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Distributed collaborative teaching and learning in a groupware environment

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ABSTRACT

Using FLE2 groupware (Future Learning Environment 2) we have tried to integrate a distance education course into the regular academic programme at Roskilde University, Denmark. The course was offered jointly by two universities, attracting students and involving teachers from both institutions. The course was evaluated by an external consultant. The practical and pedagogical problems encountered are discussed, and it is suggested that while net-based teaching may be suitable only under certain circumstances in a normal academic programme, skills of communicating and working in an online environment are important qualifications that should be introduced broadly into academic life.

Keywords

Future Learning Environment 2 (FLE2), net based collaboration, net based learning, online courses, resource sharing.

THE PROBLEM AND A POSSIBLE SOLUTION

The problem: Roskilde University, Denmark, though a fairly small institution (some 8.000 students) each year accepts a couple of hundred foreign students on various exchange programmes. We are able to offer only a limited number of courses in English, but we would like to offer more courses of high quality in a broader range of subjects.

A possible solution: An apparently rational way of improving the situation would be to share resources and students with other universities in a similar situation. In this particular case we chose to offer a course jointly with another university rather than just exchanging courses. Since our international courses are in English and the medium is the Internet we are limited in choice of partners by type of program and pedagogical and academic approach rather than geography. An additional reason for conducting such an experiment is the establishment in 2002 of a Danish Virtual University that promises to become a marketplace for online courses. Modularity, exchangeability and collaboration are buzzwords in the current discussion of how to modernize academic life to cope with internationalization, demands for increased efficiency and a national political ambition of becoming a leading player in the information society.

The outcome: The experiment reported upon is one of a series of courses offered to test an educational software system, The Future Learning Environment 2 (FLE2, <http://fle2.uiah.fi>).¹⁾ The course was not an unqualified success, the reasons for which are partly our inexperience in running shared online courses and partly the limitations imposed by the software.²⁾ However, it was a valuable experience for students and faculty alike, and it demonstrated that there is a need for teaching students how to communicate and work in an online environment.

THE COURSE

Since 1996 Roskilde University has been offering Open University courses as computer-based distance education in combination with weekend face-to-face sessions (Cheesman & Heilesen, 1999). Regular university courses, however, have remained traditional classroom sessions, increasingly augmented with e-mail and web pages. Since 2000 we have experimented with BSCW groupware (Basic Support for Cooperative Work, <http://www.bscw.de>) in the problem-oriented project work that is practised at Roskilde University, and in Spring 2001 we decided to base an entire course on a groupware product.³⁾

Initially four institutions participated in the planning: Department of Communication, Journalism and Computer Science at Roskilde University (<http://www.komm.ruc.dk>), Department of Media Studies at Aarhus University, Denmark (<http://www.imv.au.dk>), UIAH Medialab, University of Art and Design, Helsinki, Finland (<http://www.uiah.fi/>) and Centre for Research in Networked Learning and Knowledge Building, University of Helsinki (<http://www.helsinki.fi>). Eventually only students from the two Danish universities participated in the course, but a member of the Medialab monitored the course and took part in the discussions.⁴⁾

The course, *Methods in Internet Research*, dealt with two themes: research into communication *through* the Internet and research *by means of* the Internet.⁵⁾ In addition to these two themes we wanted to provide our students with a hands-on experience of working in a virtual environment. The course lasted for five weeks in March and April 2001, and on successful completion the students were awarded 3 ECTS points (European Credit Transfer system).⁶⁾

38 students were active in the course (22 from Roskilde University and 16 from Aarhus University), another 10 had been admitted but were not active. The Aarhus students were all Danes, The Roskilde students came from Spain, Italy, France, Canada, the Czech Republic and Denmark. The course language was English, but in the chat there were sometimes exchanges in Italian and Spanish.

