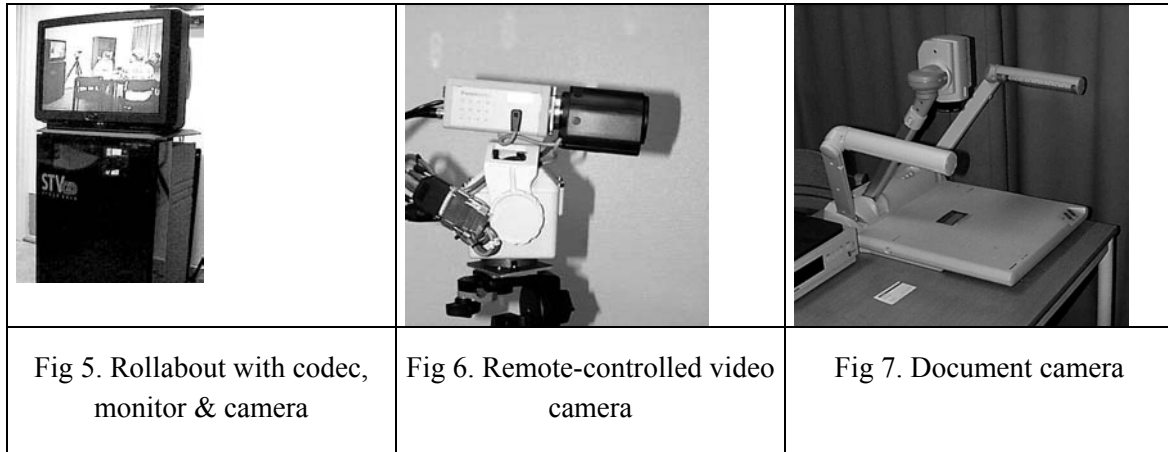
3.3 Educational concept

It was clearly stated, prior to the start of the SYDUB project, that the DE-programme should have a curriculum identical to the existing campus-based version of the programme (on the level of individual courses as well as entire bachelor programme). With this as a background, a small project group[3] was formed eight weeks before the start. The group consisted of the three teachers of the first course to be delivered (Mathematics and Statistics). The primary task of the group was to construct a technological and pedagogical design for the first course. However, the work resulted in a more generic course concept that divided the course into weekly modules each of a similar structure. Each module would typically start with the publishing of a study-guide just before the weekend. This study-guide (MS-Word document) would contain supplementary material to aid the student in working with the text book chapter(s) for the module, but also exercises with solutions and general study tips. After the weekend the slides for Tuesdays videoconference lecture were made available to the students on the DisCo course site. The VC-lecture was a three-hour multiparty session with two or three short breaks. The rest of the week the student worked with individual and group assignments distributed via DisCo. Tutoring was mediated through the course discussion forum or email. On Friday a second three-hour VC-session closed the module. This session was often more interactive and contained

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[3] The author was one of the participants in this group.

presentations of assignments and discussion of problems submitted to the teachers during the week.

The project group suggested increasing the amount of group assignments in the first courses. This was thought to enhance group cohesiveness, and consequently reduce the risk of dropouts. There is no evidence as to whether this was a successful strategy or not, and in fact the dropout rates that were surprisingly low the first year have increased slightly over time. This focus on collaboration among co-located students is perhaps an explanation of the few examples where assignments are designed to make students from different learning centres form groups.

The basic course concept was disseminated through the organisation primarily through the informal and short sessions that introduced teachers who entered the SYDUB programme to DisCo and videoconferencing. Many of the elements in this basic concept evolved into a default standard for most courses. However, as teachers became more experienced and comfortable with distance educational practice, they tended to experiment more with alternative designs such as two-party VC-sessions.

Other course elements that were frequently occurring were for instance course kick-offs and computer-lab exercises at Campus in Uddevalla and visiting-tours where a team of teachers met the students at their learning centre.

3.4 Students and Teachers

The sizes of the student groups have varied from one site to another and from one year to another. Originally the aim was to have groups of 8 – 12 students, but on one occasion a learning centre was cleared to join the project with as few as four students, and there are examples of where up to 35 students studied at the same learning centre. The students were fairly heterogeneous with respect to age, gender and educational background, but in comparison with campus-based students in system analysis, there were slightly more students older than 25 years in the SYDUB programme. The average grades of the students admitted to SYDUB have systematically been lower compared to the corresponding campus-based education programme at UTU, and the average number of credits per semester was also lower. However, this is probably related to the fact that SYDUB students could not as easily join extra courses when failing in a regular course.

At the start of the project few if any of the teachers involved had any prior experiences from teaching distance education. Over time some got experienced, but throughout the years, there has been a constant flow of new teachers entering into the DE-programme. In fact this aspect has sometimes been quite problematic in the sense that students quickly move from novices to experts on DE-practice in their first semester. Consequently their expectations and demands on teachers increased over time, and they became less tolerant to inexperienced teachers using the Internet or the VC-medium in an 'immature' way.

The aspect of computer literacy has been more of an issue for teachers than it has for students. The students enrol to take a degree in systems analysis with a high portion of computer-related courses, such as, system development, database design and a number of programming courses. Hence attitudes towards IT and computer skills are generally good. This is of course also true for their teachers in computer courses, but the bachelor programme also contains courses in other subjects such as Marketing, Accounting, Organisational science, English and Psychology, and in these subjects there were examples where teachers were very frustrated over the increased computer related work load. They were not confident in preparing all lecture material electronically and using the Internet for text-based communication. In a few cases this has resulted in teachers demanding to be excluded from teaching on the SYDUB programme.

4.   Research Approach

To study the practices of distance education, using a broad approach, involves some profound methodological challenges. Perhaps the most fundamental challenge derives from the fact that the practice was geographically (and temporally) distributed. Not only with respect to the learning centres, but also in terms of students and teachers "working" at other sites (in their homes, on the bus, in the library etc.) and at different times. This volatile nature of distance educational practice calls for innovative ways of doing qualitative and interpretative research. What is accessible for the researcher in this context is first and foremost the persistent digital traces of student and teacher activity that are left in log-files and in public discussion forums. Similarly, if resolving questions of research ethics and personal integrity, access to participants email archives can contribute to a richer picture of the practice.

Understanding a practice from the persistent reifications that these text messages constitute (Wenger, 1998) is connected with both weaknesses and strengths. Experiencing a practice through reading text-entries places the researcher in a similar situation as the participants. In this respect, it is important to "live" the discourse while it is happening, rather than relying only on transcripts from message archives. These temporal aspects of a discourse are important and cannot be fully grasped simply by having access to the time-stamps of an entry.

However, understanding a practice or a phenomenon from interpretations of digital reifications alone is problematic. Wenger (1998) states that practice as meaning involve a dual relationship between reification and participation. Consequently, analysis of digital reifications needs to be complemented with other data collection techniques that maps the "offline"-participation of the practice under study.

To understand the nature of computer-mediated activities through qualitative analysis of electronic data is sometimes referred to as net-ethnography or netnograhphy (e.g Wittel, 2000). Like ethnographical methods applied in physical spaces the fundamental task of net-ethnography is to give meaning to the observed phenomenon (Harper, 1993), and in addition to the type of electronic participant observation described above, net-ethnographies often involves online interviews. However, given the fact that the participating actors (students as well as members of staff) could quite easily be contacted for face-to-face meetings, this data collection technique was not used. Wittel (2000) argues that both interviews and participant observations in net-ethnographies runs the risk of having low validity due to the increased possibility for participants to fake their identity (see also Turkle, 1995). The closed setting and limited number of actors probably contributed to minimise the risk of this type of bias.

The research questions (Table 1) of this thesis are organised in a way that reflects two additional dualities with inherent methodological problems.

Firstly, there is the issue of *interpreting* versus *designing* an emergent IT-mediated practice. Vidgen and Braa (1999) captures this duality in a triadic framework of research goals and activities, where the activity of design is connected with the goal of supporting practice, and interpretation is about understanding practice. The third node in their triangle is concerned with improving practice through intervention. These goals could be addressed independently and in isolation, however in order to arrive at a rich view of practice, the power lies in pursuing the goals collectively. Mathiassen (2000) comments on this, stating:

> The triangle symbolizes that the involved activities presuppose each other: we reach a deeper understanding of practice as we attempt to change it; we need to understand practice to design useful propositions; and the propositions and our interpretations of practice are ultimately tested through attempts to improve practice (pp. 132)

Secondly, the time-scale aspects highlight how understanding of situated activities calls for close examination of what people actually do when interacting and collaborating through computer media, whereas long-term phenomena in distance educational practice need to study how these situated interactions evolve into use-patterns that constitute the cultural elements of practice.

In this project these challenges were to some extent addressed by the adoption of a *longitudinal* and *action-oriented* research approach. The research approach has been action-oriented primarily with respect to the multitude of different roles that I myself have played throughout the project. In addition to being a researcher, I have been a member of the teaching staff on the SYDUB programme, as well as participated in the system development group for the DisCo system[4]. On one hand it can be argued that such a multifaceted insider account is benign to the quality of research, offering the possibility to step in and out of roles thereby manufacturing necessary distance (McCracken, 1988). At the same time, such close involvement could be argued to be counterproductive in the sense that the researcher fails to acknowledge aspects of the practice that are familiar and taken for granted – the researcher suffers from tunnel vision (Stenmark, 2002). Furthermore, being an insider implies personal relationships with colleagues and students. Such relationships of friendship and/or power could especially bias person-to-person inquiry such as interviews and focus-group sessions.

The strategies adopted in this project to address such potential risks were primarily to involve an outside non-teaching researcher to conduct interviews with students[5]. Similarly, the collaboration with the co-authors of papers 2[6], 4[7] and 5[8], were important in order to reduce the risk that data analysis and interpretations were biased by tunnel vision. Furthermore, the research presented in this thesis was conducted in parallel with several other studies with similar research focus. These studies aided in manufacturing distance in the sense that analytical ideas,

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[4] Tobias Ekenstam and Christian Östlund were the other members of the team

[5] Maria Magnusson conducted interviews and had all direct contact with students.

[6] Joan Greenbaum

[7] Maria Magnusson

[8] Carsten Sørensen

design implications, and characteristics of interaction could be refined and validated in other empirical settings such as consultancy firms, hospitals, a museum, and public administrative organisations (see Table 3 for selected publications from these studies).

1998	Svensson, L. & Ekenstam, T. (1998) Web Education for those who want but don't know how to, and for those who can but don't want to, in *Proceedings of WebNet 98*, AACE, Charlottesville, USA
1999	Svensson, L. & Östlund, C. (1999) E-Quality: A cybergengre for quality discussion*, Advanced Research in Computers and Communications in Education - New Human Abilities for the Networked Society*, edited by Cummings et al., Tokyo Japan
	Svensson, L., Ask, M. & Rasmussen, P-O. (1999) Multimedia Experiments: Attitudes, Activities and Interaction in Video Lectures, *The role of ODL in the Information Society*, edited by Targamadze & Treciokiene, Kaunas, Lithuania
2000	Bengtsson, F., Johansson, C., Nilsson, S., Svensson, L., (2000) Exploring Awareness, *Proceedings of the 23rd Information Systems Research Seminar in Scandinavia,* (IRIS 23), Svensson et al., (eds.) University of Trollhättan/Uddevalla, Sweden
	Magnusson, M., Stahl-Falck, P., Svensson, L., Sørensen, C, (2000) Know-how when no time – Forming a distributed Community of practice, In *proceedings of BPRC Knowledge Management Conference* in Warwick, UK, Feb. 2000.
	Svensson, L. & Sørensen, C. (2000) Informal Feedback in Distance Education. *Proceedings of NordiCHI 2000*, Design vs. Design (edited by Gulliksen, J et al.) Royal Institute of Technology, Stockholm, Sweden.
	Svensson, L., Sørensen, C., Lindroth, T., & Fägerlind, H. (2000) Communities of Conflict or Conversation, *Proceedings of NordiCHI 2000*, Design vs. Design (edited by Gulliksen, J et al.) Royal Institute of Technology, Stockholm, Sweden.
2001	Johansson, A., Lundh-Snis, U., Stahl-Falck, P. & Svensson, L. (2001) Attitudes to ICT in a Healthcare Organisation, In *Proceedings of the 24th Information Systems Research Seminar in Scandinavia* (IRIS 24), Bjornestad, Moe, Morch & Opdahl (eds.), University of Bergen, Norway
	Lundh-Snis, U., Svensson, L. & Östlund, C. (2001) Learning Together and Teaching Alone: A Case Study of an Educational Consultancy firm, *Managing knowledge – Conversations and critiques*, University of Leicester, Management Centre, UK.
	Magnusson, M. & Svensson, L. (2001) Technology and Pedagogy in e-Learning: A Case Study of Attitudes Among Content Experts, *In Proceedings of the 24th Information Systems Research Seminar in Scandinavia* (IRIS 24), Bjornestad, Moe, Morch & Opdahl (eds.), Ulvik, Norway
	Svensson, L & Lundh-Snis, U (2001): Learning on the Move: Supporting Work-Integrated Learning Communities, In *Proceedings of third Nordic Workshop on Computer Supported Collaborative Learning and Mobile Learning*, (Lundin & Nuldén eds.), Gothenburg University, Sweden
	Svensson, L., Östlund, C., (2001), Mobile focus on design: Moving from supporting work to supporting leisure. In *Proceedings of Mobilize! Interventions in the social cultural and interactional analysis of mobility, ubiquity & information and communication technology*, Digital World Research Centre of Surrey, UK
2002	Svensson, L, Lundh-Snis, U., Sørensen, C., Grundén, K, Lindroth, T., Nilsson, S., Stahl-Falck, P., Östlund, C. (2002), Exploring Tools and Methods for Work-Integrated Learning, In *Proceedings of E-Learn 2002*, Montreal, Canada, October, 2002, AACE, USA.

Table 3. List of publications related to the research of this thesis

The longitudinal design of the research project is of course crucial in order to explore the emergence and evolution of long term phenomena, it is also important

from the perspective of balancing design and interpretation into a synthesis that could result in interventions that improve practice. The sequence of studies reported in this thesis can in this respect be seen as consisting of action research cycles (Lindgren, 2002) where experiences and findings from one study can be transformed into experimental interventions as well as influence the design of subsequent studies. In this respect the research objectives where negotiated and reformulated over the duration of the project (Zmud, 1998). Furthermore, a longitudinal design allows for a combination of different approaches in the various studies (Mathiassen, 2000), including field experiments, design studies and exploratory case studies.

The papers of this thesis each have a different focus and/or scope in relation to understanding vs. supporting DE-practices, and with respect to a focus on situated action vs. a focus on processes and roles. Figure 8 illustrates this by representing each paper as a circle centred in the main focus of the paper and with a periphery that circumstances the scope of the discussion.
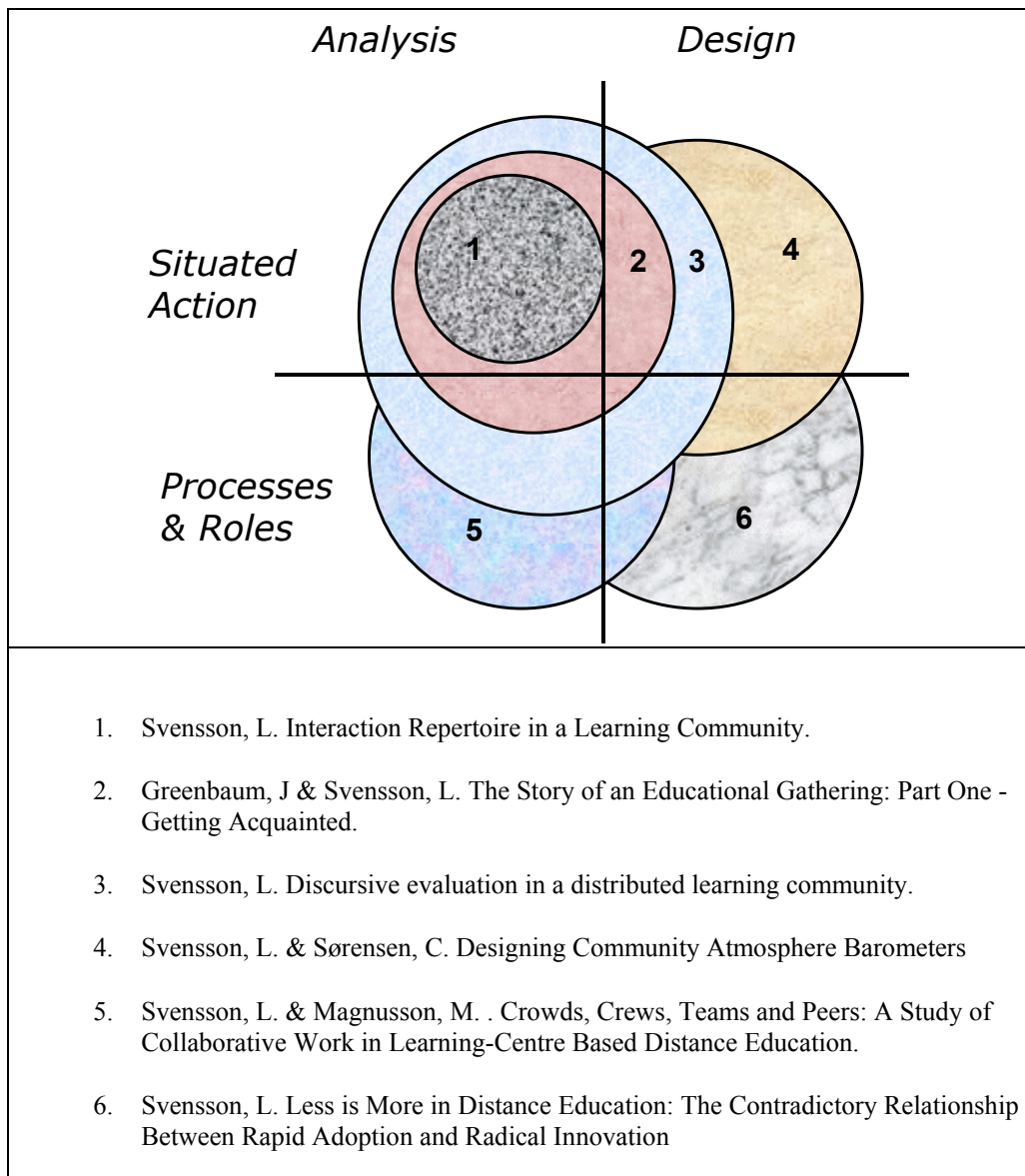
Figure 8. The focus and scope of each paper

1. Svensson, L. Interaction Repertoire in a Learning Community.

2. Greenbaum, J & Svensson, L. The Story of an Educational Gathering: Part One - Getting Acquainted.

3. Svensson, L. Discursive evaluation in a distributed learning community.

4. Svensson, L. & Sørensen, C. Designing Community Atmosphere Barometers

5. Svensson, L. & Magnusson, M. . Crowds, Crews, Teams and Peers: A Study of Collaborative Work in Learning-Centre Based Distance Education.

6. Svensson, L. Less is More in Distance Education: The Contradictory Relationship Between Rapid Adoption and Radical Innovation

4.1 Data Collection and Analysis

In total, five different classes (240 students) have started on the SYDUB programme. Together they have taken 54 courses resulting in approximately 7000 entries to the DisCo discussion forums. The total number of VC-lectures adds up to approximately 2000 hours, and the 20 different learning centres have been visited for observations and interviews on 42 different occasions.

Two basic approaches to collection of data have been dominant in the studies reported in this thesis (see table 4). Firstly, the observation of emergent use-patterns were primarily based on text-entries made to various asynchronous applications of the DisCo system (Papers 1, 2, 3 and 4). In addition to the information obtained through reading the texts, the understanding of use-patterns are also informed by structural properties of the discourse, such as how messages are interrelated and organised in threads. Furthermore, the information available in log-files on how posting and reading these messages are distributed over time added to the understanding of how IT was being used.

Secondly, as a complement to observed behaviour, students (paper 1, 4 and 5) and teachers (paper 6) have reported their experiences, perceptions, attitudes and activities through semi-structured interviews, questionnaires, workshops, focus group sessions and study journals.

In addition to these data collection approaches there have been many opportunities for gathering other, more informal sources of data, such as conversations with staff members, administrators and learning centre coordinators. Similarly, participant observations and tapes from videoconference sessions and face-to-face meetings with students at campus in Uddevalla and at the learning centres contributed to an understanding of practice that goes beyond analysis of data collected in structured ways.

Paper no:	Time of study	Sources of Data						
		Questio nnaire	Text analysis	Interview	Log files	Diaries	Work shop	Web Analysis
1	9801 – 9803		x	x	x			
2	9809 – 9812		x		x			
3	9801 – 9901		x		x			
4	9901 – 0003	x	x	x	x			x
5	9909 – 9911			x		x		
6	9902 – 0111			x	x		x	x

Table. 4. Data Collection techniques used in the various studies of the thesis.

The exploratory ambition of the research explains why the analysis of interviews and study diaries used a grounded approach, where analytic concepts emerged from the data, as opposed to originating from pre-existing frameworks or coding schemes (Stenmark, 2002).

A similar grounded strategy was used when analysing text-entries in papers 1, 2 and 3. However, in these cases the grounded analysis departs from having coded each entry according to a scheme developed from Orlikowski and Yates (1994). This scheme deconstructed the structural and lingual properties of

the data material, and was primarily used as a way of allowing for simple ways of presenting summarised profiles of the data (see for example papers 1 and 2), rather than as a way of categorising and clustering the entries. In papers 3, 4 and 6 the analysis was conducted using modifications of existing frameworks.

4.2   Reflections on Method

The context of the SYDUB case contains a number of characteristics that makes it interesting with respect to both the rigour and the relevance of the research. Rigour is promoted by the fact that each year a new group of students has entered the program, thereby offering possibilities for reflections on the stability of observed phenomena and behaviours. As argued in the introduction, the scale and duration of the project enhances the relevance of the research, especially with respect to issues and concerns that are less likely to surface in short term pilot projects. Furthermore, all studies involved actual students attending courses, as opposed to voluntary participants of simulated settings.

With the exception of the course site analysis reported in paper 6, the research has not contained any comparative elements where the SYDUB programme is contrasted with the corresponding campus-based programme. It is possible to argue that such comparative research designs would have informed the understanding of emergent behaviours and aspects, and thereby strengthened interpretations of how they related to the computer-mediated practice. However, throughout the duration of the SYDUB-project there were frequent examples of how experiences, teaching methods, use of technology and course material were exchanged between distance and campus programs. This "symbiosis", which to some extent is directly linked to the action-oriented nature of the research project, makes it harder to conduct rigorous comparative studies.

To what extent the conclusions and/or design implications from the studies can be generalised is a question best addressed in each separate paper. However this issue could also be discussed on a generic level. The SYDUB case could be argued to qualify as a *critical case*, thereby enhancing the possibility to generalise from the results (Rolland & Herstad, 2000). A critical case is characterised by highlighting some important aspect of the phenomenon being studied, and in the SYDUB case this was clearly the case with respect to the interesting mix between small clusters of co-located students, and the larger distributed and computer-mediated class community. The mixed-mode design (Campos et al., 2001) of the education therefore ensured that the public discourse

that emerged on the discussion forums did so in spite of the fact that all students had access to co-located peers.

There were also additional characteristics of the SYDUB case that were important to assess before trying to generalise the findings. Firstly, the SYDUB case was a Swedish experience, and the findings were likely to be influenced by the conditions under which Swedish students participate in higher education. For instance, the students did not pay any tuition fees for attending the University. Furthermore, each full time student received a grant from the government to cover living expenses, course material etc. In order to qualify for these grants, students were required to earn a minimum number of credits each semester. Furthermore, the students at SYDUB studied full time for a complete bachelor degree, which was likely to bring forth new issues that go beyond pedagogical and technical concerns on the level of one single course module.

5. Research Contributions

My research has generated important practical contributions to the case organisations, thereby aiding in developing and maturing the DE-programme including the DisCo software and a series of add-on applications, e. g. the Barometers (paper 4), Schedule application, QA-forum and Booking module (paper 6). The following sub-sections presents the six *papers* of the thesis, followed by the *theoretical contributions* in terms of generic concepts spanning all papers, and finally the *implications and challenges* for various stakeholders within DE-practice that can be derived from the research.

5.1   The Papers

5.1.1   Interaction Repertoire – Paper 1

Paper 1 presents a detailed account of the electronic interaction among participants of the Sydub program. The course discussion forum provided a shared arena where the community history could be exposed, and an interaction repertoire that made common sense to the community could be negotiated. The interaction was divided into a partition of three categories, or genres, each with a

characteristic purpose. (1) The *Query* genre was oriented towards solving course related tasks in co-operation with peers and teachers, through the (2) *Feedback* genre students could engage in discussions aiming at influencing and shaping what is common, and finally the (3) *Smalltalk* genre was about interpersonal relations and socialising. Each of the genres in the shared repertoire was found to contain mechanisms that was instrumental in supporting the key characteristics of a community, presented by Wenger (1998), namely negotiation of a joint enterprise and mutual engagement. As a result it was concluded that what motivated the students to participate in the discourse was not only directed towards individual goals of learning, but was also to a high extent directed towards creating and maintaining a social community.

5.1.2 Cross-Cultural Collaboration – Paper 2

Most computer-mediated communication in distance educational settings are the result of an organised and designed venture, restricted in terms of its participants and the duration under which it occurs. In this respect such gatherings are fundamentally different from online communities, email lists and Usenet groups on the Internet, where participants with similar interests are attracted to open forums. The reports from a gathering where a group of Liberal arts students from City University of New York for 11 weeks shared a discussion forum with a group of second year SYDUB students. The analysis of the rich text-based interaction that evolved on the forum told a story of "getting acquainted" where the participants gradually moved from polite dinner-table conversations that were rich on cross-cultural comparisons, to course related discussions and ended with farewells. The result stresses the importance of knowing the people you talk to. Non-trivial discussions and personal sharing must rest on a base of personal relationships, which is a maturity process that must run its course.

5.1.3 Discursive Evaluation – Paper 3

Paper 3 identifies and discusses three major aspects regarding the use of a discursive media as a forum for educational evaluation.

(i) The discussion serves the purpose of supporting the creation of an online community of students and teachers where attitudes, expectations and opinions can be shared and discussed. The results reveals how such shared experiences regarding for instance the students' frustration and satisfaction are

frequent topics for discussion. The existence of a meta discussion of shared norms for the evaluative debate is also evidence of an online community.

(ii) The forum proved to be an interesting instrument of evaluation, with characteristics that complements traditional methods of evaluation. The results from the case study show discussions in many course-related topics, rich on constructive suggestions and argumentation. This feedback constitutes valuable input for teachers, but perhaps even more importantly, it makes it possible to challenge and influence students' attitudes and expectations.

(iii) Finally the functionality and design characteristics of the application itself is argued to influence the nature of the discourse, thereby affecting both processes of community building and the educational evaluation. The continuous, public, asynchronous, and auto-structuring nature of the media are all presented as key characteristics.

5.1.4   Community Atmosphere Barometers – Paper 4

The two trials reported in this paper show how a system aiming at supporting the visualisation of the atmosphere within a learning community can be adopted and appreciated as a means of creating, maintaining and enhancing the strength of a community. It is argued that such processes of social grounding are important with respect to engagement and motivation for the members of the community, and subsequently are likely to have a benign effect on the quality of learning. Furthermore, the adoption and acceptance of such social systems is dependent on the outcome of joint construction of sense-making (Weick, 1995; Henfridsson 1999) regarding the use and purpose of the system. An important characteristic that is argued to enhance the possibility for acceptance is a system-plasticity that affords common sense-making through negotiations and visibility of user actions.

5.1.5   Group-Work at Learning Centres – Paper 5

The study shows that a clear social dimension and a strong fellowship between students in the same community dominate the work for the students. As a complement to the local community it is possible to distinguish how IT (DisCo) is used as a medium to create embryos of a virtual learning community for the group as a whole. Furthermore the study has identified four different ways of organising collaborative group work (*Crew, Team, Peers* and *Crowd*).

