

Group Organized Project Work in Distance Education

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Abstract

Project organized problem based learning is a successful concept for on-campus education at Aalborg University. Recently this "Aalborg concept" has been used in networked distance education as well. This paper describes the experiences from two years of Internet-mediated project work in a new Master of Information Technology education. The main conclusions are, that the project work is a strong learning motivator, enhancing peer collaboration, for off-campus students as well. However, the concept cannot be directly transferred to off-campus learning. The main reasons are that the students must communicate electronically, and that they are under a fierce time strain, studying part time and typically with a full time job and a family. In this paper, the main problems experienced with group organized project work in distance education are described, and some possible solutions are listed.

1. Introduction

Project organized problem based learning in groups has been the foundation for the educational system at Aalborg University from its start 27 years ago. Since then, experience has proven this a very successful innovation in higher education [9],[10]. The duration of each student project is normally one semester, and the students spend 50% of their time working on the project in groups of typically 5–6 persons, 25% is spend on project oriented courses and the remaining 25% on general courses. The learning concept has many merits, e.g. increased motivation, excellent development of analytical skills, and experience in coping with complex real-life problems. Further it gives a high degree of completion.

Consequently, it seems to be an obvious idea also to base our distance educations on the project study form. Traditionally, however, distance education has been

characterized by one-way communication and self-study, whereas the project study form is based on collaboration and dialogue. Thus, a successful implementation of project work in distance education requires extensive utilisation of new information and communication technology.

As there are only a limited number of references on project-organized learning in networked distance education available, e.g. [4],[5],[6],[14],[15], our concept is build on experience from on-campus education, but is constantly being modified as new off-campus experience is obtained [11].

The project groups communicate by:

- Document exchange via web
- Asynchronous communication using news, e-mail and discussion fora
- Synchronous communication using netmeeting fora (voice and text mediated chat)
- Face-to-face meetings during seminars

During the first year with part time studies the students make two projects, a short pilot project and a main project. For the pilot project, each group prepared a report, evaluating the collaborative work process, and these process reports combined with the teachers observations from the pilot and in particular the main projects, comprise the background for this paper.

2. The Master of Information Technology Education

The Master Education in IT Engineering (MII) is a supplementary education, established by the Institute of Electronic Systems at Aalborg University, Denmark. URL: <http://www.mii.itorg.auc.dk>

The MII differs from the regular M.Sc.E.E. education in several ways, as the students:

- Already hold at least a bachelors degree or equivalent
- Have almost no spare time for studying
- Have varying level of IT-skills (from IT professional to IT novice)

This work was supported by the ViLL project (Virtual Learning Environments and Learning Forms) under the 'Digital North Denmark' initiative.

- Constitute an inhomogeneous group of people, regarding:
 - Age (25 – 56 years)
 - Former education
 - Residence (Denmark and abroad)
 - Professional career

The MII is an Open University education, which implies payment of study fees (app. \$ 3000 per year) and it takes three years of studying on a part-time basis (approximately 20 hours per week) to acquire the Master of IT title.

Content: The MII education leads to one of 5 professional specializations, sharing a common first year education. The contents of this year are primarily basic theories and skills in: Data Networking, Object Oriented System Development, the Client-Server paradigm, Databases, Human Computer Interaction and Web-tools. The second and third year the students are studying IT concerning their own profession, attending courses of particular interest and making projects about the chosen subject of special study. The MII offers specializations in:

- IT in the Building Process
- IT in Industrial Manufacture
- IT in Control Engineering
- IT in Distributed Real Time Systems
- IT Network Maintenance

3. Project based learning

It has proven a good idea to start problem-based educations with project work by letting the students make a short pilot project in administratively selected groups. This seems also to be the case in distance education [6], so it was chosen to begin the MII-study with a pilot project, titled: “*Make a Web site for your group, to present your projects and the group members*” The objective was to get experience with project and group work in distance education, and to test relevant communication tools.

The rest of the first year was used for the main project, where the groups were formed freely and selected their project themselves within the technical frame that they had to use a client/server application and a database in there solutions. An example of a project is: “*Web-based system for industrial pump selection*”.