The course was divided into four "net seminars" each lasting a week and each one introducing a selected theme from the vast field of inquiry.⁷⁾ Each seminar was run by one of the four course instructors working from home at Aarhus, Lyngby and Roenne in Denmark, Gothenburg in Sweden and Helsinki, Finland. The aim was to introduce the students to various ways of studying the net, not to make an in-depth study of methodology or net phenomena. Each net seminar introduced approximately 75 pages of reading on the basis of which the instructor assigned tasks to be performed or topics to be discussed by the students. These had been divided into four groups, each one consisting of students from both universities. A final week was reserved for the students to write an essay and present a portfolio of their contributions. There were only two face-to-face classes. At the start of the course there was an introduction in Aarhus and in Roskilde to the theme, to the software and to the pedagogy upon which the FLE2-system is constructed. And at the end of the net seminars there was a meeting at each participating university to sum up and evaluate the seminars and provide instructions for the final week of essay writing.

THE TOOL

The Future Learning Environment 2 (FLE2) is web-based groupware for computer supported collaborative learning.⁸⁾ It offers to each user a personal archive, the *Webtop*, and two collaborative environments, the *Knowledge Building Environment*, which is basically a conferencing system where threaded discussions can be organized in a hierarchy of folders, and a *chat room*, which is an implementation of the Ewigie software.

The Webtop is a folder into which the user can upload files and create a hierarchy of subfolders (figure 1). You can link from the Knowledge Building Environment to any file on any Webtop in the same course. In addition the interface is provided with a simple messaging system, *Stickies* (A yellow panel looking like a Post-It note), and a counter informing the user how many unread notes he or she will find in the Knowledge Building Environment.

The Webtop was used little by our students, and the Stickies feature was largely ignored — most likely because it allows only very short messages. Most discussions took place in the Knowledge Building Environment, but chat became an important supplement, and all groups regularly scheduled chat meetings. Logs of some of the chat sessions were placed on Webtops or were quoted in postings in the Knowledge Building Environment.

The Knowledge Building Environment (figure 3) has been designed to support the special FLE2 pedagogy consisting of problem based learning (PBL) and inquiry learning (described in Muukkonen, Hakkarainen & Leinonen 2000). Thus there are several categories of folders (Course, Announcement, Course Context, Starting problem), and there is an elaborate system to label all contributions according to their role in the evolving discussion (Problem, Working theory, Deepening knowledge, Comment, Meta-comment, Summary, Help, see figure 2). As it turned out, the system of labels was not very helpful in making complicated threads of discussions easily understandable. A functional problem, since corrected, often caused the students to use the default label if they were not careful. Furthermore, the use of the labels had not been taught sufficiently well at the introduction to the system, nor did the instructors insist that they be used properly. In addition to these rather technical explanations, the labels also seem to offer a conceptual problem in that it is not possible to match the seven labels and the eight stages of FLE2 pedagogy (Setting up the Context, Presenting Research Problems, Creating Working



Figure 1: Future Learning Environment 2 WebTop.

Theories, Critical Evaluation, Searching Deepening Knowledge, Developing Deepening Problems, New Theory, Distributed Expertise) — a match that most students intuitively try to make. Even if they are not supposed to be matched, users tend to match "Problem" with "Presenting Research Problems", "Work" with "Working Theory" and "Deepening Knowledge" with "Searching Deepening Knowledge" or perhaps "Developing Deepening Problems". But the following stages are not readily covered by the labels, and thus our users became somewhat uncertain as to what label to choose. It should also be noted that the discussion thread with its labels does not in any way graphically represent the stages of the progressive inquiry process (figure 4).

It should be noted that FLE2 makes some very strong assumptions about the pedagogy and the structure of the courses to be run in the system. It is meant to support Knowledge Building, an activity that

"occurs as students explore issues, examine one another's arguments, agree, disagree, and question positions. Collaboration contributes to higher order learning through cognitive restructuring or conflict resolution, in which new ways of understanding the material emerge as a result of contact with new or different perspectives" (Harasim 1989).

The FLE2 pedagogical model is founded primarily on the work of Carl Bereiter and Marlene Scardamalia (Bereiter & Scardamalia 1993).⁹⁾ It is a constructivist approach to education which has much in common with the pedagogy practised at Roskilde University where problem-oriented project work performed by students working in groups is the fundamental activity. Indeed, the spiral model of FLE2 pedagogy could be interpreted as a representation of the typical process of project work.