The different group types differ depending on whether they are individually or socially oriented, that is, if division of labour dominates the work,

or if it is primarily concentrated towards focused collaboration. Yet another dimension that diversifies the groups is whether the members have different or equal roles when it comes to the work task. Contrasting these two dichotomies result in a 2 by 2 matrix where each cell represents an archetypal student group. A *Crew* has a hierarchical structure and is characterised by strict division of labour. A *Team* has a similar hierarchy, but prefers to work collaboratively. Focused collaboration is also the preferred strategy for a group of *Peers*. The Peer groups were also characterised by a more democratic and less formal structure. Finally, a *Crowd* is a collection of individuals that minimise interaction with other group members.

The analysis of the material indicates connections between the identified group types and the study orientation of the individual students. Study patterns that are oriented towards understanding is mostly common within groups distinguished by focused collaboration (Peers and Team). The non-academic orientation can be matched against the Crowd distinguished by a division of labour. Finally, there are indications of a connection between group type and the extent to which the students make use of the teacher as a resource for problem solving and support. In well-functioning groups, mostly Peers but also Teams and Crews, it is common to turn to the teacher for help as a last resort. For a group with less motivation and a more strategic or non-academic orientation (Crowd & Crew), contacting the teacher is one of the first alternatives when a problem has come up or a task needs to be solved. The validity of this claim, and to which extent it can be generalised, is an issue for further research. Exploratory studies such as this is important in order to gain a rich understanding of the situated nature and conditions of different DE-practices. The group types described in this paper can serve as simple templates for understanding and interpreting activities, performances and processes in various DE settings, thereby guiding teachers and designers in improving tasks and tools.

5.1.6   Using Lean Technology – Paper 6

The paper explores the diffusion of the DisCo system at the University of Trollhättan Uddevalla, (UTU). The empirical data consists of a series of semi-structured interviews with 20 staff members involved in teaching at the Sydub program, and 4 thematic focus group sessions with 5–10 participants on each occasion.

The interviews support the idea that a major reason for the quick adoption and diffusion of DisCo was its simple and lean nature (Robertson et al., 2001).

They also indicate that sharing of experiences and ideas rarely occurred among colleagues, although most teachers used similar course concepts and teaching methods. This harmonisation with respect to practise was believed to be the consequence of teachers being highly perceptive to suggestions from the community of students during the run of the course. In this respect, negotiation of meaning was primarily conducted between a collective of Sydub-students and the group of teachers in each succeeding course. This could to some extent be argued to obstruct innovation with respect to methods of instruction and tutoring, and indeed the primary trigger for innovative change was found to be failures and breakdowns.

The results also showed that most teachers were not aware of the ways in which their role had changed when entering into distance teaching. When asked to elaborate on this subject most interviewees reported on no change, or referred to changes in technical production such as having to prepare electronic slides instead of handmade transparencies.

5.2   Towards Useful Community Concepts

Collectively and individually the studies reported above contributes to an understanding of a new social landscape of distance education, where group identity and sense of community plays an important part. In this section the experiences and findings are synthesised in to a perspective of how the emergence and evolution of such communities can be grasped, and supported.

5.2.1   Gatherings

It is clear that the discourse of a DE-community is shaped by temporal conditions such as being restricted in time and having predetermined times for start and end. Also, the community is closed, in the sense that potential members of the community are restricted to a certain number of students and staff-members.

These designed restrictions make a DE-community more of a *gathering*[9] (paper 2) fundamentally different from other social aggregations described in

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[9] The term gathering is here used in a somewhat different way compared to Goffman (1963) who uses this concept to encompass––"any set of 2 or more individuals whose members include all those who are at the moment in one another's immediate presence", whereas my use of the term merely stresses the designed and restricted frames of interaction.

early literature on virtual communities (cf. Rheingold, 1993; Gallagher et. al. 1998). Conclusions on interactional behaviour are in previous research based on studies of long lasting communities (early examples such as the Well) where socialisation is the central process. Then a newcomer's authority and legitimacy must be proven to established members in order to be embraced by the community (Galagher et al., 1998). Instead of socialisation, gatherings are dominated by initial forming of typified and shared interaction repertoire that promotes collective sense-making of the new situation (paper 1). Paper 3 and 4 point to collective negotiations as a central element in the forming of such interaction genres or use-patterns. Furthermore, paper 2 analyses how the establishment of social relations in a gathering presupposes a process of getting acquainted in order for the discourse to mature into fruitful learning experiences. Similar to dinner-table conversations in a small party of acquaintances the discussion is dominated by entries that are one-to-all rather than one-to-one, i.e. each posting is addressed to the whole community rather than a particular member. This can be argued to be true also in cases where a posting actually is explicitly addressed and phrased to a certain individual since knowing that "everyone can hear" influences the social situation and therewith also the behaviour (Goffman, 1959; Meyrowitz, 1985).

5.2.2   Communitising

An underlying question that spans all elements of this study concerns how we can determine and detect the existence of a community? What are the signs that spell out – this is a community? One way of answering this question is to state that all activities (verbal as well as non-verbal) that to some extent attract attention to the notion of a community, are indeed the very signs that such a community exists or is in the process of being established.

In order to collect all such activities under one term the notion of *'communitising'* has been proposed (see papers 1,4 and 6). Using Wenger's (1998) terminology, communitising can be defined as the participation and reifications that aids in enforcing the various modes of belonging to a community, (engagement, alignment and imagination). Communitising could also be seen as activities that adds to the social presence of communication (Leh, 2001). Studying communitising, (rather than community), is an analytical approach that focus on the emergent processes rather than the result (product) of these processes.[10]

In the postings to the public discussion forums several instances of communitising can be detected. The most obvious example of such

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[10] c.f. Weick (1979) - organizing vs. organization

communitising behaviour is the use of notions such as 'we', 'us' or 'they' when referring to the inside or outside of the community (papers 1 and 4). Similarly, communitising could be to enact the shared genres of interaction (paper 1), (i.e. behave like a member of the community). Other, perhaps more subtle, ways of communitising could include making references to the community history (e.g. commenting or quoting other authors), or to tell private jokes that can only be understood by an insider with access to the community's shared history (paper 1).

In the same manner, the willingness to adopt the barometer application (paper 4) must be understood as communitising. Only then does it makes sense to express how you feel, and take interest in being aware of the feelings of other members of the community. The indirect effect of communitising can hopefully improve the quality of student learning — not only in relation to an increase in engagement, motivation and social presence of the communication (Leh, 2001; Gunawardena, 1995), but also through mechanisms of improved performance that comes from being aware of others working with similar tasks (Ackerman & Star, 1995).

The notion of communitising points to an understanding of a community as something that needs people's attention in order to exist. The next subsection discusses how this points to an energy metaphor for communities.

5.2.3   Communities as Energies of Attention

At any time we as individuals are participants in a large number of communities (citizens of a country, fans of a hockey team, members of a church, a family or project team at work etc.), and over time this set of communities changes as we leave some and enter new ones. Most of the time such changes are gradual rather than abrupt, and involve trajectory movements from periphery to centre or vice versa (Wenger, 1998). Living in such a nexus of multimembership (Wenger, 1998) implies that the extent to which an individual perceives herself as a member of a certain community must vary in time and space.

Even if movements along community trajectories are gradual, we certainly frequently experience dramatic shifts where our perception of ourselves as members of a certain community can be triggered by an event or a verbal reference. In other words, these conjunctures and variations are regulated through communitising activities that triggers our community awareness, thereby reinforcing our perception of ourselves as members.

Given these fluctuations and how they are connected with others and ours perceptions, it seems fruitful to view communities as *energies* that are charged by

the situational collective attention it receives. This is a metaphor that captures the way in which group identities that do not receive attention diminishes in the mind of the individual, but can be sparked when being reminded of the membership. It is also a notion that could be stressed to encompass both internal attention from members of the community (insiders), as well as external attention awarded the community by people on the outside.

The reasons for not using the terms *community building* and *community maintenance* are twofold. Firstly, these terms seem to refer to the same types of activities where building is the initial activity, at some point in time replaced by maintenance. Communitising should be understood as including both these notions. Secondly, the metaphor of 'building' a community is weak since it indirectly suggests an uni-directional development process where the community can only be strengthened over time (or perhaps static if no community building is done), but as argued above the energy of the community is constantly changing as a function of communitising activities. If no communitising is accomplished the energy of the community will diminish. In terms of building, the rapid erosion of a community that receives no attention from its members resembles a house of snow in the desert.

In terms of design of IT-applications for communities, the energy metaphor could hopefully inspire to innovative ways of visualising community activities[11] that enhance the social awareness through rich possibilities to express and experience communitising activities.

5.3   Implications and Challenges…

Embracing the social potential of distance education, and viewing communitising as a potentially benign behaviour that can substantially contribute to good collaborative learning, should be followed asking how such communitising can be supported and encouraged. The following sections present a tentative summary of the author's interpretations of how these questions could be addressed in terms of new roles for students, teachers, designers and organisations.

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[11] c.f. The Babble applications and the notion of social proxies, (Erickson & Laff 2001; Bradner et al. 1999)

5.3.1   ...for Students

To be a distance student is in many ways different from being a student in a traditional campus-based educational program.   In several aspects these differences are potentially problematic in the sense that learning and performances runs the risk of falling short. Frustration over technical malfunctions, ambiguous instructions and lack of prompt feedback from instructors are documented examples of this (Hara & Kling, 1999). Uncertainty and lack of skills regarding new ways of interacting with and through technology could be other examples. By using the possibility to communitise and establish (virtual) relations the students create a social platform for managing and reducing such frustration, uncertainty and isolation. Learning is indirectly supported through direct support for collective engagement and motivation. By being socially active, the distance student also makes room for self-regulated actions that are outside the control of her teachers. Being socially empowered, the student can, together with her peers, engage in pursuing intellectual (and social) goals outside of the course curriculum. The new student-role could consequently, for better and for worse, be more active and self-regulated and less passive and teacher controlled (Nuldén, 1999). The challenge can be viewed as finding and exploiting the possibilities that are consequences of the computer-mediated practice. In many respects, technology can be argued to remove restrictions that are rational and practical in traditional education. The Sydub Case provides several clear examples that illustrate this aspect. For example, the fact that all students have full access to discussion forums and FAQs gives them the possibility to be the audience of (or even take active part in) the tutoring of their peers, something which they would normally be excluded from on campus where it is cost effective to tutor individuals or small groups of students in closed sessions. In this sense, web technology removes the spatial and temporal restrictions of having to be co-located and forcing everyone else to listen while one person (at a time) speaks (Sproull & Kiesler, 1991). Similarly, the use of DisCo also transforms educational evaluation (paper 3) from private to public activity, adding a discursive dimension that could be argued to constitute a cyber-practice with qualities that stretches beyond corresponding activities in traditional education. Public asynchronous text-based interaction also gives the student the possibility to reflect on the postings of others and carefully formulate her own thoughts and questions, resulting in more students taking active part in the educational discourse (paper 1). Other examples of new practice afforded through the use of technology surfaces in interviews with students (paper 5), where students from all learning centres report on how recordings from videoconferences are frequently used in most courses. Students that were absent

from the original session can view the material at a later occasion, and the tapes could be used for repetition and recapitulation of complex sections in the course.

5.3.2 ... for Teachers

When planning and conducting a first distance educational course it is perhaps natural for a teacher to departure from previous experiences (as a teacher or as a student) of campus-based education. It is however primarily the teacher that should be held responsible for liberating herself from (unnecessary) structural and organisational restrictions. As argued above, technology can move the border between private and public, between back-stage and front-stage (Goffman, 1959), and it could consequently be perceived as frustrating for a teacher to find herself in an electronic forum that simultaneously resembles a classroom, a student café and a course-evaluation debate (paper 1). However, the findings from the Sydub case clearly indicates the values of resisting any temptation to moderate and control the discourse in to becoming structured and divided according to the familiar patterns of school buildings. Many platforms and systems for distance education, available on the market, do precisely this by directing social and less serious discussions to separate chat-rooms or cafés, something that risks resulting in reducing the positive effects of students focusing all attention on one forum. Scattering students on a web-site could lead to confusion on "where to post what" as well as a failure in reaching a critical mass for sustainable discussion (Bradner et al., 1999).

The challenge is subsequently to a great extent linked to an acceptance of the redefined social situation where the teacher can be audience in discussions she is normally excluded from. At the same time it is worth pointing out that the classroom metaphor have benefits that, if totally abandoned, could introduce elements of insecurity with the students. To evolve from the familiar context of the classroom into an emergent new cyber practice is a process and a journey for both students and teachers, where collective sense-making must be negotiated between the participants (paper 1). An important element when paving the way for the establishment of a distance community could be to design course concepts and exercises that promote informal communication and communitising, for instance through open group assignments. The experiences from the Sydub project indicates that the social presence (Gunawardena, 1995) of teachers in public discussion forums is of vital importance for the course atmosphere (paper 4), (see also Oren et al., 2002). Through active participation in Feedback and Smalltalk discussions, the teacher legitimises a discourse that is central for mutual

engagement and negotiation processes that make the situation meaningful for the students (paper 1), (see also Rovai, 2002). A central feature in the DisCo-system is that it is used for distribution of text-based material such as study-guides, exercises, and lecture notes for videoconference sessions. It is a strategic feature of DisCo as a system that such distribution could be managed without extensive technical know-how on web publishing. A difference in teachers' skills in this area has however resulted in variations with respect to technical qualities of the produced material. It is not possible to detect a clear connection between technical quality and student satisfaction. Instead the important quality parameter appears to be the timing at which material is published. The most appreciated strategy in this respect has been to present the students at the start of a new course with an empty course-site and subsequently publish portions of course material throughout the duration of the course. In some courses teachers have chosen to publish all material up front, which has resulted in many students reporting on difficulties in navigating the material and being confused about what material to attend to at a given time. By successively providing students with appropriate material it is possible to pace, regulate and coordinate students to be prepared for lectures and seminars in real time.

5.3.3   … for Design

The assumption that the use of digital media changes the social landscape and redefines roles, behaviours and situations (Meyrowitz, 1985), clearly signals that design of educational systems should be understood as designing for an emergent practice rather than as support for an existing practice. As argued above, this implies that functionality and interface need to be freed from the restrictions of the classroom metaphor, not separating social activities from learning activities. Under these circumstances a major challenge is to create systems that can visualise the activities of all users, thereby contributing to the general awareness and the establishment of key community processes (papers 1 and 2). It is also believed to be critical that the systems provide social affordances (Krejns & Kirschner, 2001) that can support communitising through both verbal and non-verbal utterances, compensating for the loss of gestures, facial expressions and body lingual expressions, (paper 4). Furthermore, it is essential to respect the unpredictability and complexity that follows when systems are collectively used for collaboration and communication by a group of people. The relatively fast adoption of the DisCo system could perhaps to some extent be explained by its simple and lean character (paper 6). More complex systems could open for more

ambiguity, in terms of differences in the way various individuals perceive how the system should be used, resulting in rejection due to failure in negotiations of use and common sense-making. However, as was shown in the experiences from the Barometer trials (paper 4), it is equally important that collective systems are malleable and afford some space for collective negotiations thereby increasing the probability that a tool is accepted and used, rather than rejected.

This delicate balance between complexity and simplicity, between structure and malleability is made even more difficult by the situated and unique nature of each distance education project, making it extremely difficult to discuss generic quality aspects of any design. What can be said is that quality is proven in use – meaning that a good system is a system that is adopted by the users, and given that such adoption is difficult to forecast, the only definite implication is perhaps to adopt a richer perspective on design that also involves the process of domesticating the artefact (Silverstone & Haddon, 1996).

5.3.4 …for Organisations

The experiences from the SYDUB case clearly demonstrates that launching a distance educational programme raises a series of challenges that calls for new ways of organising. In the beginning of the project all efforts were directed towards organising each individual course, addressing the structural, technical and administrative demands as they occurred. This focus on courses as the unit of organisation gradually proved to be insufficient as generic problems surfaced on the level of student service, teacher training and technological concepts. An important challenge for the involved university organisation consequently is to involve all relevant staff members (e.g. student counsellors, programme secretaries, librarians) in servicing students and teachers – something that calls for new IT-mediated channels for communication and exchange of information. In this manner DE-practice provokes and stresses routines for many processes and activities that are more or less transparent in a campus-based organisation. Furthermore, these challenges also include involving personnel and resources at the participating learning centres which constitute a resource with a potential for radically enhancing the educational quality.

In situations, such as the SYDUB case, where a complete educational programme (B.Sc. degree) is offered, broadening the perspective implies paying attention to extra curricular activities that are an integral part of campus based education. This includes for instance student union and other student organisations, student contact with future employers, international exchange and

representation in university committees and working groups (e.g. quality team, programme committee, departmental board etc.). As discussed in paper 3 (see also Svensson & Östlund, 2000), the presence of all involved actors in evaluative discussions of educational situation is important for improving conditions and reducing frustration among students. Such digital presence of non-teaching staff and learning centre personnel could also compensate for the lack of sharing of information that comes from not being co-located on a campus, and be instrumental in communitising and strengthening the community.

Similarly, an important aspect relates to the sharing of knowledge and experiences among teachers. This is something that is often neglected, and lacks proper infrastructure, also in traditional educational organisations (paper 6) where the walls of the classroom serve as effective (and opaque) borders of diffusion of pedagogical and methodological innovations.

6.   Conclusions

The research presented in this thesis deploys a broad exploration of processes and activities within a DE practice. This exploratory approach combines a close investigation of the situated actions of students' and teachers' technology mediated interactions with an analysis of how these activities over time evolves in to an emergent practice promoted and restricted by the properties of the used technology.

My research concludes the following aspects as central of social text-based interaction.
- DE-gatherings are fundamentally influenced by the fact that they are restricted in time and with respect to potential participants, putting the focus on getting acquainted with peers in a novel situation rather than being socialised into an existing community.
- An interaction repertoire with typified use-patterns is in different ways instrumental in supporting the establishment of a community of DE practice. Through joint evaluation, problem solving and socialising, mutual engagement can be canalised towards negotiating the joint enterprise.
- The members' perception of the existence of a community is enforced through communitising behaviour such as the use of a 'we' notion and references to shared history.

In the long-term perspective, these mechanisms over time evolves into cultural elements of the DE-practice. The following aspects are concluded to be central in this respect.

- The interaction repertoire evolves through collective negotiations where relations mature over time, and interaction that is fruitful for learning rests on participants being socially acquainted.
- Change to DE-practice is in many respects a longitudinal and slow process of incremental innovation-in-use. In this respect radical innovation is in contradiction to fast diffusion of lean DE-technologies.
- The strength of the community lies in the collective attention it receives. Consequently communities of distance education are best understood using an energy metaphor, where the community is charged through communitising behaviour.

The research also allows for conclusion regarding design of software and practice.
- A key feature of collective application is the visualisation of social information. Visualising what is shared, and support for community awareness is important to the establishment of a social community.
- The research supports the idea that micro-element, both in terms of functionality and interface design, has an important impact on community behaviour. However, this impact is not deterministic but rather situated in the context of use.
- Consequently, the quality of design is proven-in-use since adoption and adaptation is the result of joint negotiations. Such collective negotiations require software that is malleable and tolerant to adaptation.

My research also concludes that a new social landscape of DE, emerging from the use of IT as mediator of educational practice, involves important implications and challenges for students and teachers in order to adapt to new roles.
- For students and teachers the major implication is that DE becomes increasingly public. Processes that for rational reasons are private in traditional educational settings can, when mediated by IT, become collectively visible to the whole community.
- The reciprocal relationship between DE-technologies and DE-practices can emerge into novel patterns for collaborative studying where students can learn

from observing others that interact, as well as into novel patterns for discursive evaluation and collective tutoring.

- A challenge for teachers and course designers are consequently to free themselves from the structures of traditional education and embrace a new rationale, where the physical boundaries of school buildings are not recreated through technology.

6.1 Directions for Further Research

Understanding the role of technology, as a mediator of social processes, in relation to distance education must constitute a strong argument in favour of research where relevance is favoured in the trade-off with rigour (Moody & Buist, 1999). Only by paying attention to all activities and processes in the educational context can we interpret and analyse what we observe. This also implies that studies of students' online behaviour should be complemented with studies of how work is organised offline. It seems reasonable to assume that there exists interesting relationships between on the one hand pedagogical and instructional design, and on the other hand students' activities, attitudes and motivators. Such a broad research approach points in the direction of qualitative research designs where ethnographical studies (complemented with field experiments and surveys) of real students in realistic educational settings are the major focus of attention. IT is also vital to acknowledge that students' way of using technology changes over time. It appears natural to assume that such a development runs in a direction towards more mature use, which is an argument in favour for longitudinal studies where changes in use and understanding of collective use can be observed and analysed. The relation between technology and learning is complex, and it is important for research in this area not to presuppose too strongly, and to direct relations between quality of technical systems and quality of learning. Assuming that "good learning" is a consequence of "good systems", is in a sense comparable to a belief that good novels are the result of good technology for writing, and as hard it is may be to argue in favour of quills or typewriters in comparison to modern word-processors, we must still acknowledge that many a great book has been created using the less sophisticated technologies.

The challenge when trying to understand the relationship between use of technology and learning is consequently to avoid a narrow focus, where important contextual processes are being lost, or in the words of Brown and Duguid (2000):

"the light at the end of the information tunnel is merely the gleam in a visionary's eye. The way forward is paradoxically to look not ahead, but to look around."

7.   References

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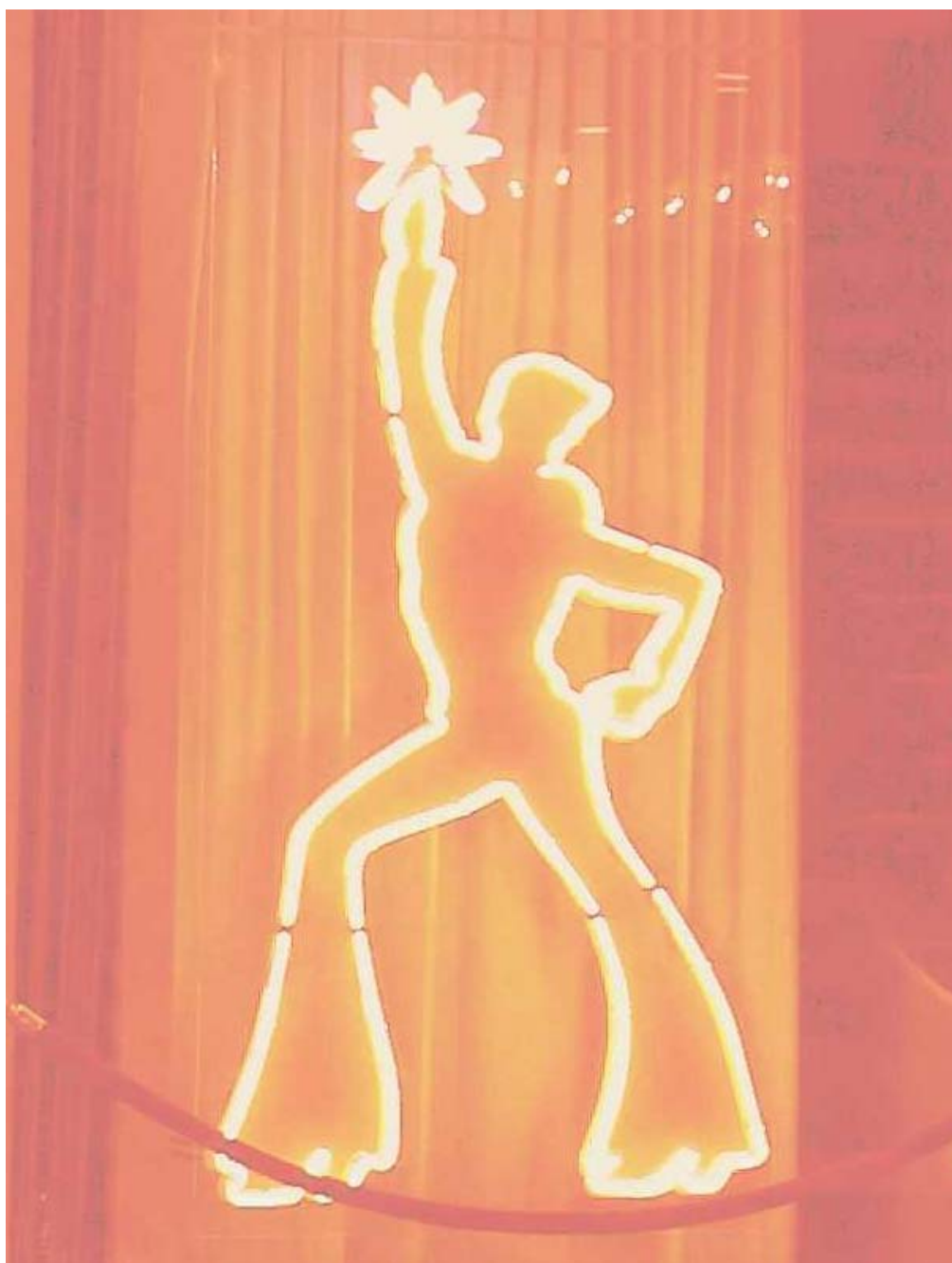
First Paper[12]

Interaction Repertoire in
a Learning Community

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Abstract. *Information Technology enhances the possibility for people to communicate when separated in time and space. In Distance Education this means new tools for tutoring and collaboration. But what effects does IT have on the interaction between students and teachers? This paper presents results from an exploratory study of a distance education project at the University of Trollhättan Uddevalla (UTU) in Sweden. The study focuses on text-based electronic interaction that takes place within this setting. The analysis of the interaction identifies three typified interaction patterns. These are labelled Query, Feedback and Smalltalk. Together they constitute an interaction repertoire that reveals information on the collective dimension of the educational practice. They also clearly shows how geographically dispersed students pay attention to processes of mutual engagement and negotiations of their joint enterprise, thereby putting a social community into practice.*

1.   Introduction

Distance Education (DE) has moved through several generations during the last decades. Each generation has to a great extent been shaped and formed by the restrictions and affordances of the technological media used for distributing and delivering the educational content. The first generation was dominated by

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[12] Svensson, L. (2002a) Interaction Repertoire in a Learning Community, : In *DVD-Proceedings of Computer Supported Collaborative Learning*, CSCL 2002, (edited by G. Stahl), Boulder, CO, USA

correspondence courses, where students worked individually, studying course material and completing assignments delivered via mail. This concept allowed for asynchronous communication between student and teacher. Furthermore, there was great potential for allowing flexibility in time, since each learner could design his or her personal study-pace, shifting from intensive periods to periods where less time was spent on studies. The second generation came with the introduction of the telephone as an educational media. Tele-conferencing implied real-time interaction and tutoring, in some cases even for group sessions.

Both generations involved evolution and progress of teaching methods, course material and general concepts. Slightly differing concepts and traditions emerged in different parts of the world (Peters, 1993.), however still faithful to the interactional patterns dominated by instructor-learner interaction (Moore, 1993), asynchronous and or synchronous. The current generation of Distance Education originates from the emergent use of computers and electronic media (Garrison, 1993). This is related to a more generic trend of extending the notion of Information Technology (IT), to the notion of Communication Technology (Braa et al. 2000). Over the last years, the Internet has become a melting pot where most traditional media, such as television, telephone and newspaper has merged and collided, resulting in fruitful combinations and new functionality (ibid.). From the perspective of Distance Education this means a technological platform with support for dynamic distribution and organisation of hypermedia course material, but also with support for more flexible interaction, e.g. chat-rooms, computer conferences and news groups.

The use of ICT should not be understood merely as neutral improvements in educational efficiency, but in terms of changes to the social systems. When communicative patterns change, social and cultural changes follows (Sproull & Kiesler, 1991) Meyrowitz (1985) makes a similar point, stating that the use of electronic media changes and restructures the social situation with respect to the available social information, the audience and the different roles that defines the situation. And indeed, the perhaps most important outcome from using the Internet in Distance Education, is the social dimension it has introduced. The ease, at which informal contact can be initiated amongst students and teachers, is in strong contrast to the demand of structure and planning, necessary in distance education based on correspondence or teleconferencing. Internet based distance education then has the potential of being more social than individual, and more emergent and flexible than controlled and static.

