

IMPLEMENTING CHANGE THROUGHOUT THE FACULTY: COMBINING EDUCATIONAL PRINCIPLES, STRATEGY AND TECHNOLOGY

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ABSTRACT

This paper describes key guidelines underlying a major change process occurring in the Faculty of Educational Science and Technology at the University of Twente in The Netherlands. The change process involves re-designing all of our courses, within a short period of time, to reflect a new instructional approach and to make substantial use of WWW-based course-support environments. Central to our approach is a recognition that instructors must be centrally involved, and maintain ownership of their courses. We have developed an approach for this which is briefly described in the paper. The choices made by the instructors relating to what sorts of WWW-based tools and applications they would like to use to support their courses are summarised. Finally some of our key challenges are identified.

1. CHANGE IN RAPID TEMPO: THE TELETOP APPROACH

I work in a faculty of educational science and technology in a traditional university setting where course design and delivery is the task of the individual instructor. Our courses are of five general types: theoretical courses, survey courses, courses organised around group projects, skill-development courses, and statistics and research methodology courses. In this context, a number of instructors in our faculty have been pioneers in the re-design of their courses involving new technologies. For example, members of the faculty were among the first to use the WWW as a collaborative-learning environment for course assignments, in March 1994, so that experts in different places in the world could interact with the students in the course on the collaborative writing of course materials using the WWW as a common dissemination environment (Collis, 1997b). By the end of the 1996–1997 academic year, our faculty could be characterised as having moved from a *support-the-pioneers* stage with respect to the use of information and communication technology (ICT) in instruction, to a *1,000 flowers blooming stage* (Collis, 1997a).

In the momentum of this experience, our faculty has decided to move from the *1,000 flowers blooming stage* to a stage of *managed change* in our instructional practice. We have made this decision on the basis of not only the naturally evolving interest and momentum for course re-design taking advantage of the potential of ICT for increased interactivity and communication within courses, but also because of the strategic decision to offer our education program in a more-flexible way. In particular, the decision was made in mid 1997 that by September 1998 students entering our program could participate as local students, as students meeting together in a satellite campus on the other side of our country, or as part-time mature students, already

in the workplace and maintaining their jobs and home situations while participating in our program. All three of these cohorts come together to our campus one day every two weeks for various common sessions and opportunities for face-to-face interaction, but after that each course is being re-designed so that all three of these cohorts can have their particular needs met within a shared course experience, with no extra instructional staff. The entire process will take several years, with all of the first-year courses re-designed for the academic year that began in September 1998, and the majority of the rest of the required courses being redesigned in the current academic year (1998–99). In addition, we are also redesigning our senior elective courses to be tailorable to students from other faculties as well as to the students in our Masters Programme for Educational and Training Systems Design. The latter is an English-language programme which currently enrolls students from over 20 countries, partially or fully at a distance.

Key to all this activity are three different organising principles. One is the idea of flexibility: the multiple use of courses, alterable to the needs of different groups of students. The second is the idea of *extending the good instructor*: we are not replacing or distancing the instructor from the students, but rather looking for ways to amplify the individual strengths of our instructors and strategically increase communication between instructors and students. The third principle is actually a cluster of principles all relating to increasing the chance of successful change implementation within a faculty, for example, by stressing instructor empowerment and involving the instructor in an on-going way throughout all aspects of the change process for his or her course. And also fundamental to the whole process is to use technology as shrewdly and powerfully as possible.

In order to steer and manage this complex implementation project, an instructional development team, called *TeleTOP* has been formed. I am the chair of the team. Responsible with me is the director of our faculty computer and multimedia centre. Five graduates of our faculty are full-time team members (with specialities in technical system design, functional system design, instructor support, new pedagogies, and strategic communication). The task of the TeleTOP team is to lead and carry out this systematic and integrated course re-design initiative, what Gustafson and Branch (1997) would categorise as a system-orientation approach, but working within the reality and strengths of the local instructor-specific, classroom-orientation culture.

When our team was formed, in September 1997, it seemed to many that the task was overly ambitious: getting everyone to change, developing and establishing complex new technical systems, introducing new cohorts of students, keeping everyone reasonably happy, and changing the personal technical literacy level of everyone in the faculty (students, instructors, support staff), all in one year. But we are doing it, on time and target and generally smoothly. In this paper, I will try to extract the aspects of our experience that may be of most use to others involved in similar change processes. In particular, I will give a set of our guiding design principles, describe our approach to maximise faculty involvement, and give an overview of what our instructors are choosing in terms of ways to use the WWW to support their courses. In the presentation that goes with this paper, I will demonstrate a number of our courses to show the variety of instructional approaches and ideas that are evolving.

