# Designing for Flexibility in the Traditional University

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## Abstract

Instructors in traditional universities are expected to respond to the needs of an increasingly diverse student body by making more flexibility available in their courses. Based on a systematic analysis of flexibility options, various tools to help instructors in the design of their course Web environments for more flexibility have been built into the CMS (*Course Management System*) used at the University of Twente since 1997. It is our experience that instructors use the tools to increase course flexibility with regard to the efficiency and logistics of participation but do relatively less with respect to increasing course flexibility when this involves new pedagogies.

## Résumé

Les professeurs des universités campus se doivent de répondre aux besoins d'une clientèle étudiante de plus en plus diversifiée, en proposant des cours plus flexibles. En nous appuyant sur une analyse systématique des différentes options permettant d'introduire davantage de flexibilité dans les cours, nous avons développé, depuis 1997, différents outils afin d'aider les professeurs de l'Université Twente à concevoir des cours Web plus flexibles. Ces outils sont accessibles dans le système de gestion de cours (*Course Management System*) de l'université. Notre expérience nous amène à conclure que les professeurs utilisent ces outils pour augmenter la flexibilité de leurs cours, mais surtout en termes de flexibilité logistique visant une participation plus grande des étudiants. Les outils sont moins utilisés dans le but d'augmenter la flexibilité de leurs cours au plan pédagogique.

## Introduction: Support for Flexibility

Traditional universities are in the process of responding to rapidly diversifying student cohorts (Middlehurst, 2003). At the same time, course management systems (CMSs) are becoming commonplace in campus-based universities (De Boer, 2004; Landon, 2002). Many institutions have adopted CMSs as tools to increase the flexibility of various aspects of course attendance, for example so that students can submit assignments via the CMS instead of having to be on campus in order to physically submit them. Instructors see and expect that a CMS can help them with organizational and communication tasks and help them to provide course materials in a flexible way; however only a minority of the instructors use the CMS in a way to enable more flexible pedagogical approaches (Collis & Van der Wende, 2002; Morgan, 2003). Mioduser and Nachmias (2001) support the same observation.

One of the reasons may be a lack of awareness relating to flexibility options themselves. Instructors need to know

what types of flexibility are available before they can choose options that are suitable for their courses and students. In addition, instructors need to understand how to use a CMS to offer and support the different types of flexibility. However, there are often only limited resources for instructor support with respect to the use of CMSs, and limited time on the part of the instructor to make use of resources even when they are available (Collis & Van der Wende, 2002; Verstelle & Benthem, 2002).

A solution could be to make support available electronically, integrated directly within the CMS, to be used when the instructors design and manage their courses. The support could provide features such as help, advice, step-by-step guidance, cases and examples, models, templates, and decision support. The support could also be focused on the particular aspects of flexibility that the institution or instructor wishes to offer to their students. At the University of Twente, we have been designing, implementing, and evaluating the use of such tools integrated within the CMS and used throughout the institution since 1997 to support instructors in providing more flexible courses. In this paper we summarize highlights of this on-going research around the following questions:

1. What are ways to categorize options for flexibility that instructors can select during their course design processes?
2. How can support tools be designed for and integrated in a specific course management system so that the tools stimulate thinking and practice with regard to options for flexibility?
3. What are the experiences of instructors in using the integrated tools? Are their courses becoming more flexible?

These three questions are discussed in the next three sections of the article.

## Flexibility in Traditional, Campus-Based Higher Education

In our research we define flexible learning as a situation in which the learner has a range of options from which to choose. In 1997 we started to make a distinction between two general types of flexibility in courses in traditional higher education. One of them is related to leaving the course unchanged in terms of its pedagogical design but using a course management system to provide more flexible access to resources and people. We called this the enhancement of logistical flexibility. In contrast, we also began to study how to take advantage of the flexibility offered by a CMS to change the pedagogy of a course to include aspects that were not feasible before the technology. We called this pedagogical re-engineering (Collis, 1998). Table 1 shows common groupings of functions within CMSs related to the enhancement of logistical flexibility and to pedagogical re-engineering. It can be seen that the sorts of changes involved in pedagogical re-engineering also often involve logistical flexibility, but with students having new kinds of options for their learning processes.

We have been studying flexibility within courses in higher education, not only within our own university but via international projects and comparative studies (for reviews, see Collis & Moonen, 2001; Collis & Van der Wende, 2002; De Boer, 2004). We have seen the two types of flexibility –logistical and pedagogical– reflected in practice and also have seen that logistical flexibility changes are more likely to occur than pedagogical ones. We have also developed tools within our own CMS to support instructors in implementing both types of flexibility. Three cycles of these tools are summarized in the next section.