In previous research on interaction within an educational setting, the focus is often set on interaction processes directly relating to the technology-mediated

collaborative learning activities themselves. For instance, Baker et al. (1999) explores how students need to engage in processes of grounding, i.e. the interaction necessary to establish sufficient common ground to complete a collaborative task and Wasson o Mørch (2000) presents collaborative patterns expressed by small groups of students using various types of groupware. Furthermore the research has been dominated by studies designed with an emphasis on control and rigour, using voluntary subjects and constructed tasks for experiments with short duration.

This paper report the results from an exploratory study of a distance education project where the primary focus was to explore and understand the text based interaction between teachers and students. The object of study was a distance course in Mathematics and Statistics. It was the first course of a three-year program for 52 students located in six communities in the vicinity of a Swedish University College. The primary technologies used in the course were videoconferencing (VC) and a system for web based education, called DisCo (See Svensson & Ekenstam, 1998). The system provided a web site with course material and support for communication, primarily through an email function and a threaded discussion forum. Drawing on the concept of genre repertoire proposed by Yates and Orlikowski (1994) the purpose and form of text-based interaction between students and teachers were analysed in order to identify typified patterns that could be said to constitute genres of communication. The genres were subsequently analysed with respect to its motives in relation to the key processes of a community proposed by Wenger (1998). The result revealed three fairly distinct genres of communication (Query, Feedback and Smalltalk) that constituted a shared repertoire through which mutual engagement and negotiation of the joint enterprise was enforced. The results underscores social factors as important for understanding the interaction in a distance educational setting, thereby implying that studies of distance education should encompass all processes within the practise of education. It also implies a research focus on how groups of "real" students in real situations choose to use and make sense of ICT. Such a holistic perspective is argued to be vital in order to understand distance education as a social practice (Wenger, 1998) where motivation, engagement (Nuldén, 1999) and relations play a central part in a learning community.

The next section briefly reviews earlier work on social aspects of computer mediated interaction. This is followed by a presentation and an analysis of the interaction repertoire that was found in this study. The paper proceeds with a discussion of how the categories of the interaction repertoire could be

understood as expressions of a socialy oriented activity rationale. Finally the findings are summarised and concluded.

2.   Communities and interaction

The term Virtual Community is used to describe a variety of aspects where a social dimension is present in computer mediated communication. The fact that scholars from many disciplines (e.g. Sociology, Cultural studies, Informatics etc.) pay interest to social aspects of cyberspace contributes to the heterogeneous image of what this concept encompasses. Many of the definitions departure from how communities are perceived in real life and typically includes elements such as 'people', 'social interaction', 'belonging', 'membership' and 'trust' (Kapoor 2001).

According to Coyne, (1995), the term "virtual" suggest an absence of some of the real life aspects of a community, instead being replaced by something that looks, sounds or feels as if it is real, when it in fact is not. A similar viewpoint is advocated by Croon et al. (1998):

> A virtual community is first of all a social entity. It is a number of people who relate to one another by the use of a specific technology. In a traditional society we often see communities as something evoked by geographic closeness (village, neighbourhood, town, etc.) or organisational belonging (schools, churches, sports, hobbies, etc.)

Klang and Olsson (1999) highlight the role of technology in this context. They argue that the communication of a virtual community must be based in a digital environment. Furthermore, active membership which leads to member generated substance is crucial. Building around the common interests of the members, the virtual community has a history that its members have access to. To be able to do this there are tools and infrastructures that support this in a proper way. A more generous definition, consequently covering a wider spectrum of social activity is offered by Rheingold, (1993).

> Virtual communities are social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace.

Phil Agre (1998) departs from "people who occupy analogous locations in social or institutional structures", when defining a community. He argues that members

of such a community are tied together by institutional bonds, and may or may not interct when persuing a core of common goals. Furthermore a community in Agre's terns will have typified "forms of association" guiding their potential interaction. Others avoid the blurred contours of the community concept and replaces it with other notions such as on-line discourse (Erickson, 1997) or enclave (Bellah et al. 1985).

The understanding of the notion of community that is used in this paper is based on Wenger (1998) who describes processes of learning in what he calls a community-of-practice, (See also Lave & Wenger, 1991, Brown & Duguid 1991). He identifies three central processes or activities that are characteristic for a community: (1) Mutual Engagement, where members in various manners pays attention and interest to whatever is in common in the community. (2) The Negotiation of Joint Enterprise stresses the fact that available resources and boundaries must not be perceived as static, but rather as objects of constantly ongoing debates, interpretations, and change. Finally a community is characterised by its (3) Shared Repertoire, where the mutual history constitutes the foundation for knowledge of shared norms, tools, language genres etc. that distinguishes the insider from someone outside or in the periphery of the community. Similarly Orlikowski and Yates (1994) discuss Genre Repertoire, as a notion of the complete set of genres used for interaction in a community. They say:

> Once established a genre repertoire serves as a powerful social template for shaping how, why and with what effect members of a community interact to get their work done.

Both the composition as well as the frequency with which they are used is important aspects of a repertoire. When genres are heavily intertwined and overlapping it may be fruitful to talk of a genre system, where genres are enacted in a certain sequence with interdependent purpose and form. (ibid.) A genre is defined as:

> Typified communicative act having a socially defined and recognised communicative purpose with regard to its audience.

In addition to the definition they make several clarifications that are helpful in order to grasp the genre concept. Firstly, they emphasise that the purpose referred to in the definition should be recognised and shared within the community/group/organisation, and not to be conceived as the purpose of individual community members. Secondly they state that a stable substance and

form should be glued to such a shared purpose in order to constitute a genre. Substance refers to the topics and the discursive structure of the interaction, and form has three sub-dimensions: structural features, communication medium and language. In a similar manner, Shepherd and Watters (1998) define a Cybergenre to be characterised by content, form and functionality.

In their study of email-interaction within a community of geographically dispersed knowledge workers (LISP-case), Orlikowski and Yates (1994) found that the properties of a genre is strongly influenced by the experiences and expectations that exists when the community is formed. Shepherd and Watters (1998) reach a similar conclusion, and argue that when an existing genre enters the Internet, it is replicated from its origin, despite the change of medium. In time the cybergenre can evolve into an emergent cybergenre that appreciates the functionality provided by the new medium, and as an example they discuss a study of newspapers on the Internet. They also state that novel (spontaneous) cybergenres can be found in a new media. An example of this is the genre of personal home pages (Roberts, 1998).

Studying genres, genre repertoire and genre systems can consequently reveal vital information on the work processes of a community. However, genres are not totally static. They can change, for example through community members challenging the interaction norms of the genre (Orlikowski & Yates 1994) or through the use of new communication media. (Shephard & Watters 1998).

3.   A crusade to the academic outback

All locations that participated in the study are characterised by low rates of people with academic diplomas. Several actions and political initiatives have been taken in order to increase the number of people proceeding to higher education. For example, all communities in the region have invested in videoconference studios and there are ongoing projects aiming at improving the digital infrastructure, providing fast Internet-access for more people and companies.

The subject of the study presented in this paper is the SYDUB -project (funded by the EU and local companies), where students in six small communities in this region can take a B.Sc. in System Analysis via distance education. The first course started in January 1998. It was a ten week course in Mathematics and Statistics, using primarily videoconferencing and the Internet as education-media. There were no students present in the teacher-studio, and all studios had

comparable equipment including a document camera and the possibility to broadcast the screen image of a studio computer (PC). The Web Education is done with the help of a system called DisCo.

This system has been developed at UTU and is a framework for all course-related activities where teachers and students can publish documents into a hypertext structure with support for navigation and interaction. The interaction is primarily facilitated through an email function and a threaded discussion board. The system holds a register of all students, teachers and other persons interested in the course, making it possible for teachers to send email to a particular student or to everyone on the list. Other functions of interest to the student-teacher interaction are a Bulletin board that serves as a start page for the course-site and a FAQ (frequently asked questions) operated by the teachers. The system also provides a simple Push-functionality (Wired Magazine, March 1997), so that when a teacher publishes a document into the hypertext structure of the course-site, an automatic email to all members of the mailing list is generated. For a more detailed description of DisCo, see Svensson and Ekenstam (1998).

Three teachers were involved in designing and delivering the course (the author of this paper was one of the teachers). They divided the course into nine seven-day modules. Each module started with a teacher publishing a study guide document on the course-site (Friday). The document typically contained hints on how to read the course literature, solved problems with detailed comments and a list of key concepts and module-objectives. Three days later there was a three-hour videoconference lecture on the same topics. The lecture was videotaped in each of the seven studios. The rest of the week students were tutored primarily through email, but also through teacher-entries on the discussion board and FAQ-page. Every other module ended with a videoconference session (3 h) where one group of students made a 15-minute presentation of an assignment. All 13 groups prepared for making the presentation, but only one group was picked at random. After the presentation other students as well as the teachers gave comments on, for example, alternative solutions. The remaining time was used for demonstrating solutions to exercises chosen by the students. On two occasions this videoconference session was substituted with a face-to-face meeting with all three teachers. They visited each place for two hours covering all communities in two days. The facilities for students in their 'home-community' varied slightly, but all six sites provided (limited) access to computers and some premises for student collaboration, in two cases this equalled the videoconference studio. Each community had a part-time (20 %) co-ordinator that helped students with practical and technical issues.

Figure 1. SYDUB students collaborating at the learning centre

4. Monitoring the Interaction

The primary objective of this study was to conduct an explorative analysis of the electronic text-based interaction within the setting of the case study. There were several sources of empirical data collected for this purpose. Primarily, the entries on the threaded discussion board were logged, along with all visits to this page of the DisCo-system. Secondly the email sent from students to teachers and from teachers to students was retrieved from the teacher's mailboxes at home and at work. Finally, the students participated in informal group interviews shortly after the course was ended. The interviews were directed towards investigating how the students had perceived and used the course web-site during the course.

The messages (email & discussion entries) were coded based on a scheme proposed by Orlikowski and Yates (1994) The scheme includes a number of nominal variables used to operationalise the structure and language of the electronic interaction. A detailed template for the codes is presented in table 1. Each text was coded with one primary purpose and zero or more secondary purposes. Each of the other structure and language indicators where coded as present or absent in the text.

Purpose Indicators	Primary purpose (1 coded), Secondary purpose
FYI	"For your information"
Meta-comment	Comment on group process, use of the medium
Question	Request for information, clarification
Response	Reply to previous message(s)
Other	e.g. thanks, apology
Structural Indicators	
Embedded message	Message includes all or parts of previous message
List	Message includes a list in body of text
Opening	Message includes an opening salutation
Signoff	Message includes a closing remark or signature
Subject Line	Message includes a subject line
Smiley	Message includes a smiley, e.g. :-> ;-)
Language Indicators	
Emphatic	Message includes strong discussion or argument
Humorous	Message includes jokes or humorous references
Informal	Message indicates informality
Sarcastic	Message includes words denoting sarcasm or irony
Other	Message contains other emotion (e.g. anger, sympathy)

Table 1: Indicators for coding

Each entry were, based on the coding-scheme in general and the purpose indicators in particular, grouped into categories using an iterative process inspired by grounded theory (Glaser & Strauss, 1967). It should be noted that the indicators used for coding each entry (tab. 1) merely served as an initial guide in the process of grouping entries into categories, i.e. the final categories or clusters were not optimised with respect to similarities in data patterns. The termination of this bottom-up approach to analysing the data was instead guided by a wish to obtain a granularity that was durable, i.e. instances of each category should exist throughout the period, and at the same time made sense to the community. The latter was operationalised as a check that any given discussion-thread was to be dominated by entries of same category.

5.   Query, Feedback and Smalltalk

A total of 165 email from students to teachers, sent during a period of six weeks in January and February (1998), were examined. During this period 210 entries were posted to the discussion-board, divided into 48 different discussion topics, (threads). The number of visits to the discussion board were, according to log-file data, approximately 3000,made by students and 400, made by teachers. Not all 52 students had been equally active in email interaction, at least not with respect to the name (or pseudonym) given as the author of the email. The fact that students studied together could suggest that some student function as spokespeople for a group. In fact this was detected in some email signed wit a group number or the name of one of the communities, e.g. "The boys from Kungshamn". Using the above stated technique for clustering entries into categories, or genres, resulted in the identification of three genres of interaction.

The categories were labelled Query, Feedback and Smalltalk. It is not possible to fully prove that this particular set of categories (or genres) were the most relevant way of grouping the text entries, but in relation to the quality criteria presented in the previous section, they pass the test. All of the 48 threads were dominated by entries of the same genre, (in threads with ten entries or more a sub-thread sometimes occurred with entries deviating from the genre of the rest of the thread). Furthermore all genres existed both in the email interaction and on the discussion board throughout the period of the study.

Below are some short characteristics and examples of each genre. When translating from Swedish the focus has been on preserving the 'tone' of the text, thereby replacing some of the more idiomatic phrases and slang-expressions. Some texts are shortened (indicated with /...../). The percentage numbers given in the headers of each genre is due to the small amount of data, rounded to one significant digit. Note that the totals of emails and discussion board entries do not add up to 100%. This is due to two reasons, first of all not all emails could be sorted in to the three genres, (2 %), for example one email read "testing my new address". Secondly, there were minor overlaps between genres, especially longer email were sometimes classified as belonging to two genres.

5.1   Query (70% of email, 20 % of discussion entries)

This label is used to categorise entries where the content is oriented towards questions and responses relating to issues such as help with exercises or

clarification of textbook examples. Some query messages on the discussion forum has the purpose of providing 'backup' or support for a question with comments such as "I too have trouble with solving that problem…" . The messages often have a personal structure and language with friendly opening salutations and closing remarks occurs in most cases. This typical example from the discussion forum shows how a student wants assistance and comments on her proposed solution to an exercise.

Posted by Sofia on Feb 18, at 12:12:48:

Hi Everyone!I have been trying to crack exercise 6! Anyway, I have succeeded, and I have failed. Succeeded in the sense that I get the right amount of Nitrogen, Phosphate and Magnesia when I run a test on the equations. What I haven't been able to get is reasonable values on the variables! The value of fertilizer-Y is negative! How can the soil "throw up" a certain number of units of fertilizer? It is practically impossible /……/ Has anyone solved this problem in a more feasible way? Would be very grateful for an answer /…..

The query emails from students to teachers are naturally all questions. The following is a good example on the informal and familiar language and structure that dominated.

(Email example)

Hi there Mr. Math! Yet another question from Tanumshede. In chapter 13 there are some confusing remarks on randomness. Is this something we should dig in to, (there was nothing in the study guide about this).

Have a nice day, we surely do /George

5.2   Feedback (20% of email, 30 % of discussion entries)

This genre is focused on evaluative activities. It includes both "negative" entries where students draw attention to some aspect of the educational setting that is not perceived as satisfactory, as well as "positive" entries where credit is awarded to teachers or peers. The primary purpose indicators of feedback messages are mostly Meta-Comment or FYI (for your information). Positive feedback was

mostly on course material, videoconference-lectures and thanks for quick responses to email questions. The negative comments were dominated of technical errors (web-server, videoconference) and complaints about the study-pace. Also constructive propositions were given. Messages were personal and friendly (especially in negative feedback) but sometimes anonymous. Several examples of 'multiple-rounds-email occurred (sent back and fort between teacher and student).

(Email example)

Comment: Thanks for a very good lecture (980203), but you were a little too quick for me in the end (sigh). It would be great if we could have a file with trancripts of the calculations you made/Kind Regards Martin A

Posted by Niklas on Jan 18, 1998 at 19:45:36:

To whom it may concern

Could it be arranged so that one can see how the submission of a file proceeds in the 'Hand-In Category' Perhaps a terminal-window where you can see that everything is going alright and an indicator showing how much time is left. Sure, I can see the lights blinking on my modem, but if I use a computer at school or one with a built-in modem I can only guess what is going on. Perhaps you can throw in some music during the transmission process? Uddevalla Brass Band?

5.3   Smalltalk (8% of email, 50 % of discussion entries)

The purpose is to entertain and to socialise and the content is often related to some course activity or other events from their shared history. Other themes relates to for instance tv-shows or current media events or the student's everyday life. Many posting to the debate forum are signed with pseudonym. The genre shows several examples where messages were coded as humorous and sometimes sarcastic. Emails (nearly) always had at least one secondary purpose (often a question or a comment in the end). The following example from the discussion forum shows how Smalltalk entries sometimes are directed to the teachers of the course.

Posted by Anders on Feb. 17, 1998 at 17:37:56:

New Super-Computer to the University of Lund, what do you say about that - Uddevalla?

This spring a new super-computer will be installed in Lund. It will be one of Sweden's three fastest/...../For those of us who loves numbers ..it will consist of 100 processors, 300 MHz each, 24 GByte RAM and 582 GByte disk and will have a top speed of 60 GFLOPS..... one can't help wondering when are we gonna get that kind of brute force on our desktop? How about the situation in Uddevalla? Can you match this or…? /….

The next example is a short extract from one of three longer postings, titled "A chronicle" written by an anonymous student. The chronicles contains several humoristic comments and references to other discussion threads, course content and videoconference sessions.

Posted by "Sydub" on Feb. 02, 1998 at 18:24:38:

The stereo plays beach music, but outside my window heavy snow is falling, feel free to use logic to analyse the contra-positive of that statement./....../ Well now three weeks have passed and are we any smarter? to cheer you up, I can tell you that it is now only 153 weeks to go, so we are done with 1.9% of our education. Using truncation (as computers often do) the correct number should be 1%. Uplifting thought, don't you agree.. Now they say on the radio that Enya is recording a new album….Maybe one can make it through this course after all. For what can compete with doing arithmetics with hexadecimal numbers while listening to Enya? Possibly a cold pint on a hot summer day, but as I said..heavy snow is falling, So I guess I´ll have to settle for Enya for the time being/....../Ok my Sydub friends, hope you are all set for tomorows lecture. It´s now the going starts to get rough. Matrix algebra is not kid stuff. Sleep tight, I'll get back to you in a week or two..

SYDUB

5.4   General comments on the repertoire

Some difference between the email and discussion versions of the genres could be observed. The language, for example, tends to be 'better' and more worked through in discussion entries, perhaps due to a bigger audience. Practically all discussion-entries had only one purpose, whereas over 30 % of the email had two or more. Sometimes a message in the query genre was both posted on the board and sent as an email.

Crucial to the forming of a genre with respect to dimensions of form (and structure) is for the interaction to be explicit. The shaping of typified interaction patterns in the LISP-case (Orlikowski & Yates, 1994; Yates & Orlikowski, 1993) was probably strongly promoted by the fact that all messages were sent to all the participants of the group. In the setting of this case the discussion board was visible to everyone, and it is reasonable to argue that the Smalltalk genre started and took shape in this forum, the fact that the teachers engaged in writing follow-ups to early Smalltalk entries probably promoted this development. The same could be said about the familiar structure of the Feedback genre. Friendly and informal answers from teachers could have been encouraging students to give constructive propositions along with negative feedback.

5.5   Changes over time

The duration of the study is to short to detect any clear trends with respect to the frequency of messages in the various genres. However it should be noted that the number of email seemed to decline in the second half of the course, a period during which the number of entries on the discussion forum slightly increased. The total number of discussion board entries was evenly spread over the period of the study, but with smaller peeks the third week and at the end of the course. Days close to a videoconference lecture showed a slight increase in the number of email. As stated earlier it is of great interest to the understanding of work processes to study the frequency of use of the different genres. The number of Smalltalk entries increased slightly at the end of the period, and feedback and query entries decreased. Even though these changes in use is fairly weak, the fact that student socialise and collaborate face-to-face could explain the decline in Queries, hence many questions can be answered by group members. Likewise, the teething troubles of technology and administrative routines could count for the drop in Feedback. Perhaps increasing group dynamics can also account for the

incline of Smalltalk. With a stronger social position in the community one is more confident to engage in socialising activities.

6. DISCUSSION

It is important to view the rich and durable interaction reported in this paper in the light of the call for a holistic and relevant research focus that was advocated in the introduction. The data is not the result of a designed and controlled experiment, but rather an emergent and non-moderated expression of student-initiated interaction, which is argued to add substantial validity to the interaction repertoire as being rooted in realistic conditions. This does of course not imply that the genres are generic and exhaustive, but it is interesting that they emerged without moderation or strong attempts to structure the interaction.

In Agre's (1998) words the group of students constitutes a community by definition, simply through the fact that they share an institutional location, being classmates in the same course, and could therefore have typified forms of association. However this is not a pre existing community where a newcomer can adopt to an existing culture, but rather one that needs to be established, maintained and evolved from scratch. The data does not provide evidence of to what extent the characteristics of the interaction repertoire was shaped by the experiences and perception of the members (Orlikowski & Yates 1994, Shepherd & Watters, 1998), but the results reveals how energy and attention is durably paid to activities with the social rationale of community building.

This community building involves several mechanisms of creating boundaries and identity for the community, (Wenger, 1998) Such processes also involves developing a shared vocabulary and indexicality (Star, 1999).

The postings to the discussion forum contain several examples, which can be found in all genres, where the postings can be read as utterances of a social community. On one hand these signs are indications that in retrospect points to the existence of a community, but perhaps more important they should also be understood as situated reifications that, when read by visitors to the forum, enhances the feeling of togetherness and belonging. The community is energised when people behave as participants of it. The most obvious example of such 'communitising' behaviour is the use of notions such as 'we', 'us' or 'they' when referring to the inside or outside of the community. Other, perhaps more subtle, ways of communitising could include making references to the community history

(e.g. commenting or quoting other authors), or to tell private 'jokes' that can only be understood by an insider with access to the community's shared history. An example of such a private joke can for instance be found in the previously presented example of a query entry to the discussion forum, where the author talked about the "soil throwing up fertilizer" when the quantity was found to be negative. This was (probably) drawing on an example from an earlier VC-lecture where the teacher suggested this interpretation of negative quantities of vitamins that was calculated to fit a medical prescription.

The emergence of the Query, Feedback and Smalltalk genres is in itself an expression of a what Wenger (1998) calls a shared repertoire that is socially constructed in the situated context of the SYDUB case. As such, these genres or interaction categories can be viewed as reifications (Wenger, 1998) of the students communication with their peers and teachers through the DisCo system. The discussion forum does in that respect function as a boundary object (Wenger 1998) where the physical communities of each geographical location can meet and establish common grounds.

Applying such a community perspective when trying to make sense of the genre repertoire indicates that all genres play important roles for the on-line discourse to take the shape of a social community. In the following table (tab. 2) the students' enactment of the interaction repertoire is interpreted in terms of support for the two additional key processes (mutual engagement and negotiation of shared enterprise) in Wenger's framework.

Shared repertoire	Query	Feedback	Smalltalk
Mutual Engagement	This is about learning and engaging in the learning of others, but also about *visualisation of the complementary contributions*, (Wenger, 1998) of various members. Knowledge of "who knows what" is essential for sharing and dissemination of knowledge.	Discussions and debates with the purpose of influencing and shaping what is shared. Wenger refers to *an engaged diversity*, and stresses that a community involves as disharmony and conflict well as harmony and consensus	Members presenting personal portraits of themselves as well as responding to other member´s portraits contributes to community buildning and community maintenance.
Negotiation of Shared Enterprise	The topics and content of the discourse is a negotiation of what should be perceived as central and peripheral knowledge within the community	Discussions of interpretations, opinions and suggestions that affects the mutual prerequisits in terms of content, context, tools practices etc. The purpose is to negotiate a situation that collectively acceptable and makes sense. In Wengers words this is about "*making the place habitable*"	A social negotiation that indirectly defines the borders for the discourse through constantly ongoing processes of defining what is private and therefor excluded and what is collective, shared and included.

Table 2. Analysis of interaction repertoire in relation to Wenger´s (1998) key community processes.

The table shows how each category in the repertoire involves mechanisms that contribute to the social processes of a community. However, I am not arguing that all interaction should be understood as being motivated solely by a social rationale, but rather that the social dimension must be considered when trying to understand and interpret what motivates the students to engage in the discourse. It is highly likely that the social rationale coexists with a rationale oriented to personal goals of learning and or educational merits. In the light of such motives, engagement in query and feedback activities could be seen as strategies for optimising the conditions for the individual.

Query and Feedback genres both corresponds to organised practices in traditional campus-based education, but result from this study indicates that they have evolved into more emergent genres, drawing on the functionality provided by the electronic media. For instance, the discursive nature of feedback threads on

the discussion forum is to a large extent a new social situation compared to for instance traditional post-course questionnaires. The electronic media has turned course evaluation into a new practice with new audiences and roles for teachers and students (Meyrowitz 1985). In the same manner, tutoring of individuals and small groups is traditionally conducted in private sessions with tutor and student(s), but with query threads on the discussion forum such activities becomes accessible for all members of the community. The Smalltalk genre can be considered to be a novel, spontaneous genre (Shepherd and Watters 1998) where one must look outside organised educational activities and into cafés and other places for informal student conversations to find arenas for similar behaviour in campus-based settings. But just as in the case of the other genres, the public nature of the electronic arena implies changes in behaviour that adapts to the new conditions. All together the patterns of student interaction points in the direction of an emergent genre repertoire that in many ways has evolved from its origins in traditional campus-based education, thereby indicating the contours of a new social landscape of education.

7. Conclusion

The paper presents a detailed account of the electronic interaction among participants of a distance education program. The course discussion forum provided a shared arena where the community history could be exposed, and an interaction repertoire that made common sense to the community could be negotiated. The interaction was divided into a partition of three categories, or genres, each with a characteristic purpose. The Query genre is oriented towards solving course related tasks in co-operation with peers and teachers, through the Feedback genre students can engage in discussions aiming at influencing and shaping what is common, and finally the Smalltalk genre is about interpersonal relations and socialising. Each of the genres in the shared repertoire was found to contain mechanisms that supports the key characteristics of a community presented by Wenger (1998), namely negotiation of a joint enterprise and mutual engagement. As a result it is concludes that what motivates the students to participate in the discourse is not only directed towards individual goals of learning, but is also to a high extent directed towards creating and maintaining a social community

This community is energised when authors behave as being members of it, such communitising behaviour involves using a "we-notion" when referring to the community, as well as making references to the shared history or telling private jokes, thereby creating boundaries and identity for the community. It also involves the development of a shared vocabulary and indexicality (Star, 1999).

The data is not the result of a well-designed and controlled experiment, but rather an emergent and non-moderated expression of student-initiated interaction, which is argued to add substantial validity to the interaction repertoire as being rooted in realistic conditions. This does not imply that the genres are generic and exhaustive, and the most interesting aspect is not the composition of genres, but rather the actual use (Orlikowski & Yates 1994). The novelty of the social situation (Meyrowitz 1985) is partly relating to the way the genres coexist, thereby mixing activities traditionally typical for a classroom, an evaluation questionnaire and a student café. It also relates to the public nature of a shared discussion forum where the entire community is the audience of activities that are traditionally more private.

The findings imply that design of software and course concepts should appreciate the potential of moving beyond the roles and behaviours of traditional schools and classrooms. Embracing and inviting socialising behaviour such as the Smalltalk and Feedback genres found in this study, rather than isolating it to separate digital cafés not only helps in attracting students to common discussions but also aids in the negotiation of a common ground that is essential for collaborate learning.

