

# **Supporting Problem-based Learning in Groups in a Net Environment**

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**Abstract:** Since 1996 the Communication Studies programme at Roskilde University (Denmark) has been offered as distance education. During the four years, we have improved our means to achieve a functioning CSCL pedagogy, developing from initially a somewhat naïve translation of face-to-face and group organized PBL to an online context, into a now rather reflected CSCL learning concept, with intensive facilitator/supervisor involvement.

In this paper we seek to identify ways of supporting PBL in groups in a net environment. This exercise is based upon four years of continually refining the conversion of pedagogical principles from face-to-face teaching at Roskilde University to Open University activities using WWW technology. In this process we have been looking for a software concept that could help implement our ideas by supporting students and teachers in their efforts.

While smart technologies may make it easier to transfer messages of all kinds (including multimedia components) and to co-operate on distance, pedagogical insights and competencies cannot easily be replaced.

**Keywords:** problem-based learning, project-based learning, scaffolding

## **Problem-based learning at Roskilde University**

Since its start in 1972 Roskilde University has practised a set of pedagogical principles that still are novel and controversial to many higher education settings. These include notably:

- Group work
- Project organized work
- Problem-based learning
- Interdisciplinary approach.

These principles guide studies at both undergraduate and graduate levels at Roskilde University, extending even to the exams which are mostly carried out as group examinations (with individual assessment). In 1972 it was quite a radical setup, unheard of (in Denmark) as an institutional set of guiding principles, covering most educational activities.

Since then, much has happened. Other Danish universities have recognized the benefits of group work, project work and problem-based learning (PBL) - but very few if any have as yet implemented the "Roskilde model" in its entirety. However, elements of the Roskilde concept have been introduced at many educational institutions. PBL is a widely employed learning

model, group work and project organisation are to some extent conducted and recognized in many educational settings. At Roskilde radicalism has softened, and individual studies and individual assessment are now also part of the recognised pedagogical toolbox.

At the beginning of each term the students form groups, each with an appointed supervisor. The group is formed on the basis of common interest in a problem or a topic which may be chosen rather freely within the framework of an interdisciplinary theme. When approved by the teacher it is explored in the ensuing project work which constitutes most of the students' workload. Project work deals with real life problems, and the nature and development of the project is determined by the approach used by the group. Often it is an interdisciplinary one, reflecting the fact that matters in the real world often are too complex to be restricted to only one academic discipline. Project work amounts to 50 - 70% of the total study time.

The group learns mainly by reading, discussions and contacts with relevant people, institutions and firms. Progress is reviewed at tutorials. The group itself can greatly influence the way these elements are joined together. At the end of the term the group hands in the results of their work in form of a project report, which is then evaluated.

In addition to the project work the students attend courses and seminars, some of which are mandatory. Subjects may relate directly to the issues dealt with in the group projects or may provide general knowledge of the theories and methodology of one or more disciplines. Because of the focus on interdisciplinary, problem-oriented and project-organized group work, studies at Roskilde University are not limited by traditional subject boundaries.

### **Communication Studies at Roskilde University and InterKomm+**

The Roskilde University Department of Communication specializes in the communication to the general public of professional, scholarly and scientific information and research. Our programme, briefly described in the [appendix](#), differs from most other European university programmes not only in its focus on "science communication", but also in requiring students to become proficient in producing presentations in one or more media. The choice of media ranges from oral and print media to interactive multimedia and the Internet. The concept of "target audiences" is central, and communication activities are to be designed specifically to their intended audiences. This focus has inspired numerous theoretical and methodological considerations and has led to the development of new qualitative research methods, a variety of dialogue based methods and the refinement of interviewing techniques.