Figure 2: FLE2 Create New Note window showing the categories of inquiry.

However, in the course in question we did not adhere strictly to the FLE2 pedagogy, nor did we use the system quite as intended by its creators. FLE2 is a groupware system meant to supplement face-to-face classroom work. We used it as a conferencing and collaborative work tool in what has been primarily a distance education course. For this kind of use FLE2 is not optimal. Having to rely almost entirely on electronic contact between students and between students and instructors, and running a rather tight schedule we deemed it necessary to present the students with the themes to be discussed rather than letting them create their own research problems and working theories.

LESSONS LEARNED

Net based education is demanding for instructors as well as students

As mentioned, the course was an experiment in resource sharing. In terms of involving various competences the course was moderately successful. In terms of efficiency saving for the departments and instructors involved, however, it was not. Even for a first-time course it was extraordinarily time consuming for the teachers involved, and we experienced several both practical and pedagogical problems.

The practical ones began in the phase of preparation: Coordinating two programmes at different universities proved complicated, since the curricula are not yet geared for that eventuality. Planning a course by means of an FLE2 conference and e-mail was slow and prone to misunderstandings. And the formalities of registering students in the system and actually making them succeed in logging on were unexpectedly time consuming.

The screenshot shows a web-based course management system. At the top, there is a navigation menu with links for 'My WebTop', 'Knowledge Building', 'Chat', 'Library', 'Course Administration', '[bookmark]', and '[bugreport]'. The main content area is titled 'Methods in Internet Research' and is divided into several sections:

- Announcements:** Contains links for 'Assessment: Grades for course participation', 'What'll happen in the FLE22', and 'ASSESSMENT: Essay and Portfolio'.
- Seminar 1: The online interview & identity on the net:** Includes links for 'Group 3: discussion of the interview and reflection', 'Group 2: discussion of the interview & reflection', 'Summing up Seminar 1', 'Group 2: The Interview with Victoria', 'Announcement: Seminar 1 extended one day', 'Group 1: Preparing the interview', 'Group 2: Preparing the interview', 'Group 3: preparing the interview', and 'Group 4: Preparing the interview'.
- Seminar 2: Quantitative methods, cybergeography:** Includes links for 'Closing down', 'Group 1's discussion forum', 'Group 1: Getting started', 'Group 2: Getting started', 'Group 3: advice and preparing the work', 'Groups for seminar 2', 'Assignments', 'Discussion forum', and 'Readings'.
- Seminar 3: Online observation:** Includes links for 'observing chat', 'Life After Cyberspace', 'Group 1: Let the discussion begin', 'Unreliability persists', 'GROUP 2: GETTING START', 'Group 3: work in progress', 'Assignments', 'Discussion forum', and 'Readings'.
- Seminar 4: Virtual community and knowledge:** Includes links for 'Discussion forum: Group 3', 'Discussion forum: group 1', 'com bills over the internet', 'com people and technologies', 'Discussion forum: group 2', 'prob Note', and 'Assignments'.

Figure 3: Announcements, course context and starting problems of the Methods in Internet Research Course. Simplified screen shot of the key course contexts and with only a sample

of the starting problems.

Achieving an acceptable level of proficiency in using the system also involved extra work, and it slowed the course down from the beginning, leaving too little time for course content in the first net seminar. At the first meeting in class, the FLE2 system was introduced and about an hour was spent on a hands-on exercise in using the software. But clearly this was insufficient. Instructing thoroughly in the use of the online system is of course a one-off investment, but it is a heavy one for the first online course the students attend. The cost is not just a matter of the number of classroom hours spent on technical matters rather than substance. Also the instructor has to throw in more hours of online technical support.