2. DESIGN PRINCIPLES: COMBINING PEDAGOGY, STRATEGY, AND TECHNOLOGY

While the original examples in the faculty of use of WWW environments to support courses were those of enthusiastic pioneer instructors, the TeleTOP Project has to deal with a more difficult target group: all instructors, including the less-interested, less-motivated, and sceptical, are to be supported in their re-design of their courses and their design of WWW sites to support their courses. Given these two basic aspects – empower, not replace the instructor with technology; and engage all instructors, with a wide variation in computer skills as well as a wide variety of levels of interest in the use of technology in their own teaching – we developed the following set of 12 guiding principles (Tielemans & Collis, 1998):

1. To make the threshold of use as low as possible for the instructors, the WWW-environments must be useable by the instructors without having to have a special training course and as easily as they handle a word processor. The TeleTOP team realised this principle by developing a database-generated system in which a flexible course-support environment is available to the instructor. The instructor chooses the features he or she desires to support the course, and only has to type into various types of fill-in forms to organise the notes and other material that is to be put into the WWW site.
2. Students also must be able to use the system without instruction, and no more than a small manual. Once they are familiar with the interface of one course-support environment, they have a consistent interface in other courses, reducing the need to learn to handle new environments with each new course. The environments are to be accessed through familiar browsers; no new packages to learn, and nothing that requires them to come to the computer laboratory to use.
3. Similarly, the instructor must be able to do everything he or she wishes with the course through an ordinary WWW browser; no special authoring software, no special client. An instructor travelling out of the country can work on his or her course wherever there is access to the Internet via a standard browser. A guest instructor in another country can enter notes and materials directly into the course site, again without any special equipment and without needing to have access to the server. Thus the system should not be a server-client model, whereby the instructor in addition to the Internet browser has to install special software at the client side to get access to the learning environment.
4. By the principle “empowerment of the good instructor”, the instructor must be able to choose for him or herself the way that a WWW site will be used to support his or her course. There is no standard pedagogical model that all are expected to follow. With this in mind, the TeleTOP Team developed a WWW-based Decision Support Tool (DST) (see De Boer & Collis, 1998a,b) to help the instructor get a systematic overview of examples of different ways WWW-based tools can be used within the organisational aspects of their courses, the aspects relating to lectures and face-to-face sessions, aspects related to communication with and among students, to the presentation of course-related materials, to file distribution and the addition of resources to the course site. After an interview session with TeleTOP Team members and the DST, the instructors have a more-informed idea of what is possible, and more importantly, what they will find appropriate to use in their own courses. Directly after the use of the DST, a WWW-based framework of each instructor’s new course-support site is available, to be tried out by the instructor via an ordinary browser. We believe the instructor must be the decision maker about the course site, but we know from our experience with authoring systems for instructors, that this principle often does not lead to any use of the authoring system or products made from it. This our approach involves continual contacts with the instructors.
5. We do not see the course-support sites as replacing the textbooks in the courses or making lectures unnecessary. Instead the course-support sites help the instructor add extra opportunities for student reflection, for communication, for student contribution of additional learning resources, for peer interaction and peer evaluation, and to add a “preparation for” and “follow-up from” each face-to-face session. Thus we conceptualise our course-support environments as information-communication exchange environments, that are also coupled with other information systems of the faculty such as the bureau responsible for student issues and administration.
6. The course-support environments must be capable of supporting a large variety of different types of instructional approaches, from courses focused on reading and written assignments with classic final examinations, to courses with complicated approaches to group work and project-based education. Tools to support any instructional approach must be available, including shared workspaces, test banks, and discussion boards.

7. The system must work with all other WWW products, for example Java applets and plug-ins.
8. The instructor must be able to put in and take out whatever is necessary in the course site without needing direct technical support (although we have student assistants who help out). Uploading and downloading attachments of a variety of types is particularly important.
9. The course-support sites must help instructors organise the information streams within a course; instead of student messages coming to the instructor's e-mail address, for example, they can be posted directly into the course site, either as private (only for the instructor to see) or public (for all in the course to see). Feedback from students or the instructor must follow the same principle. Also, there should be easy-to-set-up ways for messages to be sent to a group of students, or all the students in the course, or other groupings within the course, all from the same WWW environment.
10. Access to the system must be organised on the basis of inlog data which are used by the system database to tailor what can be seen and not seen to each individual. Also it must be easy to leave the system and go to an external site on the WWW and then return to the system, without leaving the browser. Privileges must therefore be regulated at the resource-document level, as to who has read and/or write rights to any item in the database. The author of an item should be able to decide him or herself who has rights to a submitted item.
11. The system must be efficient to maintain, thus no labor-intensive hand-made HTML pages, but pages generated dynamically out of a database.
12. The system must handle multimedia resources the same as text resources. Video and audio must be streamed over the bandwidths available to the students.

