Paper 8:

Building a Virtual Workshop: Collaboration based on Internet Technology

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Summary

- Learning has always been expressed by means of learning goals. Such learning goals could typically be integration of theory and practise, learn to underlie arguments and collaboration (project work). Traditionally, university students have organised themselves in colloquial groups, to achieve richer learning. Discussing the curriculum with other students have always been considered excellent pedagogy.

In recent years, more students are studying part-time, often full- or part-time employed. In this life-long learning (LLL) field, distance learning become important and very effective. The students are not able (or at least unwilling) to leave their work for several days, attending a course. They want to stay at work, or with their families, studying. This implies that they are often left on their own, with no other students attending the course to discuss with face to face. If we can state that collaboration is good pedagogy, how shall we overcome the lack of presence of other students? This paper will discuss collaboration in open and distance learning, more specifically Computer Supported Co-operative Learning (CSCL). McConnell [1] defines CSCL as (p. 8):

Methods and Approaches

"No matter how distant each member is, they all have a need to work together on some aspects of their learning, and do this through the use of computers. I call this form of co-operative learning computer supported co-operative learning (CSCL)."

Introduction

- In Norway, there has been a lot of focus on lifelong learning lately. Norway is a country with long distances. Distance learning is therefore an appropriate method of learning in adult education. This fact also makes learning more "international". It doesn't matter if students attending a course are situated in Norway, UK, USA or China. If they are connected (to Internet), they can participate. This can lead to quite interesting (and frightening?) results for the market of future distance learning in (especially) adult education.

  This paper will consider using Internet as a 'classroom' for distance courses. It will not give an overview of what is "possible" to do with Internet learning, but be based on the "action research" that have been done through the "NITOL project" (Norway-net with IT in Open Learning) and "DoODL" (Dissemination of Open and Distance Learning, a project granted within the European Commission programme SOCRATES). In these projects, "availability" is emphasised. The equipment requisitions to the end-user are minimised. The boundaries are set with an ordinary PC with Internet connection, and we have tried to achieve as much as possible within these limits (the possibilities and experiences will be discussed later in this paper). NITOL was started in 1994 with a handful of students. Today (spring 1998) there are more than 1500 Norwegian students taking course modules each semester.

  Of course, there are both advantages and disadvantages with Internet learning. Availability has already been discussed as an important advantage. The limited bandwidth and the simplicity compared with other systems (like Lotus Notes) are often considered disadvantages.

Co-operative learning on an experimental basis

- Research shows that co-operative learning leads to higher achievements and better results than competitive work by ones [1, p.23], also in the field of networked learning [2]. This section will consider Internet co-operative learning and look into what services and software tools that are suitable within the boundaries mentioned in the previous section. The theory will be funded on experiences from projects within the open and distance learning (ODL) area.

  During the past years, we have experienced a tremendous growth of Internet users. In Norway, more than a million people have access to Internet (of four millions in total), and the increase seems to continue. This makes Internet more attractive as a learning arena as time goes by.

Tools assisting co-operative learning

One of the great advantages to Internet learning is the availability and low-cost applications. Most of the software that the students use with Internet learning is totally free of charge (freeware). Some tools cost a few dollars to use (shareware). In this paper, I will focus on six different tools: Web browsers, e-mail clients, news clients, Internet Relay Chat clients, conferencing tools and BSCW (Basic Support for Co-operative Work). Later, they will be related to learning aspects within distance learning.

The NITOL model of distance education

Before I start discussing tools for collaboration in learning, I will briefly give an overview of the pedagogical model of the NITOL project. The model is quite simple. The philosophy is that students should be able to easily understand the teaching model without necessarily being IT persons, and to participate at a low cost. An average PC (about US$ 1200) and an Internet connection should be enough to participate in any course. No expensive

software is required. With respect to the growth of Internet connections mentioned above, the market potential is good.