8. Acknowledgements

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Second Paper [13]

The Story of an Educational Gathering:
Part one - Getting Acquainted

Abstract: *As the dust begins to settle from the e-learning hype it is worth reconsidering that learning is a set of complex activities that can not be easily designed into technological features. At the same time, as the study documented here illustrates, we must also realize that some very simple concepts from our daily lives are important in building distributed communities for learning. Computer-mediated group communication in educational settings are often designed as gatherings with temporal restrictions in terms of when they start and when they end, and they involve a predetermined set of people (students and instructors). This paper report from a case study where students in Sweden and USA met for 11 weeks on a joint web based discussion board. The paper describes and discusses the emergent processes of this virtual gathering, where the students began by getting acquainted, through gradually moving from polite conversations to active discussions on course related subjects, often with a cross-cultural dimension, and ending as a successful gathering should – in friendly farewells.*

1.   Introduction

The Internet is mediating a constantly growing number of group meetings between people that communicate using text, video and/or audio systems. Communication can be synchronous as in MUDs, MOOs, chat rooms and videoconferences, or asynchronous using email lists, news groups, bulletin boards

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and threaded discussion forums. Recent research on the nature of computer-mediated communication (CMC) recognizes the social dimension of such discourses, and the term virtual community is often used to encompass this aspect (see for example Rheingold 1993; Coyne 1995; Ericksson 1997; Nonnecke & Preece 2000). The literature on computer-mediated group communication is dominated by studies of on-line discourses where the participants voluntary engage in discussion in, often open, established communities and forums. The research has explored aspects such as, rhetorical strategies (Galagher et al. 1998), the richness of the media (Daft & Lengel, 1986), and its ability to support social presence (Leh 2001; Gunawardena 1995) and development of personal relations (Utz 2000). Kreijns & Kirschner (2001) state that social interaction does not occur automatically, and is to a large extent dependent on the social affordances of the media. Others have focused on exploring the communicative patterns (Svensson 2001; 2002a) and the structure of social networks (Haythornthwaite 2001)

However, in distance education most group communication is the result of a teacher-driven, organized and arranged setup that is restricted in several ways that we believe are important for the nature of the discourse. Firstly the group of potential participants is often predetermined to a finite number of students and teachers, and secondly the duration of the communication is limited through a given time for starting and ending. In these senses the communication is framed more like a gathering than a pre-existing community. This is not to argue that a virtual gathering lacks the social dimension of a virtual community, nor is it to argue those social processes automatically will emerge whenever group communication is staged as a gathering. It is merely a suggestion that it seems plausible to assume that the communicative processes of a gathering could in part different from those of an established community, and studying the interactional patterns of gatherings could help in understanding how social structures can be supported in such a context.

The purpose of this paper is to explore and discuss the vital characteristics and processes of a gathering in distance educational setting, using a study of a cross-national project between USA and Sweden as empirical base. Finally, the paper discusses the implications for using cross-national gathering as a tool for collaborative learning

The result shows how the participants mutually negotiated a s shared understanding of the experience that fits well with the gathering-label, resulting in a discourse that gradually matured from getting acquainted to focused discussions, and ended as gatherings should – in friendly farewells. In the process the students

learned through collective reflections on the ideas and experiences of others as well as themselves.

The next section presents theories and concept used as lenses in analyzing the data. This is followed by a brief description of the case setting and a summary of the outcome in sections three and four. Section five presents the analysis of the on-line interaction, which subsequently is discussed in section six. The paper ends with a concluding summary of the findings

2.   Understanding educational gatherings

In order to gain a rich understanding of how learning processes are affected when being mediated by technology, we adopted a research approach that involved analysis of both technology and software, as well as the emergent behavior of both teachers and students, along with changes in the educational content and design. Meyrowitz (1985) argues that the use of electronic media impacts the mediated situation in profound ways. In his thinking the entire social landscape is re-staged with new roles, communities and audiences for interaction. Studies of computer-mediated communication then becomes studies of "*patterns of access to social information*". (ibid.)

Similarly, Orlikowski & Yates (1994) concludes that the structure, form and purpose of communication is shaped in interplay between the communicating community and the technology being used, thereby resulting in situated and typified genres of communication.

The process of establishing common ground should also to a great extent be understood as a social phenomenon, where the use of technology must make collective sense to the community, (Orlikowski & Gash 1994). This is according to Wenger (1998) rooted in the joint enterprise of the community, and accomplished through an ongoing process of negotiation of meaning.

Understanding the communication of a gathering as a social situation, influenced by contextual properties of people and medium also affects the way we should view learning. Consequently, the effect of technology on learning could not be viewed as a collapse of time and space that makes for more expedient learning. A central problem with claiming that distance learning enables students to learn faster and at their own time, rests on a view where learning is seen as a product. In contrast, we viewed learning as a situated process, and as Lave and Wenger explain (1991):

> …we emphasize the significance of shifting the analytical focus from the individual as learner to learning as participation in the social world, and from the concept of cognitive process to the more-encompassing view of social practice. (p. 43)

3. Using distance to expand learning: what we did

The empirical data presented and analyzed in this paper springs from a joint project where we (the authors) set out to use distance in the process of learning, with a particular interest in the cross-cultural interaction of people 'talking' to each other from different country perspectives. Our connections were through themes in "Computers and Society" courses in two universities which were linked in three ways:

1. the use of a joint course web site, including a threaded discussion board, (a discursive media, Laurillard 1993);
2. a common reading assignment;
3. and a similar project assignment.

Thus distance was not the objective of the learning, but rather a vehicle to extend multicultural interaction in the learning process.   We choose to use a discussion board on a web site as an extension of classroom and collaborative project activity (so called mixed-mode education, Campos et al. 2001).

In both countries the students read Donald *Norman's The Design of Everyday Things* (1988) as the central text, and both groups had a similar assignment to analyze an everyday artifact that 'annoyed' them and redesign it using Norman's principles. Both the book and the problem-oriented assignments were a good basis for cross cultural discussions, and provided a solid range of projects involving redesign of objects as varied as: hard to open snack bags; microwave ovens; and, of course, ubiquitous cash machines.

The educational environments were vastly different, as were the background and expectations of the students. At the university in Uddevalla, Sweden, the students where studying the second year of a three year program in Computer Systems Analysis. The students were located to learning centers in six small communities in the outlying districts of the university.

In New York, at LaGuardia Community College of City University (CUNY) all of the course work was in small, seminar classes, and was taught by two faculty members. The students were incoming Liberal Arts majors, who were part of a required and in-person learning community called a 'cluster'. In addition

to the Computers and Society course, they shared other courses in literature and social science.

4.   Getting Academically Acquainted: what happened

What follows is the telling of a story about getting acquainted. Imagine, if you will, that you are joining a diner party of people you don't know, or entering a reception at a conference where most of the people are new to each other. Awkward and perhaps unsure of ourselves we fall back on a set of social 'rules' for getting acquainted. We might talk about the weather, of course, or sports, or national and international events, as ways of testing the water and finding common ground. And once into a common topic we might talk about it for a short time, before conversing about our own work or interests or lives. And such was the pattern of our joint course web site. Although it took us time to realize that is how the students were using it, and it took a good deal of analysis of the web postings to better understand the interactions.

Web site learning, like dinner party or cocktail talk, takes some getting acquainted. The lessons we have learned from our study we believe will help us establish a more realistic view on how to foster learning community building using distance learning sites.

During the semester, the student 'chat' on the joint discussion-board appeared at a glance to be disappointing.   Reflective, analytical discussions over issues like Norman's principles of good design appeared not to be taking place--at least not in an academically structured way that one might expect in a classroom. Indeed, during a presentation of the project to a group of university deans in New York, several deans asked "what's this got to do with computers and society?". But it did. And in analyzing the threads of the discussion board interactions we saw three distinct patterns which we believe offer pointers to other educators integrating learning processes through web sites. The three patterns that we found in the interactions were:

1. initial 'getting acquainted' entries, which served as a form of community building;
2. course discussion entries mixed with fascinating cross cultural descriptions; and
3. as the semester neared the end, entries which were more flavored by community maintenance activities.

5.   Analyzing acquaintances

5.1   Overview

> Hi..
>
> I just don't like to see that this page is empty so I will write about nothing and hope that it soon will be a lot of messages here..
>
> This page is like a wall that newly has been painted. Everyone try to keep it clean but when someone make a little something on it, it will soon be full of messages etc.
>
> I'm looking forward to "meet" our new mates...
>
> Have a great day!
>
> *hugs*

This is the first entry to the board, posted by a Swedish student on the 23rd of September (1998) and it was to be followed by 324 more messages during a period of 11 weeks.   The text hints at the author expecting the discussion board to become a meeting point for two groups of people, rather than for 50 individuals. There were indeed many factors that encouraged her (and us) to approach the course from such a group perspective, since the characteristics of the two groups in many ways were different.

On one hand the Swedes; older students living in small communities in the countryside, studying their second year of a rather technical program. All of them experienced computer users with more or less unlimited access to the Internet. On the other hand, the young Americans; mostly immigrants to a world metropolis, studying Liberal Arts in classroom-based seminars, many of them using the Internet for the first time.

There were 29 Swedish and 18 American students involved in the course, both groups having a similar gender-mix with approximately 40% women. Although the groups varied in size, they both ended up with a more or less equal

number of entries. From table 1 we can also see that men and women were equally active in posting.

No of Entries	GENDER			
NATION	F	M	Unknown	Total
Sweden	43	101	10	154
US	64	92	6	162
Unknown	1	1	7	9
Total	108	194	23	325

Table 1. Entries to the board with respect to Gender and Country.

The entries listed as unknown with respect to gender and/or nationality springs from posting signed with pseudonyms (e.g. "Mr Loverman", "Queen's finest" & "T-DOG"). The occurrence of these entries makes it difficult to make a precise presentation of how participation varied among the students of the course. However the frequency of anonymous entries showed a steady decline during the period of the study, and no pseudonym was used more than twice. In table 2 the students are grouped according to how active they were in contributing to the discussion. 9 users did not post at all (at least not using signatures that made it possible to identify them). 14 students made 1 to 3 postings, but the majority of students from both countries made frequent postings distributed over the duration of the course.

User Category	No. of students
Non User	9
Not frequent (Less than 4 postings)	14
Frequent (4 – 12 postings)	19
Very Frequent (More than 12 postings)	5

Table 2. Grouping Students with respect to their level of activity

5.2   Data Analysis

The data material is not sufficiently rich to do a deeper analysis of various patterns of participation. It is however interesting to notice that 2 of the students, (one American and one Swede), were more active in contributing to the discussion. Together they made 53 entries and their behavior included both frequent seeding (starting new threads of discussion) as well as making follow-ups to existing threads, thereby acting in a way as hosts of the discussion, keeping the conversation going.

The forum had relatively few solos (n=12), and an average length of 5.5 entries per thread which indicates a fairly discursive nature of the communication.

In order to analyze the web posting we used several coding schemes (see Olikowski, & Yates, 1994; Svensson, 2002a) such as: identifying structural elements (greetings, emoticons, signoffs); language indicators (humor, emphasis, anger); and purpose (agreement, disagreement, apology etc.). However we found that classification schemes which relied on individual posting were not particularly useful for an educational environment where students in different countries were working collaboratively. We shifted the unit of analysis up to groups of postings or threads and began to look at the collaborative themes which emerged.

The process of grouping the threads in relevant clusters aimed at capturing the various topics and purposes for discussion. Guided by these preferences, we conducted a classification of labels and keywords that was iterated until arriving with the set of categories that are summarized in table 3, and briefly presented and exemplified in the following sub-sections. The ambition to find categories that partitioned the data material was however not totally fulfilled. The cross-country postings did surface as a category of its own, but was also present in several postings in threads of other categories.

Category	Threads %	Entries %
Cross-Country	10*	14
Community	37	42
Readings	25	13
Design	26	29
Coming Out	2	2

Table 3. Theme categories of threaded discussions

It should be noted that the categories found in this study closely resemble the categories derived by Leh (2001) in her study of personal email correspondence between students in Mexico and the USA. However the private, person-to-person, correspondence in Leh's study for natural reasons lacked a community-category.

5.3   Cross-country postings

This series of entries started with a long discussion of the Clinton-Lewinsky affair (the dominant international news story at the time) and continued with political and social events such as a terrible fire in a disco in Gothenburg, Sweden. Other general interest topics included Swedish moose-hunts, and New York City crime. By the end of the semester topics such as homelessness, drugs and assisted suicide (which were research topics the American students were investigating) were discussed. Clearly as in any dinner or cocktail party the Clinton-Lewinsky affair was an easy conversation opener, but as the Swedish students quickly found out, the New Yorkers were, for the most part, in agreement with them, and the 'conversation' fizzled out. The following example is the posting of a thread titled "Can you recycle politicians in the US"? Posted by a Swedish male student.

> Today it was the opening of the new elected Swedish parliament. The prime minister presented his new staff of ministers. Within the ministers there were two who were scandalized earlier: Is it possible to do so in US?

An American male wrote this follow up.

> Most probably Not. US politicians are very image conscious. The wouldn't dare align themselves with someone who has a tarnished reputation. It's all about winning, not who is the best person for the job. On the other hand if a politician feels that he will gain an advantage by aligning himself with a serial killer he probably would do it. To answer your question briefly, It's very contradictory and depends on the situation.

5.4   Community postings

This category collects the threads that were directed towards building, and later maintaining and protecting what was mutually shared, i.e. the board and its content. The example is a follow up to a posting, probably entered by a person

outside the course community. The posting, labeled OPPORTUNITY, recommended everyone to send $1 to five addresses and promised lots of money in return. A student in the course responded:

> Hi again Opportunity!
>
> Well if I didn't make my self clear above or if there are anything that are indistinct, then please reply to this or read some more anti-spam pages. Just follow my link below ;-) I guess this isn't part of our studies, and I also guess that most of us in this course aren't interested in listening to this kind of "crap"... I really like to be straightforward ;-)
>
> So please go spam your news in another board! I would not like to hear from these "OPPORTUNITIES!" around here anymore.

Towards the end of the semester a new type of community postings occurred when the students on both sides of the Atlantic were posting "Adios" and "Farewell" messages. Some of them expressed a wish to continue the communication after the end of the gathering.

> To everyone in Sweden:
>
> It was nice speaking with everyone during the semester but we are at the end now. We talked about a lot of different and interesting topics. You learned some new things about us and we've learned some new things about you'll. Hopefully everyone will get the chance to correspond with each other much more in the future.
>
> Bye-bye

5.5   Readings

Most of the entries about Donald Norman's book, The Design of Everyday Things, were short and not part of extended threaded discussions. The following example was written by an American student as a follow up in a thread labeled "Cool book".

> I like the book "Design of Everyday Things". I think it is really interesting to walk around everyday life and notice how so many things are poorly designed. In New York, for example, there is a new Metrocard system to pay

for the subways. Well often, it simply doesn't work. They tested it in labs with engineers, but they didnt test it with real people in real subway stops.

In this entry as in other themes, students tended to relate the material to the broader world and seemed comfortable applying their knowledge of Norman's design principles to practical projects.

5.6 Gadget design

Entries and threads in this category were related to the common redesign assignment and covered rich discussions about a variety of poorly designed things. A wide variety of objects were discussed, for instance soda cans, water faucets, ATMs and microwaves. The threads not only contained reports on failure, but also constructive proposals and discussions about how to improve the design. In the following two entries, the remote control is the subject of discussion.

> The thing that ERK'S me the most are the new remote controls. These new controls have so many functions that you really don't need like the edit mode and these new rewind and fast forward these features are not very hard to learn but how about settings! most of the new T.V and VCRs has to be set on the remote control, and therefor have alot more buttons.

> Its a big issue when it comes to people who don't speak the native language. You have to read the manual to understand the remote control!

> That freakish!!!   -j

> _ _ _ _ _ _ _ _ _

> Hi there...

> This could be a real problem, but I do think that most of the TVs and VCRs sold here have OSD with support of many many languages. But the remote control might need a redesign! I don't think that it's 100% possible to learn all the functions. Perhaps the simple things like colour and that could be easy to learn. But my VCR has all these strange things for satelite stuff, and some kind of editor to make videos look better. I find it almost impossible to use

> theese functions without the manual...On the other hand, I don't see how they could make the RC more user friendly. I guess you could make it much bigger, that could help a little bit. But who wants to drag around with a big RC?? /B

Many of the design discussions evolved into comparisons between the conditions in the two countries. For the American students who were also studying sociology, this type of cross-cultural analysis about the social use and design of artifacts was expected in their seminar discussions and thus was encouraged on the web discussion board.

5.6 Coming Out

In the last period of the course two interesting threads emerged with very personal content. This is the posting of the first one, labeled "My personal scare of breast cancer". It was followed up by five more entries made by other students.

> When I was 17 years old I discovered a lump on the right side of my breast. I was taking a shower and happen to have come across it. I was completely terrified. At that moment time froze, and I realized that if it is a tumor that I could die. I told my family members and that same day I went to the doctor. She told me that she wanted it removed as soon as possible. As a result I decided not to register for the second semester of school and have my surgery. It was a small proceduer that only lasted 20 minutes. The next few weeks were agonizing. I already new that I had an uncle that died from cancer at the age of 7 seven and another who had just recenly died of cancer. So I knew that I had cancer in my family. When I finally went back to my surgeon for a followup he told me that it was not cancerous. I was relieved but he told me it could return. Through the whole ordeal I realized that there was so much I did not do in life and the most important thing of all, that you can get breast cancer at any age and it also does not matter what sex you are, cancer does not discriminate. Before this incident, because I was young I felt I was invincible to these things and I am sure there are alot of young peolpe who today feel like I use to feel. People should always be aware of all the changes that your body goes through and if you think something strange is going on go to your doctor do not delay because the longer you wait the worse it can get. Let me repeat again CANCER DOES NOT DISCRIMINATE!!!!

6.   Discussion: Situated learning in an educational gathering

The analysis implies that a gathering is a setting where people become part of a social community, not through processes of socialization, where newcomers can move on a trajectory from periphery to center and become insiders of an established community, but rather through collective social maturing occurring as the result of negotiations of the social situation at hand. The following sub-sections will discuss the characteristics of these processes and their implications for e-learning practice.

6.1   Negotiating the social situation

The opening entry on the board (cited in section 5.1.) expresses how the student understands the social situation, not only as a meeting of 50 individuals, but also as a meeting of two communities. Wenger (1998) discusses how shared artifacts, or boundary objects (Bowker & Star 1999), can support such encounters between separate communities. [add def of boundary object from Bowker & Star ?]The discussion forum clearly constitutes such a boundary object, and its public nature is a vital property that, through visualization of the discourse, supports and facilitates the emergence of a joint community, the fact that all participation in such asynchronous text-based communication is persistent rather than ephemeral further underlines this. The archived discourse documents the shared history, and can easily be accessed and interpreted by all participants.

The opening entry was signed off with the phrase - I'm looking forward to "meet" our new mates. By putting the word meet in quotation marks the author indicates that what will follow is something different compared to a face-to-face meeting. She clearly perceives the digital media as something that will impact the social behavior. This is consistent with the point of departure of Meyrowitz (1985), who states that the medium itself must not be viewed as a neutral delivery system. The public and persistent nature of the discourse changes the conditions for communication firstly with respect to the audience, and subsequently having impact on the behavior of the participants. In this sense , 'getting acquainted' could partly be seen as a response to wanting to know the audience. Goffman (1959) argues that knowledge of 'who can hear ' is wanted and needed in all human communication, and as a consequence humans will engage in presenting

impressions of themselves, as well as being audience to similar performances of others. On the discussion forum this is accomplished through posting and reading.

In addition to boundary objects Wenger (1998) also advocates that communities can interact through so called brokers, i.e. people that move between the peripheries of two communities and participates in both. The behavior of the most active posters on the board most likely had such a brokering effect. If using the analogy of a dinner party, their activities were those of the hosts, constantly contributing to the establishing of a joint community through encouraging discussions and suggesting new topics for discussion. Orlikowski et al. (1994) argues that this type of technology-use-mediation has the effect of meta-stucturing the way open-ended technology is being used.

Being designed by someone (in this case us – the teachers), a gathering has one (or more) pre-existing purposes, that can be more or less visible to the participants. Such pre-set objectives could be argued to influence the way students perceive what is expected of them in the new and unfamiliar situation. However, the results from our study imply that this was probably restricted to influencing the point of departure for the collective negotiations of how to behave, and what to achieve through participation. The behavior that emerged, in many ways took on forms and content that was not part of the original objectives. This understanding of the gathering as informal and casual, rather than strict and regulated was of course promoted by the deliberate strategy for the teachers to keep a low profile, and not to exercise any unnecessary regulation or moderation of the discourse.

Defining the social situation is not restricted merely to an initial negotiation-phase, rather it is subject to constantly ongoing collective processes of re-interpreting the social situation-- in that sense negotiations are also interwoven with the maturity of the discourse over time.

## 6.2	Socially Maturing

The main patterns we found told a familiar story of community building; one where members or would-be members begin by getting acquainted through general discussion topics and then move on to discuss more serious issues, in this case the course assignments. This is then followed by more personal communication in an attempt to maintain the group they may then feel part of, and finally ending the gathering with good-byes and farewells.

The process of gradually moving from rather shallow and safe topics of discussion to more intimate and personal presupposes the participants 'getting acquainted', and can be seen as a mechanism for the participants to learn to collaborate – what Baker et al. (1999) labels grounding. It is clear that threads such as the "coming out" posting are less likely to appear at an early stage of the discussion, and early threads discussing taste in music, and favorite sports were absent in the latter stages. In this respect the evolution of the discourse is a maturity process where time and timing is of the essence. This evolutionary process should not be understood as being predetermined in any sense. Rather it is a process that is shaped through collective negotiation of meaning, (Wenger 1998). These negotiations rely on control mechanisms that can be used in order to express what is accepted and not accepted, either through explicit utterances of agreement or disagreement, or through subtler signals such as ignoring a suggested topic or an expressed opinion. Each of the solo threads on the forum is in this respect a reification of a topic or an opinion that was rejected by the community.

The community postings could be argued to play a special role in socially maturing the discourse since these explicitly or implicitly refers to the participants as being a community. Thereby each of these postings aids in energizing a shared understanding of the very existence of a social entity (Svensson 2002b). It is easier to perceive oneself as part of a community if it is referred to by others as being one. Such 'communitising' can also be found in postings in other categories, where the group is referenced as 'we' or 'us', or outsiders are refered to as 'they' or 'them'.

6.3   Implications for practice

We see the use of our course site as an example of using distance to enhance project-based learning processes. Seen in this context, the concept of learning needs to be placed in the broader more situated arena of learning communities and students active participation in them. In their book Situated Learning, Lave and Wenger (1991) explain it this way:

> Conceiving of learning in terms of participation focuses attention on ways in which it is an evolving, continuously renewed set of relations; this is, of course, consistent with a relational view of persons, their actions and their world, typical of a theory of social practice. (p.50)

While Lave and Wenger examine physically co-located communities of practice, such as midwives and tailors, we believe that similar aspects of situated and participatory learning can be an analytical lens for viewing the process of learning over distance. By stepping back from our teaching, and reflectively coding the entries on the Discussion board we gained a vantage point from which to view the participation of the students and the evolving nature of their discussions.

In each of the topic categories the entries became lively interchanges, but only after the getting acquainted period had run it's course. Additionally 10% of the exchanges were about cross-country interests, although it should be noted that a large proportion of the 'gadget' design and community topics were also concerned with curiosity about students' values and interests in the other country. From our perspective this was an important finding for it reinforced one of our learning objectives--the extension of learning over distance and between cultures.

Such expansion of the cultural context provides the student with richer possibilities for reflection and analysis. The introduction to, or confrontation with, an unfamiliar and exotic culture with strange habits, rituals, artifacts and people forces the student to reflect and understand their own familiar everyday objects and activities, and subsequently describe them in a way that could make sense to an outsider. In this respect, "getting acquainted" becomes instrumental in the process of clarifying what is shared and familiar and what is different and strange. We need strangers to be aware of the fringes and the indexicality of our own community (Star 1999).

Learning as a process includes, among other things, motivation on the part of the learners and the teachers. We believe that the discussion board as an extension of the collaborative project-based group work, served as a motivational mechanism over the semester. It gave them a chance to share their projects and a place to ask questions or 'try out' ideas.

Initially some of the entries seemed to resemble attempts at a 'Chat room' style, although these disappeared rather quickly as they were not followed up. Since a course web sites for discussion are different from chat rooms, bulletin boards, email lists and news groups, it would be interesting to explore follow-up studies to compare and contrast social exchange among participants, particularly as more people are exposed to using these forms of computer-mediated communication.

The Discussion board on our web site was in no way intended to replace classroom or in person learning experiences. Rather than viewing learning as knowledge acquisition, we believe that our study offers pointers to how web-based learning sites, coordinated through problem-oriented pedagogy, can extend

learning situations for acquainting students with others in learning communities. Indeed, our students took a practical problem-solving approach to redesign of technical artifacts in their everyday life. And in the process they not only learned that they could examine assumptions about technical objects like microwave ovens, but could understand how the use of those objects differed in other cultural settings.

7.   Conclusion

In the paper we propose the term 'gathering' as a label for group communication that is framed in time and with respect to its potential participants. Based on the experiences from the case study we conclude that such a gathering can socially mature through processes of getting acquainted interwoven with collective negotiations of how the gathering should be understood as a social situation. Furthermore the characteristics of the mediating technology, in our case the open, visible and persistent nature of the discourse, was argued to influence the understanding and social maturation of the gathering.

Staging a gathering is no guarantee that social interaction will emerge and mature, however the findings of this study highlights processes and elements that are argued to be key aspect in these processes and could therefore provide valuable input for teachers and designers in distance education.

From an educational perspective our study clearly point to the need to allow time for people to get acquainted with each other in distance learning environments. Traditional claims that web-oriented education can collapse time and distance appears to be far from the mark. Instead collaborative learning needs space and time to grow. Incubating collaborative learning climates using the web, is no different.

8.   Acknowledgements

9.   References

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Third Paper[14]

Discursive evaluation in a Distributed Learning Community

Abstract: *This paper describes a distance education project where a threaded discussion board was used for interaction amongst students and teachers. The experiences from the first year of the project shows that such a forum can be an important complement to other evaluative resources in order to monitor student's expectations and experiences. Furthermore, it is argued that discursive evaluations can establish a learning community with shared norms and forms of communication and collaboration. Vital properties of the discussion board are that it is continuos, online, public, asynchronous and auto-structuring.*

1.   Evaluation in Distance Education

Evaluation is an important tool in higher education, guiding faculty and management towards better courses with improved methods of teaching and administration. The literature describes many formal techniques and instruments for this purpose (e.g Oliver 1997). Since most methods for evaluation require substantial resources for measuring as well as analysis, the dominating instrument is probably a simple written post-course questionnaire with multiple choice questions and/or open-ended short comments (Hall 1997). In addition to the results from formal evaluation, teachers have a rich flow of more informal and sometimes subtle feedback arriving continuously from a variety of sources. Casual

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conversation with students and colleagues, the atmosphere in classroom and corridors and student's body language and degree of attention during a lecture can all be viewed as carriers of evaluative feedback, (Svensson & Sørensen, 2002). Informal feedback, such as this, is of course not only interpreted by faculty members. For students this feedback can be a vital element in processes of, for example, socialisation and maintenance of the class-community.

In a distance educational setting, with students and teachers separated in time and space, these signals are drastically reduced. Compensation for this type of informal communication with computer-mediated interaction is difficult, if even possible. Whittaker et al (1994) addresses the general issue of designing IT to support informal workplace communication, arriving at the conclusion that a shared workspace is an important aspect and that rich synchronous video-media and asynchronous text based media should be combined and integrated when aiming for an acceptable design.

The focus of this paper is a threaded discussion board where students and teachers meet to discuss course-related issues. This is an informal arena of conversation where students can express their attitudes, opinions, perceptions and experiences. Such a forum can serve as a valuable complement to traditional post course questionnaires, even making it possible for teachers to challenge and manage the students' opinions. The arguments are based on experiences from a distance education project at a university in Scandinavia. The empirical data of the study are the entries made by students and teachers to a web-based computer conference (discussion-board). This conference is integrated into a web-education system developed at the University. The entries have been analysed with respect to evaluative factors such as topic and nature.