Learning approach: One of the views about problem-based learning in groups making a project, is that reflection loops have a predominant place. This understanding of learning processes is based on Kolb’s learning cycle [12], and Schön’s ideas about reflection in the learning process [13]. These ideas are combined by John Cowan to a learning concept based on planned

reflection loops [7] or Kolb coils (as paraphrased by Cowan: - experience - reflection - generalization - test -). During a project period there are three planned reflections to enhance the learning process, see Figure 1:

- before (*for*) or in the very beginning of the learning process, to decide what the process shall be to fulfill the learning needs
- *in* the middle of the process, to considered how the process so far has fulfilled the scopes and aims. Whether they are still relevant and what changes in plans if any are necessary
- after (*on*) the learning process, in order to decide what has been accomplished and what is still missing, bearing in mind improvement of future learning processes

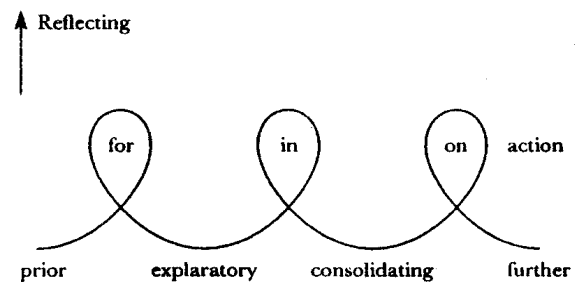


Figure 1: The Cowan diagram. [7].

One of the main purposes using this approach with three planned *and guided* reflection loops is to teach the participants to improve the quality, depth and relevance of what has been learned.

During projects on campus, running over a longer period of time (½ year or more) the students themselves reflects within the groups several times in between the planned reflections, see Figure 2.

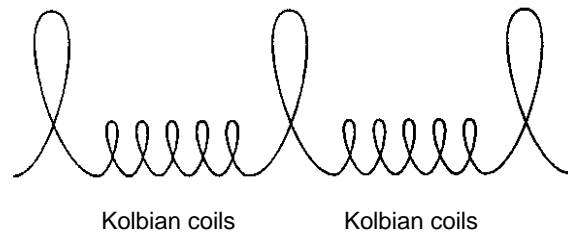


Figure 2: Modified Cowan diagram. [7].

These small reflection coils seems to shorten the individually knowledge gab between the students, and it is of great importance that they also take place in distance group work.

Form: The pilot project was started at a seminar (2½ day) and run for 2 month, with a seminar in the middle and an evaluation seminar at the end.

A crucial course: “The virtual workplace” about both communication tools (IT) for the virtual work and for face-to-face collaboration was held at the seminars. At each seminar there was time for actual project work, and according to the learning approach this was guided by reflections. The results of this first project experience is well documented in [11], were the main conclusions are:

- *Project work is a unique learning motivator*
This is particularly important for distance learners, studying at home after a long days work.
- *Project work enhance peer collaboration*
Studying at home alone may be hard and lonely, and one often gets stuck in even minor problems. Collaboration may be the answer and the way to get forward.
- *Face-to-interface meetings must be combined with face-to-face meetings*
It is commonly felt, that a good networked collaboration requires a prior personal acquaintance. Besides, the students experienced, that certain parts of the project work, in particular planning and reflection, was much easier accomplished during meetings at the seminar.
- *Virtual group meetings require a strict planning and control.*
In chat meetings, informal meeting behaviour is not adequate, but with strict planning and control, they are a useful supplement to asynchronous communication.

These experiences were used to improve the main project that runs very much in the same way as the pilot project but for a longer time (7 month). It was started at the final pilot project seminar with five additional seminars to come. Formal guided reflection was held at the first, third and last seminar according to the learning approach, but although the remaining seminars were used primarily to enhance the courses, there were also time for project work and meetings with the supervisors, who guided more informal reflections to improve the project work.

The supervisors observations of the groups process of making the projects are, together with the groups experiences, the basis for this paper.

4. Technology and Collaboration Methods

Collaborative project work in a distributed environment is difficult due to lack of a physical group room, where communication, document handling and

timing are important activities not to forget the social affairs. A virtual group room must be established and the activities defined. Documents are produced and processed by the individuals, but all documents must be stored at a central environment. All members of the group must be able to download, read, review and upload documents, backed up and nicely organized. Responsibility, deadlines, and progress information are also visible.

Many tools for remote teaching and collaboration are available, but most of them are expensive, very complex, and takes a great deal of time to adapt. It was decided to make a university tool named Uniflex which is component based (exchangeable commercial products), web based, using database and accepted standards (ASP, XML, XSL, SQL, HTML), open source, easy to maintain, easy to learn (no manual required), using personal profile and having help facilities. A personal Uniflex home page for producing this article is shown in Figure 3. The first column is used for system news and links to support materials such as template for course developers. The second column contains service facilities for communication, project work and on-line courses. The rightmost column is for persistent study informations.

