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# Blended Learning on Campus

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## ABSTRACT

On the basis of a large-scale project implementing information and communication technology at Roskilde University, Denmark, this paper discusses ways of introducing technology-based blended learning in academic life. We examine some examples of use of systems for computer-mediated collaborative learning and work in Danish Open University education as well as in courses on campus. We further suggest some possibilities for using technology in innovative ways, arguing that innovation is to be found, not in isolated instantiations of systems, but in the form of a deliberate integration of all relevant ICT-features as a whole into the learning environment.

**Keywords:** Blended learning, Computer supported collaborative work, Computer supported collaborative learning, Problem-oriented project work, Roskilde University, pedagogy, Groupware, BSCW, ICT-applications, e-learning.

Information and Communication Technology (ICT) has changed the way we write, visualize, make calculations, communicate, store and search for information. Yet we tend to think of ICT as a variety of tools meant only to facilitate conventional tasks. Even the components of advanced types of education such as Computer Supported Collaborative Learning (CSCL) can be viewed as simple remediation of the classroom discussion and correspondence course. Truly revolutionary uses may be hard to find. But innovative uses can be found, not as isolated instantiations, but in the form of a deliberate integration of all relevant ICT-features as a whole into the learning environment. Below we shall argue for adopting a holistic rather than a feature-oriented view when studying the effects of large-scale integration of ICT in learning environments.

In this paper we will report on an ICT-project meant to introduce a major change in an academic environment, adding to it an element of "blended learning", i.e. breaking down the barrier between classroom teaching, on-campus learning processes and net based learning. The project is being monitored by a group of Roskilde University researchers studying net based learning and computer supported collaborative work (CSCW). Their *RUC-Online Project* is intended to provide a longitudinal study of changing practices on campus. The present paper is the first report from members of this group.

## HYBRID FORMS OF TEACHING

"Blended learning" combines e-learning in its various forms with traditional types of training, teaching and learning. Depending on point of view, blended learning may allow the student to combine materials, teaching forms and technologies so as to provide optimal support for his or her style of learning. It may allow the teacher to present a subject by combining technologies, materials and teaching forms in order to achieve a learning goal in a proper and effective way. And it may allow management to combine and use resources in a cost effective way both in terms of delivery and in terms of fitting training into the work schedule. Thus at one end of the scale "blended learning" may be seen simply as an instrument for making training more efficient and cost effective. And at the other end it may be viewed as a reaction to the commodification latent in many forms of e-learning – an assertion of the qualities of social interaction in physical spaces [15].

In this paper we will view "blended learning" as an approach intended to provide optimal conditions for the learning experience. Our understanding of the term is grounded on the typical Danish Open University programme that has been practicing blended learning long before the term was invented. The combination of classroom lectures, discussions and exercises with net based discussions, assignments and project work is so common that it has been ironically remarked that in no other country does distance education involve quite that many physical meetings [2]. The reasons for this are both cultural and practical. The Danish pedagogical tradition of Grundtvig and Kold rests firmly on the importance of "the living word" and the social aspects of education. And getting together is not hard in a country where most of the population lives within a one or two hour drive from one of the university cities.

While blended learning is a well-established phenomenon in Danish Open University education, the use of ICT in a campus setting will normally be considered as a mere supplement to classroom work. Communicating with the teacher by e-mail, presenting course syllabi and providing handouts on the web or running a computer program to train French grammar or simulate a chemical analysis are isolated activities that have little impact on the whole of academic life on campus. To qualify as on-campus blended learning the use of ICT will have to be large-scale, systematic and aimed at changing practice – not just in terms of services offered, but also in the key areas of teaching and studying.

## THE PORTAL PROJECT

One such initiative was launched in the fall of 2003 at Roskilde University, Denmark. In the course of two years it is meant to place Roskilde University in the vanguard of Danish institutions

making effective use of ICT. The reasons for undertaking the project are practical, and most of the features of the project look fairly unremarkable even if they do add up to a considerable improvement of work conditions at the university.