In 1995 plans were made to offer communication studies as a three year part time postgraduate distance learning programme. The distance education version was named InterKomm+ (*Internet delivered Communication studies + something more, notably CMC competence*). It is directed towards adult learners with substantial work experience from a variety of professions and it is offered as a combination of online distance learning (80%) and face-to-face weekend sessions (20%).<sup>(1)</sup>

One of the assumptions of InterKomm+ has been, that the combination of virtual and real contact, long advocated in the Scandinavian tradition of distance education <sup>(2)</sup>, would be indispensable to the success of the programme. Firstly, it is much easier for people to collaborate when they know each other well, and a meeting in Real Life can never be matched by photos,

CVs, home pages and the like. Secondly, in a country where distances are certainly not an argument in favour of distance education, and where the entire pedagogical tradition is based on the ideas of Grundtvig and Kold (3) it would seem absurd not to meet and combine learning with a social and cultural experience.

Each of the three modules starts with a weekend session. Weekend sessions are used for:

- introductions to new subject areas, through
  - brief courses
  - seminars
  - workshops
- group work
  - group formation
  - group working sessions
  - meetings with supervisors
- plenary evaluations

At home or at work the students communicate among themselves and with teachers, supervisors and administrators through a conferencing system, supplemented with e-mail and ftp. Students and teachers may upload/download files to common archives, but only the owner may change or delete a file. InterKomm+ has its own homepage at <http://www.interkomm.ruc.dk/>. This contains updated information relevant to the students, including links to a "latest items" in the conference system and access to the conference system itself. The homepage is the natural starting point for any participating student's on-line sessions; it is here that students, faculty and administrators have access to most resources needed:

- Conferencing system, and sub-conferences for participants at different levels: <http://www.interkomm.ruc.dk/konf list.htm>
- Time schedules, general for each module and when relevant detailed for current courses or workshops (example in English: <http://www.interkomm.ruc.dk/tid-m2-99-eng.htm>)
- Addresses with e-mail links, including e-mail lists to students at different levels and staff (limited access)
- On-line library and software applications for download (limited access)
- FAQs.

The software used for Interkomm+ originally was developed by the Danish engineering weekly *Ingeniøren* for its online conferences. At the time it appeared to provide an adequate and affordable solution, and its simplicity had a special appeal.(4)

## **Software considerations**

In the wake of the Internet revolution lots of new distance education software has been marketed, and the level of sophistication is increasing rapidly in this highly competitive field. An advanced integrated system for net based learning today includes tools for administration and security, planning, management, presentation and monitoring of courses, testing and grading, e-mail, newsgroup conferencing and chat - and CSCW functionality is being added in the form of whiteboards and application sharing. Some systems are also being integrated with teleconferencing and videoconferencing systems allowing for a combination of asynchronous and synchronous use.

For veterans from more primitive times the question is: Do we really need all these features, or are they to some extent just a technological fix obscuring the real issues of how to create successful distance education? "We" in this case are administrators, faculty and students. For the technicians and the bureaucrats it is indeed a blessing to be able to work with a stable, integrated system with fine security features and simple routines for handling the often complex administrative tasks involving students and faculty. For these latter two groups, however, the blessing is perhaps more of a mixed one. As Howard Kaplan (1998) has pointed out, using an assortment of off-the-shelf components instead of expensive distance education software allows for greater creativity and flexibility and also requires less technical training for both students and faculty. This claim, however, ignores the importance of maintaining a uniform technical platform for all participants in a net based learning programme and it does not address the question of pedagogy which should be considered the essential one in any discussion of learning.

In our experience simplicity matters. InterKomm+ is of course based on a pedagogical model that requires only a subset of the many functions built into modern systems, most of which are designed for use mainly within the American educational tradition. In InterKomm+ students and faculty have access to a very limited number of tools that all have equivalents in real life: a notice board, a phone book, a library, a calendar and some rooms for class work and group meetings. Thus the interface has simple and easily recognizable functionality and the various tasks can be mastered with a minimum of instruction. Most of our new users are familiar with browsers and some are already regular contributors to news groups. Therefore we can concentrate on content and on the work process.