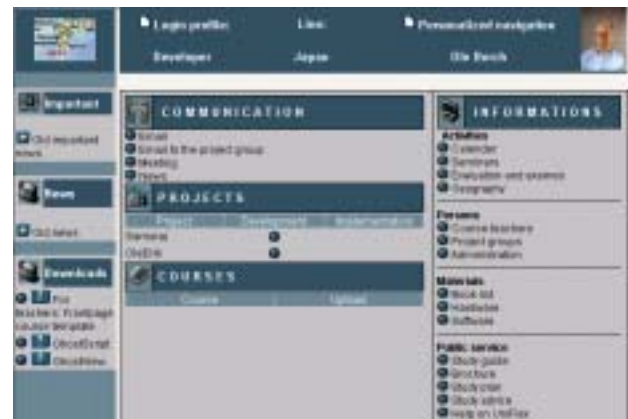


Figure 3: Uniflex personal site for the study line: "Japan". Pressing a project development ball will open the environment for upload and download of documents concerning this article.

A project group and project name(s) is defined in the Uniflex database. From that moment only the group members have access to the project. Every member is able to create chapters and upload reviews, but only the owner of a chapter can release new versions of that chapter. All documents are visible along with the status like the responsible person, upload timestamp, deadline, filename etc. A snapshot of a project work is shown in Figure 4.

Project work				
Project: "Samoraj" - Responsible: Jan Helbo - deadline: May 30, 2001		Collaps chapter	Help ?	
Chapter 1 Jan Helbo Art.Kap 0 (Hovedbudskab) deadline: ,	Vers: 1 April 20, 2001			
Chapter 2 Morten Knudsen Art.Kap 1 (Indledning+Intro.) deadline: May 9, 2001	Vers: 1 May 5, 2001	R1	R2	
Chapter 3 Ole Røkkjær Art.Kap 2 (??) deadline: May 9, 2001	Vers: 1 June 30, 2001	R1		
Chapter 4 Lars Peter Jensen Art.Kap 3 (pædagogik) deadline: May 9, 2001	Vers: 1 April 30, 2001			
Chapter 5 Ole Borch Art.Kap 4(Uniflex) deadline: May 9, 2001	Vers: 1 May 5, 2001	R1	R2	Vers: 2 May 8, 2001

Figure 4: Beginning of the project development. The snapshot is taken May 6, 2001. Chapter 5, version 1 is locked and it is not possible to upload further reviews. The chapter 5 owner has processed the two reviews of version 1 and released a new version 2 for the next review round (invited by auto generated email).

Among other features, the sequence of chapters can be changed to reflect the final contents of the report or article. Uniflex is defined in a generic class ready for instantiation when new online activities are defined.

5. Experiences with the Project work

The first experiences with problem oriented group work in distance learning from the pilot project are reported in [11]. The recommended changes really did improve the start up of the following main project and the next year's pilot project. In this paper the focus is on the experiences from the main project, especially: distance group work experiences, project work experiences, technology experiences and seminar experiences.

5.1. Distance group work experiences

By the term group work is meant the processes of collaboration, communication and planning. The students are facing many kinds of problems, social as well as

professional, to get the group work done properly. It is a special challenge to give the project precedence, because it seems that some of the students finds it much easier to use time for well-planned discipline oriented courses where progress is easy to measure and where hints are available. In the virtual group room the students communicate through chat (writing, audio), telephone (synchronous), news, e-mail and fax (asynchronous).

Problems: Compared to on campus project work the intensity in distance group work is much more fluctuating. This is illustrated in Figure 5.

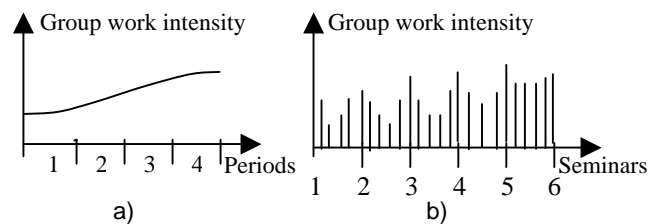


Figure 5. a) On Campus time distribution on group work. b) Distance education group work time distribution. The lines between seminars are weekly chats.

Figure 5. a) Illustrates that for on campus students the group work intensity is increasing through the semester. In the distance group work with the very same intensions this pattern is quite different (Figure 5. b). The fluctuations are due to the increased difficulty to focus and concentrate on the project because of limited time, work, family, courses and that the students are stuck in one or more problems etc. Even if the students use best practice [11] with well planed and structured weekly chat meetings, a few fail to appear at the chat meeting will interfere the progress and the group will first catch up on the following seminar. It is very important that these fluctuations are filtered out. It seems that chat is not suitable for difficult and complex problems. These kinds of problems are treated in a superficial way. Between the weekly chat there is a growing flow of mails between the group members as the semester progress.

Suggestions: It is agreed that regular chats with audio are necessary and can be used with success in group work. It is time consuming but gives the students the feeling of group solidarity. To keep up the pace between the seminars the group work should follow planned milestones. The group work must be flexible but at the same time the group members should feel responsibility because of mutually group work dependency. The group work must be planned so detailed that every student is able to contribute even if he is not able to take part in one or more chats.