2.   The Case

The object of the study is a distance education project where 60 students from six small communities in the outlying districts of a university in Scandinavia can study for a degree in System Analysis (B. Sc.). The participating communities were committed to provide some basic facilities such as access to modern computers with Internet-connection, a prescribed set of software packages, a videoconference (VC)-studio and room for collaborative work. In all the communities these facilities are located in a learning-centre with a part-time (20

%) coordinator providing elementary service to the students. The number of students in the various communities varies from five to 17.

The study covers the courses during the first year of the project, (table 1). All courses had different teams of teachers and different methods of teaching and examination.

Mathematics and Statistics	(10 weeks)
Computer Science	(10 weeks)
Business administration	(10 weeks)
Finance	(5 weeks)
C++ Programming	(5 weeks)

Table 1. Course modules covered by the study.

A common denominator in all courses was the use of learning technologies. Multiparty VC-sessions were used for lectures, seminars and presentations, and a web education tool was used for distribution of course material and for text based interaction. The system provided a web site for each course, one of its components is the core object of this paper, namely the Discussion Board. - A primitive web-based conference, where discussion topics are divided into threads presented on the screen with indents that indicate the structure of the discussions. Each entry is presented with a hyperlinked title, a date/time-stamp and the signature of the debater. The threads are sorted in descending time order with respect to the first entry of each thread. An entry is displayed in full text by clicking on the title, it is then possible to choose to post a follow up to the entry. In addition to text (with html-tags if so desired) the author of an entry can choose to submit a picture, a URL and/or an email address. Each entry should be signed with a name or a pseudonym by the author. A new discussion-thread is started in the same manner. Laurillard (1993) classifies the debate board to be a discursive medium defined as:

> Both teacher's and student's conceptions are accessible to the other and both topic and task goals can be negotiable; students must be able to act on, generate and receive feedback on descriptions appropriate to the topic goal; the teacher must be able to reflect on student's actions and descriptions and adjust their own descriptions to be more meaningful to the student (p. 100).

Using her conversational framework she claims that discursive media addresses interaction at the level of description and reflection upon actions, feedback and goals. Long & Baecker (1997) emphasise the conversational style of a discussion board, which allows for conversation among groups where each person can respond to all others while having the complete dialog-history displayed.

2.1 Previous Research

In a previous study the email and discussion-board entries of the course in Mathematics and Statistics have been analysed using a method designed by Yates and Orlikowski (1993). This method uses the concept of Genre to detect patterns in the electronic interaction. They define a genre to be a:

> Typified communicative act having a socially defined and recognized communicative purpose with regard to its audience.

The Genre concept accounts for both the substance and the form of the interaction. Substance refers to the topics and the discursive structure of the interaction, and form has three sub-dimensions: structural features, communication medium and language. The concept of a Genre Repertoire (Orlikowski & Yates 1994.) refers to a set of genres providing a social template for communication within a community. The audience or community in this case is of course the group of students and staff (teachers, course-administrators) interacting through the course web-site. The result revealed a genre repertoire that consisted of three distinct genres that appeared both on the discussion board and in the email to teachers. The genres were labelled Query, Feedback and Smalltalk (See Svensson 2002 for a thorough discussion).

The Query genre was characterised by having the primary purpose of discussing exercises and aspects of the course literature. The purpose of the Smalltalk-entries is to entertain and socialise even though the content is often related to some course activity. Social activities like this are often observed in distance learning projects, (Fjuk 1998), and serves an important role in building and maintaining the learning community. These entries can to some extent be a substitute for the subtle feedback signalling the mood of the students discussed in the first section. However the focus in this paper is more directly linked to the Feedback genre which constitutes the foundation for the analysis reported in this paper.

3. Data Collection and Analysis

The aim of this explorative study is to present as rich a picture as possible of the nature of the evaluative discourses that took place on the discussion-boards. The

primary unit of analysis is the discussion-thread. All threads with an evaluative content were included in the study.

The threads were grouped and classified with respect to the feedback-topic(s) discussed. The process of grouping the threads into topic-clusters with relevant labels was conducted in an iterative way, inspired by grounded theory techniques (Glaser & Strauss, 1980). If a thread did not stay focused on one topic, i.e. if two or more entries belonged to another of the emergent topics, the thread was classified as having two topics.

Secondly, each debate-board entry was analysed with respect to the nature of the feedback. Inspired by the classification of different types of feedback a teacher can give a student (presented by Draper 1997b) the following scheme was adopted.

Feedback types
1. Agree/Disagree with other debater
2. Success/Failure: Debater stating that something is bad (or good)
3. Behaviour recipe: Debater presenting a suggestion for change
4. Explanation: Elaboration on why something is wrong (or right)

The entries were classified into one or more of these feedback types. Some simple quantitative measures such as number of entries, the number of follow up levels and the time-span between first and last entry was recorded in order to give complementary information on the nature of the debate. In addition to analysing the debate-entries, the log-files containing data on all visits to the debate boards were analysed.

4.   Results and Analysis

The log-file data shows that the discussion-boards have been frequently visited. A total of over 12 000 visits over a 40 week period. This resulted in 223 threads with 563 entries. (One out of 20 visits resulted in a posting). 50% percent of the threads (60 % of the entries) were classified as feedback-threads and therefore included in the study.

4.1   Thread Topics

The analysis of the topics revealed that a majority of the evaluative threads focused on one and sometimes two topic-categories (table 2). The topics cover a broad spectrum of issues related to the educational setting as well as a "meta-topic" with discussions on how to behave on the forum itself.

Topic	Description
Course Context	Comments on administrative issues, student-facilities or service
Course Content	Assignments, Course-Material, Topics of study, literature etc.
Learning Technology	Comments on Videoconference or issues related to course web site (tech problems, features etc.)
Teacher Performance	Comments on lectures and tutoring
Debate Climate	Comments on the form or style of other debaters.

Table 2. Classification of threads

Topic	Math/Stat	Comp. Science	Bus.Admin	Finance	Program-ming
Context	4	1	7	3	6
Content	4	10	6	1	2
Technology	16	9	9	1	2
Teacher	5	1	1	3	0
Discussion	1	2	3	1	1
Disc/Content	0	1	0	0	0
Teach/Content	2	4	2	0	0
Teach/Tech	0	4	0	0	0
TOTAL	32	32	28	9	11

Table 3. Number of threads in each topic-category
in each of the course modules

Comparing the courses shows that the frequency of the debate is fairly equal in the first three courses and drops slightly in the last two. Also, the length of the threads drops from an average of 3-4 in the first 30 weeks, to no more than 2 in the last ten weeks. The fact that the 5-week courses tend to be more intense could be one possible explanation. Another explanation could be the fact that issues related to the web-based system were frequently debated in the first courses, but gradually the system became more and more transparent to the students and was therefore not an interesting topic to debate. In the latter courses the technology threads related to how it was operated by teachers and integrated with course content. The short threads and solo entries could be found in all categories, but dominated in Learning technology and Debate climate. The longest discussions

were concerned with the context or the content of the courses. The lifetime of most discussions were very short (1 or 2 days). Only three threads had a span of more than a week between the first and the last entry. One explanation to this could perhaps be found in the graphical interface of the debate board. Since the complete dialog history was presented on the screen, the threads disappeared from the start-screen of the board after 15 – 20 entries have been made. Then the scroll-bars must be used in order to read the entries or post a follow up. There were some examples where debaters chose to start a new thread continuing the debate on an existing topic, instead of adding to the original thread.

4.2   Nature of Feedback

In the table below the entries are divided with respect to the nature of feedback. It is worth noting that an elaborate explanation or a suggestion for changes is included in 53 percent of the entries, leaving only 47 percent with short-answer reports on success/failure or commenting someone else's opinion. The ratio of agree/disagree entries is a fairly good indicator of the degree of discussion or debate on the board. A low ratio would suggest a collection of weakly interrelated entries, as on a bulletin board. A high ratio on the other hand would point towards a discursive nature of the content, like in a conference. The table shows that one out of four entries has been categorised as agreeing or disagreeing to a previous posting, clearly indicating that the forum is more of a conference, and less of a bulletin board. This is even more enhanced when excluding the starting entry (seed) of each thread, which for natural reasons is not likely to agree or disagree with previous postings. Then we see that close to 40 percent of the "follow ups" falls into category 1 (or 1&3 or 1&4).

Cat	Description	Math	Comp.Sci	Bus. Admin	Finance	Program.	Total
1	Agree/Disagree (A/D)	17	13	24	4	5	63 (18%)
2	Success/Failure (S/F):	34	30	21	8	9	102 (29 %)
3	Behaviour recipe (BR):	5	5	14	1	3	28 (8 %)
4	Explanation (Exp)	15	18	17	4	10	64 (18 %)
1 & 3	A/D with BR	1	1	2	0	0	4 (1 %)
1 & 4	A/D with Exp	3	6	10	0	1	20 (6 %)
2 & 3	S/F with BR	4	9	4	0	0	17 (5 %)
2 & 4	S/F with Exp	9	8	3	1	1	22 (6 %)
3 & 4	BR with Exp	1	3	2	0	1	7 (2 %)
-	Others	1	4	11	1	3	20 (6 %)

Table 4. Number of entries in each feedback-type

4.3   Thread Examples

In order to visualise the debate, three examples of complete threads are presented below. The first thread (fig 1.) is from the computer-science course and deals with a course-context issue. The header of the first entry was "Why not COOP??", referring to the fact that students on the distance education program did not have the opportunity to integrate work-placements with their studies.

The second example (fig 2.) is a short thread on Learning technology from the beginning of the first course and the third example (fig. 3) deals with the debate climate of the second course as well as the use of outdated software. Descriptions in italics are translations from debate-board entries (in some cases, somewhat shortened).
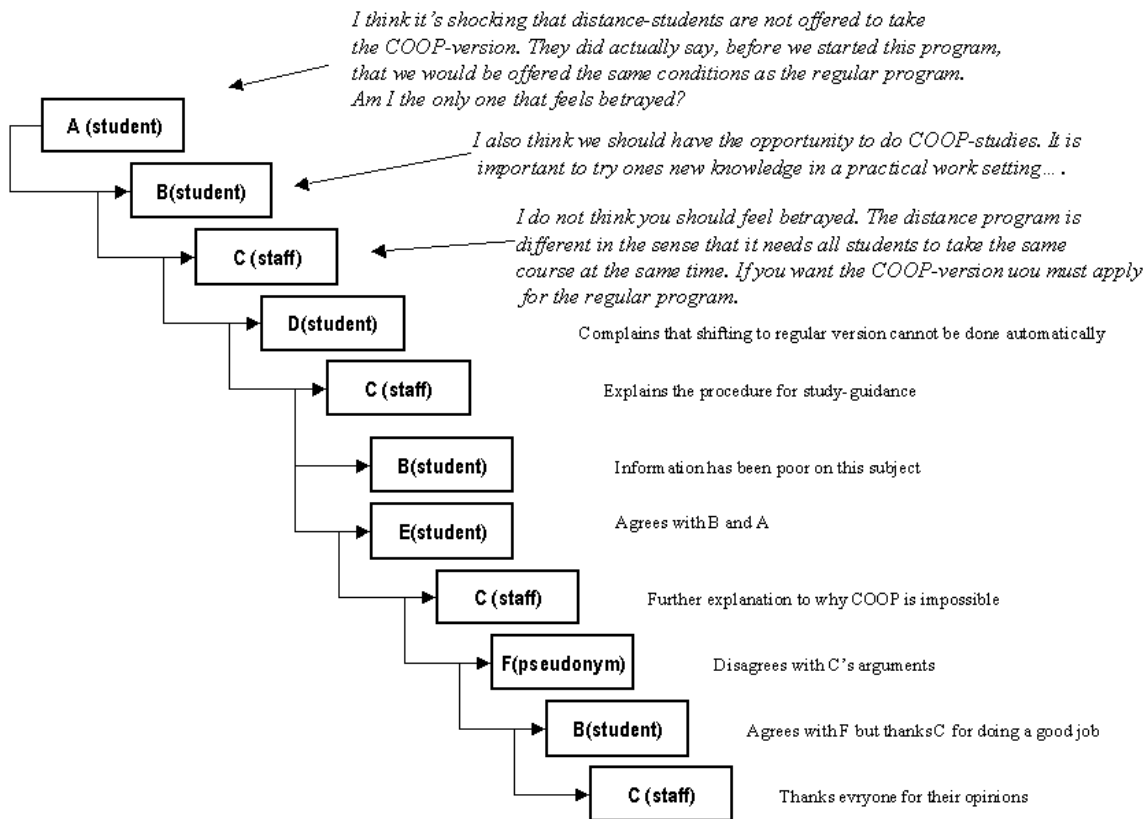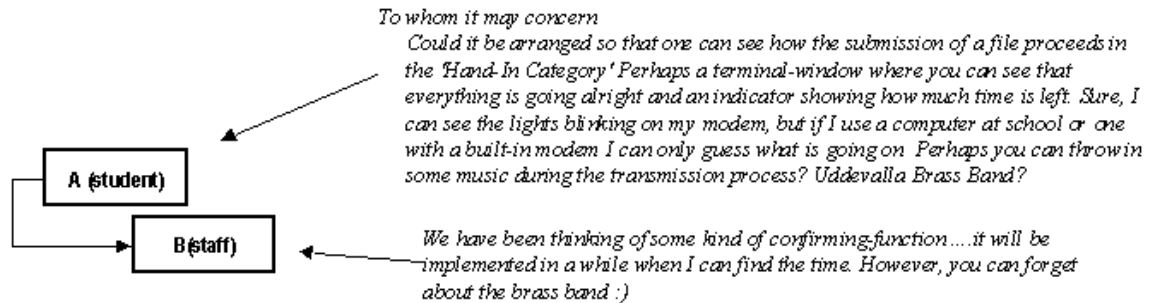
I think it's shocking that distance-students are not offered to take the COOP-version. They did actually say, before we started this program, that we would be offered the same conditions as the regular program. Am I the only one that feels betrayed?

A (student)

B(student)

I also think we should have the opportunity to do COOP-studies. It is important to try ones new knowledge in a practical work setting... .

C (staff)

I do not think you should feel betrayed. The distance program is different in the sense that it needs all students to take the same course at the same time. If you want the COOP-version uou must apply for the regular program.

D(student)

Complains that shifting to regular version cannot be done automatically

C (staff)

Explains the procedure for study-guidance

B(student)

Information has been poor on this subject

E(student)

Agrees with B and A

C (staff)

Further explanation to why COOP is impossible

F(pseudonym)

Disagrees with C's arguments

B(student)

Agrees with F but thanks C for doing a good job

C (staff)

Thanks evryone for their opinions

Figure 1: Course context thread

To whom it may concern
Could it be arranged so that one can see how the submission of a file proceeds in the 'Hand-In Category' Perhaps a terminal-window where you can see that everything is going alright and an indicator showing how much time is left. Sure, I can see the lights blinking on my modem, but if I use a computer at school or one with a built-in modem I can only guess what is going on Perhaps you can throw in some music during the transmission process? Uddevalla Brass Band?

A (student)

B (staff)

We have been thinking of some kind of confirming-function ....it will be implemented in a while when I can find the time. However, you can forget about the brass band :)

Figure 2: Learning technology thread

... I think the debate has become to much one-sided and I must admit that I don't agree with the harsh critique that has been presented. I am especially bored with the "bitching" ;-) tone in the complains about the choice of computer platform and software. I have prior experience of university studies and I can assure you that I have never experienced a department that could afford to keep up with the latest hardware & software-releases... ..

A (student)

B(pseudonym)

Agrees with A that the debate is one-sided, but claims that the computer standard at the distance communities are much worse than on campus in Uddevalla.

C(student)

... I completely agree with A.
And I know at least 2 companies that still works with win 3.11. And please, there are very few things that are black or white in this world, so stop nagging.

D (pseudonym)

Agrees with B and disagrees with C on choice of harware/software
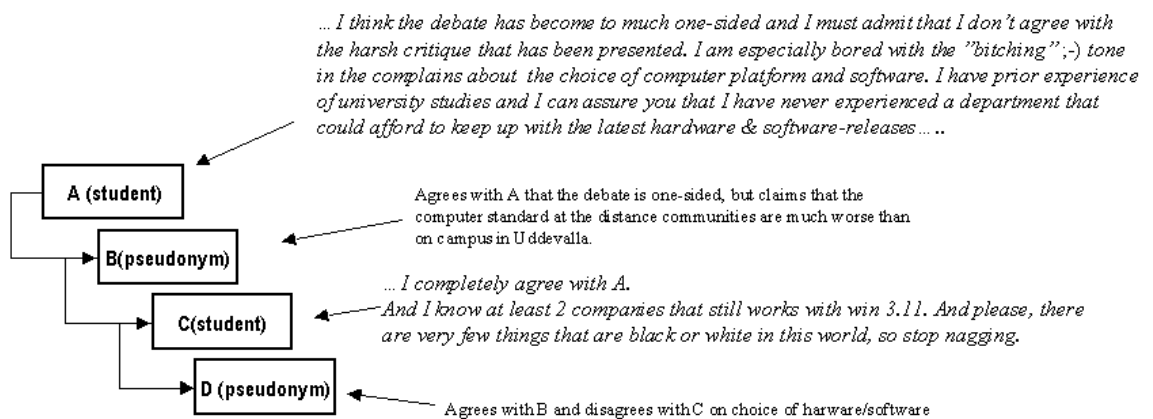
Figure 3: Debate climate thread

5.   Understanding the Discursive Evaluation

The results reveal a durable phenomenon, where student voluntarily initiates and commits themselves to evaluative discussions. This section will discuss this phenomenon focusing on the following questions: What are the key elements that motivate students to participate in the discursive evaluation? What are the strengths and weaknesses of using threaded discussion forums for evaluative purposes? and How do the properties of the application itself affect the outcome?

5.1   Community

A growing body of literature focuses on trying to understand the nature of what is often referred to as a virtual community (e.g. Rheingold, 1993) or an online discourse (Erickson, 1997). Most scholars agree that the notion of critical mass is important in order for durable communities to evolve, (Bradner et al. 1999) This refers to the fact that discussions tend to decline and vanish if the rate of visitors and new entries are too low.

Ågren (1999) argues that an important motivational factor, besides learning and interest in the topic is the acquiring of social capital that comes from active participation in the discussions. In this case, it is merely possible to speculate regarding to what extent such a generic motivational factor contributed. Ackerman and Starr (1995) highlight how awareness of the activities of other community members can be valuable for members of a geographically dispersed community. In the context of the case reported in this paper, this could be interpreted as a collective interest in being aware of the conditions on the other (remote) sites. The discussion forum then serves as an arena for sharing experiences, expectations and frustration throughout the community. Hara and Kling (1999) explore the issue of student frustration, concluding that this is a major problem in distance education. In a case study of a North American DE-project, they identify three sources of frustration: technology failure, lack of prompt feedback and ambiguous instructions, all of which are topics discussed at various times in this study. Viewing the discursive evaluation from the perspective of frustration, it seems as though engaging in discussions concerning the issues that are frustrating to the individual can help in reducing the frustration. This can be accomplished in several ways, for instance, by clearing misunderstandings, by finding out that others are experiencing the same, etc.

5.2 Evaluation

It is important to emphasize that the opinions expressed by students on the discussion-boards cannot be uncritically regarded as being representative for the whole learning community. Hall (1997) and Wheeler (1997) argue that studying computer-conference interaction can be biased by the fact that students tend to participate in the debate to a varying extent. Hall claims that technology-friendly students are quicker in adopting the medium and will therefore be over-represented. Issues such as fear for lack of anonymity and reluctance to express ones opinion in writing could imply that some students hesitate to participate in the debate. Furthermore, the familiar and 'talk-like' language generally reported to be a characteristic of text based computer-interaction, (Sproull & Kiesler 1991), could enhance the wish to express written opinions compared to other evaluation techniques like open-ended questionnaires.

Regardless of whether the debate reflects a representative image of student attitudes or not, one can question the evaluative effect of such a study. Draper et alt. (1996) declares that any evaluation designed to monitor students' attitudes is weak with respect to the evaluation of educational effect, since what is measured is really students' experience compared to their expectations. They argue that the validity of such evaluations is particularly low when it comes to students' expectations of Computer Aided Learning, since these educational settings are not familiar and well established for the students. Still they acknowledge attitude measurements to be an important tool for teachers wanting to respond and manage these attitudes. Especially in a distance educational setting when students and teachers seldom meet face-to-face, it can be difficult to keep track of students' attitudes (Hall 1997).

However, the debate board is very well suited for both discovering these perhaps diverse expectations and even challenging and discussing them. In fact the debate could serve as means for smoothing out these differences. Hall (1997) reaches a similar conclusion. She says that using the content of a computer-conference for evaluative purposes could be productive when wanting to find personal, subjective opinions among students. The illuminating qualities of the discourse could serve as a complement to a more summative post-course questionnaire. Such questionnaires are perhaps more valid in terms of representing the attitudes of the whole community, but often suffer from short comments without elaborate explanations on complaints and suggestions.

Another aspect that could be argued to add to the evaluative quality of the discussion board is the fact that students are probably less likely to perceive such a forum as an instrument of evaluation, thereby avoiding some of the bias that

characterises other more formal evaluative efforts. When a situation is identified as an evaluation, through for instance promises of anonymity, the students are likely to enter a role,(Goffman, 1969), where the existing power-relationships between them and the teacher(s) affect what is and what is not said.

5.3   Application

There are several important properties of the debate board itself, which can separately as well as collectively contribute to the way it is used. In addition to these qualities there are of course also other essential factors of the learning context that will affect the outcome.

5.3.1   *The debate is Public,*

The fact that all entries can be read by everyone in the community serves at least three essential purposes. Firstly, the risk of minority-opinions being overestimated is reduced since such entries are likely to be contradicted by others. Secondly, it makes it more interesting for students to express an opinion when they know that it will be read by more people than the teacher. This can be a strong implication for change. For example, when a student from one of the communities entered a complaint on bad service from a local facilitator, a student from another community responded with commending the perfect conditions on his site. The next entry (a day later) was from the first student reporting on a fast recovery. A third feature related to the public nature of the board is its social functions. The existence of the Smalltalk genre (Svensson 2002) points to the fact that debaters use the board for social purposes. It can not be ruled out that an evaluative entry to the board is more of a social action, than an actual wish to give feedback.

5.3.2   *Auto-Structuring,*

The Debate Board was originally intended as a place were students could discuss issues related to the content of the course but there were no attempts made to regulate or moderate the use in any way. The result of this study indicates a drift towards a more social and evaluative use. This kind of technology drifting is common when IT is used for collaborative purposes (Ciborra 1996). There is of course no guarantee that students will use the debate board for evaluation, but if they chose to do so the entries are automatically sorted into threads, making topic-

oriented analysis easier for an evaluator or teacher. If the debate is regulated (i.e. suggested topics for discussion) the threads can still provide good structure with respect to sub-topics. However, if the regulation is too strict, there is a risk of losing the discursive structure supported by the threads. At some point it will become arbitrary whether a new entry should start a new thread or add to an existing one.

5.3.3   Asynchronous,

Laurillard (1993) argues that the asynchronous nature of a discursive medium can contribute to students making more carefully thought through and 'well formulated' entries, reducing the risk for misunderstandings in analysing the content. Draper (1997a) argues that reflecting on ones own writing, is a form of 'self-feedback' that promotes learning. In the same way, taking time to reflect on other debater's viewpoints can induce a similar intellectual process.

5.3.4   and Continuous

Draper et al (1996) says that an important constraint in evaluation is not to overload students. On the debate board they only express their opinion when they want to do so. This is not the case in traditional post-course evaluations where many issues worth giving comments on are long since forgotten. Furthermore, it reduces the risk for students to think "Why should I bother to comment on this, when it's already too late for me to benefit from the impact of my viewpoints?" The possibility that suggested changes could be implemented and reported errors could be dealt with is likely to enhance students' willingness to give constructive feedback.

6.   Conclusions

The paper has identified and discussed three major aspects regarding the use of a discursive medium as a forum for educational evaluation.
(i) The discussion serves the purpose of supporting the creation of an on-line community of students and teachers where attitudes, expectations and opinions can be shared and discussed. The results reveal how such shared experiences, regarding for instance the students' frustration and satisfaction, are frequent topics

for discussion. The existence of a meta–discussion on shared norms for the evaluative debate is also evidence of an online community.

(ii) The forum proved to be an interesting instrument of evaluation, with characteristics that complement traditional methods of evaluation. The results from the case study show discussions in many course-related topics that are rich with constructive suggestions and argumentation. This feedback constitutes valuable input for teachers, but perhaps even more important, it makes it possible to challenge and influence students' attitudes and expectations. Especially in distance educational settings, where students and teachers seldom meet in person, it is important to identify ways of picking up sentiments and sources of irritation. A discursive medium like the discussion board presented in this paper should not be perceived as a formal instrument for objectively evaluating a learning context. On the contrary, it is a forum for conversations and discussions for the learning community of students and teachers, perhaps to some extent compensating for the loss of informal communication-channels of the campus based education.

(iii) Finally the functionality and design-characteristics of the application itself was argued to influence the nature of the discourse, thereby affecting both processes of community building and the educational evaluation. The continuos, public, asynchronous, and auto-structuring nature of the medium are all presented as key characteristics. The results also suggest that the graphical interface might impact aspects such as the lifetime of a discussion thread.

The explorative nature of the study, and the fact that the conclusions are based on one single case, implies that further research will be needed in order to strengthen the claims and help address questions not thoroughly explored in this paper. For instance, can similar outcome be achieved using other types of communication technology, (e.g. synchronous and or audio-visual media)? How would the discussion be affected by stronger moderation? In what ways and to what extent would a redesign of the application influence the discursive evaluation?

7.　　　References

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Fourth Paper[15]

Designing Community
Atmosphere Barometers

Abstract: *The World of learning is undergoing radical changes. Increasingly Information and Communication Technologies (ICT) support new temporal and spatial learning configurations. Traditional face-to-face learning situations offer a variety of ways for people to provide informal feedback contributing to the establishment and maintenance of a community atmosphere. ICT supported distance education presents a challenge for the establishment of community. This paper explores the design criteria for mechanisms compensating for the loss of informal feedback in a real-life distance educational setting by codifying and visualising the community atmosphere. This is accomplished by two case studies each designing, implementing and evaluating a web-based community atmosphere barometer. The results indicate the importance of providing ICT support with sufficient flexibility allowing the community to engage in collective processes of sensemaking when jointly expressing the atmosphere.*

1.   Introduction

How can Information and Communication Technology (ICT) support the ways in which we learn from each other? This question is currently creating immense interest within the academic community as well as in commercial organisations.

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[15] Svensson, L. & Sørensen, C. (2002) Designing Community Atmosphere Barometers, In *Proceedings of European Conference on Information Science*, ECIS 2002(edited by S. Wrycza), University of Gdansk, Poland

Continuous learning is deemed essential and increasingly ICTs support inter-personal and group communication, thereby facilitating the creation and maintenance of geographically dispersed networks of individuals. Using asynchronous and or synchronous text, video, sound, and images we can engage ourselves in interaction both with other people and with shared digital resources [Braa et al. 2000]. In an educational setting, such technology can mediate flexible forms of collaboration and learning that reach beyond the traditional teacher-designed collaborative educational practices, for example through facilitating informal peer-to-peer communication amongst learners. The learners can engage in a rich spectrum of collaborative activities that involves joint construction of solutions to problems, exploration of options through argumentation, or simply perceiving and using each other as educational resources [Fjuk 1998]. In this sense technology has the potential of empowering the learners - an important dimension of technology mediated education closely related to the learners' motivation and engagement [Nuldén, 1999]. Sillén [2000] advocates that empowered learners also are more autonomous and capable of assessing their needs, which in turn is related to the ability to reflect upon ones learning and modify actions accordingly. Learners and instructors using ICT for communication and collaboration purposes can be viewed as constituting a learning on-line community.