At a time of increasing competition among Danish universities for students and funds, the university wishes to promote itself as a dynamic and progressive institution by means of a high ICT-profile. The project is meant to make academic life easier by simplifying administrative tasks and providing easy access to important resources. An additional not widely publicized effect is the increased control with access to these resources that should be available only to enrolled students.

The key feature of the project is a simple version of a portal, a *portalino*, providing *single sign-on* access to all existing services as well as many new ones yet to be developed (e.g. e-mail, library services and access to electronic journals, access to a groupware system, electronic contact with the university administration – including electronic forms, registration for courses, exams and student card renewal, student loans, booking of rooms, electronic course catalogues and a bulletin board). The portalino of course also allows the user to build a personal and portable collection of bookmarks. Along with the portalino has been introduced both a *Plug'n Study* environment where every room on campus will have wireless internet access and a scheme for discount purchases of laptop computers.

The groupware system is *BSCW* (Basic Support for Cooperative Work, http://www.bscw.de/), a web-based German system for computer supported collaborative work. It was introduced at Roskilde University in the late 1990s, and prior to the Portal Project it was used chiefly in our Open University programmes and in the Department of Communication, Journalism and Computer Science. BSCW was added to the portalino partly to make it more attractive by providing an extra service at a minimal cost, and partly to facilitate new work forms. The committee report recommending the Portal Project (unpublished) rather vaguely mentions such uses as "conference system, personal archive for students, course archive and showcase for student projects".

In the actual implementation of the Portal Project, however, the groupware system has come to play a prominent role. It is now viewed primarily as an instrument for introducing changes that may lead to a form of blended learning on campus, and it is assumed that groupware will eventually play a role in all forms of teaching and studying. Some simple reasons may be offered for this sudden prominence of the groupware system. Firstly, to an end user unaware of the technical intricacies involved, the truly important features of the Portal Project such as the single-sign-on access to all services or the campus-wide wireless network may be less immediately appealing than the groupware system. Secondly, using the portalino which is just a collection of bookmarks, or configuring a computer to plug into the campus network are relatively uncomplicated tasks compared to working with the groupware system. End user training therefore has focused on this particular detail. All some 1.400 first year students have been offered a short introductory course where some of the functionalities of the groupware system have been demonstrated (students and faculty at all other levels are to follow in 2004 - 2005), and documentation has been produced describing system functionalities and suggested uses as will be discussed below [16, 17].

In order to assess the possible significance of the groupware system when used in an on-campus setting we will briefly consider our experiences with groupware both in Open University and in a number of experimental courses where groupware has been integrated with classroom teaching. But let us take a closer look at the pedagogical framework in which the technology in question has to function [14].

## PEDAGOGY AND SOFTWARE

Roskilde University practices *problem-oriented project work* at all levels of study. It is a particular brand of problem based learning according to which the students are working in groups in a self-directed manner. A group typically consist of 2 - 8 students, and it is formed on the basis of common interest in a problem or a topic that may be defined rather freely within the framework of an interdisciplinary theme. Project work deals with real life problems, and the nature and development of the project is negotiated in a continuing dialogue and discussion within the group under the supervision of a teacher.

The idea is to encourage the students to engage in self-directed endeavours of exploration. That involves a process of transformation, one filled with challenges and unknown problems. It is also a dynamic, stimulating and socially challenging process where the students, working collaboratively, have to organize work, make decisions and evaluate their results. The didactic process proceeds from formulating a cardinal question to inquiring into exemplary problems. The setting is that of participant control and collaboration, and the approach is often interdisciplinary. The problem outlined in the cardinal question must constitute a genuine problem for the participants and they have to feel a deep sense of ownership of it. Their work will involve negotiations, dialogues and inquiries relevant to the theme of the cardinal question, and they can also draw on lectures, courses and various resources that will be available in the course of the semester.

In the words of Etienne Wenger [23] this type of learning may be characterized as joint enterprise, mutual engagement and shared repertoire [10, 11, 12]. Students have a mutual obligation for designing and carrying out the project, and normally considerable mutual engagement will be fostered. Mutual obligation applies also to the student-supervisor relationship. Teachers supervising problem-oriented project work should contribute actively to establishing a stimulating learning environment facilitating the groups in their self-directed work.

