De Boer, W., & Collis, B. (2000, 28 June). The adaptation and use of a WWW-based course-management system within two different types of faculties at the University of Twente. In J. Bourdeau & R. Heller (Eds.) *ED-MEDIA 2000: World Conference on Educational Multimedia, Hypermedia & Telecommunications* (pp.237 - 242). Charlottesville, VA: AACE (Association for the Advancement of Computing in Education). ISBN 1-88-00-94-40-1.

The Adaptation and Use of a WWW-Based Course Management System within Two Different Types of Faculties at the University of Twente

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Abstract

At the Faculty of Educational Science and Technology, University of Twente, in The Netherlands, the entire faculty is involved not only in the use of a new WWW-based course-management system (called TeleTOP) but more fundamentally in a new educational approach. In addition we are working with other faculties to support the same progression. How are we doing this? In this article, the *TeleTOP Method* and implementation model are (http://teletop.edte.utwente.nl) are described and the similarities and differences between the implementation, the adaptation, and the use of the TeleTOP course support environment in the Faculty of Educational Science and the Faculty of Telematics (computer science and networks) are analyzed.

Introduction: *TeleTOP* at the University of Twente

The University of Twente in The Netherlands has a national and international reputation in the field of telematics, the European name for the branch of computer science involving the combination of information and communication technologies (in particular, related to the Internet and the World Wide Web (WWW)). A focus is the application of telematics applications to the teaching and learning process, what we call "tele-learning". In our definition, tele-learning does not necessarily imply distance education but instead emphasizes the increased flexibility that can come to the teaching and learning process through the combination of the new possibilities offered by the WWW and new ways of teaching and learning. The most ambitious of the tele-learning initiatives at the University of Twente is the *TeleTOP* project in the Faculty of Educational Science and Technology. Our core ideas are extending the levels of activity and engagement of our students and extending the impact and influence of our good instructors (Collis, 1998).

The decision made by the Faculty of Educational Science and Technology in 1997 was to involve all courses in a re-design process, both pedagogically and including use of WWW tools and environments. This involves the challenge of working with a wide variety of courses and instructors. In the academic year 1997-98 we re-designed all the first-year courses, in 1998-99 all the second-year courses, and by approximately the end of the year 2000 all other courses (for more information, see http://teletop.edte.utwente.nl, through which a number of courses can be visited for inspection and many publications and presentations are available).

To support this new approach, we needed a technical platform and an implementaiton model that would fit a variety of different kinds of courses and instructors. We identified a core

set of requirements for the WWW-based course-management system that we would need (Tielemans & Collis, 1999). In our analysis, no existing system met our requirements, so we capitalized on our own experience and in 1997 built our own system, based upon a Lotus Notes database. (This system is described in detail elsewhere; Collis & DeBoer, 1998; Tielemans & Collis, 1999). However, no matter how elegant a system is, instructors must use it, an administration must choose to support its use and thus must make resources available, the technical infrastructure already in the faculty must handle it, and soft- and hardware must be available. Thus an implementation model is necessary that integrates a variety of considerations and change entities.

After the first year and a half of implementing the WWW in our own faculty, we began in January of 1999 to respond to other faculties who also wanted to make use of our system and method. We chose as the next faculty to change its way of teaching and learning a faculty within our university with different types of courses, students, and instructors compared to our own faculty. This was the Faculty of Telematics, a technical faculty with many engineering and mathematics courses. The adaptation proceeded smoothly and we have now moved to the rest of the faculties in our own university as well as faculties in other universities. In this article, we describe the TeleTOP Implementation Model which underlies all this work. The Model indicates, based on literature and experiences, the change entities and areas which are of importance when an institution is going to implement the WWW in education in a wide-scale way. We also describe the transfer experiences with the Telematics Faculty.

The TeleTOP Implementation Model, Version 1

In an earlier study (see DeBoer & Collis, 1999) an implementation model of the change process was defined with the interrelationships among three phases of a time dimension, five change areas, and 12 change entities (see Figure 1).