All four instructors had prior experience in teaching net-based courses, so they were familiar with the special techniques of online teaching such as moderating discussions and helping create a sense of community. We had coordinated the academic programme in advance and outlined our different roles and responsibilities. But in our conventional shyness of encroaching upon the practices of a colleague we failed to go into detail about our pedagogical methods. Thus the students experienced four very different personalities and approaches to online tutoring ranging from laissez faire to zealous participation in even the smallest event. Naturally they were confused, and so were we, watching from the sideline as each new seminar introduced a new style of communication between instructor and students. The license for teachers to choose teaching methods as they wish, a cherished right in this country, has no future in online teaching.

The students

The expectations of the students accepted into the course generally were based upon a very limited knowledge about collaborative learning environments. Only very few participants had actually experienced working in an environment like this. Most of the students were expecting a rather smaller workload in this course than in the traditional classroom courses, and they were unprepared for the intensive amount of work required by the net based learning environment. Working in this environment involves getting acquainted with the FLE2 functionality, adjusting to a new way of working requiring you to take charge of your own learning in a mature and individual manner, reading — and documenting mastery of — some 300 pages of literature and of course participating on a regular basis in the seminars both by reading the postings of others and contributing to the discussions yourself. The amount of work involved in getting acquainted with the FLE2 system took many students by surprise and was commented upon. But it was clear to us as observers that adapting to the new way of working in an online environment was indeed the real obstacle.

At the beginning of the course most of the students felt uncomfortable about writing notes in the threaded discussions. Having to contribute actively to the discussions is revealing. The quality of each contribution — language mastery, level of understanding and analytic ability — suddenly became highly visible to fellow students and instructors. This had both positive and negative effects on the students. The positive effect was that they were able to see the discussions develop and get feedback on their postings. The students were required to participate in the seminar on a regular basis, at a minimum twice a week. But most of the participants were online nearly every day, and as the course unfolded they clearly became intrigued by coming online to look for new postings and to see who had commented on their own contributions. The negative effect was that some students were reluctant to participate in the discussions because they felt vulnerable and uncomfortable. Instead they became lurkers, just reading the contributions of others to the discussions and not adding to the collective knowledge. Students who overcame their initial shyness, however, became increasingly bold in contributing to the discussions, and some ended up being quite keen on the net-based way of working.

Students interviewed by the external course evaluator expressed that the course had been a rich learning experience as well as a frustrating one. Most of the students having no prior experience with distance education did not know what to expect, and in some ways they were in for a surprise. One of the main frustrations was that the amount of effort put into the course did not altogether match the academic outcome. Most students spent too much time on tasks that normally take only a few minutes in an ordinary conversation. Also the software system caused frustrations. The interface did not appear all that intuitive, and navigation seemed slow and complicated. Part of the blame should be placed on the course designers and not the software, as we will discuss below. But still, technical matters turned out to be an unexpected obstacle in the process of contributing to knowledge building.