## **Continuous evaluation**

In the first version of InterKomm+ we rather closely followed the structure of the conventional communication studies programme, introducing minimal changes made necessary by the distance education form.<sup>(5)</sup> Since then we have continuously evaluated both full modules and single elements of the programme. Students' evaluations have been collected through both structured and open-ended questionnaires, and through discussions in our conferencing system.<sup>(6)</sup> These evaluations in combination with our own observations as teachers have led to a number of conclusions and changes in the pedagogical arrangements.

During the first two years we asked students to respond to a 10-12 page semi-structured questionnaire with open-ended questions approximately each three months, and when concluding each full year of study.<sup>(7)</sup> Thus, during one year, students completed close to 50 pages of questionnaires, with a response rate between 79% and 100%.

This procedure provided us with a good and growing foundation to be used in the planning of next phase of the InterKomm+ programme. It was of course also used to improve the next versions of the courses evaluated, so each new class has been confronted with a revised course content and structure.

After the first two years, we have reduced the intensity of evaluations, by frequently using one-page questionnaires to be completed after each course element, normally after each workshop, face-to-face seminar, net seminar or project work. These questionnaires are mainly used as feedback to course teachers, but are also summarised in order to assist planning of future courses.

The written evaluations have been supplemented by plenary evaluations at the closure of each face-to-face weekend seminar.

Evaluation methods and procedures were initially implemented only as *ad hoc* pedagogical planning tools, as we had no research resources to implement a scientifically strict evaluation.(8)

After evaluations it became evident that many of the considerations mentioned below were mistakenly considerate. In fact, and to some surprise among faculty, students preferred their *group conferencing spaces to be open to all other students*. Or rather, they wanted to be able to learn from other groups, by following the discussions in groups where relevant themes were treated. As a consequence, group conferences are now open to all students, although normally only group members participate in the discussions.

A second motive for opening group conferences to common access, was the wish expressed by students that tutors could observe discussions - in the hope that they would intervene in discussions if things should go "wrong". This desired effect has not been achieved, simply because it would cause a substantial increase of teaching hours, which we cannot afford to pay.

### **Collaborating to learn and learning to collaborate**

The technological tools and the organisational setup in 1996, with teachers not physically present and students dispersed, provided a lot of hardship. Students (and teachers) collaborated intensely to overcome any obstacles, and groups were quite easily established. With hindsight, it seems as if the difficulties actually improved the learning situation. Motivation was high, and in January 1999 50% of the first class of 14 students completed the full three year programme, leading to qualifications equivalent to an M.A. title. This is a very good result, in an Open University context. As of September 1999, more than a hundred students have been enrolled in the programme.

As mentioned above initially the netbased learning environment was designed as a "translation" of the face-to-face environment: we arranged some "plenary" conferencing spaces open for all participants (seminars, a "café" for informal discussions, fora for *ad hoc* discussions about different themes, literature, etc), and restricted spaces for the individual groups of students, and for staff. In these restricted spaces access was granted only to members of respective groups.

We saw InterKomm+ as a virtual replication of a well-known physical learning environment, the university with its plenary rooms, offices, rooms for group work, meeting rooms for staff, etc. In group rooms it is possible to talk freely without the teacher listening, and students may try out "stupid" proposals in the intimacy of the group without exposing themselves to the larger group

of fellow students. In the intimacy of the group, students may also discuss the quality of teaching, try to reach a common interpretation of a comment from a tutor, etc. In the staff room, teachers can discuss the next seminar without students listening, or they may negotiate how to handle a passive or difficult student.

There is a strong motivation among students to *collaborate to learn*, involving also fellow students and teachers in the learning process.

As Hennesy & Murphy (1999) have observed, it is important to maintain a distinction between the notions of learning to collaborate versus learning through collaboration. We cannot conclude from the observed motivation for collaboration that the students also know *how to collaborate* or that they are willing to invest the time and energy to achieve a well functioning collaborative learning environment.

We may tentatively divide our adult learners into three groups when characterizing their collaborative behaviour:

- spontaneous activists
- well-prepared performers, and
- lurkers.