## Flexibility-Oriented Support Tools Integrated within a CMS

A research project in which the authors were Chair and Lead Designer respectively was established at the University of Twente in 1997 to use an action-research approach in leading the faculty toward providing more flexible learning for our increasingly diverse students. Called the TeleTOP Project, the initiative involved the development and implementation of a CMS to support the implementation strategy and educational vision about flexibility that were involved (Collis, 1998). The main goal of increasing flexibility was enhancing logistical flexibility in able to facilitate students spending less time on campus but still participating actively in a course. However, a secondary goal was to change the nature of active participation in a course away from attending lectures toward new forms of learning activities that are done outside of the classroom and make use of the CMS for learning support. Thus the secondary goal of the project was to stimulate pedagogical flexibility.

Based on previous experience and research relating to faculty perceptions of pedagogy and also their responses to various sorts of interventions aimed at stimulating them to make effective use of technology support for teaching and learning, we were well aware of difficulties with regard to the change process (for example, Rogers, 1995). Bates (1997) for example, talks about the importance of "visioning", "a technique that allows those working in an organization to understand the full range of possibilities for teaching and learning that technology can facilitate, and the possible outcomes, acceptance or otherwise, that might result from its implementation". We had used visioning approaches in a series of workshops and presentations in 1997-1999 associated with the introduction of the use of the TeleTOP course man-

**Table 1. Some examples involving CMS support to increase the logistical and pedagogical flexibility of a course (Collis, 1998)**

| Component | To increase logistical flexibility | To increase pedagogical flexibility |
|---|---|---|
| 1. General course organization | - Post all announcements about course procedures in a course Web site | - Have students add links to resources related to the course, and to the work and homepages of experts related to the course |
| 2. Lectures / Contact sessions | - Extend the lectures and contact sessions so that the most relevant points are expressed in notes available via the Web site | - Extend the lecture in terms of participation by having the students who are present at the same time (not necessarily at the same place) interact with each other in a way that engages them in discussing the lecture material and articulating their ideas in a summary. These new materials are immediately posted on the course site<br>- Extend the lecture after the contact time by having all students reflect on some aspect and communicate via some form of structured comment via the Web environment; or students can add to the lecture materials themselves, or take responsibility for some of the lecture resources<br>- The instructor uses the students' input as the basis for the next session or activity |
| 3. Self-study and exercises | - Exercises, self-study, and submission of assignments can be engaged in from wherever the students have network connections<br>- Marks, model answers and feedback can be posted on the site after all submissions have been made | - Facilitate students using each other's submissions as learning resources once these are available as part of the Web environment<br>- Structure communication and interaction via the Web site so that students are guided as to how to respond productively to each other's work and questions |
| 4. Multi-session projects or activities | - Make shared workspace tools available along with other communication and reporting tools in the Web site to allow group members to work collaboratively on projects without needing to be physically together<br>- Stimulate reporting of on-going planning, work in progress, etc., via the Web environment to increase the feedback and effectiveness of project work | - Identify new types of projects in which students locate or create resources, or make contact with professionals and make their results available to others outside the course<br>- Guide students to provide constructive on-going feedback to each other, through the use of structured communication forms and by having their partial products accessible via the course Web site |
| 5. Testing | - Present test items at a certain time, under secure conditions, so that students can write a test even if not present in a specific physical testing location<br>- Provide feedback in a quick and targeted manner, without the student needing to wait to see the instructor face to face<br>- Post feedback on the course site about areas of the test where difficulties were encountered<br>- Send feedback to different groups of students based on their needs as shown by the test | - Integrate new forms of assessment, such as digital portfolios, with the course Web environment |
| 6. General communication | - Add a communication centre to the course Web site so that individuals or groups of students can easily be contacted via e-mail | - Add a tool such as a Web board for discussion about course topics as a major activity in the course; have students take responsibility for moderating the discussions, adding links to external resources to justify their comments when appropriate<br>- Involve experts from outside the course in the discussions |

agement system (Collis & Moonen, 2001). Following the ideas of the CBAM Model (Concerns-Based Adoption Model; Lord, Rutherford, Huling-Austin, & Hall, 1987) which had guided our work with instructors for more than a decade, we systematically studied a variety of types of instructor support, differentiated along two dimensions: the amount of human vs. computer support involved, and the extent to which support is prestructured by the designer or presenter or made available just-in-time to the user to the extent that he or she wishes. From this analysis and our ongoing experiences, we determined that support tools integrated directly within the course management system, available to the instructor at the moment of need in terms of his or her course design, had the highest likelihood of being used and useful in practice (De Boer, 2004).

Thus to help instructors realize the goal of increasing flexibility in the design of their courses, three different sets of instructor-support tools were built at the University of Twente in the period 1997-2002, each embedded in the TeleTOP CMS used within the institution (De Boer, 2004; De Boer & Collis, 1999). Table 2 summarizes the main features of the sets of integrated instructor tools.