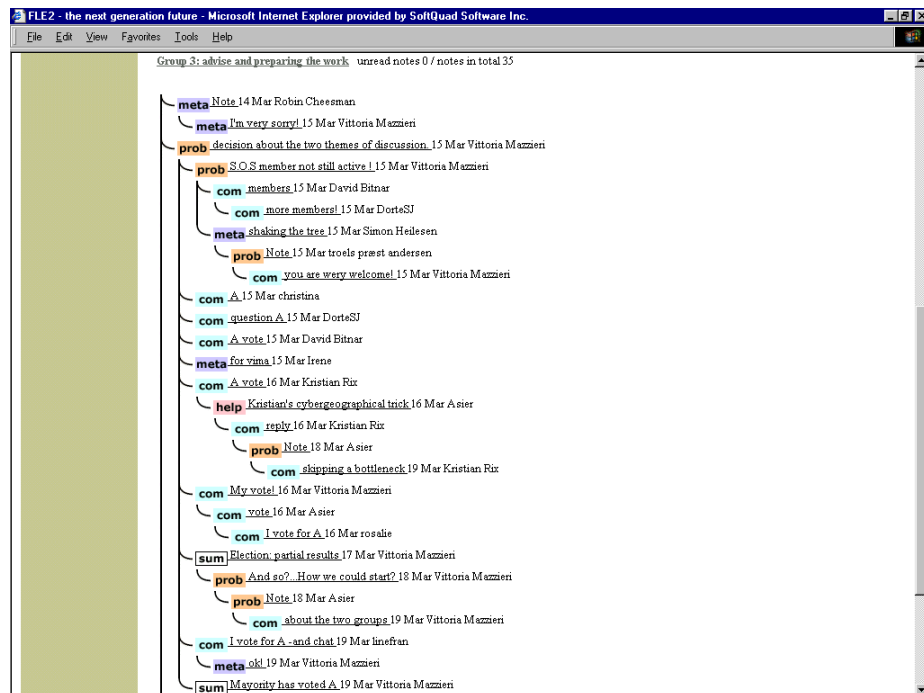


Figure 4: A thread in the Knowledge Building Environment. Discussion of what topic to choose.

Net based courses call for simpler solutions than F2F courses

Simplicity is important in distance education. This is even more so when the students are novices in computer-mediated communication. You cannot easily transfer to the net environment many of the activities that are normally performed in the classroom. Nor can you simply transfer the structure of the face-to-face course. In this section we will review a number of significant differences noticed or confirmed in our work with FLE2.

Making decisions

Making decisions is notoriously difficult in net-based collaboration and learning. Some decisions are unavoidable, such as: When is a discussion at an end? When has consensus been reached? (They often require the intervention of the moderator or of a student "whip"). But in general, students should not be given even simple choices that seem so natural in the classroom. Give a group of students the choice of working on problem A or problem B, and the result will be a meta-discussion going on for days in a conference that should be dedicated to substance (figure 4). As a tool for making decisions, chat is much more efficient than a conferencing system. But chat is only manageable with a small number of participants working in synchronous mode. We also noticed

that some students were reluctant to make chat decisions involving the entire group.

Allowing things to take time

The Internet Research Methods course had a tight schedule rather like the one you would have in a series of lectures in a classroom. This turned out to be a major mistake as most discussions took a long time to get going. Of course, asynchronous discussion in a conferencing system normally develops rather slowly as the participants are online at different times of the day. But it would seem that Open University students are more disciplined than regular students, the conferencing system being Open University students' main contact with the academic environment. Among the regular university students we observed a proportional relation between the duration and the intensity of the discussions. Extending the course was not an option for administrative reasons, since it had a time slot and just so many ECTS points. So the only way to deal with the problem would have been to reduce the syllabus. In other words, one should consider carefully whether or not the course subject is suitable for a net-based university course. An introductory course such as ours obviously was not. A course involving in-depth analysis of a well-defined and reasonably narrow theme probably would be more suitable. But all in all you should expect to cover less ground in an online course. Whether or not appropriation is better in the online course is a subject yet to be studied. The initial impression is that having to participate actively in the Knowledge Building Environment motivated the students to master the course literature.

Group size and social contact

As already mentioned Roskilde University has its own brand of pedagogy requiring students at all levels to do problem-oriented project work in groups. To the Danish students entering the Communication Studies programme, which is on the graduate level, working collaboratively is the natural way of doing things. But our foreign students usually suffer a cultural shock (though not necessarily an unpleasant one) when they are required to take charge of their own learning and to negotiate a common understanding with their fellow students. The online course was designed to alleviate some of the problems frequently encountered. Thus, the threaded online conference requires students to express themselves individually, negotiations become very explicit, and — working in an unaccustomed environment — all students are more on an equal footing than is usually the case. However, it was obvious that the students coming from a variety of educational environments needed time and encouragement to adjust to each other. The heterogeneity of the groups did make it difficult to establish a sense of community and obligation to contribute for the common good.

