Academics in Control

Supporting Personal Performance
for Teaching-Related Activities

Gerard J. Gervedink Nijhuis

Doctoral committee

Chairman:
Prof. dr. H.W.A.M. Coonen University of Twente

Supervisors:
Prof. dr. B.A. Collis University of Twente
Prof. dr. ir. P.W. Verhagen University of Twente

Members:
Prof. dr. J.J.H. van den Akker University of Twente
Prof. dr. J.C.M.M. Moonen University of Twente
Prof. dr. R. Oliver Edith Cowan University, Perth, Western Australia
Prof. dr. T.C. Reeves University of Georgia, Athens GA, USA
Prof. dr. P.E. Resta University of Texas, Austin TX, USA

Gervedink Nijhuis, G.J.

Academics in Control: Supporting Personal Performance for Teaching-Related Activities.
Thesis University of Twente, Enschede – With refs – With summary in English and Dutch

ISBN: 90-365-2245-5

Cover Design: Marita Wesselink-Fliervoet
Press: PrintPartners Ipskamp, Enschede

ACADEMICS IN CONTROL

SUPPORTING PERSONAL PERFORMANCE FOR TEACHING-RELATED ACTIVITIES

PROEFSCHRIFT

ter verkrijging van
de graad van doctor aan de Universiteit Twente,
op gezag van de rector magnificus,
prof. dr. W.H.M. Zijm,
volgens besluit van het College voor Promoties
in het openbaar te verdedigen
op woensdag 14 september 2005 om 15.00 uur

door

Gerrit Jan Gervedink Nijhuis

geboren op 10 mei 1948
te Bathmen

Het proefschrift is goedgekeurd door:
Prof. dr. B.A. Collis, Promotor
Prof. dr. ir. P.W. Verhagen, Promotor

Table of Contents

List of Tables

List of Figures

Acknowledgements

Performing a PhD research project is a long and winding road to reach the ultimate goal: getting a PhD degree. But at the same time the content was of equal importance to me. The research problem was to find ways to support instructors in a changing university context, especially with their teaching-related activities that are becoming more complicated with the use of Course Management Systems in education. During this research process many people supported me who I want to thank.

First my promoter Betty Collis, who arranged this research project, stimulated and supported me to the maximum, and who never stopped believing that I could reach my goal. Also my second promoter Pleun Verhagen, who was very good in helping me to keep all the problems in the right perspective. I also want to thank my ongoing supervisory committee for their interesting insights and suggestions. A special thanks to Jef Moonen who also helped in the final stage of writing as well as during the ongoing supervision.

I want to thank my colleagues in the former ISM department and in the current department of Psychonomics and Human Performance Technology for their support, especially Petra, Allard, Joachim, and Wim.

Many people were involved in this research as a respondent, as an interviewee, or as an evaluator and I want to thank them all for their contributions. I would like to thank Marijk, Petra, Anneke, and Wim, who were colleagues of Betty and me within the international survey. To be able to do interviews at the CAH/STOAS Hogescholen was very useful and motivating to broaden this research and I want to thank Michell Tappel for arranging this.

Last but not least I want to thank my family: Frank and Chantal for their love and understanding, and most of all my wife Hanny. Without her love and unconditioned support during so many years I would never have written this dissertation.

Gerard Gervedink Nijhuis

Bathmen, September 2005

1 The University Context and Pressures on Academics' Performance

Society has changed during the last decades and so have universities. New external demands and a call for more accountability in spending public money are forcing universities to change their organisational structure, change educational programmes, and stimulate the use of Web-based systems in education. These changes will affect academics because of many new demands and increased personal accountability. But although these changes have just begun, academics are already facing high workload and dissatisfaction. These sorts of pressures can lead to a feeling of personal loss of control, which can lead to negative feelings about work. This research examines the question whether performance support can be offered to academics to help them to stay in control.

In this chapter first the changing university context is analysed, showing a transformation from a collegium to an enterprise with missions and targets to reach predefined goals, and with tight budgets to meet external accountability (Section 1.1). New mission statements of universities will change the educational context (Section 1.2), and will also involve the advanced use of ICT and Course Management Systems (CMSs) in education (Section 1.3). These changes will put extra pressures on academics and current academics' response to these pressures is discussed (Section 1.4). Based on these insights, the aim of this study is to analyse how academics can stay in control, especially for their teaching-related activities, and a problem statement is formulated on how to support academics' performance (Section 1.5). At the end of this chapter an outline is given of the structure of this dissertation (Section 1.6).

1.1 The Changing University Context

In the first section, the transformation towards a university run as an enterprise is indicated, with special attention for the transformation process in The Netherlands (Section 1.1.1). As enterprises define mission statements and business plans, so will universities. These missions will be about their primary processes, research and education, and currently also about the use of new and advanced ICT opportunities (Section 1.1.2). Because of decreasing budgets, universities are held more and more accountable by government and society to effectively control their budgets and therefore internal accountability is becoming much more important than before (Section 1.1.3). At the end of this section it is concluded that these changes and demands will affect all university personnel, including academics.

1.1.1 Transformation towards an enterprise

In this section, first the transformation process is described in four major periods, followed by an overview of the transformation process in The Netherlands. McNay (1995) argues that many universities are changing towards an organisation run as an enterprise and indicates that this transformation can be described in four major periods: traditional, democratic, managerial, and entrepreneurial. To outline the transformation of the academic environment, a short overview is given of each period.

The first of these is the traditional period. Until the 1960s public universities in the western world typically were funded by central government with only marginal internal financial control. Universities were led by a president and decision making was based on collegial consensus among fellow academics who experienced full academic freedom. Chairs were groups of academics associated to a professor. Coaldrake and Stedman (1999) describe this organisational framework as: "The ideals underlying academic work evolved during a period when higher education was an elite activity, involving a relatively stable external environment, small numbers of students, high levels of professional autonomy and little financial support or interest from government and industry" (p. 3). Such an organisation can be characterised as a collegium with loose policy and loose control of implementation (McNay, 1995). McNay means by a collegium that as colleagues you work together.

The second period was during the 1960s when universities changed to organisations led by boards as stated by Chevaillier (2000): "In the wake of the protest movement at the end of the 1960s, students and administrative staff gained seats on the various governing boards of institutions. What was called 'democratization' of universities marked a significant change in the way decisions were made: consensus was replaced by confrontation and collegial processes turned 'political'" (p. 22). Chairs were combined into departments of academics researching the same subject area. To implement the decisions made by boards at different levels in the organisation, heads of departments more and more became managers responsible for designing projects and implementing policies for which they were held accountable by various "stakeholders". Over the years, procedures and rules led to a more bureaucratic organisation.

The third period started when in most countries discussions began about the way public resources were allocated to universities and about demands for more accountability and strategic planning. Rhoades (2000) indicates: "In the past two decades, universities have changed significantly, in their management and their functions. The external challenges confronted by central administrations throughout the country, in both public and private institutions, have led to increased centralisation of management" (p. 44). As funding from government decreased, the search for external funding was broadly accepted as a way to earn extra revenue. This also led to more managerial activities to be able to account for expenses to funding partners. As a result a university evolved more and more towards a managerial organisation or corporation.

In recent years the fourth period has started, as governments in many countries have offered more autonomy to universities and continued to squeeze public funding. This forces universities to operate as legal entities in the market to compete with national and international universities and address new markets for research funding and student enrolments. At the same time universities need to reduce costs to be competitive and stay within limited external budgets.

Because of the current entrepreneurial context, the internal organisation has to change accordingly to be able to handle these external pressures. McNay (1995) indicates that the keyword in an enterprise is client, and decisions should be made within a well-defined general policy framework. Most universities around the world are moving from being a collegium with loose policy control to an organisation with a tight policy such as used in corporations or enterprises. These developments will transform a university into an enterprise with stakeholders, markets, and economic business principles.

Mission statements, business plans, and economic results will prevail with consequences and sanctions if results do not meet predefined goals.

To outline models of universities as organisations McNay (1995) categorises organisations along two dimensions: policy definition and control of policy implementation (see Figure 1). According to McNay most universities incorporate parts of all four levels of the transformation process, but the dominant movement of universities at least in the UK has been from collegium via bureaucracy and corporation towards enterprise. This dominant movement is added to Figure 1 to emphasise this evolution towards universities organised as enterprises.

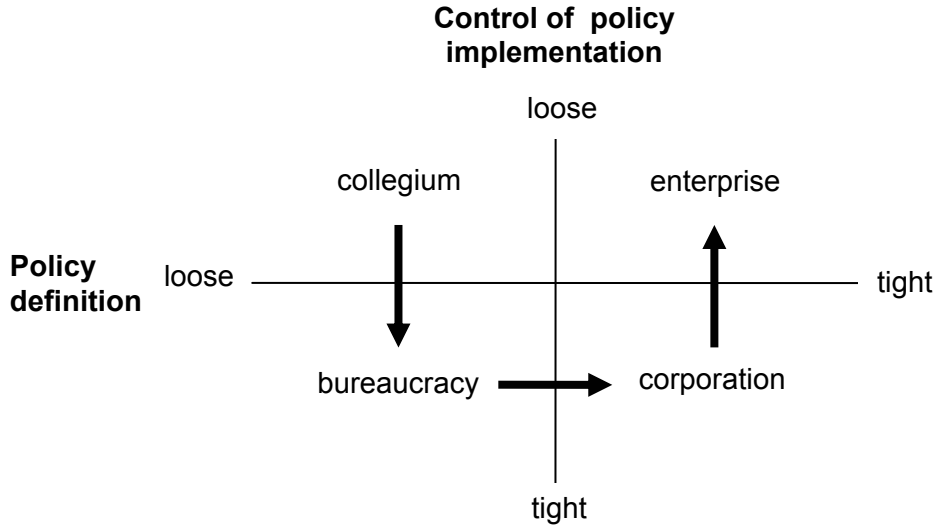


Figure 1. Models of universities as organisations, with dominant movement in UK toward enterprise indicated by arrows (adapted from McNay, 1995, p. 106).

In Figure 1 the dominant movement starts from universities with a loose policy definition combined with a loose control of policy implementation, followed by a period where universities tightened their control towards a bureaucratic organisation. Following this, universities tightened their policy so that all university personnel had to act according to the university policy. Next, and currently there is a movement to offer more flexibility to individual employees with less control of policy implementation, similar to employees in an enterprise. This also means that a university is managed as an enterprise with greater responsibilities for the individual employees who are held accountable when results fall short of expectations.

In The Netherlands, the same pattern of change has occurred (De Boer, 2003). Before the 1960s, universities in The Netherlands were organised in the same way as in many other countries, with chairs as the primary unit and a professor as leader of a chair group and responsible for education and research. In 1970, an law was accepted by parliament called "Wet Universitaire Bestuurshervorming" (WUB) [Law on Reform of University Governance] where universities became more autonomous and personnel and students got more influence in the way the university was governed through membership of boards at various levels. Within a university, there were two governing structures ("dual government"): education and research as one part, and government and control ("Bestuur en beheer") as the other part, with collective responsibility within

each part but still with many regulations from government. Chairs were combined into departments ("vakgroepen") and a department board became responsible for education and research. In 1993 a new law appeared called "Wet op het hoger onderwijs en wetenschappelijk onderzoek" (WHW) [Law on higher education and scientific research] in which the relation between Government and universities was again changed. A major goal of this law was to enlarge the autonomy of universities and to redefine the responsibilities of government and universities. The government was still dictating how universities are structured and how responsibilities are delegated at various levels in the organisation.

In March 1997 a new law was adopted called "Modernisering Universitaire Bestuursorganisatie" (MUB) [Modernization University Governance Organization] in which the government is deregulating and decentralising responsibilities in favour of universities and is allowing university management to turn the university into a professionally-managed organisation at university and faculty levels. Responsibilities that were separated in two streams under the WUB are integrated again into one integral management in the MUB. This has a major impact on topics such as the organisational structure, accommodations, and conditions of employment. A clear line of management and a more-efficient way of operating are expected to stimulate responsibility and accountability (Van den Berg, Van Bergen, & Schouten, 2001). The MUB law typifies a transition from a collegial decision-making system to a managerial model of governing a university ("besturingsmodel") similar to a company model with decision-making authority in line management, and consent and advice authority in representative advisory boards. However, based on a survey held in spring 2001, De Boer (2003) argues: "A majority of the Dutch professoriate remain guided by informal rules that enable them to exploit their professional autonomy" (p. 269). As an example of implementation of the MUB law, the University of Twente has strengthened the planning and control cycle between its board of governors and faculties based on explicit responsibilities. All units within the university are assessed based on gained results compared to agreed-upon performance. Managers are being held directly responsible for the results of their organisational unit (Universiteit Twente, 2000). Again, De Boer (2003) argues that a substantial portion of Dutch professors still "do not act in accord with the faculty research policy established on the basis of the formal rules" (p. 269). But to meet one of the goals of the new structure they will have to eventually play the game by the new rules, namely to demonstrate an increase in the quality of the primary processes of teaching and research.

In conclusion, a transformation process is occurring in universities towards a more entrepreneurial organisation that can be characterised as: from collegial consensus to managerial control.

1.1.2 Missions and targets

It is common practice for enterprises to formulate mission statements for the long term and to define targets for the short term. As universities transform towards enterprises they also have to state their missions and plans more explicitly than before. These plans focus on the two primary processes of universities: research and teaching, and mission statements address topics such as: becoming more competitive, increase international orientation and collaboration, offering more flexibility in education, and doing advanced research projects (see for instance Universiteit Twente, 2000). Changes in

education are discussed in more detail in Section 1.2. At many universities, including the University of Twente (Universiteit Twente, 2000), 'innovations in technology' are also emphasised as a special mission (see Section 1.3).

To be able to fulfil these mission statements the organisation has to be turned into a target-oriented organisation, using steering mechanisms such as good staffing and budgeting, and control mechanisms such as clearly defined requirements and procedures and clearly stated consequences. This is discussed in more detail in Section 1.1.3. As a result these missions and targets will influence all aspects of teaching and research and thus the performance of academics, both as a group and as individuals.

1.1.3 Budgets and accountability

In an entrepreneurial organisation, budgets are means to reach targets and control finances. Currently universities are receiving less money from government. This is illustrated for American universities by Alexander (2000) as he states that "a new economic motivation is driving states to redefine relationships by pressuring institutions to become more accountable, more efficient, and more productive in the use of publicly generated resources" (p. 411). To cut expenses universities are or have been reorganising their faculties and services in an attempt to decrease salary costs. Alexander (2000) observes that "budget reductions and general resource constraints have become commonplace, while institutions are being asked to serve increasing numbers of students and constituencies". This can be characterised as "Do more with less". At the same time universities are trying to increase income by collaboration with companies, attracting more students, and starting new programmes, which can be characterised as "Open new markets". The University of Twente (2000) has formulated as one of its financial targets to create a match between the financial resources available and the educational expenses. Budget constraints will have implications at all levels in the organisation and thus will affect academics as well.

In addition to budget constraints, there are also pressures related to external accountability. Although universities have gained more autonomy, government still remains responsible to guarantee high-quality research and education and proper use of public resources. Coaldrake and Stedman (1999) indicate that "Government has gradually repositioned itself from being a patron of universities to a purchaser of higher education, and expects demonstrated accountability and returns for this investment" (p. 12). When budgets are under pressure, organisations need to focus more on their primary processes and improve their productivity and efficiency. Managers and employees have to become more accountable, which will lead to stricter administrative processes and control. Fisser (2001) indicates that there is a trend towards increased accountability in terms of value for money and the need for efficiency improvements is an important issue for universities all over the world.

The transformation towards an entrepreneurial university with increased external demands will result in business plans and tight controls, and this will affect all university personnel, including academics.