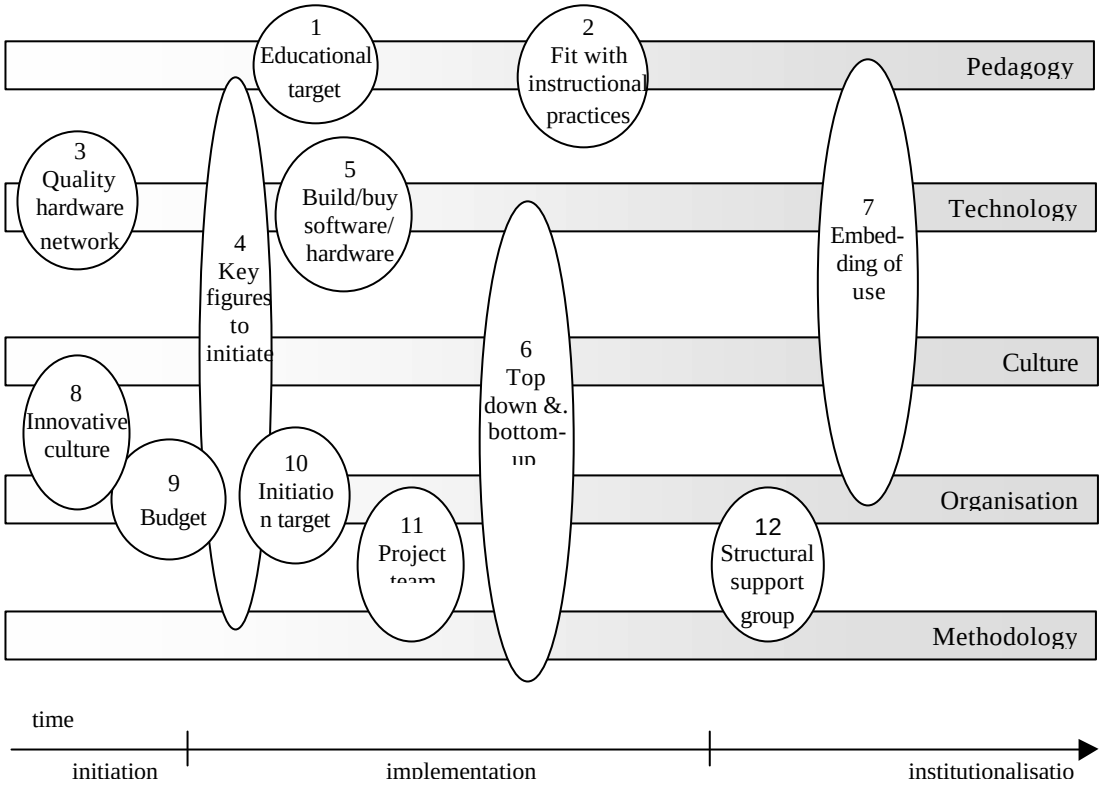

Figure 1. The TeleTOP Implementation Model, Version 1

The Model is a direct reflection of the experiences within the Faculty of Educational science and Technology since 1997. Some aspects of the innovation have already reached the institutionalization phase (for example, all students and most faculty routinely going to their start pages generated by the TeleTOP system on a daily basis) while new aspects are being initiated (such as the capturing of instructor and student presentations on digital video for the reuse of segments of these presentations through course WWW environments as video-on-demand for a variety of learning purposes). The sizes of the circles and ovals reflect complexity in terms of the number of change areas involved. The importance of key figures in the initiation phase, including all of the members of the faculty administration, had an early impact on all change areas in the TeleTOP situation.

Experiences at the Faculty of Telematics

In January 1999 it was decided that the new Telematics Faculty at the University of Twente should also set up a WWW-based course-support environment as was done at the Faculty of Educational Science and Technology. A project group (including the first author) was set up which would be responsible for the technical and instructional implementation of TeleTOP in this new faculty. A key question was if the educational culture and approach in one faculty, as visualized by the TeleTOP Implementation Model (Figure 1) could map onto another faculty. The project group consisted of two TeleTOP team members and two members of the Telematics Faculty. The Telematics members became primarily responsible for the implementation, while the transfer of the TeleTOP method and course-management system was the responsibility of the TeleTOP team members.

Figure 2 gives an impression of how the TeleTOP team planned the steps for the transfer and adaptation of TeleTOP to another faculty (a process repeated in March-June 1999 for a faculty in another university). Figure 2 can be seen as an operational version of the TeleTOP Implementation Model shown in Figure 1.