*Activists* respond with little delay to discussion themes initiated by teachers and to comments by fellow students. Responses are often brief, and (too) often of meta character. Still, activist responses keep discussions going, though they do not always contribute substantially to the learning process.

*Performers* concentrate on preparing well founded and well written contributions to the discussion. Their contributions are often longish and well documented. A performer contribution might at times prematurely *close* a discussion, by its scaring competence - until an activist again pops up and provokes response.

*Lurkers* wait and wait - but they do quite often manifest themselves close to the end of a thematic discussion, if only to announce that they have enjoyed following the discussion and that they have learned a lot.

In the spirit of the Roskilde pedagogy it is not easy to introduce strict rules for students' manifest participation, though we have of course informed them about our own standard expectations. Like most teachers, we would like a maximum number of students to participate in net seminars, as a good discussion requires both activity and quality. In practice, our norms exclude all three of the categories above: the activists should have reflected a bit more before intervening, the performers a little bit less. And lurkers, of course, should stop lurking.

Attempting to resolve the conflict between spontaneous student behaviour and our own notions of the ideal learner, we have been forced to establish a set of non-authoritarian rules of the game, to be respected by both students and teachers. These have been implemented during the Spring term of 1999.

Having observed that purely theoretical or analytical discussion themes trigger rather few contributions, we have introduced case based themes, where students are presented with a real or fictitious case as the basis for a discussion of theoretical or analytical problems posed by the teacher. In order to reduce the feeling of loneliness and insecurity that may be experienced by a student in the interval between contributing to the case based discussion and receiving response from fellow students, we have proposed that the students enter into *sparring partnerships*. This should ensure that a student making a contribution will always receive a quick and constructive response from his or her sparring partner. Teachers are asked to sum up and to direct the continuation of the discussion at regular intervals, normally a week after its start, and to sum up and conclude seminars, normally after two weeks.

It has also been our experience that running a number of lengthy and parallel discussions on themes not always related tend to confuse or paralyse participation. Or perhaps to provide pretexts for not participating. Our solution has been to have just *one discussion line* open at any time, but only for a limited time span and to be followed immediately by the next discussion theme.

The effect of these measures remains to be studied in detail, but our overall impression is that

- very few students now abstain from participating in discussions
- contributions rarely stray off from the discussion theme
- overall quality of both student and teacher contributions has improved, and
- satisfaction among students has increased.

## Conclusion

During four years of InterKomm+ net based learning activities we have experimented with a number of ways to structure student participation in order to achieve a functioning collaborative learning environment. We have sought solutions in pedagogy, rather than in smart software.

Although InterKomm+ was inspired from and implemented by a well functioning collaborative face-to-face learning environment, we have found that in net based learning one cannot rely upon the pedagogical know-how from face-to-face environments and the collaborative goodwill of students and teachers. Teachers and students better achieve common goals when these are well defined and case based and when collaboration is guided by norms and structures developed through consensual "reflection in action".

## Notes

(1) There are eight or nine weekend sessions per year. In the first four years of InterKomm+, these weekend activities have been arranged on the island of Bornholm, six hours by ferryboat or 30 mins by air from Copenhagen. Being also an exercise in regional development, in 1996 participants were mainly and deliberately recruited from the island, while by 1999 some 90% of the students come from the Copenhagen area, in spite of the costs and logistical problems involved.

(2) For instance in Holmberg (1986).

(3) For a short introduction to Grundtvig, see: Ministry of Foreign Affairs: The Danish "Folkehøjskole", [http://www.um.dk/english/danmark/om\\_danmark/hojskole.html](http://www.um.dk/english/danmark/om_danmark/hojskole.html)

(4) Simplicity only in terms of the end user experience. While students and teachers access the system by means of a web browser, administrators have had to be competent in programming, the entire system being a collection of Perl scripts. For information on *Ingeniøren* and its software, see: <http://www.ing.dk>

(5) These were changes in timing (intensive weekend face-to-face meetings with students and teachers, combined with several parallel low-intensity discussion groups), but also a limitation of media supported. Thus it did not seem feasible to work with audio production or slide shows, and at the time we did not consider CMC media to have the sufficient legitimacy. But we did, however, make a technically quite complex but pedagogically not so successful attempt with video production.