1.2 The Changing Education Context

Within universities education is one of the two primary processes and because of external pressures and demands from society, students, and government, university mission statements are defining new targets. Currently education in Europe is in transition towards a new programme structure, offering new programmes to a much more-diverse student population, and with more emphasis on quality. At least four major changes can be observed: the new Bachelor/Master structure (Section 1.2.1), changes in student demographics (Section 1.2.2), increased external flexibility in offering education services (Section 1.2.3), and new forms of external quality control (Section 1.2.4).

1.2.1 The new Bachelor/Master structure

Until recently university programmes in many European countries varied in structure, number of years, and degrees. For example in the UK a Bachelor / Master structure was offered while in the Netherlands the programme structure was based on two cycles: a one-year foundation period ['propedeuse'] followed by a three-year doctoral period, leading to a 'doctorandus' degree. In June 1999 29 European countries signed the Bologna Declaration for the creation of a European area of higher education and agreed to reform their higher-education systems within the next decade, based on two main cycles. The first cycle is an undergraduate (Bachelor) study of at least three years and awarded with a Bachelor degree relevant for the European labour market. The second cycle is a graduate (Master) study of one or two years, which leads to a Masters degree. The main objectives of the Bologna declaration are to create easily readable and comparable degrees, to promote widespread mobility for students to study at various universities in Europe, and to establish a common system of credits recognised by all universities. Each course will be assigned a number of credits based on the European Credit Transfer System (ECTS). According to the Ministry of Education in the Netherlands (OC&W, 2000), "voor hogescholen en universiteiten biedt invoering van een bachelor-masterstructuur … ook een unieke mogelijkheid om het curriculum te vernieuwen" [implementing a Bachelor/Master structure offers unique opportunities for universities and institutions of higher vocational education to renew their curricula] (p. 2). The introduction of this Bachelor/Master structure will initiate a process of major changes in educational programs and instructors have to implement these changes in their courses. In The Netherlands, the Bachelor/Master structure started at the beginning of academic year 2002, thus the instructors are under pressure to change their courses accordingly.

1.2.2 Changes in demographics of the student body

Traditionally cohorts of university students consisted of students aged 18 to 25 years and with prior knowledge gained during secondary education. Recently new cohorts of students are entering university who are older and are more experienced after some time spent in employment. They may resume their education and follow an entire programme or follow some courses that meet specific vocational purposes and enhance their competencies. Regular students also try to combine their study with labour and enrol as part-time students or alternately study and work for some months or more. The prior knowledge of students has changed and will change even more because of various

ways to participate in a study programme. Some examples of the rich diversity of current student enrolments are: students with different study programmes in secondary education, students from other study programmes, students from other universities, and students from countries outside that of the university itself. When distance education is in place students can follow an educational programme and stay in their own country, or they can choose to live in a foreign country for a while and study there. In Europe this effect will probably occur because of the Bologna Declaration in which student mobility is one of the main objectives.

1.2.3 Increased flexibility in offering education services

Because of student demands, financial constraints, and increased competition from universities all over the world, universities are formulating new missions to extend the educational services they are already delivering to their regular students and society. Three main trends can be seen (Collis & Van der Wende, 1999): flexible study programmes, life-long learning, and distance education.

- **Flexible study programmes**
  Students are demanding a more-flexible study trajectory that eventually leads to a degree. They want to select courses within various curricula that fit their personal goals. This means that students have increasingly different types and levels of prior knowledge and want to attain different goals when they start a programme or a course. This effect is re-enforced by part-time students who may select their courses within the same curriculum but at a different pace than regular students. The University of Twente indicates that ICT can play an important role to enhance the freedom of choice for students (Universiteit Twente, 2000).
- **Life-long learning**
  Most universities are starting to offer life-long learning opportunities to people who need extra competencies for their current jobs or for new jobs to which they aspire. Other motives may also play a role such as personal interest, social background, or the role of peers (Fisser, 2001). To offer life-long learning opportunities the study programmes need to be organised in a flexible way with alternative paths and be adaptable to personal backgrounds and aspirations. Burbules and Callister (2000) state that "these students expect it to be available to them on their terms, as consumers with alternatives elsewhere" (p. 288). This is also stated boldly by Chevaillier (2000): "They [students] will not opt for universities if these institutions do not offer them adequate learning conditions, by radically changing teaching methods, by designing programmes that respond to the needs of each individual and by delivering them in suitable places and ways" (p. 26). For universities this has great implications for the way they organise and offer their programmes.
- **Distance education**
  Some decades ago, distance education was associated with the distribution of study material using the post, or radio and television broadcasting. Now distance education is usually associated with using a computer and the Internet to exchange study material and communicate with instructors and students and is offered to different degrees by most European universities. Study programmes and courses have to be adapted to be used effectively at a distance: study material has to be available electronically, and often communication will be via asynchronous media such as e-mail, with less face-to-face contact. For international students distance

education is a means to study at a foreign university while staying at home for part of the study or for the entire study. However, more and more distance education is being integrated with periods of on-campus delivery to facilitate a changing student population. The use of Course Management Systems (CMSs) can greatly facilitate distance and blended education (Collis & Moonen, 2001).

1.2.4 New forms of external quality control

Another change affecting higher education is an increased focus on external validation for quality control. Government and other external partners funding universities no longer take the quality of educational programmes for granted and are demanding explicit and measurable quality criteria. Traditional procedures based on collegial processes are no longer accepted. Quality control is enforced in the context of fast-changing university curricula and entrepreneurial management. In The Netherlands when the government decentralised authority they introduced a procedure of accreditation to control the quality of educational programmes every five years. Universities are introducing quality-control methods at all levels in their organisation to meet these quality criteria and keep their accreditation. In education, this focus on quality will involve all aspects of production, such as content, process, product, and instructor.

Thus education is changing in universities because of new programme structures, new missions, a more-diverse student population, and increased quality control. All of these will affect academics and the personal control they have over their own teaching.

1.3 The Changing ICT Context

The general use of ICT has become common practice at universities. Currently advanced use of ICT is included in the general mission statements for most universities because they want to stay at the frontline of new and advanced technologies (Collis & Moonen, 2001). Two major aspects of the use of ICT in education are discussed in more detail in the next sections: the use of the Internet (Section 1.3.1) and the use of databases and course management systems (Section 1.3.2).

1.3.1 The use of the Internet

A major breakthrough for ICT use in universities was the introduction of the Internet. This global network connecting millions of computers created unprecedented possibilities to communicate and exchange information. Communication with people all over the world using e-mail, chat, and videoconferencing changed society and working environments (Bang, 1996). The same is true for the World Wide Web where one can retrieve information stored in distributed websites using a simple and uniform computer application (a browser). The Web is useful for information retrieval, but it can also be used for various other fuctionalities, such as adding information to a database, or ordering products by filling out a Web-based form. Because the use of the Internet has become common practice at most universities, its provision is not a specific mission anymore but it is part of many plans and processes to reach other targets.

1.3.2 Databases and course management systems

In addition to the overall presence of the Internet and local intranets, another change related to ICT is the increased access from the academics' desk to resources such as large databases. Academics can search literature in university libraries all over the world by using the Internet. By using institutional intranets academics are able to use internal management systems that keep track of, for instance, budgets, personnel, and study results, and let authorised employees and even students have access to these systems. Many universities implemented or are in the process of implementing Course-Management Systems (CMSs) (Collis & Van der Wende, 2002) for educational purposes, and to integrate most or all facilities for instructors and students that are needed for a learning process to happen. Facilities found in most systems include: access to course material, access to a roster or scheduling tool, access to assignments and feedback, and tools to interact with the instructor and fellow students (for an overview see http://www.edutools.info/course/). The transfer of traditional programmes and courses to a CMS is a complex process. At the University of Twente a CMS called TeleTOP is used (http://teletop.utwente.nl/) that includes many additional facilities such as: tools to participate in a discussion, to access and add websites and other resources, and to use a workspace to exchange and manage files and work collaboratively. The system was developed and implemented at the Faculty of Educational Science and Technology[1] in 1997-1998 and after its proven success in the faculty the management of the University of Twente decided to introduce TeleTOP in all faculties and urged them to transfer all their courses into this system, starting in 2000 (Collis & Moonen, 2001).

Thus, ICT is changing research, educational, and administrative processes in the university. Academics are expected to make use of these tools and systems for their research and teaching tasks.

1.4 Pressures on Academics and Current Response

Given the context described so far, Section 1.4.1 gives a summary of pressures on academics. Next some responses of academics when confronted with these new and often extra demands are discussed. One of the responses of academics is to work harder but this will increase their workload which at the individual level may lead to stress and dissatisfaction (Section 1.4.2).

1.4.1 Overview of pressures

In previous sections the changing context of academics has been discussed, focussing on changes that relate to the university organisation, the educational programs, and the intensified and advanced use of ICT and CMSs. Chevaillier (2000) observes that "all the changes that have affected higher education systems in the last three decades around the world have inevitably had an impact on the working and living conditions of academics." (p. 28). As an overview, some of the changes discussed in Sections 1.1, 1.2, and 1.3 are depicted as pressures on academics in Figure 2.

[1] The Faculty of Educational Science and Technology is now part of the Faculty of Behavioural Sciences.

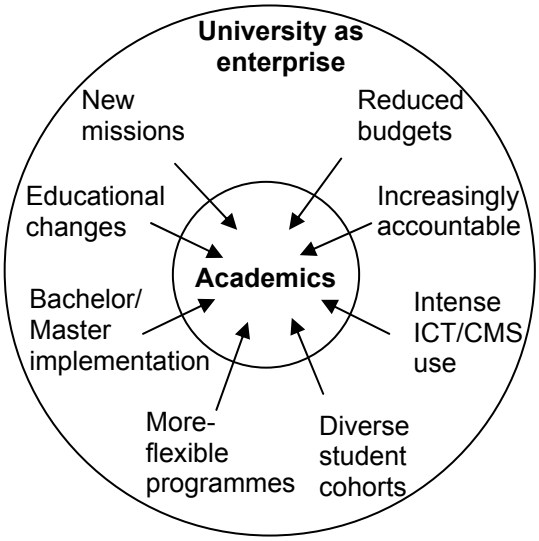


Figure 2. Examples of changes that will affect performance of academics as a group.

In the next sections, some consequences of these pressures on academics will be discussed.

1.4.2 Workload and stress

Over the years, surveys are regularly held to investigate the workload of academics. These surveys show a workload exceeding normal work hours. A total workload of 53 hours per week is no exception (for example Meyer, 1998). More than half of the workload is spent on teaching activities, even at so-called "research universities" where the emphasis is on research. In most surveys the workload of academics is analysed in very broad categories, such as teaching, research, and service. Some surveys show in more detail what activities add up to the teaching workload, for example in terms of teaching to undergraduate or graduate levels, or in class and out of class, but no explicit focus in these surveys is on teaching-related managerial activities. These surveys are typically based on the current situation and do not deal with new challenges and new roles for academics, such as using a Web-based course management system. In a recent study by the research institute IVA Tilburg among university instructors at Dutch universities, more than 27 % indicated that they perceive their workload as being too high (Werkdruk, 2001). Academics indicate that they get stressed because of the huge workload and sometimes leave for another job (Meyer, 1998), or they do not want to invest in new forms of education because of their current workload (Collis & Messing, 2001).

In general people usually do not welcome substantial changes for reasons of risk- and uncertainty avoidance (De Boer, 2003). If changes occur people may suffer from these risks and uncertainty and become stressed or disappointed. A recent study on occupational stress among 8732 staff members in 17 Australian universities (Winefield, Gillespie, Stough, Dua, & Hapuararchchi, 2002) shows that more than 30% of academic staff reported working more than 55 hours per week, and around 35 % of academic staff wished to decrease their working hours. Academics involved in teaching and research reported that the number of hours they spent on teaching-related activities had increased in the recent past. It was concluded that 54% of academic staff were identified as being at risk of psychological illness because of stress. On average,

academics involved in teaching reported the highest strain and lowest job satisfaction. In a recent meta-analysis by Judge, Thoreson, Bono, and Patton (2001) a strong relationship was found between job satisfaction and job performance. The researchers found that job satisfaction correlates significantly ($p<.05$) with job performance and even more in high-complexity jobs ($p<.01$). These findings imply that when academics have low job satisfaction this will have a negative influence on job performance.

1.5 General Problem Statement

As indicated academics experience many pressures from changes in the organisational context and changes in educational context, which include the advanced use of ICT and of course-management systems in particular. As these change processes are still evolving, pressure on academics will continue to increase. Simultaneously, academics are being held more and more responsible and accountable for their own performance, as discussed in Section 1.1.3. Yet, their workload is already (too) high and satisfaction (too) low which influences job performance in a negative way (see Section 1.4). How will academics cope with these changes and pressures and perform well as a group and at a personal level? How can they stay in control of their professional lives?

This leads to the initial problem statement for the research:

- *What are key aspects of academics' teaching-related performance that are coming under increased pressure in the changing university context?*
- *How can an individual academic stay in control of these pressures?*

A set of research questions related to this problem statement will be developed in Chapter 2. How the research builds upon this initial problem statement is described in the next section where an overview of the study is given.

1.6 Overview of the Study

A general overview of this dissertation is shown in Figure 3.

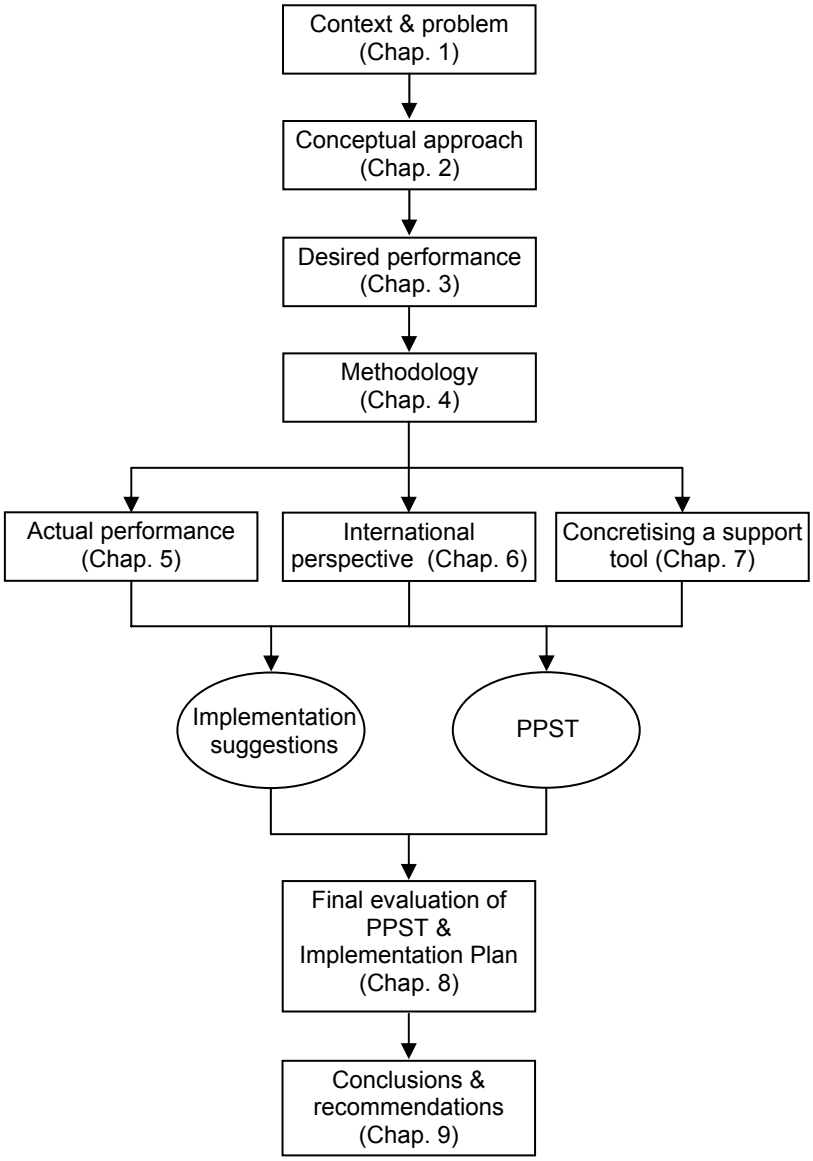


Figure 3. Overview of chapters (PPST means Personal Performance Support Tool).