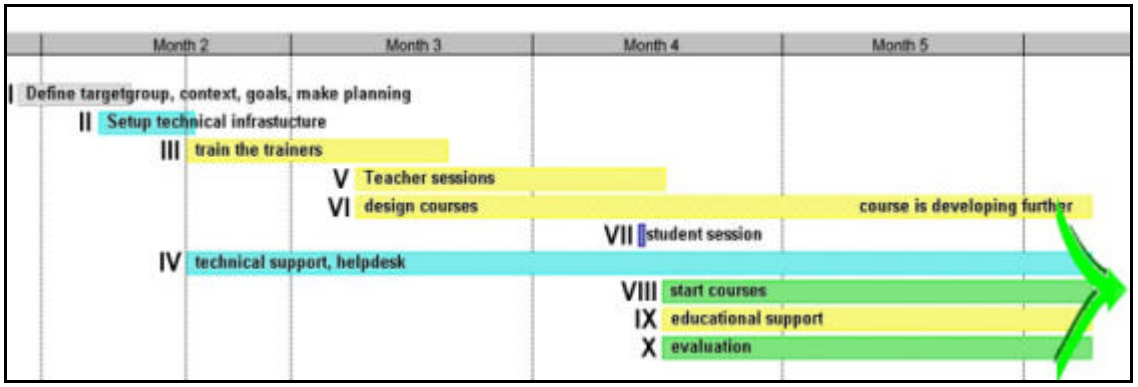

Figure 2 Steps for adapting the TeleTOP Implementation Model and methodology at the Telematics faculty

The actual implementation steps visualized in Figure 2 will be summarized in the following section (Table 1). Comments will be given as to what was intended in the steps, and what actually occurred in the transfer process (see also Fisser, Kamp & Slot, 1999).

Table 1. The change entities used in the TeleTOP Implementation model, in terms of the experiences of the Telematics Faculty

Entities	Comments
1. Educational target	This corresponds with the step: ***I. Defining the target group, context, goals and making a plan.*** In the Telematics Faculty situation, while most of these activities occurred, the goal of this innovation was not made explicitly clear to all involved. There was not a real educational target; the initiative was

	generally focussed on flexibility for the students and the image of the new faculty.
2. Fit with instructional practices	The instructors indicated that they had to change their ways of teaching, but this change was within reasonable boundaries.
3. Quality hardware network	This corresponds with: ***II. Set up the technical infrastructure***. The operational model shown in Figure 2 indicates that the technical infrastructure for the WWW-based course-management system should be set up in Months 2 and 3. In the case of the Telematics Faculty, this was no problem. There was already a sophisticated technical infrastructure in place in the faculty, with an excellent network, and multimedia computers for all students and staff.
4. Key figures to initiate	The key figure to initiate the educational change was the faculty administrator. In this case a top-down approach initiated the process; some instructors already had used the WWW for their courses, but had to change to the new system.
5. Build/buy software/ hardware	This corresponds with: ***II. Set up the technical infrastructure***. The only thing needed to be set up was a Lotus Notes Domino server, and to guide the faculty Web masters in learning some new skills for maintaining it. The faculty invested a considerable sum of money to get the right hard- and software. They chose to buy/license the software from TeleTOP; not build it themselves, because it was available and had proven itself in practice.
6. Top down &. bottom-up	As already mentioned in #4 (Key figures to initiate) the administrator of the faculty followed a top-down approach introducing the change. However, the way instructors were encouraged to explore the possibilities of the system and were able to use it so they would maximally benefit from the system could be seen as bottom-up.
7. Embedding of use	As the initiation phase started in March 1999, the faculty is not yet (Oct 99) at the point where embedding of use should start. This should happen in the future (within 1-2 years).
8. Innovative culture	An innovative culture should make it easier for an educational change. The faculty is still very young, so a characterization is difficult to give.
9. Budget	The commitment of the faculty administration was evident, because extra money and resources were made available. The planning should indicate when the course-management system should be operational for use. The faculty was willing to invest in human resources (support groups) and hard- and software. The instructors however did not get payment for their extra time investments.
10. Initiation target	The initiation target in this case was the fact that the new faculty was just ready to start. This was a good time to set up new courses with the course-management system.
11. Project team	This corresponds with: ***III. Technical support, Helpdesk***. The new supporters, already experienced in giving support, where educated in using the new software. The educational supporter also learned to work with the supportive educational tools, getting hands-on experiences. The project team played an important role in the implementation of the educational change. ***V & VI. Instructor sessions & Designing the course***. In an one-hour interview examples of how the WWW could be used in support of technical courses were shown. Every other week a two-hour hands-on sessions was held. Instructors used their own course-management environments, to try things out, and to exchange ideas. Most instructors attended these meetings, and thought they were worthwhile. The instructors used their time getting skilled in the using the course-management system at the same time as they were designing their own courses. Most work was done a few weeks before the starting date of a course. ***VII. Student session***. The use of a course support-management system which is fully based on the WWW and does not make use of additional programs other than regular e-mail proved to be a very user-friendly system for the students. Students learned the basics of the system and were able to work with the system within one short session. All students got a simple manual. They learned more about additional features of the environments as they used them during their courses. ***VIII & IX. Start the courses & Educational support***. The courses could start after the student session, and after the students had gotten access to the course-management environment. The use of the WWW made it possible to have interaction within the environment, and the possibility to let the environment 'grow' during the time the course was held. During the time that the courses were in operation, educational support was available to the