## GROUPWARE AND FORMS OF TEACHING

Even if project work is by far the most important student activity at Roskilde University, formal courses are also offered in various forms such as lectures, seminars and workshops. It must be considered how and with what consequences blended learning based on groupware can be introduced into these contexts as well – and, indeed, if new ones are likely to evolve.

Before turning to the various forms of teaching, it should be noted that a number of ICT uses are common to all teaching activities. Although certainly useful they tend to be fairly trivial and they do not really qualify as elements of blended learning. Thus most administrative tasks connected with teaching can be facilitated by ICT either supporting or modifying existing practices. For example, electronic bulletin boards, course plans and

reading lists facilitate the distribution of information. Making handouts and slides available electronically simplifies procedures and saves time. Mailing lists and e-mail provide for easy communication between teacher and students and among the students. None of these activities require groupware. Web pages and e-mail would work just as well. Groupware does however provide a single, adaptable and controlled environment where access to teaching materials is limited to those for whom they are intended. And it is normally simpler to handle for students and teachers alike than would be a combination of systems.

**Project work**

In order to promote groupware in project work some material has been produced describing scenarios for use [16, 17]. Some measure of instruction is required, because BSCW itself makes very few assumptions about how contents should be organized and presented, and indeed, its design does not seem to reflect any particular pedagogical persuasion. It is after all a CSCW-tool more suitable for organizing and archiving work than for teaching and having discussions [19]. The scenarios include the use of: File sharing (multiple authors working on documents), Folder sharing (inviting the supervisor and fellow students to join the workspace), Building a link library (for creating a web bibliography), Creating discussion threads (for brainstorming and documenting decisions), History and notification functions (for keeping abreast with developments). These scenarios accompanied by mini-guides to system functionalities describe several useful features of the system. But they leave the question unanswered about how to integrate groupware in project work in order to make it a tool for collaborative learning.

Some Roskilde University students have been using various kinds of groupware in their project work for years. A RUC-Online survey carried out among more than four hundred first year students in Fall 2003 suggests that about a third of them have used groupware even before they enrol. This probably reflects use of a FirstClass-based service offered in primary and secondary schools (*Skolekom*, http://www.skolekom.emu.dk),. Before the Portal Project launch most students would be using popular free services such as *Groupcare* or *Yahoo! Groups* (http://www.groupcare.com/en and http://groups.yahoo.com/). Documentation of such use in project work is of course sporadic and unsystematic.

We do, however, have some experience with blended learning project studies in two Open University settings, the Master in Computer-mediated Communication programme (MCC, http://www.ruc.dk/mcc) and the Master in ICT and Learning (MIL, http://www.hum.auc.dk/mil) where students have to complete two projects, each one lasting a full semester [3, 4, 7, 8, 20]. Supervision and teaching take place at four or more 2 - 3 day face-to-face seminars where the student groups also discuss each others work. Between seminars supervisors and students keep in contact by means of BSCW and VirtualU (VU), a Canadian VLE-system used in MIL (http://www.vlei.com/).

**MCC project work**

In the first three years of the MCC-programme 28 projects were completed, 16 of which involved three or more students. In all of these projects the groups have used BSCW for the required communication with their supervisors and with other groups. They have also used BSCW as an archive. But evidence of use of the system as a tool for collaborative work is quite rare. It has happened mainly in busy periods when groups facing a deadline have been unable to arrange physical meetings. The students clearly prefer meeting face-to-face when possible, or failing that, to use the telephone or a chat room. They explain that a CSCW-system may support the work process, but that the complexity of collaborative work is best handled in discussion at real life (or at least real time) meetings [1].

Several factors are at play here. The students correctly observe that it is a difficult and time-consuming task to negotiate meaning and to reach a consensus when using asynchronous written communication. To this may be added that they – just as their teachers – tend to think along traditional lines, remediating the conventional meeting form on to the net and ending up with something that is inferior to the traditional form. But they seem not to be looking for alternatives and not to be paying much attention to the benefits of using the net medium such as instant and complete documentation, transparency in decision-making and planning, the possibility of grasping at a glance the present state, structure and history of a discussion theme – not to mention the degrees of freedom offered by the fluctuating time/place interrelations [8].