In Chapter 2 the general concept of performance and some key processes will be discussed. It will be argued that in many professions people have a high level of job control when performing their work. To emphasise personal control over their performance the term 'personal performance' will be defined and elaborated. How human performance can be analysed will be discussed. It will be argued that the Human Performance Technology (HPT) approach can be used to analyse desired and current situations in personal performance. Special focus will be given to the aspects of personal control. It also will be argued that a project-management approach can support professionals to organise and control the way they perform their work. Chapter 2 concludes with a set of research questions.

In Chapter 3 the desired tasks and performance of academics will be analysed using the HPT methodology. The analysis will be channelled to individual academics and their

personal performance. An Academic's Personal Performance Model for teaching-related activities will be defined and desired performance will be based on this model.

In Chapter 4 the methodology to analyse actual performance and needs and for the design of an intervention to reduce the gap between desired and actual performance will be discussed.

In Chapter 5 the current personal performance of academics with an emphasis on teaching-related activities will be analysed using various sources of empirical data. Results will be related to the Academic Personal Performance Model.

In Chapter 6 the performance and needs of academics will be analysed in an international perspective, again with results related to the Academics Personal Performance Model.

In Chapter 7 an overview will be given of the development process to create an electronic performance-support tool to improve the personal performance of academics. Four prototype versions were designed and evaluated. After each evaluation, insights for redesign were obtained and the next version created. All of the versions are based on the Academic's Personal Performance Model for teaching-related activities developed in Chapter 3, but insights from the analyses in Chapters 5 and 6 as well as the evaluations of the prototypes led to adaptations to the Model. A final prototype version of the PPST will be presented in this chapter and the evaluation of the final PPST will be described in Chapter 8.

In Chapter 8 an implementation plan based on previous steps will be presented, and then the evaluation of the final version of the PPST and the PPST Implementation Plan will be presented and discussed, resulting in an enhanced Personal Performance Model and an enhanced PPST Implementation Plan.

In Chapter 9 conclusions and recommendations based on this research will be presented.

2 A Conceptual Approach to the Analysis and Improvement of Personal Performance

In this chapter, the general concept of performance will be discussed. It is argued that individual performance can be viewed as a combination of performing tasks within various processes and some key processes will be discussed. It also will be argued that in many professions people have high levels of job control when performing their work, for instance professionals and managers. A high level of job control implies that individuals are free to organise part of their work the way they want. To emphasise this personal freedom and its consequences within human performance the term 'personal performance' is introduced, in contrast to the more-general "human performance" often discussed in relation to organisations' policies with respect to their employees. Ways to analyse human and personal performance will be discussed and it will be argued that the Human Performance Technology (HPT) methodology is an appropriate choice to analyse desired and current situations in personal performance. A special focus will be on the aspects of personal control. It will be argued that a project approach can be used by employees to organise and control the way they perform their work. This chapter concludes with a set of research questions to be discussed in the following chapters.

In Section 2.1 major performance approaches are discussed and the HPT approach to performance in a collective sense is identified. In contrast performance at the individual level is discussed next, leading to a personal performance model where job control is emphasised as part of personal performance (Section 2.2). Section 2.3 moves from the general discussion of personal performance to the teaching-related performance of academics and presents a list of research questions for the remainder of this research.

2.1 Performance from the Organisational Perspective

In Section 2.1.1 performance in general is discussed, followed by Section 2.1.2 with an overview of approaches to analyse and improve performance. A specific method, the Human Performance Technology (HPT) approach, is then presented in Section 2.1.3.

2.1.1 Performance in general

Langdon (2000) indicates that the term performance is hard to define in the organisational context. In this section some descriptions will be presented. According to a dictionary one of the general meanings of *performance* is: "the process or manner of performing [doing]". The International Society of Performance Improvement [ISPI] defines performance as 'activities and measurable outcomes' (http://www.ispi.org). Stolovitch and Keeps (1999) give no strict definition of performance but relate performance with:

- a qualified result or a set of obtained results
- accomplishment, execution, or carrying out of anything ordered or undertaken
- something performed or done
- a deed, achievement, or exploit
- the execution or accomplishment of work.

Performance can be defined at various levels in an organisation. Langdon (1999c) distinguishes the level of the business unit, the level of work processes, the level of the work group, and the level of the individual. In this research, these levels are viewed from the perspective of the individual (academic) performing within an organisational (i.e. university) environment.

2.1.2 Approaches to analyse and improve performance

Many frameworks or models have been developed to conceptualise workplace performance that are also used to analyse and improve performance (Schaffer, 2000). Performance improvement is described by Stolovitch and Keeps (1999) as "increased productivity, as well as greater effectiveness and efficiency from work groups" (p. 5). Sánchez (2000) refers to performance-improvement approaches that are designed to positively modify the performer's outcomes and accomplishments in the workplace. She lists three main approaches to performance improvement: Organisational Development (OD), Human Resource Development (HRD), and Human Performance Technology (HPT) in two areas of intervention: systems and processes at the organisational level and workplace performance technologies at the individual level. In Table 1 the three approaches are listed, together with a fourth approach, Human Performance Management, which is also used in organisations to improve personal performance (Williams, 1998).

Table 1. Approaches to performance improvement (adapted from Sánchez, 2000, p. 58).

Approach	**Area of Intervention**	**Description**
Organisational Design (OD)	Organisational culture	Managing the "white space" of the organisation chart especially in times of rapid change
Human Resource Development (HRD)	Formal instructional design & training	Using the training function of the organisation to enhance strategy, structure, systems
Human Performance Management (HPM) (Williams, 1998)	Formal organisational processes	Using formal processes to stimulate individuals and groups through goals and requirements
Human Performance Technology (Stolovitch & Keeps, 1999)	Systems and processes Workplace-performance	Analysing gaps between desired and current performance and designing interventions (such as on-the-job training and job-aids) to help reduce the gaps.

Organisational design (OD) focuses on the organisation and ways to improve the organisation's effectiveness and organisational health through planned interventions. The OD process is designed "to change the organisation's culture from one which avoids an examination of social processes in communication, decision-making, and planning, to one which institutionalises and legitimises this examination" (Sánchez, 2000, p. 59). In contrast, Human Resource Development (HRD) focuses on training to increase individual skills and knowledge in order to improve individual behaviour. HRD attempts to identify individual interests, values, competencies, and needs to develop capable people for future jobs and thus enhance the capacity of the organisation. Human Performance Management (HPM) focuses upon assisting

individuals to achieve strategic organisational objectives, be judged on these achievements, and be supported in this development. Aspects involving assistance are:

- Performance in meeting job requirements
- Performance in delivering key results
- Performance in achieving agreed development objectives.

Often individual targets for these aspects of performance are specified in a Personal Performance Plan, which is used to define objectives and goals. After a specific period, a performance review is held to compare results with the personal performance plan. Consequences are defined and a new plan for the next period is created. Corrective actions will be taken if required performance is not met, such as extra skills or knowledge development, and if the mismatch continues a transfer to a new job or out of the organisation may be the final consequence. Human Performance Technology (HPT) combines aspects of both HRD and HPM but expands these with a specific analysis approach and a focus on the design of interventions. It aims at "the achievement of valued human performance in the workplace" (Stolovitch & Keeps, 1999, p. 3) and is discussed in the next section.

2.1.3 The human performance technology approach

HPT seeks to improve the performance of organisations via improving the performance of the people responsible for achieving desired results. HPT offers systematic approaches to analyse organisation and individual performance needs and improve processes. It can be applied to all levels in an organisation, from the business unit to the individual. The HPT approach can be used to improve three ranges of situations (Rummler, 1999):

- Problems: When there is a clear gap between desired and current performance
- Opportunities: When current performance standards are met but there is a chance to improve production
- New situation: To introduce new services or the design of a new organisation.

This research focuses on the individual level of performance in the three situations defined by Rummler, and therefore the methods of human performance technology are chosen as the means to analyse academics' performance and to improve the situation when gaps are identified.

In recent years many HPT-related methods and models have been used to analyse and improve performance at various levels in the organisation. Wilmoth, Prigmore, and Bray (2002) give an overview of various HPT models that can be used to analyse and improve human performance. They argue that one category of models (diagnostic models) can be used to show where to look for performance problems in an organisation. One such diagnostic model that can be used in organisations is a conceptual model for a human performance system (Figure 4) developed by Stolovitch and Keeps (1999).

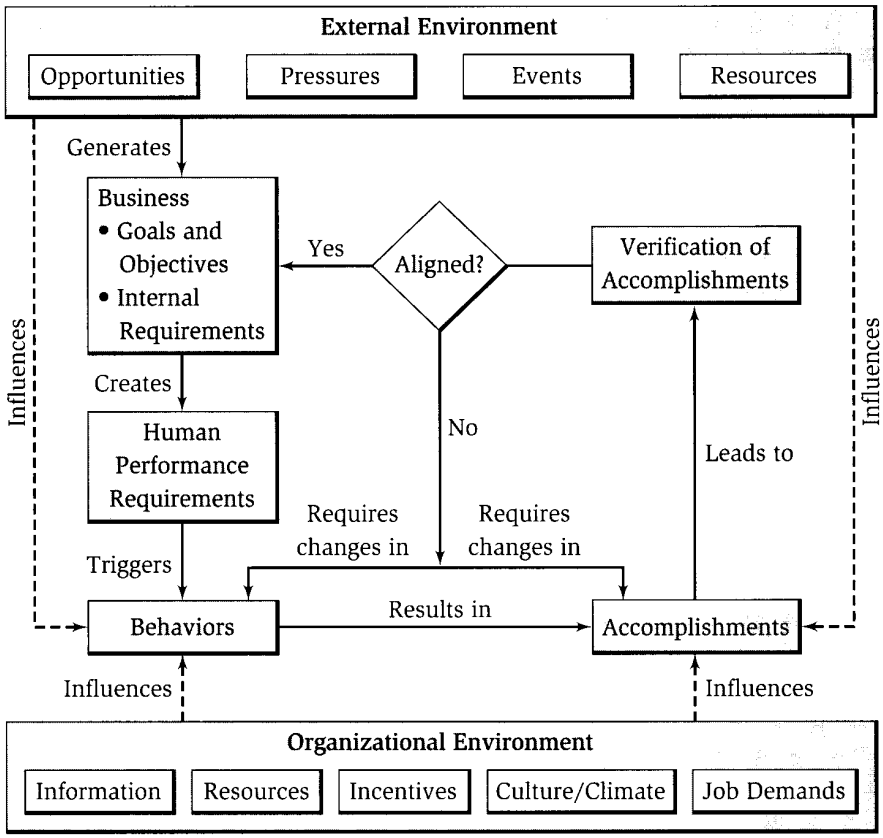


Figure 4. A conceptual model for a human performance system at the organisational level (Stolovitch & Keeps, 1999, p. 14).

In Figure 4 the external environment influences the organisation and generates business goals and objectives and internal requirements. From these objectives and requirements, human-performance requirements are defined which in turn trigger behaviours at various levels in the organisation. Behaviours result in accomplishments, which can be compared with business goals and objectives. When accomplishments are not aligned with business goals, there is a mismatch and this will require changes in behaviour and accomplishments. Figure 4 shows that behaviour (performance) is embedded in an environment set by the organisation at all levels in the organisation, including the individual (personal) level.

2.1.4 Schematic HPT model to analyse and improve personal performance

Figure 4 showed a conceptual vision of human performance in an organisational context. The two major aspects of the HPT methodology are processes and interventions. The HPT approach consists of a number of steps that have to be executed to analyse and improve performance. The HPT model shows the interrelationships and sequences between the various phases in the analysis and improvement process (see Figure 5).

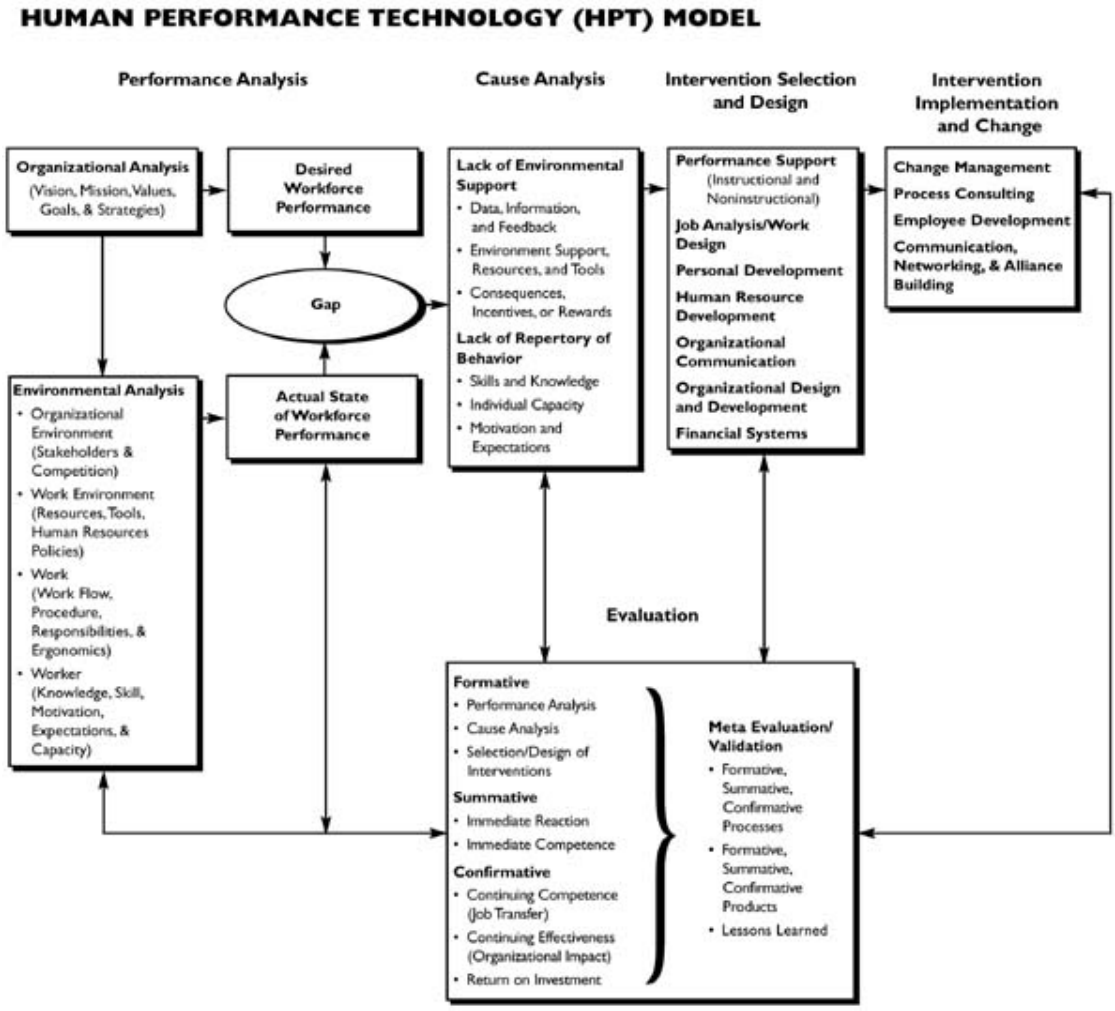


Figure 5. HPT process model to analyse and improve (personal) performance (ISPI, 2003).