Every course module (an average of 6 ECTS points, or a tenth of a full year study) starts twice a year, January and September. A course module is normally divided in 12 parts (called "lessons"). Each lesson consists of a written text and an exercise. The lessons are published on World Wide Web once a week. Students work through the lessons, do the exercises and send the work back to the teacher (or to a student assistant) by e-mail. He reads the exercise and gives written feedback in return within a few days. During the course module, there is a conference (USENET) where the students and teachers are encouraged to participate. At the end of the course module, students take an exam at an institution in the students' living area.

Web browsers

"Web browsers" are the most important part with respect to the distance education model described above. All the "static" information is presented through web pages and is read by a browser. With respect to collaboration, web browsers have not much to contribute with (static information).

e-mail

"e-mail" is also an important tool in the pedagogical model described above. Students "communicate" with the teacher and vice-versa. In collaboration, e-mail is useful for communicating asynchronous between the collaborating parts (for example the students in a group). e-mail is not useful for "online" collaboration because of the time lag.

News

It is mentioned in the introduction that students taking part in distance learning often feel alone. There can be hundreds of students taking a course module.

One such 'class activity' is "news", often called "CMC - Computer Mediated Conference". News can be implemented in several ways - the most common known electronic conferencing system is USENET. It is possible to establish one news-group for each distance learning course module, and give the students access to this group. Students often have the same problems. If the teacher answers them on news, everyone can read the answers and (hopefully) learn more. If students are doing group work (collaboration) they can use the news system for the formal discussions. In this way they are preserved for the future, and it is easy for any future project members to scan through the discussions.

Establishing news group can be a complicated task. There is an alternative news system that is easier to configure and maintain. They are often web-based (browsers are used to write and read news). An example of such a system is "HyperNews" [9].

Both e-mail and news clients often are integrated with web browsers (for example Netscape Navigator/Communicator and MS Internet Explorer).

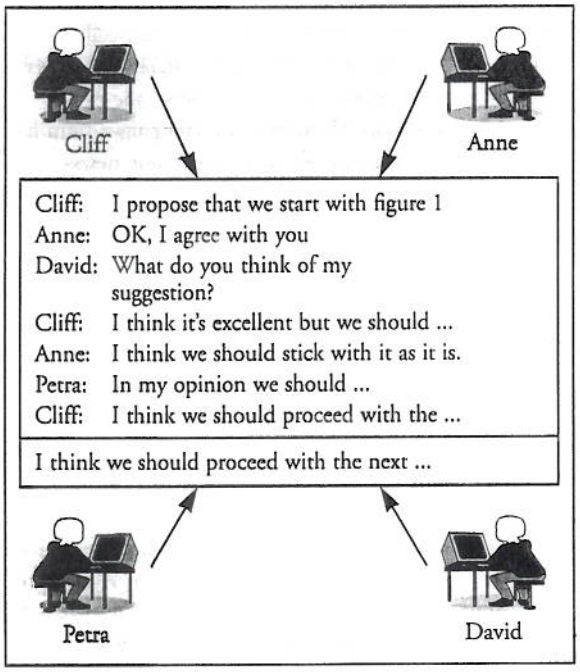

Figure: 1 - Student group communicating via IRC

IRC is text-based only. When one student writes a paragraph, the text immediately shows up on the other participant's IRC clients Figure 1 shows an example of IRC in a project group. The top of the windows (above the horizontal line) is equal at all participants, while the part below the line is the area where the contribution is written.

IRC clients are free of charge for the student. An example of an IRC client is mIRC [10].

Conferencing tools

During the past years, a lot of "conferencing tools" have come to the market. Conferencing tools usually consist of many components, typically phone facilities, video and chat (as in IRC).

One of the leading free of charge conferencing tools is Microsoftís "NetMeeting". In addition to the components mentioned above, online development is possible. One participant can share his Word document with the other participants. In that way everyone can edit the document (collaboration).

One of the drawbacks with the conferencing system in this context is the requirement it puts on the end-user's equipment and bandwidth. To exploit the system to its full extent, you also need computers with sound cards and video cameras.