(6) The main results of a number of evaluations were summarised by Cheesman & Jallof (1999).

(7) An example (in Danish) of a questionnaire can be seen at: <http://www.interkomm.ruc.dk/97-2/Evaluering-M2.doc>.

(8) However, the whole InterKomm+ project is now being researched in depth, with a wide variety of methods ranging from quantitative analysis of some 15,000 written submissions to video analysis of individual distance learners in their study environment. The study is conducted by Sisse Siggaard Jensen at Roskilde University.

## **Appendix: Communication studies at Roskilde University**

The programme is offered to students in their 3rd to 5th year of study. It consists of three modules, each with a duration of one term (five months of full time study). The following descriptions are adapted to the InterKomm+ module versions. Credits, 30 points for each module, are assigned according to the European Credit Transfer System (ECTS), in which one full time year of study equals 60 ECTS credit points.

### **Module 1: Introduction to Scholarly Communication**

This module provides the student with a basic knowledge of various important topics within communication theory and a general introduction to media production. The module consists of three elements: workshops, seminars, and a written report.

Two workshop periods last about six weeks each and the media typically represented are: video production; communication through text, pictures and layout; and multimedia networked communication. Each student attends two successive workshops, one of which in an audio-visual medium. Workshop participation is compulsory, with an attendance of no less than 80%. Each workshop has a curriculum in the order of 500 pages. The primary aim of the workshops is to introduce students to basic problems in practical communication, exemplified through the chosen media. Each workshop group (3-5 students) is required to complete one media artefact during each workshop period.



Workshops are generally regarded by students as very satisfactory, but also as very hard work. This is mainly due to the compulsory production element - students have to finish media products within the time allocated, which due to the inexperience of students is often felt as "too short".

A series of seminars is arranged in support of the compulsory reading. The reading list is comprised of about 1,000 pages common to all students of the module, 500 pages related to the two workshops, and 500 pages related to the final paper/report.

During the second half of the module, student groups produce a final paper of approximately 30 pages, reporting the results of their independent study of a subject that they have selected among the variety of subjects introduced in the module. This paper is the basis for the oral group examination which concludes the term.

## **Module 2: Communication Analysis**

The purpose of the second module is to provide students with practical and theoretical skills in analysing the process of communication, with special regard to either audience research or organisational analysis.

Audience research deals with methods for analysing a specific audience, its special characteristics, interests, knowledge, use of media, etc., of analysing media comprehension and the use of some specific media products. Organisational analysis deals with either the structure, economy, routines etc. of some media firm or institution; or the internal and external processes of communication of some other kind of organisation, analysed in relation to its aim, structure, economy, etc.

The module offers a number of seminars, covering theories and methods of audience research and organisational theories and analysis.

Throughout the term groups of students work on analytical projects of their own choice within the subject areas of the module. The results of this group work are presented in a report of 40 to 80 pages, constituting the basis for an oral group examination.

## **Module 3: Media Production**

The purpose of this module is to provide the students with thorough knowledge of the methods, theories and concepts of media production, and experience in using these during a practical production of their own. Emphasis is on production planning, research on the subject of the production, choice of medium, specification of message, and choice of genre and form. Participation in a professional media production can substitute production of one's own. Often productions are made for or in co-operation with external institutions or organisations.

The module includes a series of lectures and seminars on narrative and expository methods and forms within specific areas of communication.

The students' work during the term is evaluated in a final oral group examination, based on the media production created by the students and a written report of 40 to 80 pages, reflecting on practical and theoretical experiences made through working on the production. [Back to text](#)

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