The HPT process model to analyse and improve performance (Figure 5) can be used at various levels in the organisation and also at the personal level. It begins with a performance analysis, which examines the organisation's performance requirements in light of its objectives and its capabilities. It is the identification of the current or anticipated deficiencies in workforce performance or competence. Central to the process is the comparison of two specific descriptions of performance. The first, the desired state, describes the desired performance that is necessary to carry out the organisation's strategy and achieve its mission. The second, the actual state, describes the level of performance as it currently exists. The performance gap is the difference between these two states. It represents a current or anticipated performance problem to be solved, or an opportunity for performance improvement.

After analysing desired and current performance, an analysis can be performed to see whether there is a gap between desired and actual performance. When there is a gap, it indicates a performance problem that should be solved. In terms of personal performance, the gap relates to the difference between expectations and actual individual performance. The next step in the model is cause analysis, which is about

determining why a gap in performance or expectations exists. Cause analysis identifies specific factors that contribute to the performance gap.

Following the cause-analysis process, the focus shifts to interventions. Intervention selection involves a systematic, comprehensive, and integrated response to performance problems and their causes as well as to individual performance-improvement opportunities. The selected response is a combination of interventions, representing a multifaceted approach to improving performance. How a response is constructed is based on its presumed cost-effectiveness and its presumed overall benefit to the organisation, as well as its fit to the constraints and tasks of the individual.

Intervention design is about identifying the key attributes of an intervention. The output of the design step is a communication that describes the features, attributes, and elements of a solution and the resources required to actualise it. When no turn-key intervention is available then based on this design some or all of the elements of the intervention will have to be developed, which can be done by an individual or a team. The output is a product, process, system, or technology. Examples of interventions include training, performance support tools, a new or re-engineered process, the redesign of a workspace, or a change in compensation or benefits.

Intervention implementation and change is about deploying the intervention and managing the change required to sustain it. This deployment is about helping individuals adopt new behaviours or use new or different tools. The implementation process may involve: change management, process redesign, employee development, and communication, networking and alliance building. The selection of an implementation strategy will depend on considerations such as costs and impact on the organisation.

The final process in the HPT process-model is evaluation. Evaluation is about measuring the efficiency and effectiveness of what was done, how it was done, and the degree to which the intervention produced the desired results. The evaluation of an intervention's success is directly tied to the reduction of the original performance gap, which is measured in terms of performance improvement and organisational results. Finally, evaluation of those changes provides new data for the ongoing performance analysis process.

A simplified version of the HPT model will be used to guide discussions in this research (Figure 6).

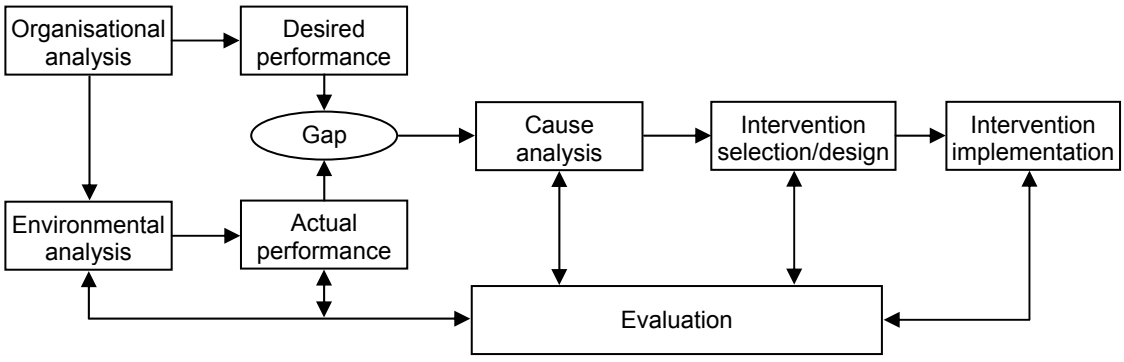


Figure 6. Schematic HPT model, based on ISPI (2003).

2.2 Performance at the Personal Level

The HPT model is typically used to analyse gaps in performance from the organisational perspective for groups of employees. This research however focuses on the individual academic within an organisation, who is also responsible him or herself for change in response to new pressures. Thus performance at the personal level within an organisation is discussed in the next sections. In Section 2.2.1 general aspects of a person's job and associated tasks will be discussed, followed by a discussion about individual performance within an organisation (Section 2.2.2), that results in a basic personal performance model (Section 2.2.3).

2.2.1 Job and tasks

Persons working in an organisation are holding jobs that can be defined as regularly paid positions. Davis and Wacker (1988) indicate that "a job is a specific set of ongoing tasks to be performed by an individual" (p. 157). Van Cott and Paramore (1988) state that a job "consists of all of the tasks performed by a given person, position, or job category…Thus a job is a group of tasks that has been assigned to a single person." (p. 655). The 'building blocks' of a job are the tasks to perform. A task can be defined as "a unit of goal-directed human behaviour. Tasks may involve the use of tools and equipment of various degrees of complexity. They may also involve the use of written procedures and other job aids." (Van Cott & Paramore, 1988, p. 659). According to Van Cott and Paramore (1988) all tasks have the following characteristics in common:

- "Some set of conditions that require and initiate human performance
- A specific purpose
- A definite beginning and end defined by an initiated cue or stimulus and a terminating cue or stimulus
- Occur in a relatively short period of time
- May be interrupted by another task
- May involve more than one person, as when one person initiates a task by another person by giving a command" (p. 653).

A task can be subdivided "into smaller units called task steps, subtasks, or behavioural elements. The characteristics of a task element are:

- It is performed by a single person
- It can usually be written as a sentence
- It can be carried out (in time) with elements of other tasks
- It is a necessary contributor but will not alone accomplish a function objective or change or verify a system state" (Van Cott & Paramore, 1988, p. 654).

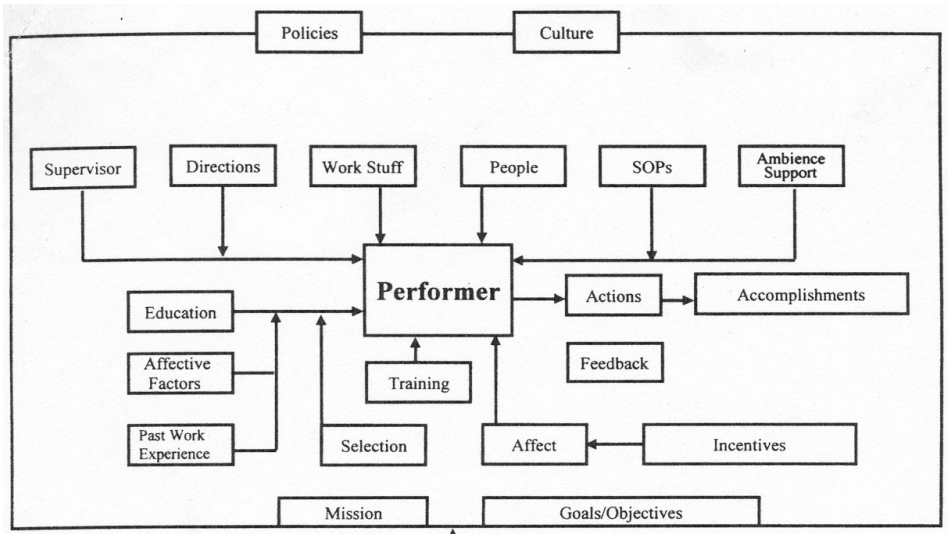
As indicated, individuals will perform these tasks and tasks elements and aspects of this personal performance will be discussed in the next session.

2.2.2 Personal performance

Langdon (1999c) indicates that "the level of the individual includes particular workers, managers, and executives and encompasses the jobs of people who make up the organization's work groups. Here, people who are performing their designated parts of a core process contribute to the work of others (that is, to work groups) for the benefit

of the whole (that is, of the business unit)" (p. 269). In a different article Langdon (2000) refers to behaviour at the individual level when he defines performance as "the act of doing (or intending to do) something. It is a kind of behaviour. It is best understood in some context, such as business, recreation, family, or personal activity" (p. 6). The personal level is also addressed by Stolovitch and Keeps (1999) when they refer to Nickols who defined performance as the outcome of behaviour "in which the behaving individual's environment is somehow different as a result of his or her behaviour" (p. 4). To identify some factors that may influence individual performance the HPT approach will be used, followed by a discussion about process-related aspects of performance.

Deterline (1993; Wilmoth, Prigmore, & Bray, 2002) has developed a diagnostic HPT model that focuses on the individual human element of performance, which he calls the 'Performer' (Figure 7).



Note. SOP=standing operating procedures

Figure 7. Performer-centred HPT model by Deterline (Wilmoth, Prigmore, & Bray, 2002).

Deterline (1993) argues that the performer is potentially influenced by many factors, both personal and organisational. Figure 7 shows the environment in which the performer is embedded. For the purpose of this research these factors of personal performance are clustered into four major categories. The first cluster can be termed "Organisational", and includes the following factors shown in Figure 7:

- Policies and Culture;
- Mission, Goals & Objectives,
- Selection, Job Affect and Incentives;
- Supervisor, Directions, Standing Operating Procedures (SOPs), and Ambience Support (e.g. a canteen).

A second cluster can be termed "Production" and includes the following factors:

- Work stuff,
- Actions, Accomplishments, and Feedback.

A third cluster can be termed "Colleagues" and consists of one factor:

- People.

A fourth cluster can be termed "Self" that includes factors:

- Education, Affective Factors, Past Work Experience, and
- Training.

Based on these general categories, a simplified version of Deterline's performer-centred HPT model can be pictured (Figure 8).

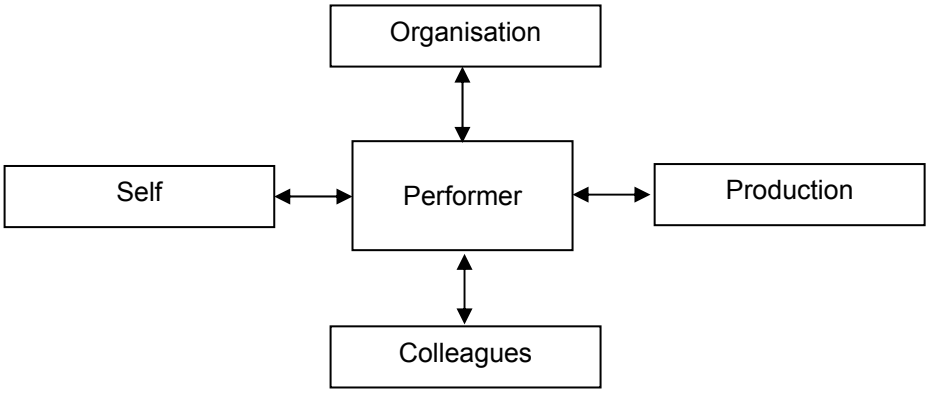


Figure 8. Simplified performer-centred HPT Model.

Figure 8 shows the performer in the centre of the model, with four clusters of factors surrounding the performer, and arrows to indicate the influence of these factors on the performer. These influences will be there when a performer is performing tasks that are related to one's job. A series of actions or operations performed in order to do, make, or achieve the tasks related to one's job can be defined as a process at the personal level. At the organisational level, processes are set up to attain organisational outputs or achievements and these processes are managed to meet internal requirements. Rummler (1999) indicates that processes at the organisational level are ultimately performed and managed by individuals and teams doing various jobs and he argues that "processes are the link between individual performance and organizational performance" (p. 52). Rummler (1999) and Langdon (1999c) both picture the individual performer as part of a process (see Figure 9).

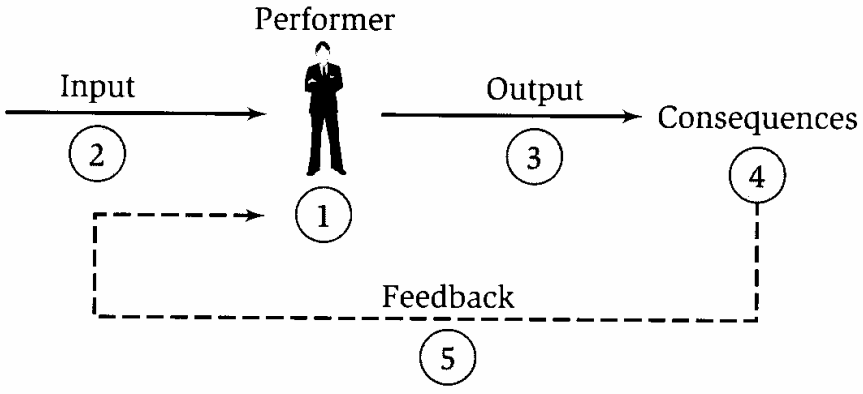


Figure 9. Human Performance System (Rummler, 1999, p. 54).

In Figure 9 the performer is shown as part of a process within an organisational system. The elements in this figure represent:

- The Performer (1) who performs various tasks. To perform as required, the performer needs to have the necessary personal capacities, and the required knowledge and skills. Langdon (1999c) adds to the performance also Conditions, which can be rules and guidelines from outside (such as laws and regulations) and from within (such as policies and procedures) to be followed during the process or that govern the process
- The Inputs (2) which are objects that are being processed, such as forms, sales opportunities, or requests, thus input refers to resources used to produce the output
- The Outputs (3) which are the objects produced, such as a product, or an inquiry answered, or a form processed.
- The Consequences (4) which are "value added" results, such as customer satisfaction, profit, or personal satisfaction.
- The Feedback (5) which refers to information a performer receives about his or her performance.

Thus the term performer in Figure 8 can be replaced by the term performance to emphasise that the performer is performing various processes.

2.2.3 Basic performance model

Based on the discussion of clusters of factors that influence a performer who is performing processes (Section 2.2.2, Figure 8) a basic performance model is presented in which performance is emphasised (Figure 10).

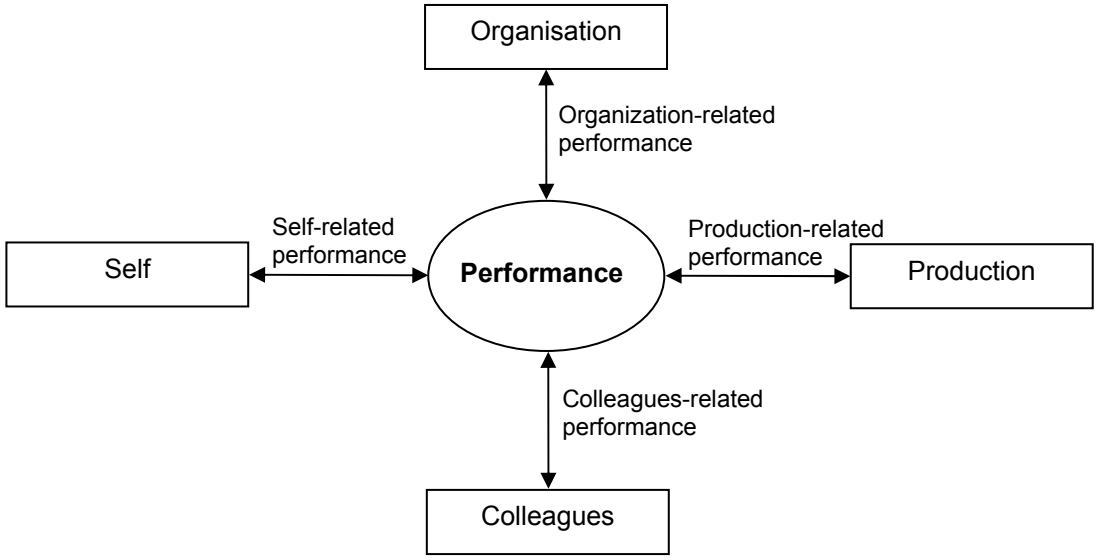


Figure 10. Basic performance model of an individual (Self).