Each of Versions 2 and 3 built upon the previous versions, offering further support based on instructor reactions. The most-recent integrated tool set, Version 3, will be described in more detail in this section. The general constraints for all of the tools was that they must be directly available within the CMS, require no instruction to use, and that they must be organized in a way that supports the ways of working of instructors in

**Table 2. Main features of the integrated flexibility support tools**

| Version | Brief description | Purpose |
|---|---|---|
| Version 1: 1997-1999 | Template, listing each type of functionality in the CMS and showing an example of how an instructor used the functionality to provide more flexibility to students. Instructors would say "yes" or "no" to the possible use of the functionality in their own environments. | Used as a interview tool involving a TeleTOP team member and an instructor new to the use of the CMS. As soon as the interview was over, a summary of the instructor's responses was available and the responses were also directly stored within the TeleTOP CMS itself for the automatic generation of a course environment with the chosen functionalities available as menu options. |
| Version 2: 1999-2003 | | |
| Menu-design tool | Information about each CMS functionality, along with options for allowing students to edit and upload into templates associated with the functionality or only the instructor | To help the instructor decide what CMS tools will be relevant for logistical or pedagogical flexibility. The instructor can add, remove, or change student access to the menu options at any time, even when the course is running. As soon as the changes are submitted, the new course environment is dynamically generated. |
| Version 3: 2003-to date | | |
| Course-model tool | Selection of course model, relating the model to key choices for logistical and pedagogical flexibility | Through answering a brief set of questions to decide which of seven generic course models related to both logistical and pedagogical flexibility is most appropriate to the instructor's course and students |
| Menu-design tool | Suggestions for CMS tools based on the course model | Related to the course model chosen, to decide what CMS tools will be most relevant for logistical and pedagogical flexibility. The new course environment is dynamically generated based on the instructor's choices and can be altered at any time. |
| Roster-design tool | Suggestions for organizing the matrix-like course-schedule template | To define the overall course planning for a given course model, with an emphasis on opportunities for flexibility. The new roster is dynamically generated based on the instructor's choices and can be altered at any time. |
| Microplanning examples | Suggestions for individual assignments and learning activity based on the course model | Examples and ideas for both logistical and pedagogical flexibility for specific assignments and other course events. |

a university with primarily technical courses and where the instructors have no formal background in pedagogy or instructional design. In other words, the tools have to be directly usable and useful to busy instructors who tend to think in terms of the content of their courses rather than considerations relating to flexibility and pedagogy.

## The Course-Model Tool: Seven course models

After several years of categorizing the key variables considered by our instructors when they choose a general course-design approach (De Boer, 2004) we were able to map their considerations onto a few key differentiating questions relating to.

- The different types of students attending a course
- Where the students will primarily participate in the course (on-campus/traditional or off campus/part-time and/or working)
- If some of the students are primarily off campus, if they will be explicitly participating in contact sessions from a distance, or if they will catch up on contact sessions they have missed when they are next on campus
- If the predominate type of learning activities within the course is based on the acquisition of knowledge or on an approach emphasizing students finding, creating, sharing and discussing resources and experiences
- If some or all of the course is organized around group projects

The answers to these questions lead to a suggestion of one of seven general course models, each familiar to instructors in our university. Each of these general models is associated with a particular start-up version of a course CMS environment, with suggestions made for the functionalities to use and for how to structure the "roster" (or scheduling) template of the course. The models and their associated start-up Web environments are not meant to be prescriptive or constraining, but rather to serve as a systematic starting point to further refinement of the course to increase its flexibility, both logistical and pedagogical. Table 3 gives an overview of the CMS templates for seven course models based on these considerations that were used for the integrated course-design tool.

The instructor begins his or her new course-environment set-up by going to the Set-up template embedded in the CMS. If the instructor wishes, he or she can answer a brief series of questions relating to the key differentiating aspects noted above. If the instructor does not choose to answer the questions, he or she moves directly to a default empty course environment. If the instructor does answer the questions (each with a yes or no), one of the general course models is suggested, based on the instructor's answers. The instructor has support for deciding if he or she wants to go forward with the model as the basis for the course design. This is done by providing general comments from other instructors that have used the CMS for the same model. With this kind of peer support the instructor can see examples that fit his or her context. This is implemented in the support tool through the use of a short video for each of the seven course models. Within each video, an instructor who has been using the model explains his setting and approach, and makes clear how he or she organized the flexibility within the course. All examples are supported within the video through screen captures of the instructors' CMS environments. Figure 1 shows how these peer comments appear to the instructor.

If the instructor is satisfied with the choice of general model as the starting point for designing the course environment, he or she moves to the next integrated support tool, the Menu Support Tool. If the instructor is not satisfied with the model, the other video resources can be studied until a model is selected that seems to be the best fit for the particular course at hand.

