CROWDS, CREWS, TEAMS AND PEERS: A STUDY OF COLLABORATIVE WORK IN LEARNING-CENTRE BASED DISTANCE EDUCATION

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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 are 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.

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 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, perhaps the 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 (compared 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.

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.

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.

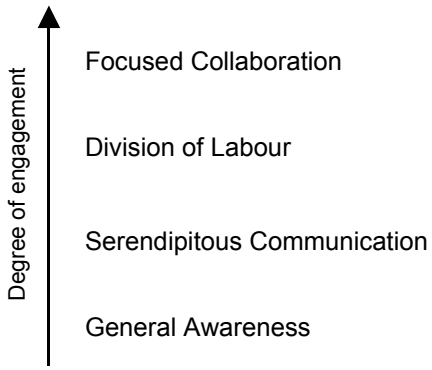

Fig. 1: Levels of collaboration, Gaver (1991)

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.

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.

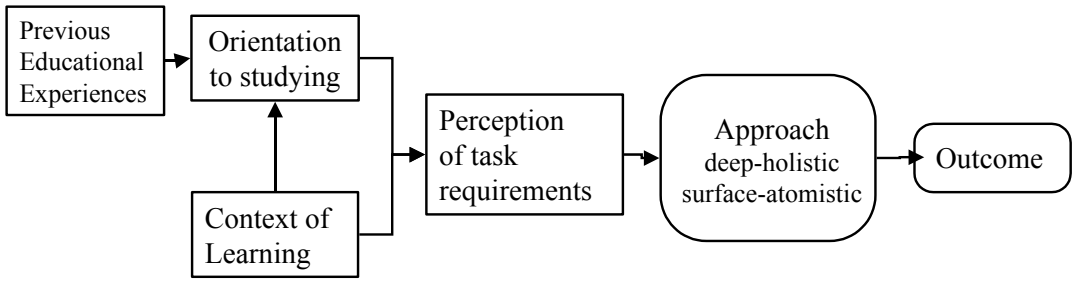

Figure 2. Student learning in context, (Ramsden, 1992 pp 83)

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.

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.

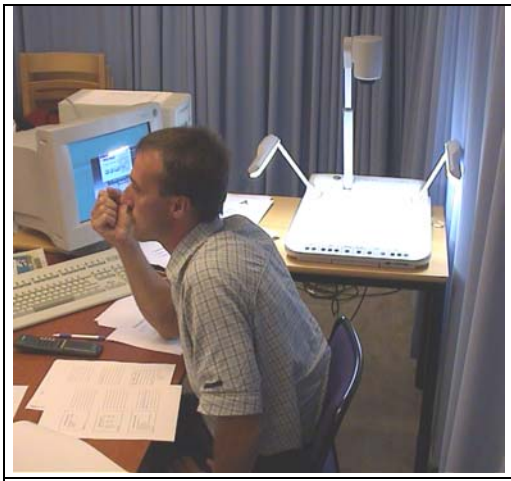

Figure 3. Teacher in VC-studio at Campus

Figure 4. Students in VC-studio at Learning Center

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.

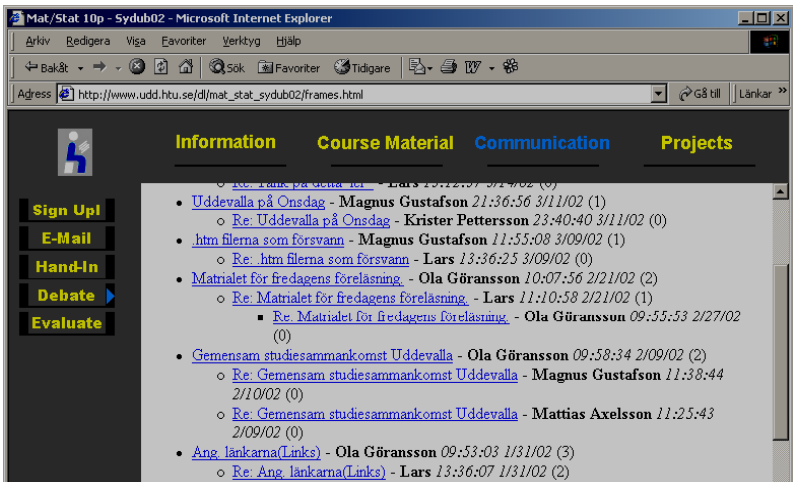

Figure 5. The start page of the threaded Discussion Forum in DisCo

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).

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

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.

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.

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 behaviour of a team member in need of support. This group-type was the most frequently observed.

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."*

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.

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."*

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).

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 learning community for the group as a whole. Furthermore the study has identified four different ways of organising their 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. 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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