We could not find an available system to meet all these requirements; thus we developed our own, using a basic system architecture that involves an HTTP server, a video server, a Lotus Notes server, and the use of the Domino database technology.

3. MAXIMISING FACULTY INVOLVEMENT: THE TELETOP RAPID PROTOTYPING APPROACH

We have developed what we call a *rapid-prototyping approach* as our key instructor-involvement strategy. This approach makes use of a WWW-based tool which we have developed, which we call the *TeleTOP Decision Support Tool (DST)*; Collis & De Boer, 1998, DeBoer & Collis, 1998). Important to the approach is a weekly instructors' session within the faculty. These sessions are voluntary, and well attended. There were more than 20 sessions during the 1997–1998 academic year, and the series is underway again in the 1998–1999 academic year. During the first two months of the sessions, instructors are first introduced to a particular way of thinking about their courses, in terms of a matrix in which the rows are standard components of courses (course-organisation aspects, face-to-face sessions, self-study and practice activities, projects and major assignments, testing, and general communication) and the columns relate to three motivations for change in each of the components (to make the component more efficient for instructors and students, to enrich the component, to make the component more flexible for different types of students). Links to examples of how WWW-based applications could support each category of change are demonstrated and discussed.

By the third month of the sessions instructors are encouraged to consider their own courses and make a list of re-design options which could be facilitated by a WWW-based course-support environment tailored for their own particular courses. One-hour individual consulting sessions with each of the instructors whose courses are going to be re-designed are then organised. The primary activity of the session is to use the especially-made TeleTOP Decision Support Tool (DST) in order to be as efficient and effective as possible in interacting with the instructor whose course is being re-designed, trying to identify which WWW-compliant tools and associated pedagogical approaches are most likely to be acceptable and interesting to the

particular course of the instructor and his/her way of teaching. For each of the course components a number of questions are asked relating to ways that a WWW site could be used relative to that component. Links to examples, primarily from courses already using the WWW in our own faculty, are provided for every question. Immediately after the last of the questions in the DST is completed, a WWW page is generated for the instructor summarising the choices that had been made, and providing the example links for those choices so that the instructor can further consider them via the use of an ordinary WWW browser at his or her convenience. This site generated by the DST serves as the product of this first round of *rapid prototyping*.

A follow-up visit in the instructor's office one week after the DST session is the next step of the process. During this visit, a TeleTOP team member and the instructor walk through the first WWW site generated from their decisions made with the DST, and make a second round of refinement of those decisions. Following this, a second prototype, a course site tailored to the instructor's choices is generated, through the use of the TeleTOP database-driven system.

The next step for the instructors is to practice with these prototype environments during the weekly staff sessions. In these sessions, instructors gradually add materials to their course-support sites, and have the chance to work together and exchange ideas at the same time. A few months later the instructors again go through the process of using a second WWW-based decision tool, choosing a final set of options for their course-support environments. From this, the final course-support environment is evolved. As a result of this rapid-prototyping process, instructors not only are closely involved in the design process of the WWW sites that will support their courses, but also develop competency in handling those sites and the associated telematics tools and applications. The results of the process are tailored course-support environments, and also the creation of a sense of community among the instructors and a heightened level of awareness and literacy throughout the faculty with regard to the handling of WWW-based applications, network issues, and the instructional integration of WWW-based applications into their regular courses (De Boer & Collis, 1998).

Instructors thus had an extensive opportunity to try out a large variety of telematics tools and applications over the course of the rapid-prototyping process. What options have they actually chosen? In the following section, a summary of the options eventually selected by 21 of the courses redesigned in the 1997–98 cycle is given.

4. WHAT ARE OUR INSTRUCTORS CHOOSING?

We showed examples of over 60 different sorts of tools and approaches for course-support sites in the DST. After their experiences during the rapid-prototyping process, which of these possibilities did the instructors actually choose? Table 1 gives an overview of the options selected by the instructors for their environments.