## The Menu-Support Tool

The tools that are included in the CMS relate to what the instructor intends to do with regard to course organization, communication, use of resources, and activities and assignments. The planning of which menu options

**Table 3. Overview of templates for course models within the course-model tool**

| | | Students' setting | | |
|---|---|---|---|---|
| | | On campus | Some are off campus | All are off campus |
| Pedagogical orientation of learning activities | Predominately acquisition and knowledge transfer | 1. Self-study Model | 2. Flexible Self-study Model | |
| | Transition from predominately acquisition to action learning; for individuals | 3. The Classroom Model | 4. The Flexible Classroom Model | |
| | Action learning, within a group/project | 5. The Classroom Project Model | 6. The Flexible Classroom with Project(s) | 7. Project-Oriented Distance Course Model |

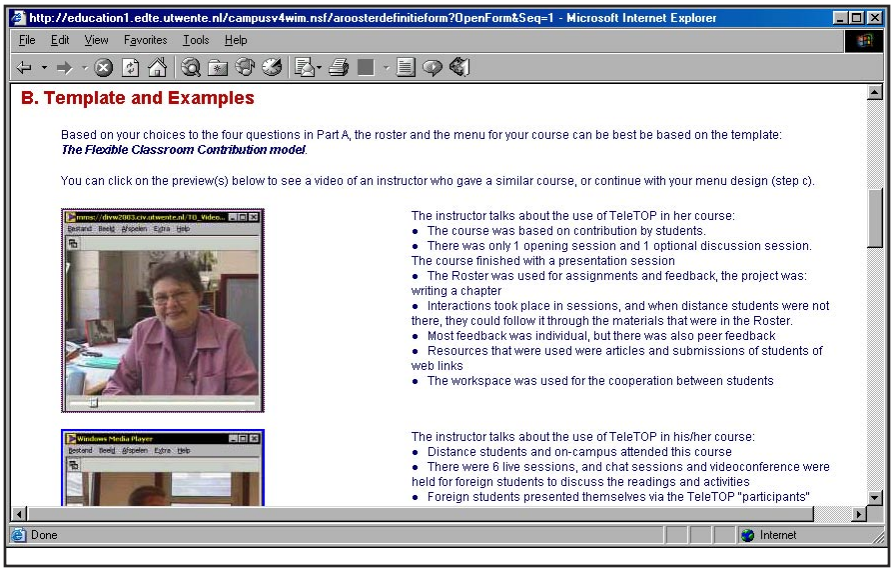


**Figure 1. An example of the videos that are presented to the instructor in the course-model support tool**

to select depends on the course model. If a course model has been selected, a specific combination of menu options is suggested for each of the seven course models: if no course model was chosen, then a default set of four core menu tools (News, Course Info, Roster, and Email Center) is presented as a starting point. For example, within the Flexible Classroom course model the menu items (CMS tool options) that are suggested are News, Course Info, Roster, Email Center, Participant Info, Discussion, Questions & Answers, Category, Web-links, and (PowerPoint) Sheets. Figure 2 shows how the suggestions for CMS tools related to one of the course models are presented to the instructor.

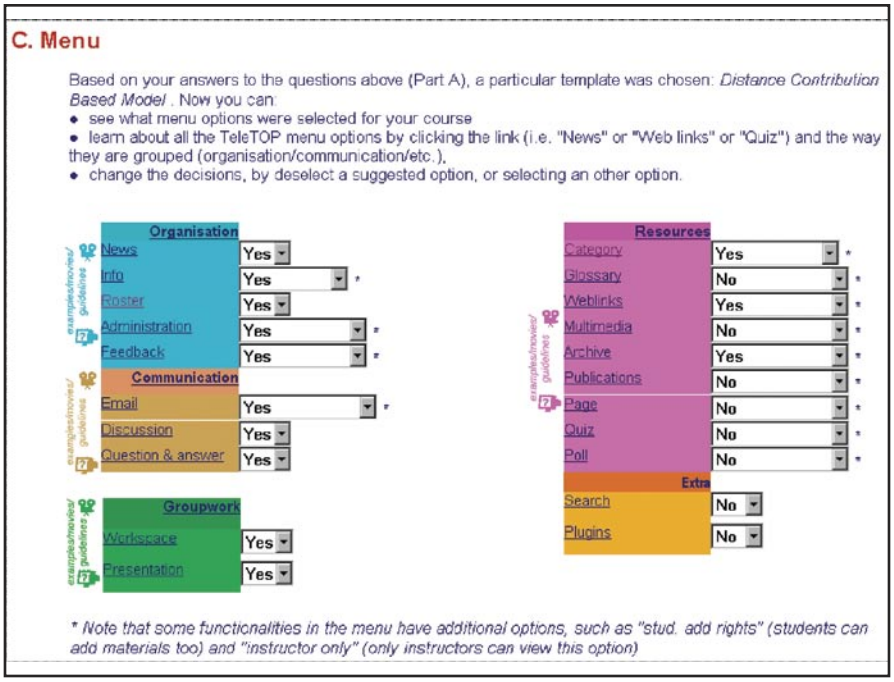


**Figure 2. Choices for menu options, for a given course model. The instructor can view examples of different sorts and change the choices per option if desired.**

For the course model chosen, not only are suggestions for the menu options made but instructors can view videos, read guidelines, see examples, and find technical support related to each suggestion. Much of the support involves suggestions for using the option to increase flexibility. The decisions that an instructor makes about retaining an option or not or selecting an additional option are immediately represented in the design of the course environment. For example: an instructor decides to integrate a discussion list for both his distance and on-campus students for a cooperative activity, based on a pedagogical suggestion he or she sees in the support elements relating to the Discussion functionality. The instructor clicks "yes" to the choice of Discussion as a menu option and this option is immediately part of the menu of the dynamically generated course environment. The support tool makes a suggestion, but the instructor is still in control and makes the final decisions about what the menu-tool advisor suggests.