Evaluation is here an essential activity in order to assess the learning experience and is in the educational context often associated with conscious and formal activities directed towards formative or summative purposes [Oliver 1997]. However, in the traditional setting there are additional subtle and informal sources of evaluative feedback that constantly reach the members of a classroom. The air is literally filled with unobtrusive and ephemeral queues that can be interpreted in terms of feedback [Schmidt & Simone, 1996]. The students can express their degree of interest and concentration through the way they sit, the expression on their faces, where they look and through other discrete expressions. There is a significant difference between a student looking directly at the teacher, nodding the head and smiling, and a student with the arms crossed over the chest, starring at the ceiling with a bored yawn. The role of ICT in a learning community should therefore not be restricted to task-oriented systems and tools that directly aim at supporting individual and collaborative learning. The formal systems and instruments for evaluation can easily be transformed and perhaps even enhanced by the use of ICT, but the equally important informal feedback is to a great extent lost in the virtual classroom. It is therefore essential to explore how ICT can promote learning indirectly through the support for informal social processes and

inter-community relations that enhance motivation and engagement. The specific aim of this paper is therefore to explore one such aspect, namely the community atmosphere — the prevailing emotional tone or attitude within the community. This is accomplished by supporting students and teachers within a learning community to continuously monitor, interpret and evaluate shared experiences.

Providing full compensation through ICT for the loss of informal feedback within the virtual classroom is probably not possible, but previous research shows that a discursive media such as a threaded discussion-board for students and teachers can support rich and frequent feedback. This type of public, asynchronous text medium can express aspects of the community atmosphere [Svensson 2000, Hall 1998]. However, research has reported a disproportional number of lurkers — users who only read messages — compared with the number of users posting messages [Gallagher et al. 1998]. A critical aspect for the success of a tool that aims at visualising the community atmosphere is the degree of acceptance and use. Prior research discusses this aspect in terms of a threshold effect and a problem of obtaining critical mass [e.g. Bradner et al 1999]. Others focus on how technology must make collective sense to the would-be users [Orlikowski & Gash, 1994; Henfridsson, 1999; Weick 1995]. Consequently, community atmosphere mechanisms should provide possibilities for subtler and less demanding means of expression — supporting general asynchronous measurement of a virtual community atmosphere.

The primary research question explored in this paper is: *What are the design criteria for mechanisms compensating for the loss of informal feedback in a real-life distance educational setting by codifying and visualising a community atmosphere?* This question is explored through the design and evaluation of two prototypes used by distance education BSc Students within Systems Analysis a at a Swedish University college. The students were distributed across six remote locations and taught from the university using video conferencing and a proprietary web-based distance learning system. The results tell a story of both adoption and rejection. The first prototype was generally accepted and frequently used by the community. The users felt that the application supported social awareness throughout the community. The failure of the second prototype is equally interesting, demonstrating that the specific features of such systems are crucial to the outcome. The results suggest that an important characteristic of systems supporting social processes is the affordance of space for negotiation of common sense-making. This 'system-plasticity' supports the community in gradually adapting to the rationale of the tool, thereby reducing the risk of rejection. Furthermore, the results point to a tension and potential trade-off

between visibility and privacy in ICTs supporting the awareness of collective social settings.

The next section presents theoretical approaches related to social information in collective systems. Section three presents and discusses the two trials. Section four explores the implications for design of systems supporting social processes, and the findings are summarised and concluded in section five.

2. Research on Social Information in On-Line Communities

Virtual Community [Rheingold 1993] is a term often used to describe a variety of aspects where a social dimension is present in ICT-mediated settings. The fact that scholars from many disciplines (e.g. Sociology, Cultural studies, Informatics etc.) pay attention to social aspects of cyberspace contribute to a somewhat heterogeneous image of what this concept encompasses. Many of the definitions departure from how communities are perceived in real life. According to Coyne [1995], the term "virtual" suggest an absence of some of the real life aspects of a community, instead being replaced by something that looks, sounds or feels as if it is real, when it in fact is not. Erickson [1997] criticizes the use of the community metaphor as a generic description of on-line discourses and supports the critique with several examples from the web where fundamental aspects of a community, such as membership, shared value, commitment and interpersonal relations, makes little or no sense. Social information is in this context often associated with notion of awareness. Awareness is a multifaceted phenomenon, containing aspects such as being able to see other people, interpret their actions and act upon them. Dourish [1997] states that *"The primary role of awareness information is to make one's activity visible to others."* This aspect is explored from a number of perspectives in various academic fields. Social Navigation, for example, explores how social information enhances the quality of navigating in information spaces [e.g. Dieberger & Höök 1999]. Other approaches focus on grouping users with similar behaviour [Maes, 1994], supporting informal conversations in distributed work settings [e.g. Whittaker et al., 1994], and on techniques for visualizing text-based conversations [Donath et al. 1999].

Erickson and Kellogg [2000] argue that social translucency, characterized as: "visibility, awareness and accountability – which enable people to draw upon their social experience and expertise to structure their interactions with one another", is an important feature of systems for communication and collaboration. They discuss three different approaches for designing translucent systems. The realistic approach, where rich media such as videoconferencing is used in an attempt to represent the experience of face-to-face interaction as close as possible. However, videoconferencing provides poor support for non-verbal communication such as body language, glances and head nods [Heath & Luff 1992, 2000], and factors such as the distance between camera and monitor as well as the delays between action and reaction also affects the interaction negatively [Gaver, 1992]. The mimetic approach aims as literally as possible at re-representing social cues from the physical world within the digital domain, for example by including 2-D and 3-D avatars that through conscious actions from their master can mimic, often unconscious, expressions from the physical world. The abstract approach, implies using text, images and graphs to illustrate social information in ways that are not guided by the corresponding physical utterances. To some extent the use of emoticons in text communication can be viewed as such abstract representation of social information [Galagher et al, 1998].

Within the field of Computer Supported Collaborative Learning (CSCL), awareness is forwarded as impacting on students' collaboration [Fjuk, 1998]. Similarly, the term grounding is used to describe processes by which students construct and maintain common understanding essential for the completion of joint activities [e.g. Baker et al. 1999]. Grounding involves levels of contact, perception understanding and attitudinal reactions. Furthermore, it is argued that the affordances and constraints of the media, in terms of for instance co-presence, co-temporality and sequentiality are important in the grounding process [Baker et al. 1999].

3.   The Barometer Trials

University of Trollhättan Uddevalla (UTU), Sweden, has since 1998 taught a three-year distance education BSc. in Systems Analysis. Classes are divided into smaller groups each attached to one of the five or six learning centres that take part in the programme each year. Each centre hosts a group of 5-20 students, thereby creating a setting where students are co-located with a few peers, but

geographically separated from the rest of the community — the teachers and students at other sites. The technological support is a mix of synchronous and asynchronous media. Weekly lectures are delivered using a multiparty videoconference system with studios at each of the participating learning centres. The distribution of course material and the communication with teachers and students at other sites are supported through an asynchronous course web-site (http://www.udd.htu.se/dl/). The course web-site with associated configuration functionality had Ultimo 2001 been used within the UTU in around 300 courses spanning more than 6000 students. Students and teachers from two different classes of the distance education programme constituted the user-communities in the interventions reported in this paper.

Both interventions involved the implementation of a web-based application, called the Barometer, addressing the loss of informal feedback in the virtual classroom. The first trial (the Alpha-Barometer) was conducted in the spring of 1999, and involved three teachers and 52 students located at six learning centres. The second trial (the Beta-Barometer) was conducted in the fall of 2000, with two teachers and 41 students within five learning centres. Both student groups were in their first semester at UTU. Each experiment was concluded with a survey of student perceptions of the prototype.

3.1   The Alpha-Barometer

The design rationale for the two community atmosphere barometers is to integrate a simple feed-back mechanism into the existing web-based distance learning system. This facilitates students voicing their experience of the course and provides a mutual awareness of how others' experience it.

The application supports through a simple interface an individual indicating his or her present mood or attitude through selecting either a green rectangle, labelled "positive" or on a red rectangle labelled "negative" and subsequently submitting the verdict [Fig. 1.]. It is also possible to add textual comments as annotations to the mood-indication. The barometer displays cumulative statistics of the mood-indications made during the course. A submission without explicit green or red indication is interpreted as a neutral mood. The time-stamped text-entries are presented in descending chronological order. The text is colour-coded in green or red corresponding to the mood-indication. To the right of the list there is a graph showing the total number of positive, neutral and negative indications.

Figure 1. The course site, with the Alpha-Barometer interface (bottom left)
Integrated into the course web-site. The list with student's comments and a graph
showing the frequencies of positive, neutral and negative indications

3.2   The Extensive Use of the Alpha Barometer

The barometer was introduced to the web-site six weeks after the start of the first course of the programme (January 1999) and was used by the students until the end of the course four weeks later. The study included a survey aiming at monitoring student attitudes toward their possibility to exercise influence over their learning context, before and after the implementation of the barometer. The survey also includes questions directed towards an evaluation of the interface of the application. As a tool for categorizing and describing the text entries, each submission is coded using a coding scheme inspired by Orlikowski and Yates [1994] with respect to indicators for: (i) Structure (smileys, capital letters, exclamation etc.); (ii) Language (humour, sarcasm, etc.); and (iii) Purpose (mood-indication, explicit feedback etc.). The entries coded as having a primary purpose of giving explicit were then analysed using the following nominal scale.

      (1) Agree/Disagree with other author
      (2) Success/Failure-report
      (3) Explanation
      (4) Suggestion for change

The four weeks of use resulted in a total of 213 submissions, of which 63 included a text-comment. The number of comments per day varied from 4 to 15 during

weekdays with no obvious ascending or descending trend over the time-period. 57% of the comments were coded in red, 10% neutral and 33% positive. Most comments are short and have an informal, structure and language. The use of smileys, capital letters and (repeated) exclamations and question marks were very common, but opening salutations and signoffs were not used. Categorising the entries with respect to primary purpose reveals that 63% exclusively served the purpose of expressing the author's "mood".

> Example 1 "Now I start to get the hang of this, and tomorrow it's time for a new module…*sigh*"

> Example 2 "Can it get any worse?"

> Example 3 "I hope I can use this later, or else I will vomit"

> Example 4 "I'm actually on top of things, GREAT!!!!!"

> Example 5 "Tired!"

27 % of the comments contained an evaluative content — sometimes added to a mood-indication — providing feedback on the learning technology, teacher performance and course content. This feedback was classified as reports of success (6 entries), reports of failure (8) agreeing with a previous entry (1) and suggestions for change (3).

> Example 6 "Probability theory is rather fun!"

> Example 7 "Great teachers make this course worth taking, so shouldn't I feel glad?"

> Example 8 "Is it possible to sort the course material in order of the date it is published /on the web-site, authors' comment/, so we don't have to search for the latest file."

It is interesting to notice that the colour code was not always coherent with the text of the message. Several entries reported on great difficulties to keep up with the pace of the course, but were still coded in green, and one entry (ex 7, above) gave positive feedback on teacher performance coded in red. For most of the

period, the mood indications and coloured text comments appeared more or less in random and heterogeneous sequences with a mix of red, black and green submissions. However, at one particular stage, shortly after an introductory lecture in Logic, the alpha prototype was unambiguously filled with red text comments on the horrors of and difficulties of Logic, sets and relations. Also, at the end of the course, the red mood indications dominated accompanied by text entries commenting on the upcoming exam.

The results from the survey showed that students in general were satisfied with the barometer, and only a few students reported to not having used the system. The following quote mirrors how several students perceived the system as a support for the mediation of their shared experience:

> ..a splendid way of seeing how other students experiences the course. If it feels to much, you can see that after all you're not the only one feeling that way – that gives you an extra push to sit down with the books again

3.3   The Beta Barometer

During the fall of 2000 a follow-up experiment was conducted using a redesigned application also aimed at visualizing the course atmosphere. The Beta-Barometer implemented significant changes compared to its predecessor, both with respect to the submission of mood-indication and regarding the visualisation of the community atmosphere. The Beta-Barometer did purposefully exclude the possibility for adding textual comments to mood-indications. Instead the number of mood indicators was increased from the previous three to the following five: "angry", "neutral", "happy", "worried" and "tired" [See Figure 2]. Furthermore, the barometer was moved from its prior position in the navigation frame of the course-site, and instead constituted the default-starting screen. In order to proceed to the normal interface, the system forced the user to submit a mood indication. The neutral mood was marked as the default. The visualisation of cumulative mood-indications [See Figure 3] had a temporal dimension, allowing the user to view the tallying for "today", "this week" or "entire course".

Figure 2. Five moods to choose from.

Figure 3. Cumulative statistics of mood-indications

3.4 The Rejection of the Beta Barometer

It is difficult to compare the Alpha and Beta Barometers since submitting a mood indication was voluntary with the alpha, and (more or less) mandatory with the beta. The Beta Barometer log-file showed a slow but steady decrease in number of mood-indications made by the students over the four week period. After two weeks, 215 submissions were recorded, and at the end of the course two weeks later, the total was 308. This is not believed to indicate that the course-site was less visited by this second batch of students, but rather that students found ways of avoiding the mandatory barometer start-screen, using bookmarks that pointed to pages further down in the course site. The possibility to do so in order to avoid the barometer was hinted by a student at the class discussion forum only a few days after the trial started. This is however not the only indication of user rejection of the Beta Barometer. Studying the frequency of the default neutral mood indication show a very clear trend, increasing from 30% the first day, to over 60% after two weeks and ending up close to 80%. This can be interpreted as a clear sign of the user rejecting to "use" the system for it's intended purpose, and instead quickly moving on by accepting the default setting. This interpretation is indirectly supported when comparing with the results from the Alpha Barometer, were the anxiety and negative mood indications increased significantly towards the end when approaching the examination period.

Textual comments provided in the survey revealed some explanations for the Beta Barometer rejection. Most commonly cited was a lack of appreciation of the purpose of using the tool. Most students stated that the barometer did not add any value to their study situation and was therefore useless. The following comments shows how the Beta Barometer was perceived as invading the privacy of the user

"This is too personal!"

"I already know how the people I care about feels, I don't need to find out from the computer"

A few of the comments were more aligned with the positive responses from the Alpha-Barometer trial

"Cute gadget! Made me stop and think, how DO I feel at the moment?"

"Comforting to see that others are having as tough a time as I have!"

4.   Discussion

Erickson [1996] discusses how social cues could be used in order to navigate hypertexts. In a similar way, the Alpha and Beta Barometers invite the user to leave explicit marks on the web-site, thereby providing social signals to be picked up and interpreted by other members of the community. The bar-charts and the list of red and green text-comments of the Alpha-Barometer and the five counters of the Beta-Barometer show a snapshot as well as the history of these signals that, when interpreted by the users, provides some social awareness of the course-atmosphere and the adoption and continuous use of the barometer is critical. The experiences from the alpha-trial indicate a need to connect and socialize with remote peers beyond the few situated in the same learning centre. The motives for doing so stretch beyond the goal- and task-oriented rationality discussed by Baker et al. [1999], regarding grounding. What happened in the alpha case could be understood using a social rationality, where relations between dispersed members of a community is a goal in itself. The motivation for these activities is subsequently to strengthen the learning community through adding to the shared

history and shared experiences that constitute a necessary prerequisite for any community. The actions are signs of the students perceiving themselves as members of a community, only then does it make sense to express how you feel, and take interest in being aware of the feelings of other members of the community. Individuals acting as members signify the processes by which the community is established, maintained and enforced – it is processes of social grounding or "communitising". The indirect effect of communitising can hopefully improved quality of student learning — not only in relation to an increase in engagement and motivation, but also through mechanisms of improved performance that comes from being aware of others working with similar tasks, [Ackerman & Starr 1995].

4.1 Implications for Design

The rejection of the Beta-Barometer cannot be interpreted solely as a sign of this group of students being less of a community, and lacking the motivation to 'communitise' (although this with the given data can not be ruled out). Instead we suggest explanations that are more closely related to the design of the Beta-Barometer application. Collective sensemaking is a process that involves negotiations and reaction to other members' way of using the system [Orlikowski & Gash, 1994]. The Beta Barometer did not provide any space for the users to jointly shape and adapt the tool into use that made sense to the community. Consequently, the application would either have to make sense immediately to, or be rejected by, its users. In contrast the voluntary text-comments of the Alpha-Barometer constituted such a space, thereby adding 'plasticity' or malleability to the system, thus allowing for asynchronous collective sensemaking. An important aspect of this plasticity, is that the activities of each user were visible. If the individual sensemaking is not visible to the rest of the community, the user is left with mere assumptions about how others perceive the purpose. In contrast to Erickson and Kellogg [2000] we do not believe that this visibility is necessarily connected to a need for accountability.

The Alpha-Barometer was primarily a collective system, with no sign of the individual member of the community, apart from anonymous text entries. Ericksson and Kellogg [2000] argue that there is a corresponding tension between the visibility and the privacy of a socially translucent system, which in our case is supported by the fact that the Beta-Barometer with richer and more precise mood-categories were perceived as leaving the collective community sphere and

intruding on private territory. Both barometers visualised social information using what Erickson and Kellogg [2000] characterise as abstract techniques. However, the nature of the social information to be captured makes it impossible to generate automatically, leaving the user with the problem of having to attend to the process of lifting these signals from the more or less unconscious level of body language to a level of conscious action. In this process from subconscious to conscious there is of course a risk of loosing some of the genuine nature of informal feedback, thereby reducing the validity and reliability of the social information.

4.2   The Barometer as an Instrument of Evaluation

One of the triggering thoughts behind the barometer initiatives was that teachers participating in the distance education programme, complained over the loss of not being able to "read" the group and sense if the students understood, or if they needed additional explanations. The results do not provide substantial support for the idea that the barometer could constitute a central instrument for evaluation. At most a barometer could add a quantitative dimension that could estimate the magnitude of negative or positive climate within the group, but then again this implies a high degree of use throughout the community. In the two experiments there were only one occasion were teachers reacted in response to activities on the barometer, shortly after the "horror-lecture" in Logic reported above, the teachers responded with publishing a file with elucidative examples and explanations.

5.   Conclusion

The experiments reported in this paper shows how a system aiming at supporting the visualization of the atmosphere within a learning community can be adopted and appreciated as a means of creating, maintaining and enhancing the strength of a community. We believe such processes of social grounding or 'communitising' to be important with respect to engagement and motivation for the members of such a community, and subsequently are likely to have a benign effect on the quality of learning. Furthermore, we conclude that the adoption and acceptance of such social systems is dependent on the outcome of joint construction of sense-making regarding the use and purpose of the system. An important characteristic

that is argued to enhance the possibility for acceptance is a system-plasticity that affords common sense-making through negotiations and visibility of user actions.

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Fifth Paper[16]

Crowds, Crews, Teams and Peers:
A Study of Collaborative Work in Learning-Centre Based Distance Education

Abstract: Distance Education (DE) in the Internet age is rapidly moving from experimental small-scale projects to large-scale educational programs. This transition is likely to forward new sets of questions that need to be addressed by researchers and practitioners, where students motivation, engagement and frustration is at the centre. This paper explores the on-line and the off-line activities of Scandinavian students in a learning-centre based full time DE program in Computer Science and Systems Analysis. In particular, the way students organise and perform group work has been investigated. The results reveal four different typified group types (labelled crew, team, crowd and peers), each with a different focus and purpose for the way members use IT when working with co-located group members and when participating in the distributed class-community.

1.   Introduction

The Internet has become a melting pot where most traditional media, such as television, telephone and newspaper have merged and collided, resulting in fruitful combinations and new functionality (Braa, Sørensen & Dahlbom 2000). This is related to a more generic trend of extending the notion of Information

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Technology (IT), to the notion of Communication Technology (Braa et al. 2000). From the perspective of Distance Education this means a technological platform with support for dynamic distribution and organisation of hypermedia course material, but also support for more flexible interaction, for example chat-rooms, computer conferences and news groups. These potential effects are what Sproull and Kiesler (1991) call primary effects, oriented towards an enhanced educational efficiency. These are often properties of the new technology that to some extent are possible to foresee, and accordingly functions as strong motivation for a fast adoption and diffusion of the technology, in the context in question. However, Sproull and Kiesler proceed with the argument that new technology must also be understood in terms of the secondary, more longitudinal, effects. They say that the use of ICT influences the social systems where the technology is adopted. When communicative patterns change, social and cultural change follows. Similarly, Meyrowitz (1985) argues that such changes in the social landscape relate to the way electronic media influences the audience, the roles and our perception of the social situation. And indeed, the perhaps most important outcome from using the Internet in distance education, is the informal and social dimension it introduces. The ease, at which contacts can be initiated amongst students and teachers, is in strong contrast to the demand of structure and planning that is necessary when using correspondence and teleconferencing. Subsequently, the web has become a medium where learning communities and new practices can form and evolve (Svensson 2002). The need to address social aspects of DE is also furthered by the fact that many educational organisations are experiencing problems with high numbers of dropouts in DE (Rovai, 2002), while at the same time the volume of DE increases as experimental projects are being replaced by large-scale programs. Together these aspects bring issues of students' motivation, engagement, frustration, perceptions and expectations to the fore.

When exploring the social nature of distance education it is important not to set a too narrow focus only on on-line activities, and activities planned and supervised by instructors and tutors. There is a need for research that adopts a broad approach that also includes what happens outside the virtual classroom (Bannon, 1989; Alavi & Leidner 2001). Furthermore, since Internet-based DE is a social phenomenon, as argued above, the research should include both individuals as well as groups of students as the unit of analysis.

The aim of this paper is to explore how students in a learning centre based distance education organise, perform and perceive their collaborative work, on-line as well as off-line, and how these issues can be related to their use of information and communication technology? The object of the study was a

distance education project in Sweden where 46 students, divided into six groups, studied full time for a bachelor degree in systems analysis. The education was organised around six learning centres, each located in smaller communities in the region surrounding the University College that was providing the courses. In each centre 6-15 students met weekly for videoconference sessions. A web education tool called DisCo (see Svensson & Ekenstam, 1998 or Svensson 2002 for a thorough description), facilitated all additional contacts between teachers, students and administrative staff. The case setting has a number of interesting characteristics, where interaction within the community is mediated in different ways. Moore (1993) identifies three different types of educational interaction. In this case the (i) learner-instructor interaction is predominately technology mediated. This is also true regarding (ii) learner-learner and (iii) learner-content interaction within the community as a whole. However, it is supplemented with face-to-face interaction taking place in each sub-community (compare to mixed-mode education, Campos, Laferrière & Harasim 2001). The study involved interviews with 13 of the 46 students and 14 additional students kept a study journal for two weeks, describing all study-related actions. Finally, on site observations were made at all six learning centres in connection with a scheduled VC-session.

The results reveal typified patterns with respect to the way students organise their collaborative work. The different group-types also make use of the Internet in different ways and to some extent for different purposes. Finally, the different group-types are connected to different approaches and strategies for learning.

2. Related Research

The social aspects of distance education have in previous research been approached from several different perspectives. Based on Media Richness theory and Social Presence Theory it has been argued that the social quality of computer-mediated interaction is to a large extent predetermined by the medium (see for example Daft & Lengel, 1986). This view is challenged by Gunawardena (1995) who shows how the social presence is not solely a static property of the technology, but should rather be seen as dependent on the participants subjective perceptions (see also Leh 2001). Patterns of communication and collaboration have been explored by researchers in the field of CSCL (Computer Support for

Collaborative Learning). Wasson & Morch (2000) identify typified strategies for synchronous collaboration, and Haythornthwaite (2001) examines how students interact inside and outside teams. Others include cultural and organisational aspects of DE (e.g. Fjuk 1998; Hakkarainen, Järvelä, Lipponen & Lehtinen 1998). Fjuk uses a triadic framework to describe the factors that affect the interactional processes, and describe them as:

> ..a field of tension between organisational, technological and pedagogical aspects (Fjuk 1998).

Nuldén (1999) presents a framework, that in addition to technology, also emphasise the empowerment of students, and perhaps even more importantly their engagement concerning their studies. A study by Hara & Kling (1999) shows that student-frustration is a neglected topic in most research on DE. In a case study of a North American DE-project, they found that most students report a strong feeling of dissatisfaction and frustration primarily related to three aspects: (1) technical problems, (2) lack of prompt feedback from teachers and (3) ambiguous instructions.

3.   Collaboration

Understanding how students organise, perform and perceive their work should departure from a general understanding of collaboration and co-operation. Gaver (1991) presents a simple model with four different levels or modes of collaboration (fig. 1). At the lowest level, general awareness represents shared knowledge of who is participating in the project or the community. It could also be extended to include knowledge of whether a certain individual is available for interaction or not and what type of work he or she is doing at present. The next level, serendipitous communication, refers to informal and unplanned conversations between two or more people, where sharing of experiences or ideas leads to fruitful progress. Division of labour is used to label any type of practice where a project or a task is deconstructed into a number of sub-assignments, to be completed by an individual or a smaller group of people. At the highest level, the term *focused collaboration* is used for activities where people work simultaneously together on the same task.

Degree of engagement

Focused Collaboration

Division of Labour

Serendipitous Communication
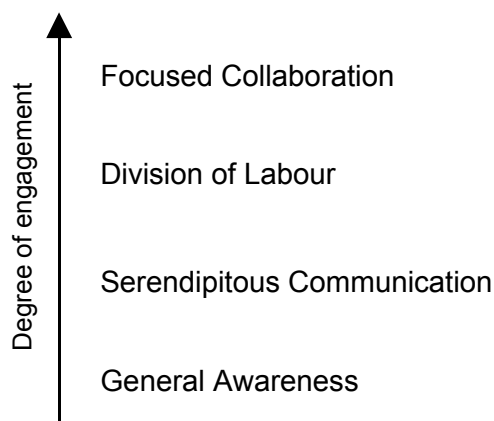
General Awareness

Fig. 1: Levels of collaboration, Gaver (1991)

Gaver (1991) argues that group members constantly move up and down the engagement-axis shifting among the various levels of collaboration. Furthermore he argues that most computer based systems, designed to support these processes often neglect the need for lower levels of awareness, focusing solely on focused collaboration.

4.   Learning

Marton and Säljö (1984) and Ramsden (1992) argue that the ways in which students interact and work can be related to how and what they learn. They discuss the notion of approaches to learning (see Ramsden, 1992, pp 39-66). This is not to be perceived as a generic approach that a certain student uses in all learning situations, but rather as a situational phenomenon, influenced by a complex web of contextual factors, for example course design, methods for teaching and examination and so forth. Marton and Säljö (1984) distinguish between two approaches to what students learn. The deep approach is oriented towards understanding and the surface approach is where students are typically occupied with memorising facts. This is in turn related to how they learn. Ramsden (1992) describes that the atomistic approach implies focusing on fragmentised parts without attempts to relate them to one another. This is contrasted with a holistic approach, where focus is on the big picture, and the way things relate to each other. The process of how they learn is dependent on the students' insight in how the world can be interpreted in different ways, which in

turn affects the engagement in the learning process, and to what degree the student has a contextual, relativistic thinking.

These situated approaches are also connected to orientation to studying or general approach to learning, that is a generic preferred strategy used by a student based on experiences from previous learning situations. Ramsden (1992) presents four such orientations.

- *Meaning orientation*: The student has a deep-holistic approach, uses data critically, relates new info to existing knowledge and learns for the sake of learning
- *Reproducing orientation*: The student focuses on memorising, pays close attention to the demands of examination, avoids work that is not mandatory, lacks confidence and is not likely to discover relations between concepts and ideas
- *Strategic orientation*: The student seeks for clues to what will be assessed, motivated by hope for successful examination and is highly confident and competitive.
- *Non-academic orientations*: The student organises work poorly, and is cynical, frustrated and poorly engaged. Draws conclusions and generalise without proper support.
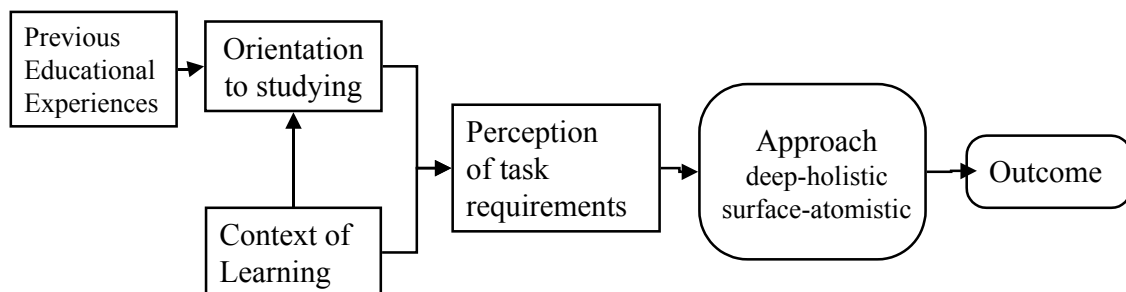
Fig. 2 shows how the outcomes and learning effects are interrelated with approaches to learning, study orientation and organisational and pedagogical aspects of the learning context.