Document pools

All the systems above lack one important feature. Collaboration demands that you have something to collaborate on, typically a document (report). Every participant in the project group needs to have the latest version of the product. e-mail or a news-system can solve this. Every time one of the members update the document, the new version is distributed to the others. This causes a lot of traffic, and there will be a problem keeping track of all the versions.

A "document pool" takes care of this. This is a common workspace where everyone in the group has access. Such a workspace can be implemented in many ways. There is a freeware solution to this problem, called" Basic Support for Co-operative Work (BSCW)" [11].

Levels of co-operation

Above, six important components of a framework for CSCL are presented. In this section I will relate this to different levels of co-operation, based on experiences from NITOL and Do ODL by a matrix.

1. **Communicating/collaborating with teachers.**

   The first (and lowest) level of co-operation is when students only communicate with the teacher/teacher assistant. This communication can hardly be called collaboration since it consists of answering exercises to which the teacher gives feedback. News can also be used in this model to let students have a feeling of belonging to a group.

2. **Collaboration on exercises by e-mail, news and other off-line systems.**

   The second level of co-operation is when student groups are arranged. The groups solve exercises in common. The students use any kind of off-line tools to do the exercises, i.e. e-mail and news. This makes the learning process better since the students have to communicate with each other, not only the teacher/teacher assistant.

3. **Virtual meeting to discuss curriculum/exercises.**

   The third level of co-operation extends the first point by online meetings between students and perhaps involving the teacher. This enriches the teaching because it is possible to discuss common problems. Virtual meetings can take place on regularly basis, for example once a week at the same time. IRC can be used in order to arrange such meetings.

4. **Online collaboration based on project work**

   The last level of collaboration is the most extended with respect to co-operative learning. The teaching is organised by project work and the students learn the course module by collaborating (IRC, NetMeeting etc.). Different kinds of course modules can be organised this way. There are course modules where the aim is to learn about project work. It is also possible to use this kind of pedagogy with traditional course modules (for example economics and marketing). The teacher can interact on a more or less regularly basis. A document pool (or a corresponding system) is highly recommended to keep track of the documents.

Through the NITOL project, we have experiences with running courses this way. Students from all over Norway are gathered in virtual groups, using Internet tools as the only communication.

These four levels of collaboration can be related to the presented tools above:

Results

- A research project from the California State University in autumn 1996 [2] shows that students taking courses as distance learning with collaboration achieved 20% better exam results than a similar group attending traditional classroom teaching. Another interesting fact is that it appeared that students taking part as distance learners had significantly higher peer contact (40%), and time spent on class work (30%), than the traditional class. The students were randomly divided into the groups.

  In the NITOL project, many course modules are offered both as traditional teaching and as distance learning (following the NITOL model described above). The students are given the same exam at the same time. The results show us that distance learners achieve better results, and are more motivated than students present are. There is no figure that confirms these assertions.

Tool	Method 1	Method 2	Method 3	Method 4
Web browsers	x	x	x	x
e-mail	x	x	x	x
News	x	x	x	x
IRC			x	x
Conf. tools			(x)	(x)
Document pool		(x)		x

Table : 1 - Levels of collaboration

Case study - software engineering

This case study will serve as an example to illustrate some of the aspects described in this paper. The Norwegian course module 'Prosjektrettet systemarbeid' (software engineering) is considered a 'heavy' course module. It was run after method one above (almost all the communication was between students and the teachers). To improve the results and to make the course module better, some of the methods above have been tried out.

Establishing groups

Collaboration was set up as a learning goal for the course module. The students came from all over Norway (and from Norwegians abroad). This made 'online collaboration' necessary. To achieve this, groups were established. The first exercise was to shape groups. All the students presented themselves, their ambitions and other facts on the newsgroup of the course module. Then it was up to them to propose a group composition. When 4 or 5 members had joined, the group announced themselves on the newsgroup.