## The Roster Tool

Within the TeleTOP CMS the organization of the course is also strongly related to the use of the Roster tool. The roster template allows the instructor to set up a table with between one and four major columns and as many rows as desired. The roster not only deals with course organization and scheduling, but also with structured communication (i.e., through assignments and feedback) and structured presentation of information or content or resources. In Figure 3, a roster is shown in which the instructor chose to have four major columns, organized around the contact sessions of the course: The columns were given the headings: *Before the session*, *Date and location*, *During the session*, and *After the session*.

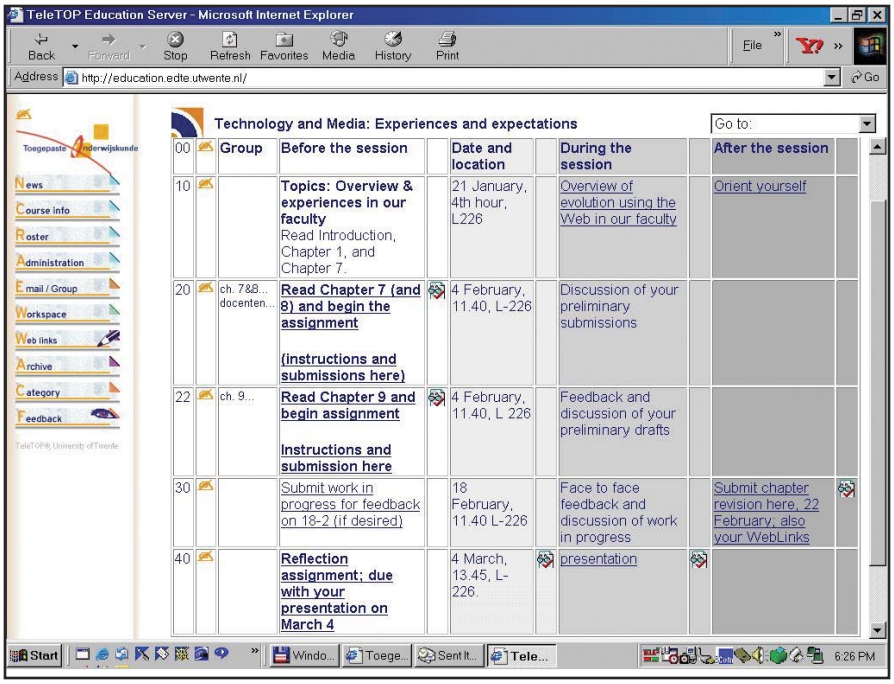


**Figure 3. Example of a roster, organized around four major columns (Before the session, Date and location, During the session, After the session)**

The three columns on the left do not appear to the students. The row numbers are only for the instructor's convenience; he or she can insert a new row at any time by simply indicating a number that indicates where the row is meant to go. The second column that is not visible to the students contains the edit symbol, which the instructor clicks in order to change the text on a roster row. The column titled Group indicates that the instructor can make some rows visible only to certain groups of students or even to an individual student, if the group or single student could benefit from variations in assignments or study materials. In these ways, the roster is not only an organizer of the course but also a key tool to expand the logistical flexibility of the course.

In the support tool for designing the Roster, a suggestion is made for the number of columns and the wording for the column headings, based on the course model selected. As with the menu suggestions, the instructor can always override the suggestion and change the number of columns and headings used. As an example, for the Flexible Classroom Project Model the Roster Tool suggests four major columns, with the headings "Week", "Self-study/assignment", "Contact sessions - Notes/tasks", and "Project instructions". This suggests that each row of the roster relates to a consecutive week of the course, and for each week, there will be associated study materials, materials for the contact session for those who will be present as well as notes and tasks for those who will not be present, and instructions for the next step of the project activity. If the instructor wants to organize the roster around a series of topics rather than weeks, all he or she has to do is type in the word "Topics" in the roster column heading instead of the word "Weeks" and the change is automatically generated.