Social contact — or rather "social obligation" — is essential for successful collaborative learning. The knowledge gained in the group of participants in a course is highly dependent on the activity of all members, their willingness to contribute and their eagerness to share. The students did have face-to-face contact with fellow students at their home universities. But all contact between the two groups of students in Aarhus and Roskilde was virtual by means of FLE2. Identities were established partly by a "personal details" form in the system (including a 50_50-pixel photograph), partly by small CVs published in the discussion threads by several students, and partly by participation in the discussions. Evidently this was insufficient for establishing a sense of community and social obligation, and in future courses much more emphasis should be placed on community building. No matter how we assigned the work groups, the students from Aarhus University tended to communicate primarily among themselves, as did the international students and the Danish students at Roskilde University. As one student expressed it:

"I pay most attention to those I know. I do not pay much attention to the others because I do not know who they are, what they are trying to say and what sense they are saying it in. Given that it is rather frustrating to work in FLE2 it has meant much to my commitment that I have been able to work together with people whom I already know. It motivates me to log on to the system."

An additional reason for the somewhat low level of cooperation may be found in the differences in pedagogical tradition among the three groups of students. Project work done in groups is a way of life for Roskilde University students, it is rather less so for the Aarhus University students, and as mentioned earlier it is a new and challenging experience for most of the international students. This seems to be reflected in the discussion threads, where the postings by Roskilde University students tend to be the most reflective and independent.

Group size is a matter to be experimented with. In face-to-face project work on the undergraduate level groups of half a dozen students are common. On the graduate level groups are smaller, often three to five on early projects, and for thesis work the average is below two. For the FLE2 course we divided the students into groups of nine to ten to make sure that each group would have sufficient volume even if some students should turn out to be lurkers. During the course we had to reduce the original four groups to three because one group remained more or less inactive. Since most of the assignments involved discussion rather than collaborating on a project (such as a paper or a web presentation) we assumed that large groups would be appropriate. The groups did indeed generate a fair amount of contributions, but the process was hampered by the fact that many students in each group did not really get to know each other well during the five weeks of course work. Also being so many in each group may have encouraged lurking. If another student expresses more or less what is on your mind, you do not feel encouraged to butt in and repeat the argument.

Integrating online classes in a conventional setting

The Methods in Internet Research course was an attempt to offer online classes on equal terms with conventional classes. Full-time university students generally attend several parallel courses. Thus the students at Roskilde University are supposed to take four courses as well as complete a major project during one semester. Among so many simultaneous activities, the FLE2-course had difficulty competing for the attention of students. Absence from a face-to-face course is often observed by teachers and fellow students, and is normally preceded by a reflected cost-benefit decision by the absent student. Mostly, students do show even if they have not found the time to complete the recommended preparations, e.g. required readings. The reason for turning up even if unprepared might be the imagined or real threat of sanctions, or a hope to learn something without too much work. In a course on the net, based on the active participation of students, there is no such benefit awaiting the ill-prepared. You learn mainly from working with curriculum texts, assignments and from participating in a dialogue based on these. Just "being there" would not make much sense, and definitely not in an asynchronous environment as the FLE2. The competitive course context in combination with the relative uselessness of "logging on" without being prepared to contribute seems to have had a somewhat negative effect on student activity. At least this was the situation until the very end of the course, when several students suddenly became eager to fulfill requirements in a last-minute effort.

Nearly all universities offer parallel courses, and that has never been known to constitute a major problem. In virtual learning environments, however, parallel course activity is known to be counterproductive, and therefore learning activities tend to be organised as successive courses. In the present case we have had to accept the conditions applying to the conventional academic programmes of the universities involved in the experiment. But clearly creating a mixed environment where virtual and face-to-face activities must co-exist is not a trivial matter, and the successful creation of such environments is an area for further research.

Avoiding clutter

From the outset, the folder for the course in Internet Research Methods was structured as an online syllabus presenting all four seminars (divided into subfolders) in chronological order. Initially this provided a good overview of the course (figure 3). But as the number of contributions grew, so did complexity, and working with the system became a protracted affair. The print media logic of the course presentation turned out to be counterproductive in the online environment where speed and accessibility are all-important.