5. Method

The case study was conducted at a Swedish University College. The objects for the study were second year DE-students in the Systems Analysis program. The fieldwork involved qualitative interviews, study journals and participant

observations. Out of a total population of 46 students a sample of 34 students was selected to be part of the study. 13 semi-structured interviews with a stratified sample of students were used to investigate the perception of learning, co-operation, collaboration and use of technology as a DE- student. The interview method was based on Mc Cracken's (1988) systematic guide for open-ended long interviews. Three of the 13 interviewees had experience from traditional higher education, and the remaining 10 where first time students at the University level. Only two of the interviewed students had prior experiences from Distance Education. The students had diverse educational backgrounds and working experience. Six of the interviewees had responsibilities, such as families and/or work, in addition to their studies.

The sample also represented a diversity of people of different ages living everywhere from a walking distance to a one-hour drive from the learning centre. The majority of the interviews were conducted at the six learning centres and some were for practical reasons conducted at the University campus during three weeks in October and November 1999. Each interview lasted for approximately one hour, and was recorded on tape or minidisk. Prior to the interviews, an email was sent to the interviewees, explaining the objectives of the study, highlighting the main issues of the interview guide (for example, study techniques, used technology, social dimension, communication, text based tutoring, community issues, thoughts and feelings concerning the studies). The respondents were asked to reflect upon these topics, and during the interviews they were encouraged to give elucidative examples. Parallel to the interviews, two to three additional students from each learning center were asked to make daily entries to a study journal (diary) during two weeks, in order to survey the daily habits of a distance student. In total, 14 diaries were handed in (21 students were asked). The diary was aimed at exploring study activities, thoughts and reflections on their studies and the coordination, communication and collaboration in the educational context. The students were given directives in an e-mail on exactly what periods to do the diary entries and to especially reflect upon topics such as organisation and studying arrangements (individually and in group), feelings, attitudes, place, time, ICT-support (and other aids), studying materials and so forth. The students were also encouraged to use their own personal style when keeping the diary. The period for the diary was planned to cover the last week of one course (including examination) and the first week of the next course. Included in the missive was a document template for the students to fill in. Each individual student was kept anonymous in transcripts. The actual studying conditions and lectures over the video conference system from the students' perspective were studied through

visits to all six learning centres. These visits included participation and observation of three lectures and they also included several informal conversations with the students as well as inspection of the premises and studying environments.

6. The Case Setting: Learning Centres and DisCo

When the distance education project started in 1998 it had 58 active full time students. At the time of the case study the amount of distance students in the same group was 46. The education was a cooperative project between the University, The European Union structural funds and six municipalities in the region. The project made it possible for students in these six municipalities to study the first two years of a three-year Systems Analysis program, in the form of distance education.

Each participating municipality is located in a region distinguished by weak traditions of higher academic education. Consequently, one of the project's main purposes was to increase the knowledge about higher education among companies, organisations and citizens in the region. It also aimed at improving the pedagogy, methodology and ICT-support for distance education as a concept. The education was organised around a learning centre in each municipality. All learning centres were equipped with a studio for the videoconference (VC) system (see fig 3-4), a computer laboratory and a part time local coordinator, responsible for student service matters and administrative contacts with the University. Regarding these and other aspects such as possibilities for collaborative work, opening hours and access to facilities such as copy machines and library recourses, the conditions varied between the learning centres.
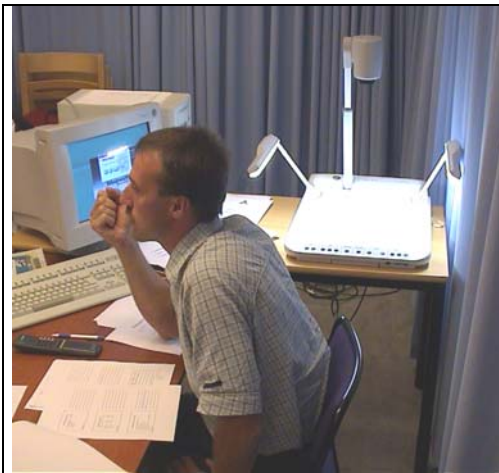
Figure 3. Teacher in VC-studio at Campus	Figure 4. Students in VC-studio at Learning Centre

The DE courses uses a web-based system called DisCo (Distance Courses) (fig. 5) that provides the possibility to publish course material and to communicate student(s) to teacher(s) and student(s) to student(s). It offers the possibility to publish text-based material and tutor students and is designed to overcome obstacles such as lack of computer skills. The teachers can publish course information and material such as course description, content, goals and methods for examination, presentation of involved teachers, study guides, assignments and exercises. The interaction between all users is primarily facilitated through an email function and a threaded discussion board.
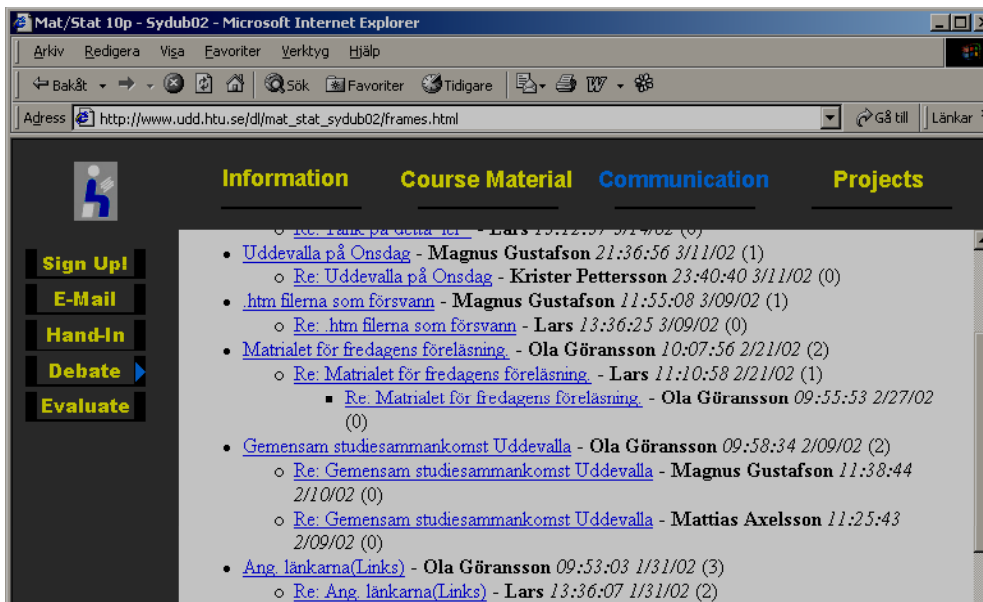
Figure 5. The start page of the threaded
Discussion Forum in DisCo

For small group collaboration the system provides possibilities to share files and hyperlinks within project groups. All course-site maintenance is done with standard browser software. For a more detailed description of DisCo, see Svensson & Ekenstam (1998).

7.   Results and Analysis

The interviews and the study-diaries give a fairly consistent picture of what activities could be considered as collaborative work for the students. This picture is dominated by activities relating to studying the subject matter of courses, for example, assignments, exercises, literature studies, projects and exams. In addition to this, students are also occupied with evaluation (formal evaluation as well as informal evaluative feedback), administrative tasks such as registering for courses and applying for financial aid, planning for future courses and so forth.

The students can use a collaborative approach to all course elements, even the "home exam" which they are explicitly instructed to complete individually. Other course elements are designed in a way that forces the students to form working-groups. The study diaries mirror how all students worked during a two

week period that contained the final stages and examination of one course and the initiation of two following parallel courses. These situated stories were complemented with the more longitudinal descriptions and reflections expressed in the interviews. Table 1 briefly outlines the nature of each course on the level of explicit course elements.

Week	Course-module	Course element
1	Enterprise Information Systems (5 credits)	**Programming-project**: A large-scale project with pre-defined sub-projects. All students at each learning center formed one group.
		Exam: A written "home-exam" that students should complete individually within five days.
2	Organisational Theory (5 credits)	**Literature-studies**: First week included lectures, literature seminars and preparations for a forthcoming project assignment
	Project Administration (5 credits)	**Literature-studies**: Introductory textbook in project management.
		Project-assignment: One project per learning centre. All six projects were provided by and conducted in cooperation with local companies. The assignment instructed each group to appoint a manager and a secretary.

Table 1: Courses and course-elements at the time of the study

7.1 Understanding Groups

Studying the situations where groups were formed resulted in two major observations regarding how work was organised. Firstly the various groups differ with respect to whether the preferred mode of work was oriented towards an individual or a social focus. The individual approach is characterised by an orientation towards division of labour, whereas groups with a social approach have focused collaboration as the preferred strategy of organisation.

Secondly there appears to exist clear differences regarding to what extent the individual members of the groups adopts diversified roles. A group with differentiated roles is often highly structured and characterised by their members having different and well-defined responsibilities, and subsequently also explicit mutual relations. This differentiated structure was more or less totally absent in other groups where all members appeared to have equal roles and status.

		Work-orientation	
		Individual	**Social**
Roles of group-members	**different**	*Crew*	*Team*
	equal	*Crowd*	*Peers*

Fig 6. Group types observed in the study

These findings are summarised in a 2 by 2 matrix, where the preferred mode of work is contrasted with the degree of equality with respect to group members' roles and responsibilities (fig. 6). The result is four metaphorical group-types all observed in the case study. These group-types should not be perceived as static labels attached either to individuals or groups, but merely as possible ways to organise collaborative activities in connection with a specific course element. In fact, the data points to several occasions where groups changed their strategy when shifting from one assignment to another or when reforming in to new group-constellations.

7.1.1 The Crew

This group-type bears the resemblance of a formal bureaucracy or perhaps an aeroplane crew. Assignments and exercises where group work is required are approached with division of labour as the dominating strategy. The contribution of each member is subsequently merged in to a homogeneous product. The Crew has one (or perhaps two) members functioning as managers or coordinators with responsibility for monitoring and managing progress as well as editing and unifying. The Crew often uses a similar approach for individual course elements, such as literature studies. Even though this work is mostly performed individually, there are frequent coordinating activities where members through planned or serendipitous conversation can check and compare their work with the others. Members of a Crew use ICT primarily for coordinating group activities, such as distributing documents, checking the status of fellow group-members, and when necessary, also contacting them for exchange of information.

> When I got home I wrote the remaining part of our system documentation and received the final contributions from the others. Then I distributed the complete text to the other group-members for cross reading. This work is much more time-consuming than you think.

This entry to her study diary, was made by the coordinator in one of the communities where the Crew approach was used for nearly all the course elements.

7.1.2   The Team

The differentiated roles within a Team are primarily related to variations in engagement and sometimes also level of expertise. This group-type is characterized by having a leader or a core of leaders, which organizes and supervises the group activities, seldom distributing sub assignments to the members, but instead preferring focused face-to-face collaboration. In some situations there are members with moderate engagement resulting in very passive roles or even absence from joint activities. Technology is used for communication and in some cases for supporting the general awareness when the group is not gathered for work. The group as a collective mostly solves problems related to the subject matter, and questions to teachers are submitted by the group, rather than by individual members.

> I prefer asking the others when there is something I don't understand it is more convenient, and I don't have to formulate a written question [..] when we work in the group we sometimes send an email together…

The quote, from an interview, is an example of the behavior of a Team member in need of support. This group-type was the most frequently observed.

7.1.3   The Peers

A democratic structure, where all members are equal and nearly all group tasks are done in focused collaboration. Individual exercises and assignments are mostly done together and individual work is more or less restricted to literature studies on evenings and weekends, subsequently followed up by group discussions.

> If someone has a problem we always stand by each other, 100%. When you work like this it is a prerequisite to do so. We are a school in the school. We

> explain things to each other, give new angles of approaches, tips on good
> chapters or articles to read, share lecture notes etc. We have a close fellowship
> in our small group, and we are pleased when someone else has a success,
> there's no jealousy.

The typical Peers are a small group of 3-5 people with a high level of motivation and engagement for all members. ICT is used in the purpose of community maintenance and awareness and seldom for communication with teachers. The Peer approach was found to be the dominating strategy for sub-units in two of the communities, in all course elements where small groups were suitable or a prerequisite. In one case a somewhat awkward situation arose when two groups with different ways of working were forced to co-operate in one of the course modules. One of the groups was a typical Peer-group, while the other group varied between Crew and Crowd behaviour. A woman in the Peer-group made the following comment (quoted from her diary).

> This group work doesn't work at all in this big group constellation. And this
> time we had a really difficult assignment to solve too. […] We are not used to
> working this way, we usually work together and try to actually learn
> something, not to just get the job done and get it over with as soon as
> possible.

7.1.4 The Crowd

This label, aims to describe the situation where a collection of individualists chooses to deconstruct an assignment into parts which is required to be performed by a group. Most work is done from home, and little resources are spent on coordination and fitting the pieces together.

> …we do the work at home, we are dispersed so you think twice before going
> to the centre. Do you REALLY have to meet with the others or can you
> manage on your own? I mean there is always email and telephone - that's
> preferred!

The use of ICT for these purposes is restricted to individual interaction with teachers and other group members when questions or problems relating to the successful completion of their subtask arise. The crowd-approach is not observed as the preferred strategy in any of the communities, but appearing as an alternative approach in situations where the group members are poorly engaged and less committed to the assignment.

7.2   The Role of IT

The above presentation of the four group types indicates how some differences with respect to the use of IT emerged from the data analysis. To some extent, such claims of uniformity with respect to IT-use is tentative, in the sense that the use-patterns observed could not be strictly mapped to all individuals of a group at a certain point of time. However, if each group type were to be connected with a primary purpose and a primary functionality with respect to group work, the labels (in Italics) of fig. 7 came closest to synthesise the primary focus of IT-use in the various group types. Crews were primarily oriented towards using IT to coordinate the division and merging of sub-tasks in exercises and assignments. In Teams, IT was frequently used for administrating physical meetings at the learning centre, and subsequently to update members that was absent from group gatherings.

Similarly, Peers were oriented towards socialisation and maintenance of personal relationships, whereas Crowds tried too minimise group interaction that went beyond mere negotiations of how to complete tasks with minimum effort and engagement.   It is also interesting to contrast these local foci for IT-use in work together with co-located group members, with the more global purposes of using IT for interaction with peers ands teachers outside of the learning centre. From interviews, and to some extent also from diaries, we can detect some differences in the way students used public discussion forums and teacher emails. The clearest tendency that could be observed was that public student-student interaction seemed to be more frequent among Teams and Peers compared to Crews and Crowds. Furthermore, Crowds and Crews were more active in sending email to teachers requesting help with assignments.

Crew _Coordination_ **Local**: Coordination of sub tasks with email and telephone Global: Teacher email and discussion forum for individual support	Team _Communication_ **Local:** email and ICQ for team management Global: tutoring of groups with email and forum
Crowd _Tutoring_ Local: Minor email negotiations of minimum demands for individual work **Global**: Requiring help from teachers with email, discussion forum for evaluation and socialising	Peers _Socialising_ Local: email and ICQ for group maintenance **Global**: Socialising and replying to questions on discussion forum

Figure 7. Focus for Use of IT for Global and Local Interaction

The discussion forums of the DisCo system can to some extent be used for establishing a shared community for all students in the project (Svensson 2002). However, the interviews show that the frequency at which students read and/or posts messages varies within wide ranges.

> I check it out occasionally, but I never write anything.

> I read all entries and go there often, sometimes several times a day, especially if there is some interesting debate going…some gossip or so.

The frequent users can be found at all learning centres and in all group-types, but it is worth noticing that the density of frequent users is much higher on the two smallest learning centres. It appears as though a small group of co-located students increase the motivation to interact with their virtual peers. The data reveals much information on the students' perceptions, attitudes and expectations regarding their situation and daily habits as distance students. However, there are no indications of these aspects being correlated to the different ways the students organise individual or collective studies. The nature of the study environment in distance education as open and flexible is a contrast to the traditionally organised education, and can be a source of various frustrations for the individual distance

student (Hara & Kling, 1999). At the same time as distance learning expands the educational opportunities it involves some obstacles in the way for individual as well as social tasks. These obstacles can be very frustrating and result in distraction and less efficiency for the student.

> The weekend between week 43 and 44 I spent 2 hours trying to reach someone who works at our learning centre and who is able to tell me the actual opening hours for the upcoming week. We would like to finish an assignment and need the technical equipment, no luck, I give up […] next morning after one hour of persistent phoning I finally reach the janitor and get the information I want. I can email the other group members and we agree to meet on Monday morning at 9 am.

8.   Discussion

Studying how work is organised and performed leaves a clear impression of a strong cooperative working culture. This collaborative atmosphere is supported by, what Fjuk (1998) refers to as a tension between organisational and pedagogical aspects. In systems analysis education it is customary to include several assignments and exams that should be performed by groups rather than individuals. Additional support for this social orientation can be found in the field between technique and organisation, namely the physical organisation of the distance education project, with learning centres equipped with videoconference facilities and computer-labs at each participating municipality.

Even though social work dominates over individual, the study reveals several differences with respect to interactional patterns that cannot be explained using Fjuk's triadic framework. One plausible dimension that could contribute significantly to explaining these differences is the element of individual engagement (Nuldén, 1999). Groups where the members had different roles, (the Crew & the Team), seems to vary with respect to the engagement of different group members, and the leaders and coordinators who are most active and engaged. Groups where the members played equal roles tended to be more equal also with respect to engagement. The Crowd, being a collection of poorly engaged students and the Peers - a tight and highly engaged collective. However, this should not be seen as an evidence of that the group-type is a dependent variable, modelled and explained by the group members' level of engagement as a set of independent variables. Reversing the direction of this dependency offers an

equally relevant reflection, namely that the engagement of an individual could be influenced by the way a group is organised. It is probably hard to resist the invitations from enthusiastic Peers, and equally difficult to maintain a high level of engagement if surrounded by reluctant people in a Crowd.

When reflecting on how the different group-types relate to outcome in terms of learning, it is tempting to try to connect the group-types to a matching approach to learning (Marton and Säljö, 1984) and the different study orientations (Ramsden, 1992). And indeed, the possibility to do so seems, at least theoretically, promising. The tendency to prefer division of labor in favor of focused collaboration is coherent with the typified behaviour of a surface-atomistic approach. Both strategies involve the deconstruction of the whole into parts. Consequently, work patterns dominated by focused collaboration are, if not a sufficient, at least a necessary condition for holistic understanding to occur. However, we do not rule out the possibility that a member of a well organised Crew, where much time and efforts are spent on coordination and merging the different sub-tasks could end up with a holistic overview of the task in question. Since the approach a certain individual adopts, by definition, is situational and strongly dependent on the characteristics of each task, it is hard to find substantial empirical evidence to confirm such a connection between group-types and approaches to learning. The study-diaries contain some entries supporting these connections, but the interview-data does not allow for certain answers and statements to be connected to specific course elements or events. The interview data should rather be interpreted as expressions of the interviewee's average or default approach to learning situations, and is therefore more useful in providing an image of, what Ramsden (1992) calls, the general approach to learning or study orientation used by a certain individual.

Applying these concepts to the characteristics of the four group-types found in this study, result in a good match between meaning orientation and the Peers. Both concepts include active interaction, engagement, satisfaction and a holistic approach. In the same manner, the non-academic orientation matches the properties of a Crowd with low level of engagement, satisfaction and ineffective ways of organizing work. It is not equally obvious how the strategic and reproducing orientations respond to the group-types. There are some examples in the case study, where a group classified as a Crew, resembles the hallmarks of the reproducing orientation, with an atomistic approach and a tendency to delimit their work, not to exceed the demands of the task in question. In other cases, a well performing Crew runs a lean operation, focused on producing a high quality product at the lowest cost. Focus is goal oriented and set on good grades, which is

more compatible with the hallmarks of the strategic orientation. The Team is the group-type that is most ambivalent with respect to its study orientation. Some Teams appear to have a somewhat strategic orientation, but most of the observed Teams cannot be said to have one shared study-orientation for all members. Perhaps these Teams are better perceived as consisting of two groups? A core of engaged leaders, functioning as a miniature group of Peers with a holistic approach, and a remaining group of members resembling an attached Crowd, sometimes not even present at the work activities of the group. The way information and communication technology is used within various groups is consistent with the types of collaborative levels it is supposed to support. Division of labour calls for coordination of files and coordinating communication, focused collaboration is more aligned with pure communication through email and chat. As was reported earlier, most focused collaboration is done in face-to-face sessions, perhaps due to the fact that the DisCo system does not provide advanced support (for example. shared documents, Bannon and Bødker, 1997) for such work to be conducted when separated in time and space.

Looking at the way technology is used to communicate with teachers, and contrasting it with the differences in approaches to learning discussed earlier, suggests an intriguing connection. It seems as though the deep-holistic approaches of Peers and (the core of) Teams are connected with low tendency to use IT for interacting with teachers regarding problems and questions concerning the subject matter. Instead most problems are solved through discussions within the groups. To send an email with a question to a teacher is considered the last option when the group has failed in coming up with a solution, or when the group for some reason cannot get in contact with each other. Questions directed to teachers through email are much more frequently used in individually oriented groups with a higher tendency to a surface-atomistic approach.

This could imply that teachers should regard it as comforting when he or she hears nothing from the students, and start getting worried about the quality of learning when the email starts piling up. This validity of this somewhat tentative claim can of course be questioned, but the possibilities of in-depth face-to-face collaboration is a major advantage when organising DE around learning centres. Haythornthwaite (2001) argues that group-based interaction risks dominating over class-wide interaction when group assignments are used in a course, thereby reducing the size of the class, and consequently the individual's exposure to other's ideas. She advocates that this could be balanced through providing appropriate tasks and tools. In this case the discussion board at the course sites was used and appreciated by many as a forum where a joint community could

form. However, these initiatives for class-wide interaction were more or less solely driven by the students and were in that sense not exploited by the teachers. The challenge is consequently to find tools and tasks that not only aids in creating a discourse that is rich, both on the level of class-wide communication, and on the level of group work, but also aids in supporting group work that is oriented towards meaning.

The interplay and relationship between the local and the global, between being physically co-located and being geographically dispersed constitutes an interesting element of the mixed-mode design in learning centre based DE. With this type of organisation we can combine the benefits of small-size co-located groups where isolation and frustration are less likely to appear (Oren et al. 2002), with a global community where the quality of learning discourse could prosper from the fact that ideas are discussed in a bigger group (Haythorntwaite 2001).

9. Conclusions

The study shows that, a clear social dimension and a strong fellowship between students in the same community dominate the work for the students. As a complement to the local community it is possible to distinguish how ICT (DisCo) is used as a medium to create embryos of a virtual and global learning community for the group as a whole. Firstly, the study has identified four different ways of organising collaborative studies (Crew, Crowd, Team and Peers). The different group types differ depending on whether they are individually or socially oriented, that is, if division of labour dominates the work, or if it is primarily concentrated towards focused collaboration. Yet another dimension that diversifies the groups is whether the members have different or equal roles when it comes to the work task.

Secondly, The analysis of the material indicates connections between the identified group types and the study orientation of the individual students. Ways of studying related to understanding is mostly common within groups distinguished by focused collaboration (Peers and Team). The non-academic orientation can be matched against the Crowd distinguished by a division of labour.

Finally we see indications of a connection between group type and to what extent the students make use of the teacher as a resource for problem solving and support. In well-functioning groups, mostly Peers but also Team and Crew, it

is common to turn to the teacher for help as a last resort. For a group with less motivation and a more strategic or non-academic orientation (Crowd & Crew), contacting the teacher is one of the first alternatives when a problem has come up or a task needs to be solved. The validity of this claim, and to which extent it can be generalised, is an issue for further research.

Exploratory studies such as this is important in order to gain a rich understanding of the situated nature and conditions of different DE-practices. The group types described in this paper can serve as simple templates for understanding and interpreting activities, performances and processes in various DE settings, thereby guiding teachers and designers in improving tasks and tools.

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Sixth Paper[17]

Less is More in Distance Education:
The Contradictory Relationship Between
Rapid Adoption and Radical Innovation

Abstract: This paper reports on an exploratory study of the introduction of a system for web-based education at a Scandinavian University college (HTU). The study documents how the system was rapidly adopted and spread throughout the organisation, in spite of remarkably little assistance from central management to support the process. The results indicate that this can be explained by the lean characteristics of the system in combination with social factors such as demands from students and shared perceptions of technology. Finally, it is concluded that technical and methodological innovation to some extent is obstructed by the same factors that support diffusion and adoption.

1.   Introduction

Internet technologies are in many ways changing the conditions for Distance Education (DE). This change partly relates to the Internet as an information technology with a potential to create innovative and interactive learning environments, but it also relates to the Internet as a communication technology with flexible support for a wide variety of interactional designs (Svensson, 2002; Braa & Sørensen & Dahlbom, 2000). The past decade has seen a steady growth in web-based DE initiatives, making it a phenomenon that concerns an increasing number of educational organisations. In this sense, DE is no longer an issue only for an enthusiastic minority of pioneers, but is rather becoming a concern for large segments of faculty (Wolcott, 1995). When moving from experimental projects to

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large-scale programs it is likely that new sets of questions and concerns will surface. As predicted by Bannon (1995), the question of rejection or adoption of learning technologies will be an issue at both the classroom and the organisational level.

Previous research has focused on how the success of learning technology depends on a number of student related factors (e.g. students' confidence in technology (Atkins & Vasu 2000), student satisfaction (Motiwalla & Tello, 2000), student frustration, (Hara & Kling 1999), and student engagement and empowerment (Nuldén, 1999). Others have explored the importance of teacher oriented issues such as training (Farenga & Joyce, 2001), design of content (Gilbert, 1999) or social presence (Gunawardena, 1995). To a large extent this research focuses on the individual teacher and learner as the unit of analysis. The social nature of adaptation of collective technologies in an educational setting is consequently neglected (see e.g. Limayem & Hirt, 2000 or Fjuk, 1998 for exceptions). In research on the introduction of groupware technology in knowledge intensive organisations, it has been found that the adoption is influenced by a number of organisational factors such as incentives and reward systems (Orlikowski, 1993). Furthermore, introduction of technology has been found to be a dynamic and evolutionary process where technology is contextualised, structured (Orlikowski & Yates & Okamura & Fujimoto, 1995), negotiated (Svensson, 2002) and domesticated (Silverstone & Haddon, 1996) in use which sometimes leads to unintended and emergent changes (Ciborra, 2000). Consequently, it is important to acknowledge that communication and collaboration technologies should not be perceived as neutral delivery systems, but rather as agents for change (Meyrowitz, 1985; Braa et al. 2000; Svensson, 2001; Svensson & Sørensen, 2002). In summary – there is a need for research that recognises the social aspects of the introduction of collective computer-based learning environments into educational organisations.

The main research question addressed in this paper is, *what factors are central to the adoption and innovation of distance educational technologies and how does such technologies interplay with the innovation of practice?* More specifically, the paper explores the introduction of a system for web-based Distance Education, (DisCo), at a Scandinavian University college (HTU). The focus is set on teachers' individual and collective attitudes, perception and expectations in relation to changes in work practices implied by the new technology. The results indicate that the fast dissemination of DisCo to a large extent derives from the lean characteristics of the system. Furthermore, the experiences document how fast adoption goes hand in hand with the establishment

of a rather uniform culture for delivering distance courses, where innovation and incremental change is triggered by breakdowns, technological curiosity and reflections-in-use. The results also imply that more radical change is obstructed by the same factors that promoted quick adoption.