	instructors, as well as technical support (see Step IV). Most instructors however were capable of managing their own environments.
12. Structural support group	It is not clear yet how and who will be supporting the instructors in the future. This is of great importance for the successful institutionalization of the change.

Thus, as summarized in Table 1, the TeleTOP Implementation Model did seem to reasonably describe the experiences of the Telematics Faculty in initiating and implementing the use of a WWW-based course-management system.

Differences in the use of a WWW-Based Course Management

For almost two years, courses have been using the TeleTOP system at the faculty of Educational Science and Technology. The Faculty of Telematics has used the system for half a year. At both faculties an evaluation was carried out to look at the use of the systems. It is interesting to look at differences in use between the two faculties, of which one is more technical (Telematics) and one of which is a social science (Educational Science and Technology). Are there differences in the use of the TeleTOP system and what factors influence these differences? In particular, both groups of instructors have found a WWW-based matrix (which we call a *roster*) as an organizing structure for course content and activities to be particularly useful. Figure 3 shows the options that were chosen by the instructors of samples of 26 courses of Educational Science and Technology and 10 instructors of the Faculty of Telematics.

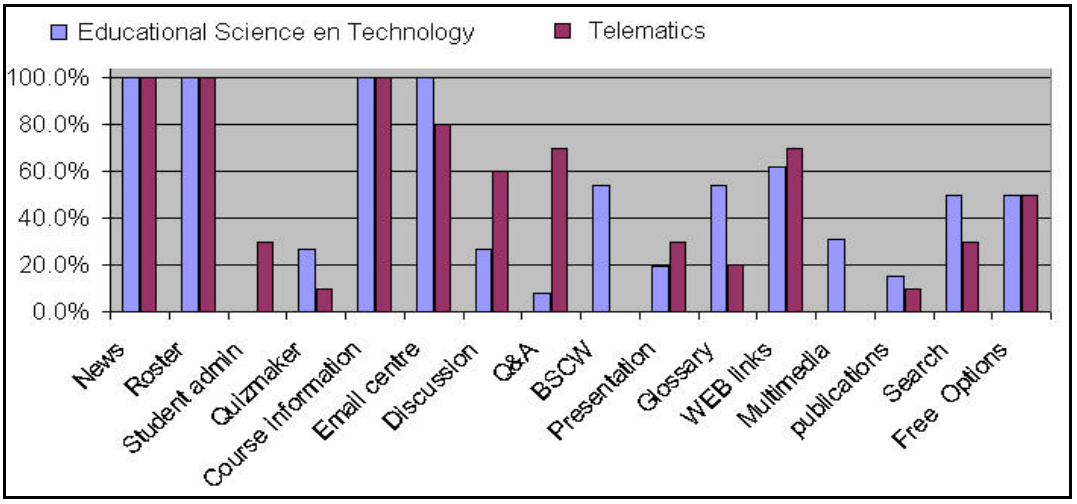

Figure 3. Percentages of instructors using various options (for Ed. Science & Technology, N=26, and for Telematics, N= 10).