The FLE2 version used for the course automatically adds new folders in (a fixed) reverse chronological order, inviting you to build up the course gradually so that new elements always appear near the top of the web page. This facilitates overview, but in order to keep the Knowledge Building Environment simple and uncluttered, the best thing would be to break up the course into a series of short courses, one for each net seminar. However, presenting just one fragment of the course at a time may result in a kind of tunnel vision, robbing the student of an understanding of the course as a whole. Probably a better solution is to introduce a kind of "fish eye perspective", as we have done with courses run on BSCW. Here the top-level folder outlines the learning environment and links to e.g. "current net seminar" are used to refer to the flow of activities throughout the term.

LOOKING AHEAD

Being able to communicate and work collaboratively in net-based environments is likely to become an important qualification in 21st Century society. Becoming an expert in online work methods is already one of the attractions of our Open University Programmes such as the Master of Computer-mediated Communication (<http://www.mcc.ruc.dk>). Encouraging

the students to use CSCW-software in their project work we have also started in a small way to introduce net-based collaboration into the regular academic programmes. The course in Internet Research Methods has demonstrated some of the difficulties involved in integrating net-based teaching into a more conventional academic programme.

There are many new skills to be taught and mastered — both for students and for faculty, and in early courses such as the current one the problems of adapting to the new setting tend to overshadow everything else. In our course we have taken the extreme position of doing nearly everything online, whereas a mix of online and face-to-face sessions might have been easier to deal with. But still, the net result of the course has encouraged us to continue experimenting combining virtual and "real life" learning environments. The foundational setting for this work will be the Centre for Net-based Collaboration and Learning (CNCL, <http://www.cncl.ruc.dk>), which has been established at Roskilde University in the Spring of 2001 in order to encourage research and experimental work in the CSCL and CSCW fields.

NOTES

1 The course was evaluated by Mia Cudrio Thomsen from the Learning Lab at Copenhagen Business School. Data for the evaluation consists of: all course postings in the FLE2 system, e-mail correspondence between the instructors, interviews with the instructors before and after the course, a questionnaire filled in by the students at the start of the course and interviews with a sample of students at the conclusion of the course. The evaluation report (manuscript) has been used extensively as background for this paper.

2 We wish to emphasize that this paper is not part of the FLE2 software evaluation project and does not deal systematically with the functionality and pedagogical qualities of the system. It is a report on a teaching experiment that could have been performed in several other conferencing systems.

3 Since the Fall term 2000, BSCW has also been used in both our Open University programmes. For a preliminary report on our experiences using BSCW, see (Cheesman & Heilesen 2001).

4 Faculty for the course consisted of associate professors Joergen Bang, Aarhus University, Robin Cheesman, and Simon Heilesen, Roskilde University, external lecturer Eva Ekeblad, Roskilde University and system designer Teemu Leinonen, Medialab, Helsinki.

5 Research into communication through the Internet focused on selected categories of Internet based communication, intending to demonstrate the application of methods relevant to science communication and political communication. Research by means of the Internet focused on to what extent and how — augmenting and modifying well-known methods — quantitative and qualitative research can be conducted using the Internet as the (only) medium for communication.

6 In the ECTS system recently adopted in Denmark, a full year of study equals 60 ECTS point. 3 ECTS points are thus equal to two weeks of full time study, i.e. some 75 — 80 hours of work. The Aarhus University students participated in the course as part of a more extensive course, and they did not receive credits based upon participation in the shared course. Naturally this difference is reflected in the level of activity. The majority of the completely inactive students were from Aarhus University. But those Aarhus students who did participate contributed just as much as the Roskilde University students.

7 A net seminar involves moderated group work, either in the form of a discussion of course literature or in solving a task, fx. conducting, analyzing and presenting an online interview.

8 The FLE2 R&D project is supported by NordUnet2 (<http://www.nordunet2.org>), the Nordic Council of Ministers and by the Nordic Governments. Roskilde University is involved in the project in the capacity of tester and pedagogical evaluator and is scheduled to run three test courses in the project period. Each course is evaluated by external evaluators from the Learning Lab at Copenhagen Business School. The course described in this paper is the second of the three courses.

9 For a description of CSILE (Computer Supported Intentional Learning Environments) and a Bereiter & Scardamalia bibliography, see: <<http://csile.oise.utoronto.ca/>>.

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