## Other Integrated Support Tools

The tools that have been discussed so far all support the instructor during the setup of a course environment and try to steer him or her to think systematically about options for increasing both logistical and pedagogical flexibility in the overall design of the course. Within the particular pages linked to the roster cells, the instructor focuses on the microplanning for the course, the particulars of the study materials, and most importantly for pedagogical flexibility, the options for learning activities. Extra support materials are linked to each roster page, wherever the instructor sets up an assignment. These types of support provide dynamic hints and tips, quick tours and tutorials, and demos and practices, sometimes through video, all relating to pedagogical ideas that the instructor can consider, again in terms of the general course model chosen. The different types of support that are offered are based on principles of minimal instruction (Van der Meij & Carroll, 1995). They use the experiences of peers to show examples. Over 50 integrated support documents related to activity and lesson planning are at the instructor's fingertips during the microplanning of the course.

## Instructor Experiences with the Integrated Tools

Since 1999 all instructors at the University of Twente have used either the second or third version of the integrated support tools (see Table 2). Version 2 of the integrated menu-support tool focused primarily on support for increasing the logistical flexibility of the course. In contrast, the third set of support tools, described above, added the hints for flexibility related to different course models as well as explicit suggestions for course design based on the chosen model and embedded suggestions for pedagogical flexibility whenever the instructor sets up an assignment. Through inventories and analyses of log files between 1999 and 2002, we knew that almost all of the

instructors routinely used the menu-support tool in Version 2 to set up their course environments (De Boer, 2004). The only times they did not use it were when they simply copied a course environment for a new version of the course. With the introduction of the much-richer set of tools in Version 3, we wanted to study in detail if the instructors would in fact take advantage of the additional pedagogically oriented support materials, if they would be stimulated to make more use of different CMS functionalities in their course environments, and if their environments would demonstrate more examples of logistical and pedagogical flexibility than when they only made use of the second version of the support tools. Thus we set up an experiment before the third version was rolled out for general use. This section describes this experiment.

## General Description of the Experiment

During the period 1999-2002, all instructors at the University of Twente used the TeleTOP system and were personally responsible for the set up and design of their course environments. Version 3 of the support tools, available as embedded tools within the CMS, was made available to a random selection of instructors, while the rest of the instructors served as a control group and continued to work with the second version of the integrated support. This experiment was carried out over two years, so that the changes over time among the instructors could be observed once they had the opportunity to use the new support tool.

## Methodology

Central to this experiment were the questions of whether instructors would use the new pedagogically oriented options in the Version 3 support tool embedded in the CMS and when they did, if they would also show more use of the CMS in terms of the types of options available in their courses. Secondly, the degree to which instructors changed their strategies concerning flexibility and pedagogical change in a particular course would be studied. A Pretest- Posttest Control Group Design (Campbell & Stanley, 1963, p. 13) was chosen. Within this design both groups were still using Version 2 of the support tools for the 2001/2002 versions of their courses, but the experimental group that used the new Version 3 support tools embedded within the TeleTOP CMS for the 2002/2003 version of their courses was compared to the control group that continued to use the Version 2 tools for the 2002/2003 versions (there was no way to have a control group not using the tools at all, as the Version 2 tools were already standard practice for instructors). An overview of the research procedure that includes how the measurement was organized is given in Figure 4. In addition to self-report questionnaires relating to each of the two cycles of the courses, log file analyses were also done to objectively measure the use of TeleTOP options in both the 2001/2002 and 2002/2003 cycles.

## Subjects

For the experiment 60 courses and instructors with no instructor involved in more than one course were randomly selected from four departments at the University of Twente (two behavioural science departments, a business administration department, and a physics department) and randomly assigned to the experimental and control groups. These faculties were chosen to represent the overall variety of the ten faculties in the university as well as the variety of experience in using TeleTOP. All of the instructors were contacted to ask if they would agree to participate in the research and were told it would involve the researchers studying their use of the CMS in detail over two years as well the instructors filling in two questionnaires. Only one instructor declined but several others had to drop out because of changes in teaching assignments over the two years. Thus there were two years of data for 26 instructors in the control group and 29 in the experimental group. Table 4 shows the characteristics of the instructors in the experiment, the average age, sex, professional degree, teaching experience, TeleTOP experience in number