Table 1

The options chosen for the WWW-based course-support environments by 21 of the instructors

Component	Options	Description
General course information, self-study, lectures and support	News	A place for up-to-date information
	Roster	Here, instructors can put their study materials, assignments, sheets, notes and feedback related to the lectures. Also, the roster provides a convenient way to have the students enter follow-up reflections or assignments after each class session, for these submissions to be directly posted in the site, and for the instructor and the students to give feedback.
	Quizserver	This option enables easy-to-make (self) tests.
	Course information	A course description stating the objectives, organisation of the course, assigned texts, etc.
Communication	Email	In the mail-centre addresses of individuals and groups can be found. E-mails can be sent from here.
	Discussion	The discussion area can be used for asynchronous discussions.
	Question and answer	Same as the discussion area, here with the focus on questions to the instructor.
	Chat	Synchronous communication.
Groupwork	GroupWare	An easy-to-use file-management area, for collaborative work.
	BSCW	A more-advanced file and communication-management shared (GMD, 1998) workspace area, for collaborative work.
	Presentation	Presentations and other products can be presented in this part.
Resources	Glossary	Area where concepts can be explained. Relations with other areas can be made clear as well.
	WWW links	Resources: Links to sites on the WWW
	Multimedia	Resources: Links to a multimedia database maintained within the faculty.
	Search	A search centre within the course environment or the WWW

The options *Newsflash*, *Roster*, *Course information* and *Email centre* were chosen by all the instructors in the 1997–98 cycle, and thus are being strongly advised as the basic environment for the new round of courses being tailored during the 1998-99 academic year. The other options were chosen in various combinations by the instructors. Instructors with specific needs can get more tailor-made options. Figure 1 gives an overview of the percentages of the instructors who chose each of the above options. These numbers are based on the first 21 courses being offered between April 1998 through March 1999.

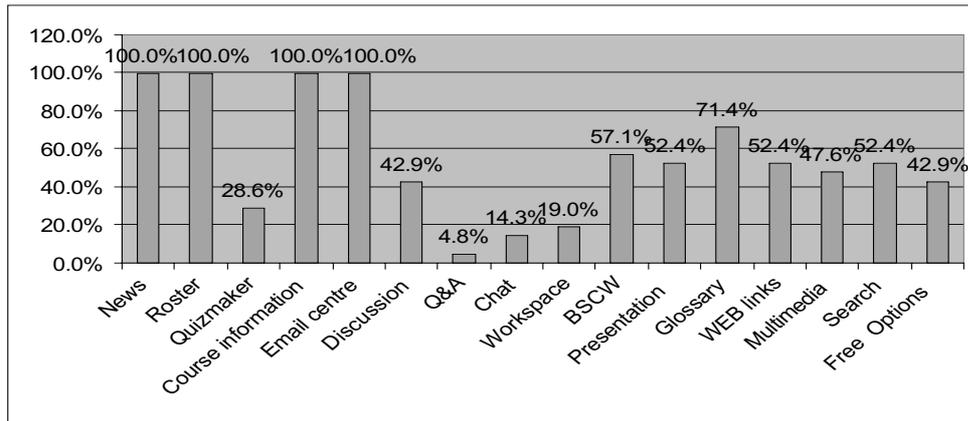


Figure 1: Percentages of instructors choosing various options (N=21).

5. WHAT ARE OUR MAJOR CHALLENGES IN YEAR 2?

During the first year (1997–98) major challenges involved raising awareness, raising technical literacy, anticipating the access and computer needs of instructors and students, breaking down initial resistance, confronting stereotypes and fears, developing the technical infrastructure, and finding an efficient way to communicate about a complex and evolving process. In Year 2 (the current year), these challenges are less urgent in that we seem to have reasonably responded to them during Year 1. However, major challenges remain or are emerging, including the following:

- At the university level, a policy decision has just been made to introduce new educational changes, such as allowing students to move from one faculty to another within the first year without loss of credit and without being behind in the new faculty. Although we are well positioned with respect to already having our first-year courses more flexible, the instructors are now going to have to re-consider their courses again in terms of this policy and the pre-requisite knowledge they can expect students to have. This is annoying to some of the instructors, who would like to feel their re-design work is finished and stable. It is also an unexpected time demand for the TeleTOP team, who may have to revise some aspects of the first-year courses.
- Because of the success of our approach, we are continually approached to extend it to the university level, to share it with schools, to join in collaborative ventures with software companies or private training organisations, to make it available to other educational institutions. Finding a way to share our experiences, but maintain our intellectual and financial investments, is complicated and taking much time.
- We were so successful with our awareness-raising activities last year that it is harder this year to attract instructors to the weekly sessions. While in one way this is desirable, that the need for the sessions is decreasing, on the other hand we know that these sessions are important, particularly for the instructors whose courses are currently being re-designed.
- The problem of how to measure the impact and effectiveness of all of this activity is particularly challenging. An external formative evaluation is occurring to support this process.

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