Central in the course environments is the roster of a course, integrating study materials, contact-session notes, assignments, communication, and feedback. Figure 4 shows the roster of Telelearning, a course of the faculty of Educational Science and Technology. The roster in the TeleLearning course gives an overview of the assignments and meetings of the course. The course was organised around contact sessions. Instead of lectures, the students present could interact with each other in a variety of ways, and students not present would join in, within the next 48 hours, via the course WWW site. For students not able to be involved for reasons of work or distance as part of the real-time group during any of the sessions, participation in the group session was also expected, but asynchronously and via the WWW. Figure 5 shows the roster of *Switching and Control Systems*, a course given at the Faculty of Telematics. In this course, students were reasonable for presenting more than half the lectures. Students formed groups and chose a topic, about which they presented material to their fellow students and to the instructors. All material was placed in the session row of the roster of that particular week. The first part of the lecture session was the actual

lecture, the second part was intended for questions and discussions. Also after the sessions the discussion would go on in the discussion area of the site. The site was therefore intended as a real support site, to be used for information, materials and communication.

Roster

Before the session	Date and location	During the session	After the session
	23 March 99, L209 (IAC), 8:30-10:25	Intro to course; Intro to video in WWW sites; guest Mr Jose Bidarra	Find & reflect: Example of educational WWW site with video (5 pts)
Read Chs 1 & 2. Submit follow-up questions (5 pts)	30 March 99, L209	Extending the lecture. Guest visitor (dr. S. Santemo)	Evaluate two examples of the extended lecture (5 pts)
Read Ch 6. (Submit response; 5 pts, due 5-4-99)	6 April 99, 8:30, L209	Introducing the project. Using the template, choosing roles. Intro to the videoconference the next week	Content, HTML, Video, and teams meet. Manager reports (by 21:00 Sunday 11 April; 5 points)
read Ch 4; No written assignment but click to get more information...	13 April, 8:30, L209; & 15 April, videoconference (15:30-17:00)	General comments on planning, group work; Differences to note between the video conf & asynchronous settings	Comments about the videoconference (25 April 10 pts)
	20 April, L209, 8:30-10:25	Walkthrough, video plans.	Self-evaluation comments (5 pts)
Read Ch. 8, respond to questions (5 pts)	27 April, L209, 8:30-10:25	Design principles for WWW sites with video	Apply design principles to an external site (9 May, 10 pts)
	18 May	Issues confronting the use of the WWW (with & without video) in education	Finish your group projects...Due, for evaluation, 20 May 1999
Read Ch 10	25 May, L209, 8:30-10:25	Present group projects (video captured). (30 pts)	Reflection on the course, and on tele-learning (15 pts)

Figure 4. The roster of *Telelearning.*

Roster

Before the session	Date and location	During the session	After the session
Register with BOOZ EL	Mon 22 March, 5/6th, hour, CT1845	Introduction	Form groups
	26 March	No Lecture on this day.	
D1: Docent- Lecture.	Fri 9 April, 5/6th hour BB109	Introduction to Wide Area networks.	
D2: Read performance analysis material in the reader. Docent-Lecture.	Fri 16 April, 5/6th hour BB109	Performance Analysis Background	Assignment D2 available 24 April, and due 10 May 12:00.
S1: Read material in the reader. Group S1 prepares the lecture, Group S6 prepares the questions.	Mon 19 April, 5/6th hour ELTN10152	Architecture of Switches and Routers	
S2: Read material in the reader Group S2 prepares the lecture. Group S7 prepares the questions.	Fri 23 April, 5/6th hour BB109	Performance Analysis of Switches.	
	7 May	No lecture on this day.	Assignment D2 worked out.
S3: Read material in the reader. Group S3 prepares the lecture. Group S1 prepares the questions	Mon 17 May, 5/6th hour ELTN10152	Signalling Systems	
S4: Read material in the reader. Group S4 prepares the lecture, Group S5 prepares the questions.	Fri 21 May, 5/6th hour ELTN10152	IP over ATM	
D3: Read material in the reader on MPLS and IP Switching. Docent- Lecture.	Fri 28 May, 5/6th hour ELTN10152	IP Switching	Assignment D3 is available. Due in one week on 4 June 1999.

Figure 5. The roster of *Switching and Control Systems*

Differences in use?

Looking at Figure 3 and taking into account the two examples of the use of the roster shown in Figures 4 and 5, it can be concluded that the differences in use of the system between the two faculties are not very large. It seems that the Faculty of Telematics focuses a little more on communication via the support environment, and Educational Science & Technology focuses more on collaborative work through the support environment. Both faculties are still in the implementation phase, and have a long way to go until full institutionalization. It is therefore interesting to follow the faculties and see where they will be at in one or two years. Maybe the differences will fade away or maybe they will increase?

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