In Figure 10 performance is related to the four clusters of factors that influence the performer. These major elements are discussed in more detail in the following paragraphs.

- **Organisation-related performance**
  Organisation-related performance refers to the formal contract for the job that was signed by the employee. In such a contract the major tasks of an employee are stated, but it may also state explicitly as a requirement or it may be part of an implicit organisational culture that an employee should perform according to the organisational missions and goals and other objectives and targets set by management. It is also common practice to review on a regular basis, once every one or two years, the individual performance and to compare the personal formal accomplishments with the expectations of the organisation.
- **Production-related performance**
  Production-related performance refers to all tasks and activities performed in production processes. This typically involves indicators of effectiveness and efficiency. For a job the most-ideal situation (Hellriegel, Slocum, & Woodman, 1995) is the "effective use of employee's competencies and skills to create and deliver quality products and services most efficiently" (p. 529). Effectiveness means to produce the intended result. This means that employees should know what activities to perform and how to perform them. Efficiency is "the quality of doing something well with no waste of time or money" (Hornby, 2005, p. 489). A second set of production-related performance deals with planning and control that relate to the production processes and includes administrative procedures. Before, during, and after a production process employees have to perform administrative tasks that relate to their productive performance, such as writing proposals, filling out forms, and writing reports. Individuals have to perform these administrative tasks as part of their job.
- **Collaboration-related performance**
  In many processes an employee has to collaborate with colleagues and support staff. These team efforts will have an impact on the performance of an employee because he has to work in line with work processes within the team. Collaboration will imply greater responsibility for planning activities and performing according to agreed-upon procedures.
- **Self-related performance**
  Self-related performance relates to the activities a person has to take on, to be able to meet the requirements to perform. This will involve using one's competencies, skills, and knowledge that a person has already acquired. However, in a changing and demanding environment, it will also involve activities to learn and enlarge one's own skills and knowledge, in order to keep on performing one's job in an adequate way. It will be influenced by factors such as personal preferences, attitudes, and background.

These processes are performed in an organisational context in which an employee may have more-or-less autonomy or job control over one's work and the way work is performed. This part of personal performance will be discussed in the next section.

2.2.4 Job control and personal performance

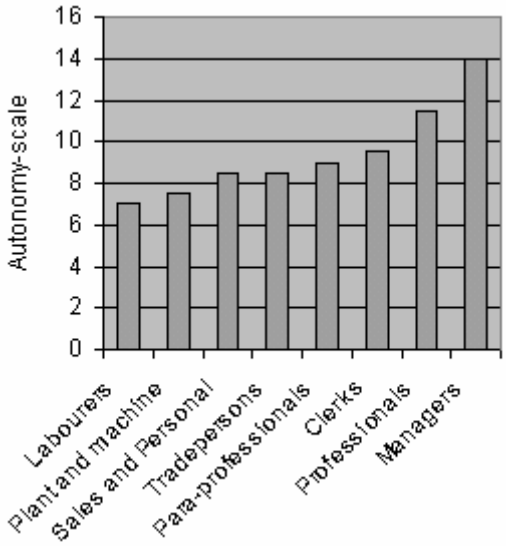
In Section 2.2.4.1 job-control characteristics are discussed. In Section 2.2.4.2 a project-management approach will be suggested as a tool to control performance. Based on these discussions about job control the basic performance model (as discussed in Section 2.2.3) will be adapted to a Personal Performance Model (Section 2.2.5).

2.2.4.1 *Job-control characteristics*

Job control means that employees have more-or-less freedom to work the way they prefer. At the same time, organisations require from employees that they work in a effective and efficient way. Employees are held responsible for their overall performance. This implies that individuals have to perform in a professional, skilled way. They have to find their own ways to fill in their freedom and stll perform well. As an example of how employees working in an organisation may have more-or-less control over parts of their work, an Australian survey analysed the "empowerment of employees" (Harley, 1999). In this survey, which involved around 20,000 employees in 2000 workplaces in Australia, the respondents were asked six questions that were used as indicators for the level of control that employees have over their work and over management of their workplaces. These six items refer to:

- Type of work
- How work is done
- Start and finish time
- Pace of work
- How the workplace is managed
- Decision making.

Results showed that employees experience that they have most influence on 'how work is done' (47.4 %) and on 'pace of work' (38.5 %), and much less personal control on 'decision making' (12.6 %) and 'how the workplace is managed' (11.3 %). In this survey, a composite 'autonomy scale' was utilised that was produced by summing the items, all of which had been scored on a four-point scale. Then these autonomy-scores were related to professional job categories based on the Australian Standard Classification of Occupations (ASCO) major groups (see Figure 11). Optimal job control would be represented by an autonomy-scale score of 18.

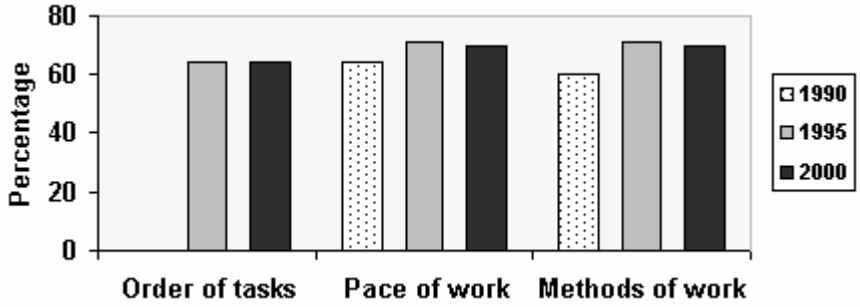


Note. Autonomy scale: Sum of six variables each with values of 0=none, 1=a little, 2=some, 3=a lot.

Figure 11. Mean values for autonomy-scale by ASCO major job groups (Harley, 1999).

Results show (Figure 11) that for instance labourers and sales personnel have a much lower score on the autonomy scale than professionals and managers.

Similar results were found in a survey (European Foundation, 2001a; 2001b) held by the European Foundation for the Improvement of Living and Working Conditions [Eurofound] in which data were collected from a representative sample (*N*=21,703) of the total active population in Europe, i.e. persons who were at the time of the interview either employees or self-employed workers. The survey was carried out simultaneously in each of the 15 Member States of the European Union in March 2000 and results were compared with results from previous Eurofound surveys carried out in 1990 and in 1995. As part of this survey, respondents were asked about their levels of control over task order, pace of work, and work methods. Results about respondents' work autonomy are shown in Figure 12.



Note. In 1990 order of tasks was not a survey item

Figure 12. Percentage of European persons in employment (*N*=21,703) with aspects of work autonomy (European Foundation, 2001b, p. 4).

Figure 12 shows that the percentage of some control over 'order of tasks' has been stable at 64 % in 1995 and 2000 (in 1990 this question was not part of the survey), which is almost two-third of all workers. The percentage of European employees who have control over their own pace of work has increased from 64 % in 1990 to 71 % in 1995 with almost the same percentage (70%) in 2000. Also the percentage of control over methods of work in their jobs has significantly increased between 1990 and 1995 and remains stable between 1995 and 2000 (71% and 70% respectively). From Figure 12 it can be concluded that a great majority of European employees currently can influence part of their work. The survey also concludes that "two out of five workers (44%) have control over their working time and … occupational groups with a high level of professional skills have the most control over their working time compared to other sectors." (European Foundation, 2001b, p. 4). Among these occupational groups with a high level of control are professionals, managers, and academics.

Within the context of job control an individual is also responsible for solving his or her own problems and to seek guidance and resources instead of waiting for management to solve the problem or to arrange support.

2.2.4.2 *A project-management approach*

From the viewpoint of the individual the level of job control is an important factor in personal performance. However, the more freedom a person has in job control, the more this person is responsible to organise his or her own work in a proper way. This responsibility will imply for instance the need of each individual to plan one's activities and to order these activities in the right way, to plan when to perform activities and the time needed for these activities to be able to control pace of work, and to use the proper

resources and standards to control his or her own methods of work, also based on personal preferences. To organise work in an effective and efficient way it is common in business and production-oriented organisations to use a project-management approach (Kerzner, 2003). Kerzner defines a project as a series of activities and tasks that have a specific objective; have defined start and end dates; have funding limits (if applicable); consume human and non-human resources (i.e. money, people, equipment); and are multifunctional. Project management is often used to manage complex projects involving many employees, but Kerzner (2003) defines various categories of projects and one category of projects he terms "*individual projects*". These are projects "normally assigned to a single individual who may be acting as both a project manager and a functional manager" (p. 57). Thus within the context of job control it seems natural for an individual to act as project manager of his or her own work, and to use a project-management approach to organise and manage his or her own tasks as part of personal performance.

Project management involves basic principles such as project planning, scheduling, and controlling work. Kerzner (2003) argues that project planning and scheduling must be systematic, flexible enough to handle unique activities, disciplined through reviews and controls, and capable of accepting multifunctional inputs. He lists four basic reasons for project planning (p. 378):

- To eliminate or reduce uncertainty
- To improve efficiency
- To obtain better understanding of the objectives
- To provide a basis for monitoring and controlling work.

Project planning determines what needs to be done, by whom, and by when, in order to fulfil one's assigned responsibility.

During the operating cycle of the project a well-organised control system should be implemented to effectively manage the project. Control involves for instance:

- Cost control and time management. Kerzner (2003) argues that "if the project manager cannot control his own time, then he will control nothing else on the project" (p. 273) and this is even more true for individual projects in which the project manager and "else on the project" are the same person.
- Risk management to control risks and react proactive to problems that may occur.
- Quality management to control and assure quality.

These aspects of job control can be added to the basic performance model of Section 2.2.3 as indicated in the following section.

2.2.5 A personal performance model

Persons are more than machinery in that they can have their own goals, requirements, accomplishments, and personal preferences, for instance in organising their work or in the way they plan their work. Many different personal characteristics can affect personal performance. These include an individual’s tendencies to be innovative or conservative, and a general willingness to accept help. They also affect the control the person wishes to have over his or her work. In Figure 13 the elements from the basic

performance model (see Section 2.2.3) are still present. But based on the discussion about job control the model is adapted. "Performance" is now changed to "Personal Performance", as it is performance in the context of job control. Job control-related aspects refer to the levels of freedom available to organise one's own work and time usage.

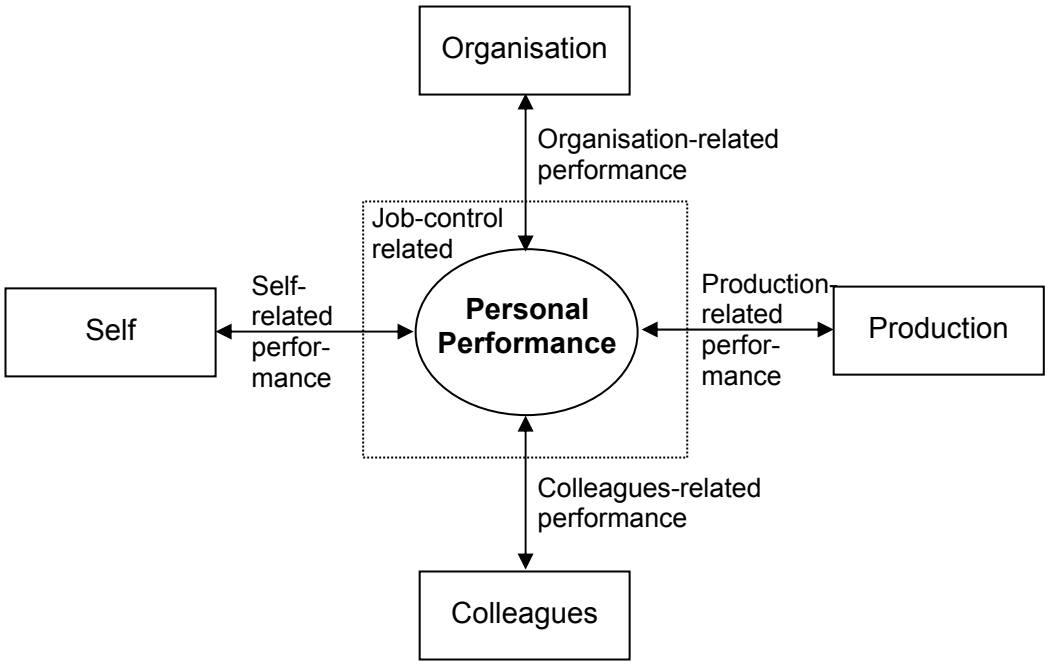


Figure 13. Personal Performance Model including job control.

In the next session, the relationship of the Personal Performance Model (Figure 13) to the HPT methodology for the analysis and improvement of personal performance will be discussed.

2.3 Research Questions

As discussed in this chapter, HPT methodology can be used to analyse and improve personal performance. HPT methodology was discussed to analyse various aspects of the personal performance and as a result implement some interventions to improve personal performance. While Chapter 2 has been presented in a general sense for personal development, the research requires that the HPT methods be applied to the specific case of the teaching-related personal performance of academics.

The problem statement from Chapter 1 was:

- What are key aspects of academics work-related performance that are coming under increased pressure in the changing university context?
- How can an individual academic stay in control of these pressures?

Based on the discussions in this chapter, this problem statement can now be expressed in terms of the following set of research questions:

RQ1 *What are key aspects of personal performance of academics?*

RQ2 *What is the desired personal performance for the current and future teaching-related activities of academics in the changing university context?*

RQ3 *What is the current level of personal performance in the teaching-related activities of academics in changing university environments?*

RQ4 *What gap is developing between these current and desired levels, and which interventions can be selected to support the reduction of this emerging gap between the actual and desired personal performance in teaching-related activities of academics in changing university environments?*

RQ5 *What are criteria for such interventions to be effective and efficient?*

RQ6 *What are the results when a particular intervention is designed and evaluated?*

RQ7 *What recommendations based on this study can be given to support academics to stay in control when performing teaching-related activities?*

In this chapter Research Question 1 (RQ1) has been addressed in a general sense. In Chapter 3 RQ1 will be discussed more specifically for academics and Research Question 2 (RQ2) will also be discussed in detail. The other research questions will be addressed in Chapters 5 to 9 (RQ3 in Chapter 5; RQ4, 5, and 6 in Chapter 7 and 8; RQ7 in Chapter 9).

3 Desired Personal Performance of Academics for Teaching-Related Activities

In Chapter 1 the changing university context was described in which academics have to perform their jobs and a general problem statement for this research was derived from this discussion. In Chapter 2 the general concepts of personal performance were analysed and a HPT methodology was chosen as a framework to analyse and improve academics' personal performance (Figure 14).

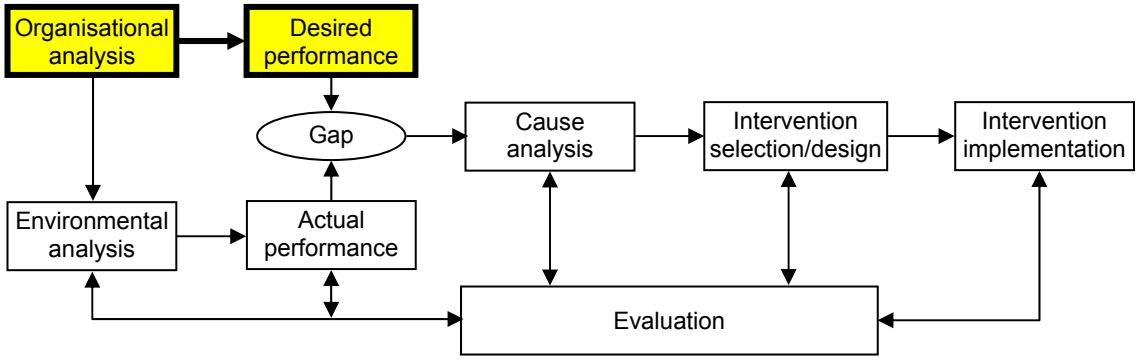


Figure 14. Schematic HPT model with desired-performance related components highlighted.