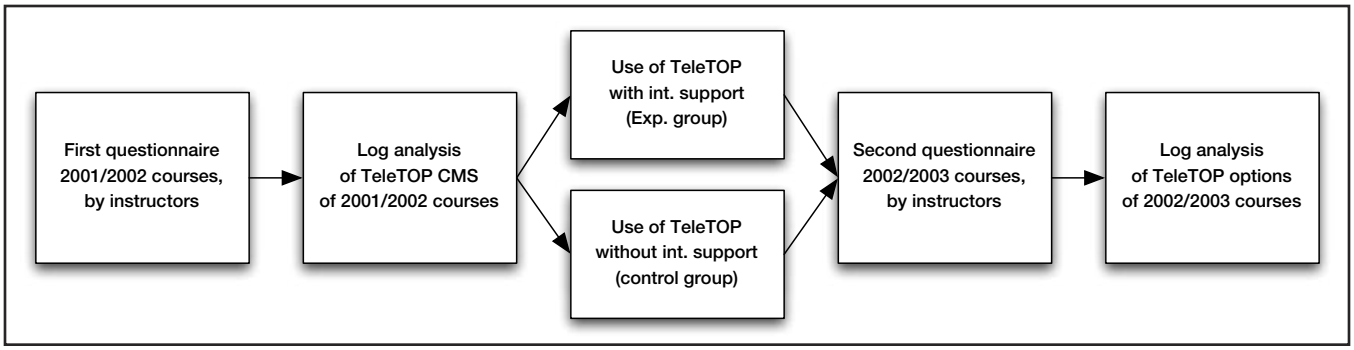


**Figure 4. Research procedure for the comparison of Version 2 and Version 3 of the integrated support tools**

**Table 4. Characteristics of instructors involved in the experiment**

| Group | Control | | | Experimental | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean | N | SD | Mean | N | SD | t | df | Sig. (2-tailed) |
| Age | 44.23 | 26 | 7.67 | 42.44 | 29 | 9.17 | 0.75 | 53 | 0.46 |
| Sex | 54 % male | 14/26 | | 55 % male | 16/29 | | | | |
| PhD (0=no, 1=yes) | 84 % PhD | 21/26 | | 69 % PhD | 20/29 | | Mann Whitney U 332.50 | | 0.32 |
| Teaching experience | 13.05 | 26 | 6.18 | 13.09 | 29 | 8.05 | -0.02 | 53 | 0.98 |
| TeleTOP experience (in number of environments) | 13.05 | 26 | 6.77 | 11.44 | 29 | 6.93 | 0.85 | 53 | 0.40 |
| Year started using TeleTOP | Majority in 1999 | 26 | | Majority in 2000 | 29 | | | | |

of environments, and when the instructor started using TeleTOP. T-tests on all these variables to compare the two groups of instructors at the start of the experiment showed no significant differences ($p<0.05$) between the groups of instructors.

## Results

For space reasons, only key results will be reported here; a complete analysis is available in De Boer (2004). One key question was whether the instructors who had access to the richer set of tools would take advantage of the new options. In general, they did. For example, all but three of the instructors in the experimental group made use of the course-model tool, yielding the variety of course models shown in Table 5. For most instructors the Classroom model was most applicable, in most cases with a pedagogical approach emphasizing student contributions.

The options that were chosen for the TeleTOP menu for the two groups of instructors over the two cycles of their courses are given in Table 6.

**Table 5. Suggested course design models for the instructors in the experimental group**

| Course design model | Frequency | Percent |
|---|---|---|
| Classroom model | 4 | 15.38 |
| Classroom Contribution model | 13 | 50.00 |
| Flexible Classroom model | 0 | 0.00 |
| Flexible Classroom Contribution model | 6 | 23.08 |
| Self-Study model | 1 | 3.85 |
| Distance Contribution Based model | 1 | 3.85 |
| Total | 26 | 100.00 |

(Note: N=26 because three instructors did not choose to use the course model selection tool.)

The McNemar Test for the significance of changes for a before-and-after design in which each person is used as his own control (Siegel, 1956) showed no significant changes for the control group that used Version 2 of the support tool. Of the 22 menu options, 15 stayed the same, six dropped slightly, and only one (Archive) increased in choice. Some interesting changes however can be found in the experimental group that used Version 3 of the support tool. Only seven of the options stayed the same, while four decreased and 11 increased. The McNemar Test for the significance of changes was again used. There are significant differences in the experimental group between the 2001/2 and the 2002/3 course environments for the Weblinks option ($p=0.039$), the Categories option ($p=0.002$), and the Feedback option ($p=0.004$), with an increase in all cases. Thus having the new version of the menu-support tool with a richer set of hints and with hints associated with a course design model led to more diverse use of the menu options. However, the differences between the two groups are not dramatic.

After the support-tool experiment, the self-report questionnaire that had been used for the pre-test was re-administered to question the instructors about any changes in flexibility that they felt had occurred between the two cycles of their courses. The results of t-tests comparing the two groups showed no significant differences ($p<0.05$) between the two groups in their self-reports in changes in flexibility. Thus, disappointingly, the use of Version 3 of the support tool did not influence the way instructors offered flexibility in their courses compared to the control group using Version 2, at least as measured by the self-report questionnaire. However, there were large standard deviations in all of the mean scores, in both control and experimental groups. The self-reports were confirmed by ex-