Pressure of work is another factor. Written communication is time-consuming, and so is the constant need to reorganize the online-archives in order to keep them up to date. The latter is the price to be paid for using a system that allows for maximum flexibility in designing and running the virtual workspace. When you have a job, a family and a demanding part-time study, naturally you will be looking for the most efficient way of getting things done – even at the expense of a relevant experience in online collaborative work. An additional external factor is that most of the MCC-students live within a 100-kilometer radius, and they do seem to enjoy meeting privately.

**MIL experiences**

In the first four years of the MIL-program 79 projects have been completed, of which 37 projects involved three or more students. In all projects the groups have used VU for the required communication with supervisors and other groups, using a predefined folder structure (to be subdivided freely). VU is a somewhat dated system, and handling files is a cumbersome process. But still, most of the groups have been very active and have produced a lot of material to be used in their work with their project reports. Cooperation as well as genuine collaboration has in fact taken place. The participating students – 40 to 50 each year – are coming from all parts of Denmark from Norway and from various locations in Europe where their families are stationed. Early on in their collaboration the students agree on two hours of chat a week, logging the conversations for later use. Chat is included in VU in a primitive version, so some students use alternative systems or even hold IP-telephony meetings. Occasionally the students (and possibly the supervisor) meet face-to-face regardless of geographical distances for a day of dynamic and personal discussions. In the last couple of years some groups have been using other systems like Groove, Fronter, FirstClass and QuickPlace, even if important documents must be shared in VU.

**Seminars and workshops**

Over the last few years we have carried out a number of experiments at the Roskilde University campus in combining classroom teaching and net based work using BSCW, Groupcare, FLE2 and Fronter [5, 6, 9]. They have involved both courses taught on-campus in Roskilde and courses shared with

other universities nationally and internationally. Net based tasks typically consist in assignments to be carried out by a group of students either in the form of creating a product or contributing to a discussion, sometimes both. Most if not all of the courses have been advertised as a way to get hands-on experience with net based work in addition to learning the subject taught. Students therefore have been motivated to participate in a venture into blended learning. Yet the results are not altogether convincing, and they differ notably from the positive results achieved in MIL net based discussions [20, 21, 22]. The main categories of problems identified in the campus environment are related to software, academic culture, on-campus context and course management and didactics.

**Software:** The bottom line of educational software selection is that just about any system will do the job if used creatively. Still, functionality and built-in pedagogical assumptions play a significant role. In the case of BSCW the number of features and degrees of freedom may just be too great. It is an excellent tool if you plan to use it for a long period of time, because you can tailor it exactly to your needs. But for a short course the overhead of learning not only the technical basics but also how to create a productive virtual workspace are considerable, detracting attention from the subject matter of the course. A more structured system like VU which has advanced facilities for creating and overviewing a virtual space for net-based dialogue is more likely to stimulate discussion. Built-in pedagogical assumptions are only likely to get seriously in the way if the number of functionalities are limited and inflexible, as was the case in a series of courses using prototype software (FLE2) developed specially for inquiry learning [6]. Even if "progressive inquiry" would seem to resemble "Roskilde pedagogy" we were never really successful in adapting the system to our needs

**Academic culture:** One of the great promises of net based education is cooperation between different universities. Sharing courses, supplementing an academic programme with elements offered by a partner, opening up for internationalisation of various Danish academic programmes all make a lot of sense on paper. In practise we have experienced serious problems in coordinating courses across borders and even on a national level, at least as far as ad hoc collaboration is concerned. Course structure, academic level, pedagogical practices, calculation of credits, language proficiency, ICT-skills and scheduling are just some of the factors making it a major undertaking to plan and to run a shared net based course. Net based cooperation of this kind is not a guaranteed means of rationalizing and simplifying the academic programme. However, it may work as has been demonstrated in the MIL programme which is a carefully coordinated collaboration among five universities, based on an academic network established a decade ago.