In this chapter the general concepts of personal performance are set out in detail for academics' teaching-related performance and the following research question will be discussed:

RQ2. *What is desired personal performance for the current and future teaching-related activities of academics in the changing university context?*

In this chapter, first the academics' performance is discussed in general focussing on individual academic as performer (Section 3.1). Teaching is discussed in detail leading to a basic academics' performance model (Section 3.2). Teaching-related activities are discussed in Section 3.3. This leads to a discussion about the desired teaching-related personal performance of individual academics (Section 3.4). At the end of this chapter, some conclusions are presented about the desired personal performance of academics (Section 3.5).

3.1 Academics' Performance

This section starts with a discussion about academics' jobs (Section 3.1.1). Then the academic as performer within a university is discussed in more detail leading to a simplified academic-centred performance model (Section 3.1.2).

3.1.1 Academics' jobs

A university consists of faculties and departments based on subject or field. Academics are appointed as faculty members and in general work as professor or closely related to

a professor, as instructor or researcher, based on their discipline. They get their assignments from the professor or from a research or education manager and they are accountable to these persons. Often a central organisation exists that decides about tenure, promotion, or dismissal. In a traditional university, the individual faculty member is the "primary unit of investment, the principal means of delivery, and the main guarantor of academic quality" (Honan & Teferra, 2001, p. 189).

3.1.2 Academic as performer

In Chapter 2 a basic performance model was developed where organisation and production are part of the model. For academics the university is the organisation they are working for, and key elements of their production are research and teaching. In Figure 15 the basic performance model is adapted to reflect the context of academics performing within a university.

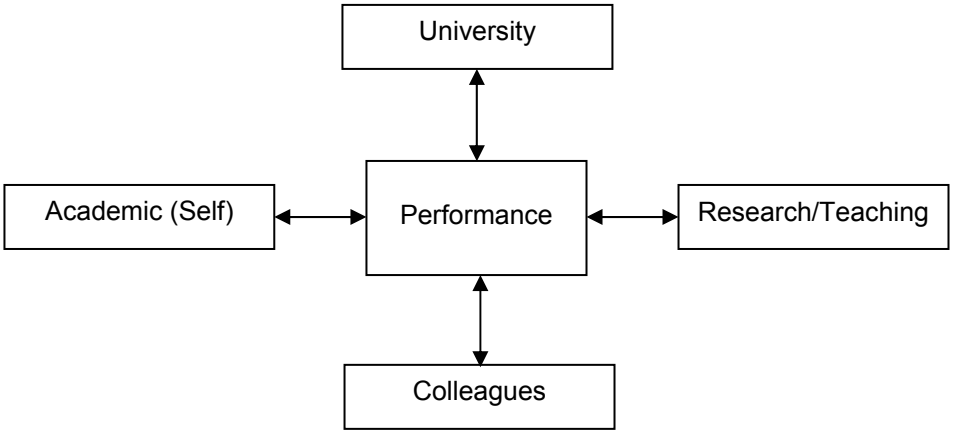


Figure 15. Basic performance model adapted to academics' context.

An academic job consists of many tasks, but the major 'production' tasks of academics are to perform teaching and research: "Teaching and research are widely recognised as the basic tasks of faculty members" (American Association of University Professors, 2002). However, faculty work is more complex than doing teaching *or* research. Rhoades (2000) indicates that faculty work is very diverse and that there is "no such thing as a typical university faculty member" (p. 29). In addition to teaching and research, faculty also keep up with developments in their field and consult with government, business, non-profit, and community organisations (Bureau of Labor Statistics, 2002). Honan and Teferra (2001) argue that there is no uniform definition of what constitutes the role and function of a faculty member, but a typical full-time faculty member at a U.S. college or university "divides his or her time among a range of teaching, research, and service activities, in addition to other activities such as consulting and professional development" (p. 194). As academics perform their main tasks they are part of the university organisation. Academics perform their work not in isolation but within departments and faculties. Often they will collaborate with colleagues to perform research or teaching. Being assigned a job as an academic implies that he or she is professionally skilled and has excellent knowledge of the subject matter. As this research is focussing on teaching aspects, in the next section teaching is discussed in more detail.

3.2 Teaching

In this section, first teaching in general is discussed (Section 3.2.1), then changes at university level that are leading to a much more dynamic teaching context (Section 3.2.2). This will have its impact on the ways academics perform their teaching (Section 3.2.3), and especially teaching via a Course Management System (Section 3.2.4). This section concludes with a basic Academics Performance Model focussing on teaching (Section 3.2.5).

3.2.1 Teaching in general

Educational programs are structured according to a curriculum that usually consists of courses. A faculty member is assigned one or more courses by management and is responsible for these assigned courses or partly responsible as member of an instructor team. These courses may be offered to undergraduate or graduate students, or both, and a course structure consists of various formats of instruction, such as lectures or practice sessions. Instructors decide how to structure each course and select the best way to instruct their students. Major activities of instructors are: to prepare their lectures, exercises, and laboratory experiments; to deliver their courses; and then to grade exams and papers (Bureau of Labor Statistics, 2002). Paulson (2002) lists five distinct activities when 'delivering instruction':

- Designing the course
- Developing the course by selecting appropriate instructional methods and course materials, or creating those course materials
- Delivering the subject matter previously selected either in person (lectures, etc.) or through the use of various forms of media
- Mediating (also called "tutoring") the learning process, which helps students understand materials in ways tailored to their individual learning styles and levels of understanding
- Assessing individual student learning through appropriate methods and assignments designed to certify the attainment of a given level of competence.

3.2.2 Dynamic teaching context

In traditional universities courses are delivered over the years by the same instructors in the same format to the same type of cohorts. Such a standard procedure of appointing courses to academics will no longer be common practice. In an entrepreneurial environment (see Chapter 1) the course-planning process will be based on economic principles and courses will be "bought" by directors of educational programmes or porgramme-managers. This will be further complicated by the fact that with frequently changing targets and the need to address new markets courses have to be developed and delivered at short notice to new and differentiated cohorts. One of the conclusion based on a national survey of academics in Australian universities (McInnis, 1999) was that: "The pressure on academics to examine and change their approaches to teaching has left few unaffected. The growing demands on universities to improve performance in teaching over the last decade has accelerated most recently with the development of performance indicators [at university level] by government and the market competition for fee-paying students" (p. 150). Rhoades (2000) also indicates: "Universities have become more market oriented, with attendant implications for faculty to change their

teaching and research activities and to become more like entrepreneurs who contribute revenue to the institution." (p. 30).

A major change in study programmes at all European universities will be the implementation of Bachelor / Master programmes. This will lead to many new courses and a redesign of many others because they have to fit in this new structure. As the Bologna agreement also stimulates mobility of students it will also imply that most Master programmes will be delivered in English. Instructors in most countries will have to translate their study material or select new material and some will need training on how to deliver their courses in English and to a variety of international students with various cultures and academic background. These new demands will make teaching a much more dynamic job for academics than it ever was before.

3.2.3 New ways of teaching

Academics have to react to these changes in an effective and flexible manner. Rhoades (2000) argues that "universities themselves are changing in significant ways that are both transforming the teaching and research activities of faculty and pushing faculty well beyond traditional roles" (p. 30). For academics the dynamics will be perceived at course level, but also between courses as new demands from university and students will imply more flexibility of academics to meet these needs. This means that courses not only should be attractive, useful, and effective for students, but will require greater flexibility in terms of new pedagogical roles and delivery methods. Currently universities are changing the delivery of courses by gradually moving away from a lecture format where an instructor is teaching and students are listening (Collis & Moonen, 2001). For some situations the lecture format may still be seen as the most optimal format but new methods are forcing students to become more actively involved in the learning process (Littlejohn, 2003). Examples of such methods are: project-based learning, online discussions, and activity-based learning. Academics will no longer be 'sage on the stage' but become a 'coach at the side', and the teaching activities of academics will change accordingly because of these new didactical methods. This is also indicated by the University of Twente (Universiteit Twente, 2000): "Docenten zullen hierdoor meer en meer hun positie als aanbieders van klassikaal onderwijs verlaten, maar komen terug als begeleiders van studenten" [Instructors will leave their status as deliverers of class-based education and return as coaches of students] (p. 14). For this, the university emphasises the special role of ICT to offer educational programmes in more flexible and dynamic ways. Thus teaching not only means face-to-face interaction between instructor and students but also many other new teaching-related activities in educational processes. These teaching-related activities increase when teaching is not delivered face-to-face but offered by computer or a CMS. Rhoades (2000) notes that "teaching, broadly conceived, has always involved not just classroom teaching but class preparation and various forms of student advising and contact" (p. 38). He points out that computers and the Internet have impacted faculty work and he argues that while the functions of faculty have not yet changed dramatically, the forms of instructional work are being impacted by new technology. Using new ICT technologies for teaching and learning may involve applications such as e-mail, video conferencing, and course management systems (Honan & Teferra, 2001). Although there are a variety of forms of ICT that can support teaching-related activities, course-management systems have become the most common, particularly in terms of offering

more flexibility to students (Collis & Van der Wende, 2002). Thus CMSs are the focus in the Personal Performance Model.

3.2.4 Teaching using a Course Management System (CMS)

Mioduser and Nachmias (2002) present a comprehensive overview of the development, actual state, and emerging trends in the implementation of the Internet and the World Wide Web in education. One of the main educational functions of the Web is to support participation outside of the classroom. Courses can be offered through the Web, including facilities for information dissemination, communications, and collaboration (Collis, 1999). Course Management Systems (CMSs) offer many Web functionalities integrated in one major system. Research by Collis (1998, 2002), Winnips (2000), Van der Veen (2001), and De Boer (2004) showed many effective ways to incorporate the Web and CMSs in education and teaching. Using a CMS can offer support for students who could not attend one or more lectures or want to reread some resources. A CMS can also offer students the facility to submit their assignments, or enter new resources for other students to use. Student participation can be stimulated by offering discussions in a course through a CMS or by involving international students to work on some common task.

Implications for instructors of using a CMS in their courses are listed by Collis and Moonen (2001) for instance:

- The instructor has to learn how to set up and describe new formats
- The instructor has to monitor and appropriately intervene when there are problems with groupwork
- Handle much more communication with students, their discussions and comments
- Monitor the quality of what students submit and offer feedback
- Keep records relating to student process and participation
- Manage incoming and outgoing activities, e-mail, contacts with individual students.

3.2.5 Basic academics' performance model

Based on the discussion in the previous section the various basic elements of academics teaching-related performance are depicted (Figure 16).

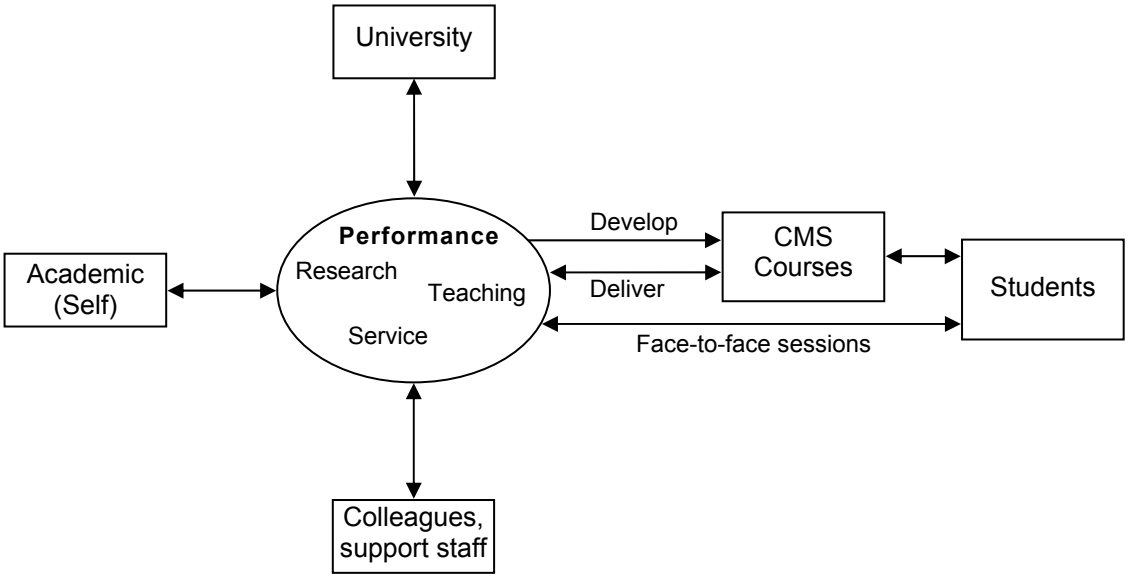


Figure 16. Basic Academics' Performance Model.

Figure 16 depicts the major elements of academics' teaching-related performance and shows that this performance relates to the organisational context in which academics work, the colleagues with whom he or she collaborates, the academic as performer him or herself, and the teaching activities, split up in a CMS part and 'traditional' face-to-face sessions.

3.3 Teaching-Related Activities

First it is argued that teaching constitutes of teaching activities performed by instructors that are directly related to the learning process by students, and teaching-related activities that are performed to facilitate this. These teaching-related activities are discussed and categorised (Section 3.3.1). This is followed by a discussion of each category: CMS-oriented performance (Section 3.3.2), Organisation-oriented performance (Section 3.3.3), Colleagues-oriented performance (Section 3.3.4), and Self-oriented performance (Section 3.3.5).

3.3.1 Categorising teaching-related activities

Teaching is performed in all kinds of educational settings where an instructor is in direct interaction with students, such as presenting a lecture or coaching at a practice. Also the use of media such as video conferencing and audio interaction are ways of direct communication. These activities are more-or-less time and place dependent, both for the students and for the instructor. The focus during these sessions is to facilitate learning by students. Another category of activities performed by the instructor relates to arranging and facilitating teaching. These organisational, administrative, and managerial activities are related to teaching but can for instance be done at the desktop and before and after face-to-face contact with the students. In this thesis this category of activities is defined as teaching-related activities.

'Teaching-related activities' is defined as all the non-pedagogical activities performed by the instructor outside direct face-to-face or online teaching to plan, manage, and

control his or her performance. Examples of teaching-related activities are: plan and manage preparing a course; organising practice; keeping track of, following through, and being clear about arrangements and expectations; marking and arranging feedback; and many other activities that take time and orderliness on the part of the instructor. Students find these teaching-related activities important and gave them a high score in ranking quality aspects of courses (McKenzie, Kirby, Newbill, & Davidson, 1998; Thach & Murphy, 1995). These teaching-related activities can be categorised in four categories based on the basic academics' performance model (Figure 16): CMS-oriented activities, organisation-oriented activities, colleagues-oriented activities, and self-oriented activities. These categories will be discussed in more detail in Sections 3.3.2 - 3.3.5.

3.3.2 CMS-oriented performance

Implementing a CMS will have great impact on the work procedures and activities of academics. They will have to create new course environments in the CMS and add their current course material and other information to these courses to facilitate learning by students. It may also imply a major change in the way academics and students interact, moving away, at least for part, from addressing a large group of students at once during a lecture to more individual communication with one student at a time, for instance to answer an email-message or to send feedback to a submitted assignment.

When using a CMS to offer courses to students, the course environment will contain the study material and all didactical elements needed by students to be able to learn when using this kind of course environment. As indicated in Section 3.2.4 such an environment has to be arranged and filled. These activities to create a CMS course environment are teaching-related as they are not directly related to didactical teaching processes or the content itself. Still the instructor has to plan and prepare these activities and take time to execute them in a proper order.