The collaboration begins

After the groups had started to establish (this activity lasted for several weeks), they were given an exercise to be solved together. This activity had nothing to do with software engineering, but was a case from a plane crash in the Antarctic. The situation was detailed described. They were the survivors, and they had only about 15 items available. The exercise was to decide the priority on each item.

One or two IRC meetings should be used to solve the exercise. Guidelines for installing and configuring IRC were given, together with a simple user guide.

The rest of the course module

After this 'fun' exercise, the course module becomes serious. The groups had become 'warm', and solved the rest of the exercises as project work, collaboratively, and probably with much better results.

Virtual meetings for the class have also been arranged frequently, both at daytime and evenings. Strange as it may seem, these meetings have not been well visited. The newsgroups have also been up and running during the whole course module. In the next step, BSCW will be used to give the groups a workspace to put their documents.

Evaluation

Evaluation showed that few students taking the course module had tried online Internet communication in any forms before. IRC is very simple to install and understand. Evaluation showed that the students were very satisfied with this 'new' way of arranging meetings, and a great deal of them considers it the 'future of meetings'. Unfortunately, no evaluation has been done with respect to results comparing these methods to the traditional ones.

Requirements for institutions wanting to build a 'virtual workshop'

- There are three major components for institutions wanting to use this pedagogy in their distance learning. These are 'know how', 'server software' and 'client software'.

'Know how'

Every new way of thinking needs competence to do the work. The 'know how' is often the most difficult to find, and the most expensive. This makes it the 'critical success factor'.

Server software

The server software needed at the institutions consists of three parts:

1. **Web server** - the most cost-effective (if the 'know how' is present) is an Apache server on LINUX platform. Another alternative that needs less competence is NT Server.

2. **News system** - an easy implementation of news is the HyperNews, which is integrated with web. HyperNews requires a UNIX version (for instance LINUX). HyperNews works well together with Apache.

3. **Document pool** - BSCW is presented above, and is an excellent system for document sharing with co-operative learning. BSCW is available for both UNIX systems and NT.

Access to e-mail for both the institution and the students are also required. It is not required to run an e-mail server. This overview proves that LINUX is a good alternative as a server platform, if the 'know how' is present.

Client software

Client software is needed for the institutions and the students. Basically, the following is needed:

1 **Web browser,** e-mail client and a news client such at Netscape Navigator/ Communicator or Internet Explorer

2 **IRC** client such as mIRC [10].

Conclusions

- Co-operative learning has always been considered excellent pedagogy. This paper has defined the term collaboration applied on distance learning based on Internet technology.

  Better distance learning based on Internet technology is not complicated to achieve. There is a lot of free software available. The challenge is to apply this new Internet technology on traditional teaching. This paper has presented simple pedagogical models with respect to online collaboration, and related them to available Internet applications.

References

McConnell, D (1994) Implementing computer supported cooperative learning. London, Kogan Page

Schutte, J (1997) Virtual teaching in higher education.
URL: http://www.csun.edu/sociology/virexp.htm

Spellman, P and Carlson J (1996) Collaborative virtual workspace.
URL: www.tema.liu.se/MUD/mitre.htm

Shotsberger, P, Smith K. and Spell, C Collaborative distance education on the World Wide Web: What would that look like? (1995)
URL: www-cscl95.indiana.edu/cscl95/shotsberger.html

Christiansen, E and Dirckinck-Holmfield, L Making distance learning collaborative (1995)
URL: http://www-cscl95.indiana.edu/cscl95/christia.html

Chellappa, R, Barua, A and Whinston, A An electronic infrastructure for a virtual university (1997)
Communication of the ACM, September 1997/Vol.40, No.9 p 56-58

The MECPOL partner team; contact P. Hynes Models for collaboration (1997)
URL: http://www.idb.hist.no/mecpol/

The MECPOL partner team; contact P. Hynes Models for ICT-based open and distance learning
URL: http://www.idb.hist.no/mecpol/

Hypernews - URL: http://www.hypernews.org

mIRC - URL: http://www.mirc.com/

BSCW - URL: http://bscw.gmd.de/