**On-campus context:** A few characteristics of campus life are relevant to the use of net based learning on campus: students like meet face-to-face, students are generally poor, students browse courses, and a lot of academic activities take place in parallel.

The undoing of the static time/place interrelations of the Industrial Age is not really an attraction for regular students. Even in courses meant to demonstrate how to work in a virtual environment, they find it extremely hard to accept that they should communicate slowly and laboriously in writing on the net when they could just as well discuss in class and do their assignments between classes.

The RUC-Online survey has shown that nearly all students own a computer and that three quarters of them have access to the internet from home. But that still leaves one student in four unable to participate from home in the net based part of a blended learning course. In addition, many of those who do have internet access object to the cost and time involved. Students still typically rely on slow dial-in internet connections, and working from home with a system that sometimes offers long response times makes participation a frustrating and quite expensive experience.

Net based courses do require more work and more active participation than do courses taught in class. One consequence is that it becomes difficult just to "browse" a course, i.e. keep participation at a low level but still complete the assignments required to pass. If a student does not log in regularly, he or she is likely to become overwhelmed by the confusing mass of documents and postings being generated. At the same time non-participation or uninformed participation is more visible than it would be in a classroom. Another consequence is that students may choose not to take net based courses, because they are too demanding in a busy semester where they have to follow three or four courses that usually offered more or less simultaneously.

**Course management and didactics:** From the point of view of pedagogy**,** adding a net component to a course is justified only if it facilitates collaborative learning or at least stimulates individual learning. Neither, however, results automatically from just transferring part of the course to the net. Careful and detailed planning and constant supervision of all activities is needed. It requires experience, dedication and a certain measure of idealism to offer a course that requires a considerable amount of extra work on a 24/7 basis. As yet there is no formal training for faculty members in online teaching and net based collaboration, so just getting started requires an extra effort. Until now on-campus blended learning courses have been experimental. Therefore there is no standard for this type of teaching, and the emergence of a plurality of more or less successful approaches to net based teaching cannot but confuse the students. Standards will be necessary, as we have already realized in the Open University programmes. MCC has been inspired by Gilly Salmon's concept of *E-tivities* [18], which seem to be applicable also in blended learning courses. MIL has been developing its own didactic model for its 2 - 5 week seminars where teachers and students attend the virtual learning space at a minimum five times a week. All members of the online group are assigned roles that are supposed to form, support and guide their discussion and to give the participants a concrete point of departure. One or more is a presenter, another discussant or moderator and some are to evaluate the process. Group discussions are wrapped up in final plenum discussions dealing with subject matter as well as meta-reflections and meta-communication on the processes completed and the experience gained [22].

**Lectures**

Old-fashioned lectures being essentially one-way communication lend themselves beautifully to electronic mediation. Thus the Danish Reseach Network is actively promoting video link lectures as a tool for rationalization and internationalization, and on a small scale both our Open University and regular program-

mes have started videotaping important lectures, so that students can view them at their own pace at a later time. Including a video in the groupware system, however, is just a way of archiving unless some activity is added – e.g. an assignment or a discussion.

As yet these possibilities have not been fully explored, but we have seen a few attempts to add a net component to a series of lectures, supplementing classroom discussions with discussions on the net, that again may provide basis for clarifications and elaborations at the next lecture.

## IMPLEMENTING BLENDED LEARNING ON CAMPUS

The intricacy of introducing new technology in organizations is largely proportional to the complexity of the organization. A learning environment is not a simple organization, as we have tried to visualize in figure 1. ICT may be used for a number of different purposes ranging from the entirely administrative (e.g. registering online for an exam) to the purely academic (e.g. negotiating meaning in an online discussion). And the purpose of introducing ICT may range from just supporting existing activities (e.g. providing course information online) to changing practices (e.g. submitting assignments and receiving feedback electronically) and to replacing activities (e.g. by means of computer based instruction).