5.2. Project work experiences

The Project work deals with description of well-defined tasks/subtasks, task planning and time planning. The groups as autonomous entities must define common plans. Every student should be confident with the plan and know all about tasks/subtasks and when they are supposed to be solved.

Problems: The members of the groups appear to have very different ambitions with the study. Project work with unclear task/subtask definitions that are imbedded in problem based project work therefore has some side effects. This implies that the strong students work far ahead of the weak students. As a consequence the group members professional skills diverse when the semester progress. Some of the students get unmotivated as well. This is quite opposite to the experiences from on campus groups, where the daily discussions between the students level the difference, see Figure 6.

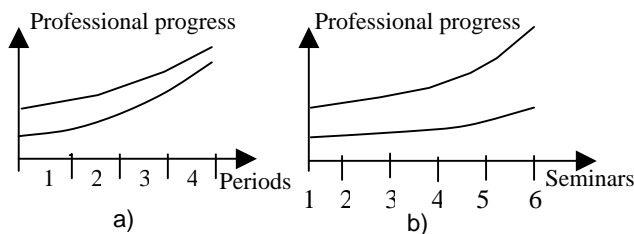


Figure 6. a) On campus professional leveling.
b) Distance education professional diversity.

Suggestions: The analysis in the beginning of the project period could be given an overview of the whole project compared to an estimated need of time. This is followed with detailed subtask definitions and a detailed time schedule. The time schedule must be flexible to catch fluctuation in the group members available work time and it must always be a topic in the chat and seminar agenda. It is important that all group members have almost the same level of ambition. Methods and procedures for forming homogeneous groups must be developed. At the same time it is very important that the possibility in project work to combine different disciplines from the courses to solve complex problems is improved.

As the project work possible level the professional skill on campus, it should be possible to organize courses and project work in distance education so that the groups are forced to reflect in a Kolbian coil manner. A mechanism that tells where and why group members have problems so that other members helps and discusses these problems. This will be helpful both for the members and for the progress in the project.

Benefits: The very enthusiastic students enjoy working together on solutions of the problems and they have no problems with the pedagogical project oriented model. But for the rest it is necessary to find modified methods, which remove the feeling of doubt, uncertainty and loneliness.

5.3. Technology experiences

Virtual group work is dependent on: synchronous and asynchronous communication, exchange of documents, version control of documents and track keeping of the time planning. [1], [2].

Communication is mainly obtained via e-mails and chats based on text and/or audio. In Uniflex the students can create net meeting for project and course discussions. News is intensively used in the beginning of the project to keep information in paralleled created threads. It is somewhat easier than uploading to Uniflex. This changes as the projects progress. From the middle of the semester all documents are uploaded to Uniflex.

Exchange of documents and version control (Figure 3. and 4.) and *time planning*: Uniflex seems to be robust and well working on the public internet. It is very easy to maintain the different documents and the reviewed versions of the documents. It is easy to build up the content in the project but a kind of spreadsheet for total status view is missing.

5.4. Seminar experiences

The seminars are needed. The students really feel that the important project progress mainly happens here. Even if only few hours are free from courses it is helpful. Especially for the complex and difficult part of the project, where important decisions shall be made, face-to-face group work is needed. Also it is observed that the project managing has a very high priority and that the sessions are used as milestones for the project state. It also is a very needed opportunity for the project supervisor to discuss with the students.

6. Conclusion

For the MII-students, who are not accustomed to project work in learning or to distance education, the small-scale process-oriented pilot project was an excellent introduction to the following main project work. The conclusions from the main project, based on experiences, are more ambiguous:

- For most of the students the project work is a unique learning motivator, but some of the students falls behind and even loses motivation.

- Peer collaboration in project work is especially enhanced between students with the same level of ambition.
- Face-to-face meetings are very important for project work with very complex and freely chosen main projects.
- Planning and control should be extended with reflections on the chat meetings and in between.
- It seems that the Kolbian coils mechanism for sharing experiences don't happen during chat's

It is recommended that the groups as their main project works with a very well planned project, which is closely connected, to the courses. For the project the analysis, task design and problem solutions must be known. There should be no free project choice the first year.

7. Future work

A full-scale experiment is organised in the project 'Digital North Denmark' where the ViLL task (Virtual Learning Environments and Learning Forms) will try to find answers to:

- How can benefits from the on-campus project based learning be transformed more effectively to the distance education?
- How do we select groups whose members have the same level of ambition?
- How is it possible to get more consideration upon the learning coils in the project work during distance group meetings and between the students in their daily work?
- Why are the existing supervising methods insufficient for supervising the students in distance project work?
- How do we utilize the new information and communication technology better for Web-based group organized project work?

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