The next section presents theory relevant to the understanding of adoption and change processes in an educational context. Section three briefly outlines the research setting and the DisCo system. In sections four and five the findings are presented and discussed.

2. Learning, Technology and Change

2.1 Understanding Learning

Every teacher, tutor or instructional designer has his or her individual view on learning that is expressed as a "pedagogy-in-use". Such a personal theory of learning can be aligned with one, or influenced by many pedagogical theories from literature, but are to a large extent dependent on personal experiences and preferences of learning, (Nuldén, 1999). Some people are rooted in the behaviourist tradition where learning is viewed as a process resulting in changed behaviour. Others draw on constructivist ideas, where learning relates to the way students explore the concepts and interrelations of a complex phenomenon (Berg, 2000). Williams (2001) summarises the differences in perspective on learning in three archetypal ways of understanding a student. Two of these ways have clear implications for teacher behaviour: The student-as-product perspective implies that an education consists of an assembly line of courses where teachers are seen as content experts who are responsible for injecting knowledge into a passing stream of students. Alternatively, a student-as-worker perspective means that the classroom is viewed as a workplace where students (in collaboration) construct new knowledge, coached by the teacher. Research in the 1970's and 1980's showed that learning is a content-dependent process, where the approaches to learning can be oriented towards reproducing or understanding depending on a number of content related factors, (see for example Marton & Säljö, 1984 or Ramsden, 1992). In the 1990´s focus has been extended to encompass the context as central to learning, and the work of anthropologists such as Lave and Wenger

(1991) (see also Brown & Duguid, 1991; Wenger, 1998) offers theoretical frameworks that emphasises the social community of practice where learning occurs. These fundamentally different views on learning also influence the understanding of the role and potential of technology in the context of education (Berg, 2000).

2.2 Understanding Technology

Just like our views on learning are formed and socially constructed through past and present experiences, so are our attitudes towards technology. In order to interact with technology, people have to relate to and make sense of the particular technology in relation to the context it is used in. Weick (1995) argues that this process of sense-making is to a large extent dependent on the individual user's pre-existing attitudes and perceptions, and Wenger (1998) views the sense-making process as collective negotiations. There is of course a complex web of contextual factors that influence how we think about technology, and a continuous flow of interaction with other people and new encounters with technology ensures that our relations to technological artefacts keep changing over time. The character of the systems to be adopted also influences the way we perceive them, and subsequently influence how they are used. Robertson, Sørensen, and Swan (2001) states that system complexity is a potential barrier for adoption, and shows how lean and simple technologies such as email are preferred in favour of complex systems, where novice users could risk developing poor mental models of the technology (Orlikowski, 1993).

Orlikowski and Gash (1994) propose the concept of *technological frames* as an approach that deconstructs people's underlying assumptions, expectations, attitudes, knowledge and experiences of technology into three dimensions of the individual's technological frames. (1) The nature of technology, which should be understood as an individual's perception of the potential and functionality of the technology in question. (2) The Strategy of technology should be interpreted as the individual's perception of the underlying reasons of implementing the technology. Finally, (3) the technology in use refers to people's understanding of the relation between technology and its use-context. These conceptual models or technological frames are essential when the individual interprets and understands his and others encounters with information and communication technology.

2.3   **Changing practice**

The introduction and use of collective technologies has the potential, if adopted, to change the organisation and its work practices. As stated earlier, these processes of adoption and diffusion depart from the way we, individually and collectively, think about technology in relation to work. On an organisational level change and innovation can be furthered and obstructed by several factors. Brown & Duguid (1991) advocate that organisations need to be enacting, i.e. an organisation that through experiments and trials not only adopts to changes in the environment, but also is proactive in shaping the context in which they function. Voß, Procter and Williams (2000) argue that design and use should not be treated as separate issues, and that change and innovation in relation to implementation of new technology is collectively constructed in use (see also Orlikowski et al., 1995). They present a framework where innofusion (incremental change to technologies during adoption) and domestication (exploiting the affordances of technology in relation to situated practice, see also Silverstone & Haddon, 1996), are overlapping processes of social learning. Orlikowski et al. (1995) argues that such contextualisation of technology is dependent on key users, that through various strategies such as episodic change and reinforcements, meta-structures the use of technology. Henfridsson (1999) shows how adaptation can be hindered through organisational resistance if users fail to develop common sense of a new system. Orlikowski (1993) find that groupware systems risk failure in the absence of organisational incentives for knowledge sharing and collaboration.

3.   The DisCo Case

The findings reported in this paper are part of a longitudinal research project that focuses on a distance education program that started in January 1998. Each year 50-60 students engage in full time distance studies for a B.Sc. in Applied Systems Analysis. The students meet in groups of 5-15 people once or twice a week for videoconference sessions at their respective learning centres.

3.1   The DisCo System

The educational technology that was studied was a system called DisCo (Distance Courses). DisCo provides the possibility to publish course material and supports interaction learner-instructor, learner-learner and learner-content interaction (Moore, 1993). It is designed to overcome obstacles such as lack of computer/technology skills and maintenance overload. The teachers can publish course information such as the description and content of the course, the goals and methods of examination, presentation of involved teachers and help for students' browser-configuration.

       The interaction between all users is primarily facilitated through a public threaded discussion forum that can be used for student-student and student-teacher communication. In addition, each DisCo course has a simplistic email function for person to person communication. The system also provides possibilities to share files and hyperlinks, and to send group email by using the project group function.

Figure 1. The start page of DisCo at Campus Uddevalla

In figure 2, the functions and features of DisCo are presented according to the two level navigational structure of each course. All course maintenance is conducted via the Internet and requires only a standard web browser. The administrative part of DisCo is located in a password protected area of the web server, with a start page containing links to maintenance pages for all ongoing courses and some shared resources for all course providers. This page also contains the functionality to create a new course. In doing so, a small configuration file containing the names and email addresses for all teachers, as well as format specifications or file listings, is created. The teacher can alter these settings at any time. Furthermore, the creation of a new course triggers a small perl-script that among other things is

responsible for creating a predefined directory structure on the web server, to which all files used in the student interface are copied.

There are basically two different techniques or actions that a teacher needs to master in order to maintain a DisCo-course. Firstly, a number of the categories in DisCo contain static text/html documents. These files are created and updated through a web-form that shows the current content of the file. After choosing what file to update, the present content of the file is uploaded to a text-box where it can be edited by the teacher, and then re-submitted to the server. The more experienced teacher can choose either to hardcode html-tags into the text-boxes, or create complete html files in an editor of his/her own choice. Examples of files that can be edited this way are the headers for the dynamically generated file listings of the Course Material category, the static files of the Information category, and also more dynamic documents like the FAQ (Frequently Asked Questions) and the news bulletin that serves as the default starting page for a course.
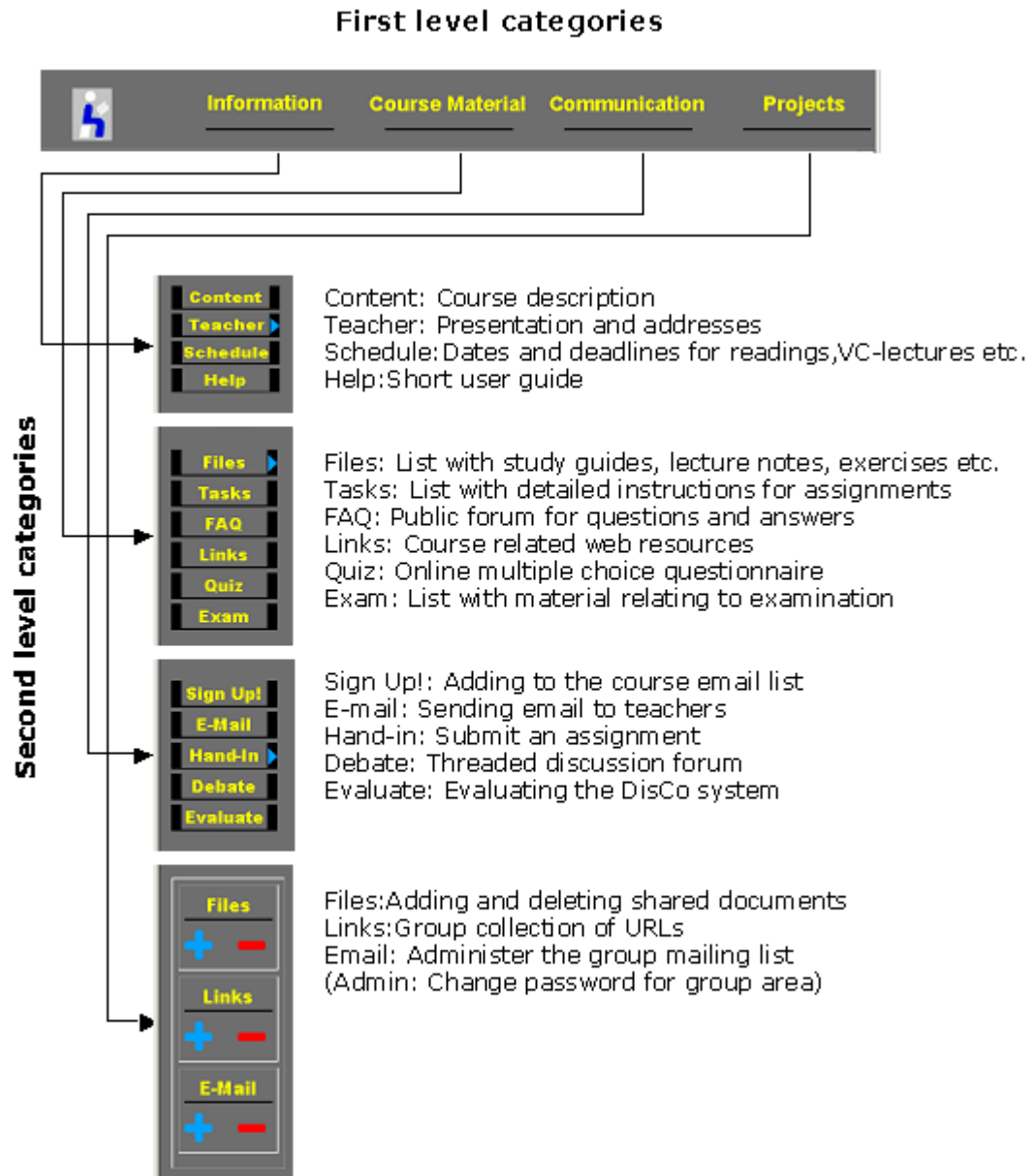
Figure 2. Functionality of the DisCo system

Secondly, a teacher should be able to maintain the content of the generated file listings of the Course Material category. For each of these, the interface has three buttons to serve this purpose: One to show the present content of the listing, one to add a file (plus-sign), and one to remove a file from the list (minus-sign). The teacher marks the file to be uploaded and writes a short text description of the content in the add-file dialogue. If the format of the submitted file matches the specifications in the course configuration file it will be included in the listing. The dialogues of adding a file or updating a text document both provide the possibility to check an option that will generate emails to all persons that have registered their address on the mailing list of the course. The message consists of

information on where the new file is available (with complete URL) and a short description of the content.

Figure 3. Example of a teacher page and the course maintenance interface

4. Methodological Approach

Exploring processes, such as adoption, adaptation and innovation of practice, require a longitudinal research design. Data from multiple sources was collected over a period of four years (1998-2001), in order to study both informants' attitudes as well as activities relating to these processes (see fig. 4). Teachers' perceptions, experiences and reflections on their work as distance educators was examined through a series of interviews (n=20) conducted during 1999 and 2001. In addition, the author moderated four thematic focus group sessions, where topics such as course planning, sharing of experiences and methods for collaboration and examination were discussed with voluntary participants (4-15 participants per occasion). In order to give a simple description of the way the system was used, a categorisation based on inspection of the course web sites that were used by the three first groups of students in the research project was made. During their first two years a DE-student takes a series of 13 courses (five or ten weeks each). Therefore, 39 DE-courses were included in the study. In order to contrast the results from these DE-courses, the courses from 2 classes on the corresponding campus program were also categorised. On the campus-programme 12 of the 13 courses used DisCo, resulting in a sample of 24 courses.
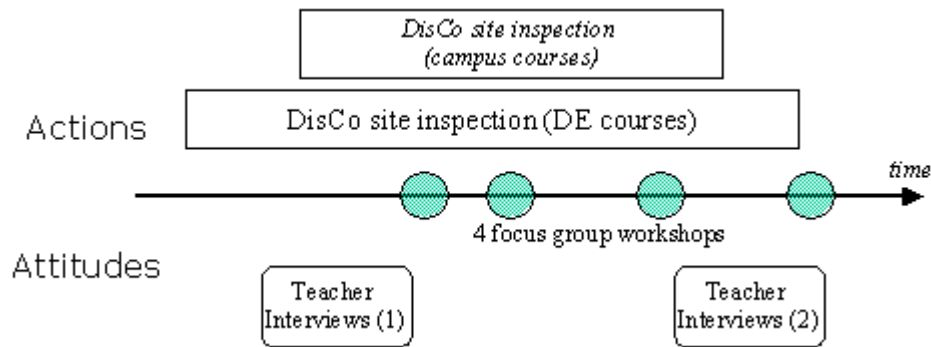
Figure 4. Data collection techniques used to explore the attitudes and actions regarding adoption of IT and innovation of practice

Each course site was classified using a simple framework derived from a taxonomy by Giroux, Hotte and Dao (2000), where elements and processes supported by a web based learning environment is classified as (1) *static elements*, (2) *dynamic processes* and (3) (peer or teacher) *assistance*. This framework corresponds well with the way the DisCo interface is divided in Information (static) and Course-Material and Projects (dynamic). The Assistance category only partially corresponds to the communication features in DisCo, since prior research (Svensson, 2002) revealed that these should not be understood only as assistance and tutoring, but rather as a web of interrelated activities that helps form and develop a community. Consequently, the classification framework was altered, labelling the third category *'communitising'* (Svensson 2002; Svensson & Sørensen, 2002). The classifications were conducted using a three level ordinal scale (Not used, Poor use, Rich use) for each of the categories.

5.   Results and Analysis

The study shows how the DisCo system rapidly spread throughout the organisation and how it was used for all courses on the DE project. It was also used in a majority of campus-based courses, initially at the campus in Uddevalla where the department that hosted the DE project was located. After three semesters DisCo had spread to the two other campuses in the organisation. Since the start in 1997, DisCo has been used in over 300 courses involving over 4000 students.

The level of use varies between different courses. Primarily, it can be stated that DE in general shows a higher level of teacher and student activity

compared to campus courses. Table 1 reveals that this is especially evident regarding its use as a communicative media.

Level of use	Static element			Dynamic Process			Communit -ising		
	N	P	R	N	P	R	N	P	R
Distance	5	15	80	0	30	70	0	50	50
Campus	29	25	46	0	62	38	25	70	5

Table 1. Percentage of DisCo-sites classified as being:
'Not Used' (N), 'Poorly used' (P) or 'Richly used' (R)

The typical campus course uses the file-categories (files, tasks, and exam) for publishing lecture slides and assignments, which are later submitted via the hand-in function. In addition, schedule, content and teacher pages are filled out. The typical DE course complements this with richer course material such as study guides and a rich use of discussion forums and project groups. Quiz and FAQ functions are only used in the most active DE courses.
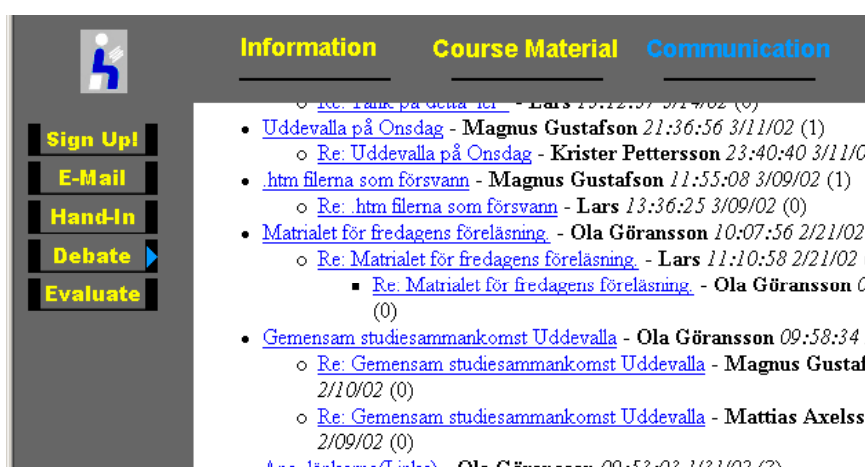

Figure 5. A threaded discussion forum

5.1 Adoption and Diffusion of Technology

Most teachers reported that they had no formal training prior to their first use of the DisCo system. Instead, they were introduced briefly through demonstrations by a technician or a colleague.

> "I think it is careless of the department to assume that we should learn these things by ourselves. I had to ask Jim [a colleague] to show me"

Consequently, the understanding of technology-in-use (Orlikowski & Gash, 1994) was to a large extent created while using the system, rather than something that was thoroughly problematised in advance. Most teachers created course concepts that resembled the campus based version, and they gradually adapted technology to overcome the problems that surfaced along the way (Wolcott, 1995). Working with the system and engaging in the DE practice resulted in a process where the teachers' technological frames gradually matured, moving from the understanding of DisCo as a neutral structure for delivering material and mediating communication, to a growing insight of ways in which the use of DisCo had impact on practice.

> "It seems as if the distance students are better prepared for class. You often get good questions on the current lecture. […]Maybe this is because they get DisCo-mail about new material."

Students often played an important role in this process by indicating demands and reporting failures and successes regarding both technology and educational context, (Svensson, 2001). Regarding the perceived nature (Orlikowski & Gash, 1994) of DE technologies in general and DisCo in particular, the teacher group seems to fall in to one of two categories. One group that thought of computer-mediated education as inferior to face-to-face teaching and that it was something that should only be used when absolutely necessary. However this view is less apparent in the interviews made in 2001, where teachers who were interviewed a second time, had started to appreciate the qualities of DE as more equal to traditional education.

> "It is surprising to see how well the Sydub-students perform, given the little time and the few lectures they are offered. Makes you wonder if we should spend all that time lecturing"

The other group was more visionary and imaginative with respect to technology. This group called for more sophisticated systems that would allow flexible and innovative teaching. In both these groups there were several comments on the shortcomings of DisCo. The fast adoption was not a direct result of excellent functionality. Instead the simplistic nature of the system made it possible for teachers to start with a minimum of technical preparation and pedagogical

reconsideration, which in turn made it possible to develop mental models that departed from existing (routine) practice.

Some issues relating to the strategy (Orlikowski & Gash, 1994) of distance education technology surfaced during interviews and focus group sessions. A common idea was that the main motivator for the organisation was to use DE as a way to recruit more students from new segments of the population, others thought of DE as a way for management to profile the organisation as modern and professional.

5.2   Innovation and Diffusion of Practice

When asked if and in what ways DE courses had caused change to their practice as teachers, most interviewees provided confirming examples. However, these examples mostly related to changes in teaching methods that had been provoked by reflections on practice-in-use. The majority of the changes was incremental and not related to the use of technology. Consequently, they were not restricted to DE-practice and were often introduced later (sometimes slightly modified) in campus-based versions of the courses. Many teachers also expressed their satisfaction of the way in which DE-teaching had provoked them to reflect on their everyday routines.

> "One of the nice things is that I can use the material I created for my distance course in [campus-based] class. […] This work would most likely not have been done otherwise."

There are also several examples of changes in practice that were more directly linked to the use of DisCo. These could be roughly divided into two types. The first type were innovations that extended DisCo with new modules or sub-systems. One teacher developed a FAQ-application for his programming classes, another team of teachers used a booking system where students could form groups and chose assignments through a web-interface. A third sub-system was a schedule-viewer that integrated DisCo with an external database that produced reports of all scheduled meetings. Finally, in one course the discussion forum was replaced with a asynchronous multimedia forum with support for submission of text, sound, images and video-clips. The second type of innovation made use of existing functionality to create new concepts for education. For instance, the discussion forum hosted structured forms of collective tutoring. Some teachers used group email for cross-reviews of programming code, and project groups

were used in one course to create a peer review routine for individual essays. It is difficult to find clear patterns with respect to what motivated and initiated these changes. However, as argued above, one source of innovation was breakdowns and perceived shortcomings that could not be dealt with successfully during the run of a course. Another motivation might be framed as technological curiosity (or optimism), and some teachers explained how trying new concepts was a natural element in their practice as teachers. It should be noted that teachers did not evaluate all these initiatives as successful. Sometimes such failures were due to negative reactions from students. On other occasions, as in the case of the asynchronous multimedia forum, the innovations were found to generate too much extra workload.

> "Some ideas cannot be launched, because the students would have to install lots of viewers and players to get the things up and running."

For the more successful initiatives there are still few examples of the innovations being transferred across courses or between teachers. To some extent this could be argued to relate to the time factor, and it cannot be ruled out that, given time, the degree of diffusion will increase. There are also didactical aspects that obstruct the possibilities for unrestricted diffusion. Not every teaching concept could easily translate from a course in business administration to a Java programming course.

6.   Discussion

The case study tells a story of the rapid adoption of the DisCo system. This process was partly pushed by the technology being simplistic and lean (Robertson et al. 2001). The low initial cognitive cost of adoption did not force teachers to explicitly express and confront the underlying assumptions of their pedagogy-in-use (Nuldén, 1999), and thereby made adoption less of an effort.

Consequently, more complex systems could have resulted in a slower pace of adoption, or even resulted in organisational rejection. Such risks does not only relate to the systems being time consuming to learn (Robertson et al. 2001), but also relates to the amount of initial re-engineering of practice that the teacher would face. The absence of training and preparation that was observed in the study, in combination with the existence of an installed base of a homogeneous teaching culture on campus, which were based on lectures, project assignments

and written exams, were important factors that could explain how a new, equally homogeneous, DE-culture emerged.

Adoption was also subject to "pull", in the sense that shared expectations from students (and to some extent also colleagues) explicitly and implicitly made rejection difficult. Consequently, the individual teacher's perception of the system was partly a social process (Orlikowski & Gash, 1994; Limayem & Hirt 2000). The fact that management attention, incentives and motivators were not part of this pull, partly contradicts the findings by Orlikowski (1993). The low management profile was perceived as supportive, yet not controlling, which probably hindered strong organisational resistance to evolve (Henfridsson, 1999).

The resemblance between traditional campus practice and DE-practice could be interpreted as an indication that technology was understood as a neutral media for delivery, and initially this was probably true for most teachers. However, the emergence of initiatives for change that was triggered by reflection-in-use (Wolcott, 1995) clearly shows how this gradually changed towards an appreciation of the situated nature of computer-mediated education (Orlikowski, 1996). Wolcott (1995) acknowledges how such reflections are influenced by the participating students, but only as passive creators of input for teachers' decision-making based on a rational wish to answer questions such as "How do I make maximum use of this medium while minimising its limitations?. In that sense, Wolcott fails to see how such reflections are better understood as negotiations (Wenger, 1998; Svensson 2002) between students and teachers trying to make collective sense of a new practice.

To some extent, the DE practice can also be argued to empower the student (Nuldén, 1999) in these negotiations. The increased visibility and public nature of discourse and activities (Svensson, 2001) makes it possible for students to act as a unified community (Svensson, 2002). Also, in this initial phase of the DE project, students are becoming more and more familiar with the new medium, while the teachers on each new course are generally less experienced with DE practice and technologies. This aspect can be expected to be more balanced in the future, as teachers develop more mature technological frames (Orlikowski & Gash, 1994) concerning DE. The study shows great variations regarding the maturity of each individual teacher. However, when reviewing the whole organisation as unit of analysis, there are signs of a gradual shift towards the student-as- worker perspective at the expense of the student-as-product perspective (Williams, 2001). It seems as if teachers rooted in the latter perspective experience the transition from campus-based teaching to DE as a

bigger change, and they are consequently forced to more actively engage in reflections and adaptation of routine practices.

The perspective on design of Educational Technology that is supported by this study is not to view design as something that is delimited to the functionality and interface of a software, and not as a process that ends when the system is introduced to an organisational context. Design should rather be understood as an ongoing development-in-use where domestication and innofusion changes the artefact as well as the mediated practice (Orlikowski, 1996; Voß et al. 2000).

It is striking how difficult it appears for these incremental innovations to spread throughout the organisation. Orlikowski et al. (1995) argue that such contextualisation of technology relies on the activities of technology-use mediators, i.e. key users that establish, reinforce, adjust and change the use of technology. As reported above, such activities did occur, but in order for them to have a meta-structuring effect, they need to be more transparent across the boundaries of each course and visible for a larger audience of teachers (Voß et al. 2000). Clearly, there were no or few formal structures that supported such visualisation of innovations. On an informal level, collegial discussions seemed restricted to technical issues, which supported adoption. Discussions concerning methodological and pedagogical issues were not as frequent.

The two types of innovations that were found in the study were both of an incremental, rather than a radical nature. The development of new sub-systems, which could be labelled innofusions (Voß et al. 2000) or episodic change (Orlikowski et al. 1995), has an arguably high potential of being shared between courses due to its tangible nature. Still there is little evidence of this happening. The only clear exception to this was the schedule system that linked DisCo to an external database. A possible explanation for the low rate of diffusion of these sub-systems is that, with the exception of the schedule-system, they were all of a specialised nature, thereby forcing adoption to be preceded by redesign and reconsideration of the DE practice. The other type of innovation was based on experiments with the limited set of basic functionality of the system. This type of activity is often referred to as bricolage or tinkering (Dahlbom & Mathiassen, 1993), and seems highly appropriate when dealing with lean technology, since familiarity with the system could be seen as supporting initiatives where the affordances of the system is reinterpreted. Both types of innovation are supported by an organisational culture, where decision making to a large extent is decentralised to the classroom. Teachers can, within generous frames, design, implement and evaluate changes without having to consult his or her peers or managers. This autonomy can consequently be seen as a factor in favour of

innovations. Simultaneously, it removes incentives to involve more people in the process.

The results from the study imply that radical innovations were obstructed by the very same factors that pushed and pulled the rapid adoption of DisCo. The lean nature of DisCo, in combination with a lack of training paved the way for DE-courses that were minimally translated from their campus based origins. Also the social factors, such as student pressure and collective sense-making of technology, aided in preserving the existing practice and obstructing radical change. This contradictory relationship between rapid diffusion and radical innovation does not mean that DE practice will not change over time. Instead, the results indicate that innovations are better accomplished through small scale experiments and reflections in use. An important aspect that could contribute to this domestication (Voß et al. 2000) is to increase the visibility of innovative experiments and to promote formal and informal structures for the sharing of experiences and knowledge between teachers (Voß et al. 2000). With such structures in place, there is an increased possibility for the organisation to become more enacting. Brown & Duguid (1991) state that:

> "..a typical enacting organisation have the potential to be highly innovative and adaptive. Within an organisation perceived as a collective of communities, not simply of individuals, in which enacting experiments are legitimate, separate community perspectives can be amplified by interchanges of communities. "(p. 54)

To increase the interchanges between such communities, consisting of the autonomous teacher (or a small team of teachers), is a challenge, not only for HTU, but probably also for many similar organisations in higher education. This is a challenge that needs to be addressed if computer-mediated education shall develop into a practice that can adapt to constant changes in information and communication technologies, and also be proactive in creating new conditions for technological innovation that could foster collaborative learning (Stahl, 2002).

The results from the study could not be generalised into a claim that the use of lean educational technologies is the only organisational approach when launching large-scale DE programs. However, the study does present a strong case that this strategy could in general be expected to overcome initial problems of technology adoption and diffusion. The study also highlights how educational practices change through incremental rather than radical innovations. Finally, it was argued that providing structures for the sharing of experiences among practitioners could accelerate the speed at which such innovations disseminate

through an organisation. With such structures in place - less could become more in distance education.

7.   Acknowledgements

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