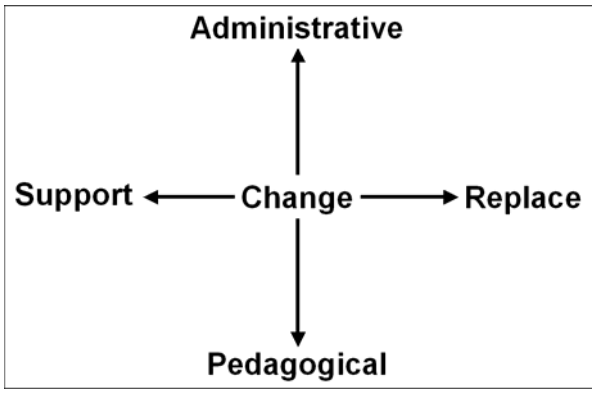


*Figure 1.*

A large part of the Portal Project is concerned with developing electronic services related to general administration and to course administration (corresponding to the upper left quarter of figure 1). The issues involved are mainly organizational integration and end user documentation, and changes relate to the setting for but not the practice of teaching and studying.

In the preceding sections we have discussed some experiences with developing learning environments and teaching by introducing groupware. Such initiatives fit into the lower left square of figure 1, since they supplement and augment conventional forms without replacing them. Even if expectations that groupware will create a positive effect are quite high in the Portal Project, our experiences of using groupware are ambiguous. While it is good for managing projects and documenting work processes, groupware-based CSCL is a demanding and not obviously useful addition to on-campus teaching and learning. At least it appears to be so if you consider the introduction of a particular software system into conventional patterns of work.

However, as already mentioned, we should be looking for innovative uses of ICT, not in the odd instantiation of a computer system, but in the integration of ICT-features as a whole into a learning environment. From this point of view we are able to suggest two directions worth exploring in further inquiries into the introduction of forms of blended learning on campus. One has to do with classroom behaviour and the other with study behaviour.

Changing classroom behaviour is characterized by delocalisation and multitasking as suggested in figure 2. It is inspired by the student-centric model for "distributed learning environments" [13], but differs significantly in that activities are classroom-situated. On a small scale we are beginning to see the phenomenon that is made possible by Plug 'n Study and the proliferation of laptop computers: students take notes, annotate PowerPoint presentations, look up references, search information and maybe even exchange messages while they – hopefully – listen to lectures and participate in classroom discussions. As yet this new classroom culture is developing rather haphazardly and probably to the chagrin of some teachers who find themselves receiving divided attention. But in all likelihood more exploratory teaching forms can be developed exploiting the potential for turning the classroom into a lab where the students contribute actively and instantly to researching, discussing and documenting a subject.

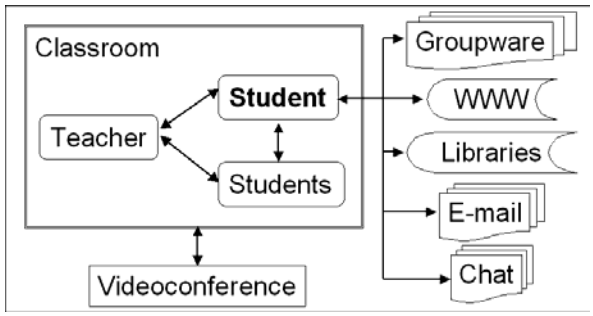


*Figure 2.*

As to study behaviour we still tend to think in terms of the traditional compartmentalization of studies into courses, projects and semesters. However, the virtually limitless archives in groupware systems and the possibility of sharing archives provide for a more coherent and dynamic view of the process of studying. Such a view could find a practical expression in the extensive and systematic use of portfolios, the principle idea of which is collaboration and synergy through sharing. Some portfolios may be simple, private archives, e.g. the student's personal portfolio that eventually will provide a full electronic documentation of his or her studies at the university – courses, projects, bibliography, notes and all. But parts of such an archive can be used actively in communicating with fellow students and supervisors – e.g. as a portfolio of competencies to be used in the always difficult negotiations when forming a project group or to brief a new supervisor of the student's previous record or even to present to a prospective employer. Course portfolios can be used for collective knowledge building (and of course as a basis for individual assessment). Topic portfolios may be used for sharing compilations and discussions on a particular subject, and they will be useful to students as well as teachers. Teachers could also use portfolios for sharing teaching materials and even courses.

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