**Table 6. Options chosen by the instructors in the two groups for 2001/2 and 2002/3 courses**

| CMS option | Control 2001/2, n=26 | Control 2002/3 | Experimental 2001/2, n=29 | Experimental 2002/3 |
|---|---|---|---|---|
| | % of instructors per group | | | |
| News | 100 | 100 | 100 | 100 |
| Course info | 100 | 100 | 96 | 100 |
| Roster | 100 | 100 | 92 | 92 |
| Administration | 44 | 44.4 | 33 | 58.3 |
| Email | 100 | 100 | 96 | 100 |
| Participants | 43 | 43 | 25 | 38 |
| Discussion | 5.6 | 0 | 17 | 8.3 |
| Q&A | 17 | 11 | 8.3 | 25 |
| Chat | 0 | 0 | 13 | 0 |
| Workplace | 22 | 22 | 29 | 33 |
| Presentation | 11 | 5.6 | 4.2 | 8.3 |
| Glossary | 11 | 5.6 | 4.2 | 4.2 |
| Web-links | 44 | 44 | 29 | 63 |
| Multi-media | 11 | 11 | 8.3 | 8.3 |
| Archive | 33 | 44 | 38 | 33 |
| Publications | 18 | 12 | 8.3 | 21 |
| Sheets | 29 | 29 | 63 | 75 |
| Html Pages | 11 | 11 | 4.2 | 0 |
| Quizzes | 5.6 | 5.6 | 0 | 0 |
| Poll | 0 | 0 | 0 | 0 |
| Categories | 5.6 | 5.6 | 4.2 | 50 |
| Feedback-tool | 11 | 0 | 0 | 29 |

amination of the course environments themselves, where some clear examples of changes in logistical or pedagogical flexibility could be seen but with strong variations among instructors in both groups.

In order to better understand this result in terms of the effort that had gone into designing and creating Version 3 of the integrated tools, a series of follow-up studies was carried out in which instructors were compared in terms of age, experience with teaching, faculty, experience with using the CMS, gender, and other demographic variables; no significant differences or patterns could be found (De Boer, 2004). In addition, a set of structured interviews was organized with a selected sample of seven instructors representing high- and low-users of the embedded tools in different settings. The key point that emerged in the interviews was that the instructors in both groups appreciated the desirability of offering flexibility to their students, and had already been making a number of options, primarily of logistical flexibility, available since their original uses of the CMS starting in 1997. Thus they were inclined to repeat what they had done before rather than to introduce more options, particularly in terms of pedagogy. They did not feel they had the time for further changes, and until they were either required to do so or rewarded for doing so within their faculties they would not be likely to be changing their approach to offering flexibility regardless of the good ideas in the support tools. They use the menu-support tool because it saves them time in setting up a course environment, but they do not feel they have the time to think about new pedagogies or to manage more flexibility in their courses.

## Discussion

The questions addressed in this multi-year study were:

1. What are ways to categorize options for flexibility that instructors can select during their course-design processes?
2. How can support tools be designed for and integrated in a specific course management system so that the tools stimulate thinking and practice about the desired options for flexibility?
3. What are the experiences of instructors in using the integrated tools? Are their courses becoming more flexible?

With respect to Question 1, focusing on the distinction between logistical flexibility and pedagogical flexibility seems useful in terms of helping instructors to be more aware of options that they can make available to their students. Logistical flexibility can be seen as increasing the efficiency of the course participation experience without changing the learning processes involved. Pedagogical flexibility typically involves logistical flexibility as well but its main focus is on offering students new learning processes and experiences. Logistical flexibility is thus easier to increase, as it does not need to involve changes in pedagogy.

With respect to the second question, a series of three sets of support tools integrated within the CMS used at the

University of Twente has demonstrated ways in which instructors can be helped "just in time" as they set up a course to consider ways to increase the flexibility of the course experiences that they offer their students. Institutions that use a CMS that does not allow this sort of tailoring for integrated instructor support would have to consider making these sorts of suggestions and examples available outside of the CMS, for example in a separate help system or in print form, but whether this would lead to instructor use would have to be observed in practice and over time.

With respect to the third question about instructor use, the fact that all instructors routinely use the menu-options tool (either Version 2 or 3) is related to the fact that it saves them time in setting up their course environments. However, once they have made the transition to using the CMS to offer a certain amount of (logistical) flexibility to their students, they are not inclined to further change their courses unless there is an institutional incentive to do so. Thus integrated tools are not enough in themselves unless the instructors can see a direct time savings in their use. In terms of the CBAM Model (Lord *et al.*, 1987) the instructors have reached their level of routine use and thus do not feel the motivation for further change. Apparently the instructors do not see the tools as vehicles for the sort of process that Boyd (2000) calls "scholar-practitioner cloning" that ideally should take place in higher education. He notes that "Most, serious academics wish to clone their way of being in the world as a scholar or researcher onto their best students. This is a matter of passing on tacit knowledge, and of attitudes and commitments and styles of enquiry and debate, not just delivering facts & skills" (p. 75). Presumably these processes will have to take place more and more via networks as higher education becomes increasingly flexible in its ways of instructor-student interaction. A major challenge will be how to move beyond using network technology predominately for logistical flexibility toward using it for scholar-practitioner cloning, in Boyd's use of the term. Our experiences at our own university show that this process will require slow and evolutionary change, in which interventions such as support tools will only come to their potential when many other changes in the culture and context have occurred.

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