IMPLEMENTING PROJECT-BASED TELE-LEARNING
Jan van der Veen*, Betty Collis*, Nico van Diepen* and Toine Andernach*

We discuss the use of Web environments as a platform for collaborating project
groups. For two courses at the University of Twente, this method has been applied
since 1994 successfully [Collis, Andernach and van Diepen, 1997]. After a
description of the courses, we will use our model describing tele-projects to
highlight some implementation aspects and the role of telematics in solving some
of the problems encountered.

PROJECT-BASED EDUCATION
We define project-based education in the university context as involving groups
of students who work together in the execution of a series of activities. These
activities involve the stages of problem analysis, decision making, design and
production, and evaluation. Both working collaboratively and working in the
context of a problem motivates and enhances learning [van Woerden, 1991].

APPLICATIONS OF INFORMATION TECHNOLOGY
The course “Applications of Information Technology” is compulsory for students
in Business Information Technology. The emphasis is on the role of information
technology in organizations. The objectives of the course also concern abilities as
cooperation, information disclosure and accounting for results. As part of this

![GROUP CENTER](image)

Figure 1. Part of the screen representing the "Group Center" in the "Applications of Information Technology" course.

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* Educational Centre & Centre for Telematics and Information Technology, University of Twente,
p.o.box 217, 7500AE Enschede, the Netherlands, vdveef@cit.utwente.nl
* Faculty of Educational Science and Technology, University of Twente, collis@edte.utwente.nl
* Department of Computer Science, University of Twente, andernac@cs.utwente.nl and
nvdiepen@cs.utwente.nl
course Dutch students work collaboratively on a project with Finnish students taking a similar course, at the Kuopio Vocational Educational Centre and the Kuopio Polytechnic. Apart from communication through Email and IRC, the groups build up their reports on the World Wide Web, using the Internet for information retrieval. Group cohesion and group memory are enabled by using a “Group Center” (Figure 1). The absence of face-to-face contact is something for the groups to be aware of. This is partly overcome by a videoconference at the beginning of the project. URL: http://wwwedu.cs.utwente.nl/~altnipbg/

INSTRUMENTATION TECHNOLOGY-1

“Instrumentation Technology-1” is a compulsory course for students entering the Educational Science and Technology curriculum. The general objectives of the course are to introduce the students to the process of designing and developing computer-based learning materials. The course is organized around three group projects, in which students work in groups of eight or nine, and within each group have different roles relative to the particular design task. The developed multimedia products include interactive Web sites with questions and feedback programmed in JavaScript and incorporating images, audio, movies, and desktop-published print materials. Coordination, publishing and evaluation of the work are all organized through a group center, combined with a planning homepage. Everyone is able to see each other’s products from a common and convenient interface. Groups do perform an informal comparison or a formal peer group evaluation. URL: http://www.to.utwente.nl/ism/ism1-96/home.htm

DIMENSIONS OF TELE-PROJECTS

When some or all of project-work activity takes place among participants distributed over time and distance, the challenges involved in making project work a productive and manageable instructional strategy increase [Collis and Smith, 1996]. In table 1, we present dimensions for tele-projects, building on models for CSCL [Heerren, 1996] and project based learning [van Woerden, 1991]. For each key dimension we present problems encountered in our tele-projects. In the last column we present telematic contributions in the solution of these problems. To improve planning and the oversight for the instructors and group management workflow functions will be added in the 97/98 editions of the two courses, see italic entries in table 1.

CONCLUSIONS

In courses at our University the World Wide Web has been used to support project groups in their work. Web-integrated sites can be designed in ways to bring project work to a much more manageable level, for both students and instructors. The instructor has the flexibility in time and place of observing what the groups are doing, and intervening or otherwise giving feedback. Students are motivated by the fact that their work is published on the Web. As the Web evolves, new groupware options and enhanced interactivity make the Web a suitable platform, not only for information exchange, but also for project-based education.
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Problems encountered</th>
<th>Telematic contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner</td>
<td>Interest and motivation</td>
<td>Publishing on the Web motivates 97/98 course editions will incorporate workflow functionality allowing oversight through status reports, automatic and tailored coaching</td>
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<tr>
<td>Tutor</td>
<td>Monitoring group process Oversight of all groups Coaching and intervention</td>
<td></td>
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<tr>
<td>Group</td>
<td>Group cohesion and group memory</td>
<td>Group Center gives access to group homepages, products and planning including visual workflows (97/98)</td>
</tr>
<tr>
<td>Task</td>
<td>Product and process objectives Problem and context</td>
<td>Products assessment through Group Center and presentations Context related resources and links</td>
</tr>
<tr>
<td>Technology</td>
<td>Access for students</td>
<td>Worldwide access through Internet Campusnetwork, dialback and ISDN connected home-offices, department pc's</td>
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<tr>
<td>Organisation</td>
<td>Pre-structuring of work Deadlines Limited face-to-face contacts Contacts with clients</td>
<td>Planning visible on Website, Deadline alert by workflow tool (97/98) Videoconferencing CGI forms for structured communication Clients can access products on Website</td>
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<tr>
<td>Assessment</td>
<td>Individual accountability ('Free rider' effect)</td>
<td>Web-report contains also individual contributions</td>
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Table 1. Key dimensions of tele-projects, encountered problems and telematic solutions.

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