During delivery of the course many activities have to be executed by the instructor to keep the course effective and up-to-date and to keep the learning process by students going. Students have to submit their assignments, the instructor has to send feedback on these assignments. Other activities will involve participation in discussions, adding extra weblinks, updating the CMS site based on new insight or suggestions made by students, and many more. To perform these tasks the instructor has to plan, manage, and control them. To give an impression of some of the activities an instructor has to perform in relating to a CMS an example is presented in Table 2. It shows an overview of management tasks of the instructor in relation to a student assignment to be submitted via a Web-based course environment. While this example relates to the experiences and the use of the TeleTOP system, it is also transferable to other instructors making use of a similarly designed Web-based course-management system.

Table 2. Instructional/managerial tasks of the instructor related to an assignment, when using a course-management system such as TeleTOP (Van der Veen, De Boer, & Collis, 2000, p. 11).

Task	**Use of course-management system**
1. Choice of task for assignment; task should involve the students making an active contribution to the course website in some way and also interact with each other in some way	1. Previous assignments can be reviewed, available via the course-management system database
2. Details of the assignment are communicated to the students	2.1 Instructor places the instructions for the assignment in an appropriate area of the course website to integrate it with associated readings, class sessions, etc. 2.2 A previous assignment can be re-used by copying it into the current course site 2.3 Assignment should be written in a step-by-step manner, so that expectations are clear to the students; a model answer can be provided if appropriate
3. Students submit assignments, as individuals or as a group	3. 1 The website is set up so that all assignments are in a common location, and the instructor can see what has been submitted, when, by whom 3.2 When assignments are submitted in other parts of the course site, such as *WebLinks* or a shared workspace, students have to be aware where feedback and points can be found
4a. Feedback: from instructor	4. 1 Instructor checks student submissions and enters feedback via the website; marks can also be directly entered into the course database 4.2 Instructor can choose from a list of comments, model answers, etc., to speed the feedback process
4b. Feedback: from peers	4.1 Instructor sets up a procedure for peer comments, and a location in the website for peer comments 4.2 Instructor must monitor peer comments and intervene when appropriate
5. Handling exceptions: Students who are sick, late, want an adapted assignment, etc.; In group situations, deal with problems of unequal contribution within the group	5.1 Instructor must make a decision about the exception, maintain a record of the decision, and monitor that the student does carry out the decision 5.2 In group situations, the instructor may have to intervene and reorganise the group or speak individually with members of the group and readjust marks and assignments.
6. Assessing overall performance and adapting next class activity accordingly	6. Instructor must decide if certain points need general attention, if the next assignment needs to be adapted, if points need to be discussed in the next class session, etc.
7. Adapt, based on student performance	7.1 Use a "*News*" feature to give some general comments about the assignment and comment about any general misconceptions 7.2 Add a link to a model answer in the course site, and ask students to compare their work to the model answer 7.3 Use communication tools such as "question and answer" or chat or discussion board, to further handle difficult points 7.4 Revise the following assignment, if appropriate, via the description in the website; inform students of the changes via the "*News*" function
8. Review the assignment process for the following year	8. Store the model answer, key feedback comments, student misconceptions, etc., in the website; revise the assignment text for better clarity of expectations

Table 2 shows specific activities by instructors when using a CMS, in this case related to an assignment. Similar tables could be made for other course processes, such as support of self-study, student questions and comments, and assessment.

3.3.3 Organisation-oriented performance

A consequence for individual academics of the transformation of universities towards entrepreneurial organisations will be a major change in the way responsibility and accountability are organised. Academics will be personally held responsible for their scientific and economic results and this may lead to individual consequences if targets are not met. Chevaillier (2000) indicates that "in higher education, there is a growing use of incentive payments linked to performances in the different activities of staff" (p. 33). As an example, the Erasmus University in Rotterdam defines as the starting point for their personnel mission that they "strive to empower personal responsibility or accountability." (Erasmus Universiteit, 2001). This will also include a strategy of salary incentives based on measurable performance indicators. Performance indicators will include effectiveness and efficiency, as universities are also held responsible for effectiveness and efficiency by government (Universiteit Twente, 2000).

Personal responsibility and accountability will imply that management will monitor more closely the individual performance: what activities an individual academic performs, how much time specific tasks take, and what the accomplishments are. This leads to more administrative procedures to inform management about planned and on-going activities, for example a proposal for a new research project or a new course has to be accepted by management before activities can start, taking into account priorities related to university's missions, targets, and budgets. During the execution of a project or a course forms may have to be filled out to record individual performance to allow management to monitor the individual academic's productivity and progress related to accepted plans and budgets. To meet pre-defined performance indicators, academics must perform in a way that is more controllable than before. Rhoades (2000) notes, "each such review places further demands on faculty to record and report their activities in standardised formats, both as individuals and in faculty committees" (p. 46). Rhoades indicates that this will have additional consequences for academics as "universities are becoming more managerial and increasingly emphasising accountability processes which increase both the demands on faculty to interact in new ways with students and the time faculty spend on reporting and reviewing activities" (p. 30). These reporting demands put pressure on academics to pay increased attention to personal administrative tasks. In general academics perceive administrative tasks related to teaching and research, especially those caused by the development of accountability, as "an unavoidable nuisance since they can hardly be transferred to administrative staff" (Chevaillier, 2000, p. 28). Thus instructors have to be aware of and follow the administrative and accountability requirements of management as they will be held personally responsible.

3.3.4 Colleagues-oriented performance

Academics can be solely responsible for a course and perform all activities needed, but often they will collaborate with colleagues to develop and deliver a course. For an individual instructor, working in a team of instructors implies that there should be consensus about the way work is delegated to each member; the activities to be

performed by whom; procedures about controlling progress, output, and marking, and much more. Individual instructors have to organise their work based on this distribution of work among colleagues and support staff and thus one's personal planning and performance should be aligned with that of one's colleagues.

3.3.5 Self-oriented performance

The desired performance of individual academic relates to increasingly high expectations about the individual's own actual competencies and professionalism. To meet high-quality performance indicators, academics have to be high-skilled professionals and in addition they have to keep their expertise up-to-date in fields that are rapidly changing. This may involve new didactical approaches, changing student demands, but also skills to use a CMS in the most effective and efficient ways. According to the Bureau of Labor Statistics (2002) "faculty keep abreast of developments in their field by reading current literature, talking with colleagues, and participating in professional conferences", but this may be not flexible and fast enough to meet rapidly changing demands. Many universities have set up central units or helpdesks within faculties or departments to offer technical or pedagogical support to instructors.

3.4 Desired Personal Performance of Academics

In this section the focus is on the personal responsibility of each individual academic to organise and control his or her own performance. Job control is discussed in Section 3.4.1), which includes a discussion about organising one's own planning, organising one's own performance control, and arranging support when needed by an individual academic. These discussions lead the development of an academic's personal performance model for teaching-related activities (Section 3.4.2).

3.4.1 Job control

Within universities academics have a high level of autonomy or job control to perform their tasks. But the desired performance of individual academics relates to pre-set performance indicators, such as performing effectively and efficiently. Individual academics will have to perform with increasing levels of effectiveness, such as doing high-quality research projects or creating attractive new courses for international students that meet their needs. Teaching as discussed in Section 3.2 and teaching-related activities discussed in Section 3.3 have to be performed effectively and efficiently in a professional manner. Individual academics are required to perform their tasks and activities within predefined time limits and within assigned budgets, thus their work needs to be organised in a highly efficient way. For individual academics to manage their tasks they have to plan and control their own activities in a more systematic way, and arrange support by themselves when needed. These three aspects, of organising one's own planning, performance control, and support have the following characteristics:

- **Organise own planning**
  Individual academics are able to organise part of their work in the way they want within the boundaries set by their university. This implies that they have to organise and manage their own planning. How they plan their activities is also left to the

individual academic. Also the time and pace to perform their activities will be dependent on the organisation, the assignments, and the preferences of each individual. Thus the desired performance of academics is to manage their teaching-related activities in effective and efficient ways. Rhoades (2000) argues that "from the standpoint of workload, perhaps most important is the fact that new (educational) forms are not replacing the old ones, but instead are layered on top of them, making for more work" (p. 38), which leads to an extra argument to manage well, also at the individual level. The workload of each academic should be within the day-or-week limits agreed upon within their faculty, university, or nationally, also to prevent stress. Collaboration with colleagues and support staff within a course team should be aligned. It is the responsibility of the individual academic to arrange his or her own planning as effectively and efficiently as possible.

- **Organise own performance control**
  Universities are more and more introducing quality-control processes to be able to meet requirements set by students, fund providers, government, and society. Also quality is becoming a major aspect of competition with other universities. New procedures are set up to demand higher quality and to manage quality-related aspects. Instructors have to "obey" these quality standards. Each individual academic will have to organise his or her own ways of controlling personal performance to meet these quality requirements. This is also true for time and budget control. It is the responsibility of the individual academic to arrange his or her time and quality control as effectively and efficiently as possible.
- **Arrange support**
  Within a university adequate support for instructors in their teaching-related tasks should be available, and for part the organisation will arrange workshops and courses to enhance academics' knowledge and skills to meet new requirements. However, within the boundaries of their own job control, academics are responsible to arrange support for themselves when needed. This not only refers to pedagogical or CMS support but also support for personal management. Academics will need to have support available when needed. It the responsibility of the individual academic to arrange their support when needed as effectively and efficiently as possible.

3.4.2 Academic's personal performance model

Based on the discussion in the previous sections, the basic Academics' Performance Model (see Figure 16) can be adapted to take into account job-control aspects and teaching-related activities, which leads to a Academic's Personal Performance Model (Figure 17).

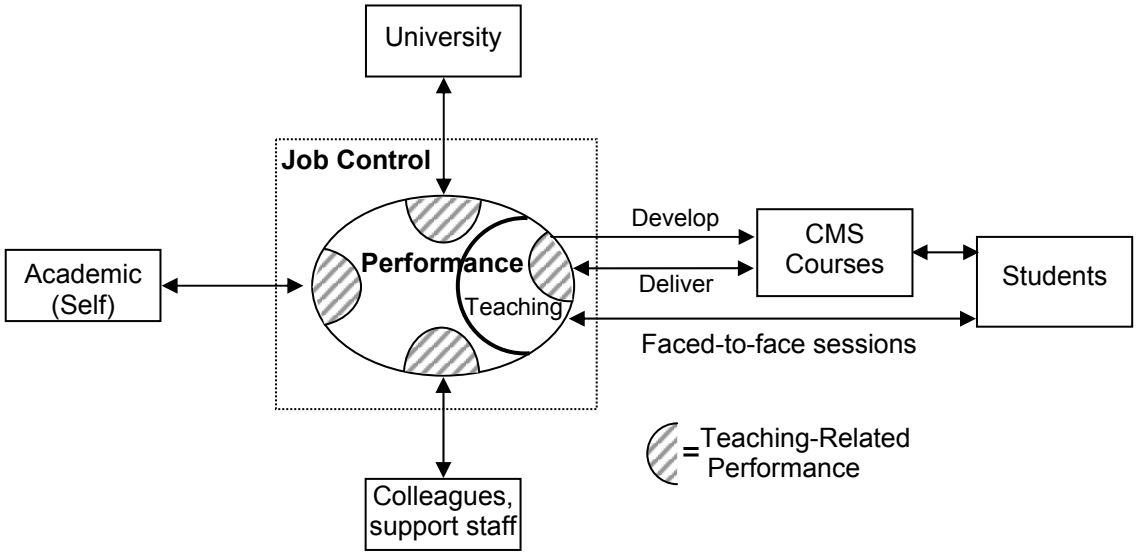


Figure 17. Academic's Personal Performance Model, emphasising teaching-related performance.

In Figure 17 the teaching-related activities are shown that relate to CMS-oriented aspects, organisational-oriented aspects, colleagues-oriented aspects, and self-oriented aspects. Academic's performance is shown within the boundaries of job control.

3.5 Conclusions

As a general summary, changes at university level, including educational changes and the increased use of ICT and CMSs are affecting the organisation in general, but these changes will also affect individual academics. As individual academics are increasingly becoming more responsible and accountable for their performance, they need to perform effectively and efficiently in organising their work, including the use of ICT. Academics are involved in many processes, but because they have great autonomy they also have to organise and manage their own teaching-related activities. Based on these discussions, an Academic's Personal Performance Model for teaching-related tasks was developed.

The main conclusion of this chapter and of Research Question 2 is that individual academics have to perform as desired by the organisation, and organise their performance as efficient and effective as possible. As they are personally responsible, planning and control are also part of this expectation.

4 Methodology to Analyse Actual Performance, Needs, and Interventions

In Chapter 2 it was argued that to improve performance the desired performance and the actual and predicted performance have to be analysed and compared. In Chapter 3 the desired teaching-related performance of academics was analysed leading to a Personal Performance Model. In this chapter a methodology will be described to analyse the actual teaching-related performance of academics, and to select and design one or more desired interventions. Steps in the HPT model that are covered in this chapter are highlighted in Figure 18.

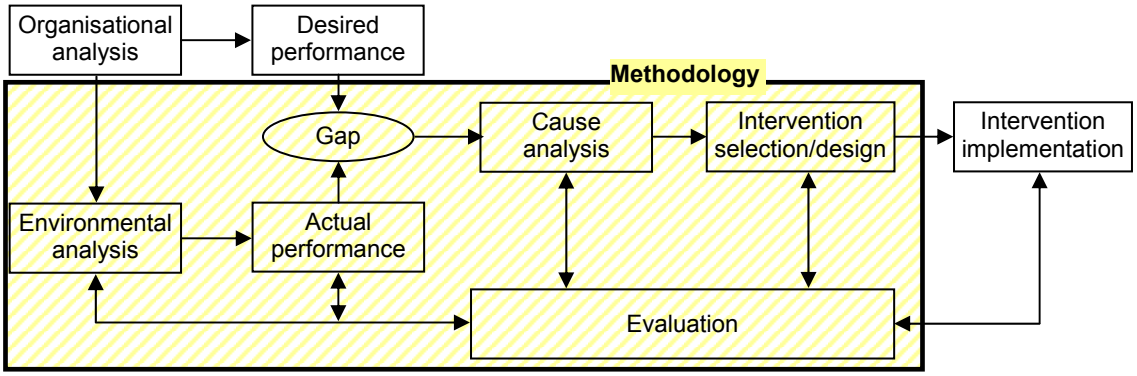


Figure 18. Schematic HPT model with methodology component highlighted.

First the selection of development and action research methodologies to analyse the actual performance and needs of academics and for the design of an intervention will be discussed (Section 4.1). Data-collecting methods to use during the development and action research processes are then linked to the Personal Performance Model and various studies are defined to investigate each component of the model (Section 4.2). As many of the studies relate to the use of a CMS (often TeleTOP) and the participants in 10 of the studies are familiar with TeleTOP, the TeleTOP system is introduced (Section 4.3). The chapter ends with an introduction to the next chapters (Section 4.4).

4.1 Methodological Approaches to Study Academics' Actual Performance and Responses to a Potential Intervention

In Section 4.1.1 three main tasks for the research are identified and methodologies for this portion of the research are chosen. In Section 4.1.2 an overview is given of major data-collecting methods that can be used to analyse academics' actual performance and responses to possible interventions.

4.1.1 Development and action research as methodological approaches

One focus of this research is to contrast academics' actual teaching-related performance with desired performance to find key aspects that are coming under increased pressure and to design an intervention to help the academic to stay in control. A second focus is on the process of finding ways to improve the teaching-related performance of

individual academics. While desired performance has been analysed in Chapters 2 and 3, the tasks for the portion of the research whose methodology is described in this chapter are to

- explore actual performance;
- indicate gaps between desired and actual performance; and
- explore appropriate interventions.

These steps are the parts of the HPT model shown highlighted in Figure 18. The steps are shown as iterative processes in which the problem is analysed and causes are identified, followed by a development process to create an intervention which is then refined until an optimal state is reached. This part of the HPT process can well be addressed by the development-research approach (Van den Akker, 1999; Reeves, 2000) in which four major steps are defined: analysis, development of solutions, evaluation and testing, and documentation and reflection (Figure 19). Although there is a linearity to the overall process, the arrows all indicate on-going iterations in the steps.

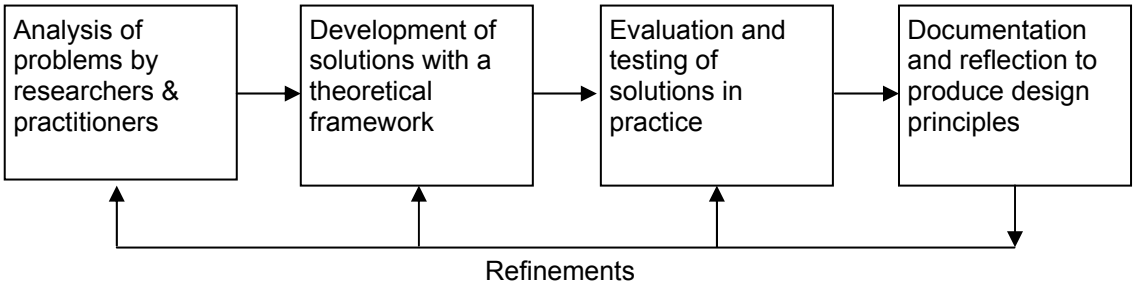


Figure 19. Development-research approach (Reeves, 2000, p. 9).

From Figure 19 it can be seen that the development-research approach, like the HPT methodology, starts with analysing problems, followed by the development and evaluation of solutions to these problems. The last step of the development-research model is one of documentation and reflection to produce design principles. This culminating step is outside the scope of this chapter, as it relates to an aspect of generalisability that does not explicitly appear in the HPT approach. General design guidelines based on the research as a whole will be presented in Chapter 9.

When relating the development-research approach (Figure 19) to this research the development-research approach starts with the analysis of practical problems by researchers and practitioners. As will be described in Chapter 5 and 6 the analysis in this research is based on analysing instructors' current practice and opinions through a series of studies, for instance a study based on self-reflection, studies based on interviews with instructors, and studies based on an international survey. The Development step of the development-research approach will be described in Chapter 7 with regard to the theoretical framework to choose and develop an intervention that can support instructors, and it will be argued that a prototyping approach is appropriate for the development of an adequate intervention. The third step of the development-research approach, Evaluation and testing, will be described in Chapters 7 and 8 when a digital Personal Support Tool will be selected and prototyped in four versions as an intervention to get a better insight into instructors' needs. The last step of the development-research approach, Documentation and reflection, will be discussed in Chapter 9 when an overview of findings related to the Research Questions defined in

Chapter 2 will be offered together with a number of design guidelines and recommendations as well as reflective statements about research methods used in this research.

Development research is similar to design research, so similar that often the terms are used interchangeably. Design research in education is defined as "a socially constructed, contextualized process for producing educationally effective interventions with a high likelihood of being used in practice" (Bannan-Ritland, 2003, p. 21). Some characteristics of design research as listed by Reeves, Herrington, and Oliver (2005) are: a focus on complex problems, the integration of known and hypothetical design principles, to test and refine innovative environments also to reveal new design principles, and intensive collaboration among researchers and practitioners. These are also characteristics of development research as described by Reeves (2000). Thus the term development research will be used but the processes could also be expressed as design research.

In the development-research approach (Reeves, 2000) the practical problems are analysed by researchers and practitioners. The close involvement of practitioners in research both as objects of study and as researchers is also the focus point in Action Research, sometimes known as participatory research. In Action Research the researcher is placed in a position as a partner "working alongside those affected by the problem, rather than as an objective observer who might impose changes from the outside" (Ryder & Wilson, 1997, p. 2). The four major steps in Action Research are: reflect, plan, act, observe, after which the cycle starts anew (Figure 20).

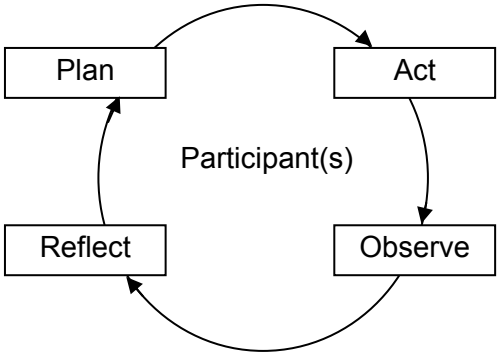


Figure 20. Major steps in Action Research (based on Ryder & Wilson, 1997).

When the researcher is also a practitioner, as is the case in this research, the reflective insights of the researcher/ practitioner can form the start of the development process. Based on these reflections a plan is developed to research a problem after which activities are performed which are observed to get a better insight. According to Ryder and Wilson (1997) participatory action research brings theory and practice together. Action Research emphasises an emergent process of on-going reflection, with the researcher deeply involved in striving for change in a situation at the same time as he or she studies the situation. As the researcher in this research is also appointed as an academic and instructor at the University of Twente, the researcher and the practitioner are united in one person. As an instructor the researcher lived through many problems other instructors are also facing. Action Research was used concurrently with the HPT approach to underlie all the decisions and processes carried out in this research.

In summary Development and Action Research can be used as underlying methodologies within the human performance approach to study the actual performance of academics and to develop interventions. In the next section possible approaches for data collection within these methodologies will be listed.

4.1.2 Overview of data-collecting methods for analysing actual performance and intervention design

To analyse actual academics' teaching-related performance and needs and to design interventions based on these many methods can be used to collect data. In this research, the following methods will be carried out.

- **Data collecting via participation and self reflection (Action Research)**
  Participation means that the researcher takes part in the actions performed. To participate in the work of other instructors by gathering data while they perform their teaching-related activities at irregular times and intervals was considered not practicable. But as was discussed in Section 4.1.1, during the whole research process Action Research was the underlying methodology by using the researcher's daily personal experiences as an instructor to guide the overall research process. Self-reflection is another way to gather data about the instructor/researcher's personal experiences and opinions. This will give more insight into the actual performance of a specific instructor over a longer period of time, a year and more. The data will be subjective and only valid for a specific context. They can be used as an example and as a starting point for further, more-objective studies.
- **Data collecting via elicitation of comments**
  Elicitation means that information is extracted from persons, using for instance an interview, a questionnaire, or a survey. Interviews are a useful means to elicit experiences and feelings, opinions, and concerns of people, at a specific moment in time. Various types of interviews offer more-or-less freedom to go into details. During an interview card sorting can be an additional method to get responses from interviewees about for instance categories of activities. In card sorting each card has the name of an activity written on it and the interviewee is asked to categorise these and explain why specific categories are formed. In this research this offers insight into the way the interviewee is experiencing his or her work and how teaching-related activities link together. A questionnaire is often used for soliciting the thoughts and concerns of a person or a target group by using a list of specific questions with a limited number of distinct options to answer each question. A survey is a questionnaire that is offered to a large number of people. A questionnaire or survey can be presented in various ways, for instance by phone, on paper, or through the Internet. The reliability is hard to monitor with open-ended responses. The validity of the process depends on the match of the questions to the research domain.
- **Data collecting via measurement**
  Measuring means that some sort of equipment is used to measure a phenomenon such as time to perform an activity. This approach can be used for instance to measure the time needed to perform specific activities. In this research teaching-related activities by instructors when using a CMS are measured in a direct way by analysing the log-files of the CMS, and in an indirect way by using personal recorded time sheets and by deriving time expenditure from CMS analysis (see

Chapter 5). Databases associated with the course environments of a specific CMS can be used to analyse the outcome of academics' actual teaching-related performance with the CMS. This requires identifying what information is stored in a CMS course database, and what its characteristics are. As the data is the output of instructor's performance the reliability is high, but to strive for high generalisability a large number of courses at various universities should be analysed. Log-files for the TeleTOP CMS automatically store all the interactions between a user (instructor or student) and TeleTOP. Each time a user submits data to a course environment, or the system presents course information to a user, the interaction is recorded and an exact time stamp is added. Afterwards, the data can be used to analyse the interactions of a specific person or related to a specific course but also the time intervals between specific interactions can be calculated and analysed. Both reliability and validity are limited as the data is interpreted afterwards and the log-files only reflect the activities of instructors who offered the courses that were analysed.

- **Data collecting during prototyping**
  Prototypes are unfinished, "in-between" versions of all or part of a product that show major characteristics of the final product (Smith, 1991). By offering participants a realistic, although incomplete product, they can perform a walk-though, get an impression of the look and feel of such a product, and its potential functionality and offer comments and suggestions for the subsequent development of the next refined prototype. The reliability and validity of prototype walkthroughs are acceptable as the final prototype emerges in a way that meets needs and preferences of other instructors and organisations (Moonen, 1996). These characteristics all seem applicable to the research problems in this research. To test and refine innovative environments a prototype approach will be applied using cycles of prototype refinements. Prototyping can be used for elicitation, demonstration, and evaluation of various aspects related to a product. An important argument to use a prototype approach is that "the prototype itself will serve as the formal statement of needs" (Smith, 1991, p. 45) and that each prototype version can be used for further needs elicitation. In Chapter 7 this prototype approach will be used to develop an intervention to elicit the detailed needs of instructors.

Using a mixed-methods research approach (Johnson & Onwuegbuzie, 2004) data-collecting methods can be combined to strengthen the outcomes. For instance "adding interviews to experiments as a way to discuss issues under investigation and tap into participants' perspectives will help avoid some potential problems" in interpretation (pp. 18-19). Johnson and Onwuegbuzie focus particularly on the mix of quantitative and qualitative data. Various combinations of the data-collection methods can be mapped onto the dimensions of the Personal Performance Model as will be discussed in Section 4.2.2.

In the academic's Personal Performance Model academic's performance is related to four dimensions: self (the individual academic); colleagues and support staff; management at the university and faculty level; and tasks related to the use of an online CMS system. In Figure 21 the academic's Personal Performance Model is presented again, with labels added to identify these four components (labelled A, U, C, and O, respectively). An extra component is added to indicate possible support interventions (labelled I) that can be used to support an individual academic with his or her job

control of teaching-related performance, therefore the intervention component is linked to job control and to the individual academic (Figure 21).

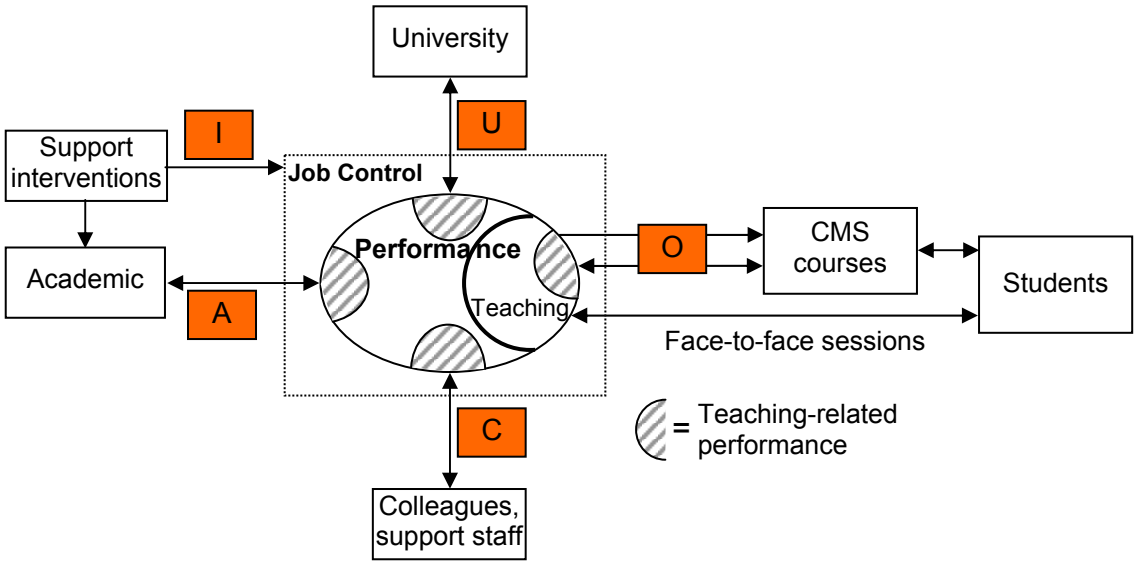


Figure 21. Dimensions to study performance of teaching-related activities.

To study the actual performance of academics and their responses to prototypes of interventions these dimensions shown in Figure 21 have to be analysed in detail using appropriate methods. For each dimension appropriate methods chosen are:

- **Academic (A)**
  To investigate how an individual experiences day-to-day problems over a longer period of time, one method could be to observe instructors while performing. As this is very "intruding", time consuming, and hard to organise, direct observation over a longer period of time seems inappropriate beyond one or two cases. Personal-reflection is an appropriate analysis method, because it offers information over a longer period of time, and can refer to individual feelings, opinions, and problems encountered during the introduction and use of a CMS.
- **Colleagues (C)**
  As this research is focussing on the individual performance of instructors an appropriate way to get insight into their personal feelings, opinions, and problems is to perform open or semi-structured interviews. In this way, instructors can elaborate on their responses, by listing examples or discussing a specific problem they experienced. This is not as effective when using a questionnaire. However a questionnaire is also an appropriate method to get systematic insight into specific aspects of instructors' performance. To analyse instructors' teaching-related aspects on an international scale, an appropriate method is to use a survey.
- **University (U)**
  Universities and faculties are in the process of implementing a CMS in their educational programmes (see Chapter 1). It is not well known yet what sorts of expectations and experiences directors of educational programmes (faculty members responsible for a program as educational dean, in Dutch 'opleidingsdirecteur') may have about instructors' teaching-related performance involving the use of a CMS. To analyse these aspects, it seems most appropriate to

use elicitation techniques to get insight, because in interviews the interviewer can react to answers given by the interviewee with respect to the specific work circumstances of instructors in their faculties.

- **Online CMS use (O)**
  At the University of Twente, all interactions between the user and the TeleTOP course-management system are recorded in log-files. It is appropriate to use these log-files as a method to get insight into instructors' activities with the CMS, although the log-files only record keyboard and mouse clicks, not the goals and intentions of the actions. Also, as log-files contain timestamps for each activity and interaction, log-file analysis can be an objective method to measure the time of usage of the CMS by instructors. Another method to elicit data about time usage is to let instructors fill out time sheets, although these data may be unreliable. Another method is database analysis, because all course information and interactions between instructor and students are stored in the TeleTOP database. As these are indirect methods, it may be necessary to also use other methods, such as interviews, to interpret the data for better insight.
- **Interventions (I)**
  As discussed in Chapter 2, interventions can be implemented to improve the performance of individuals and groups. To gather data about the feelings, opinions, and suggestions from instructors about potential interventions, carrying out interviews is an appropriate method. A major problem is that instructors may not be aware of the possible functionality and usefulness of types of interventions, such as Electronic Performance Support Systems (EPSSs). Presenting instructors with examples or prototypes of an intervention and capturing their responses as they 'walk through' the prototype is an appropriate method to get detailed information about the possible content and usefulness of an intervention. To elicit instructors' opinions during the walkthrough questionnaires and interviews are appropriate methods.

Table 3 summarises for each dimension of the Personal Performance Model the data-collecting methods chosen and the components.

Table 3. Most-appropriate data-collecting methods to analyse various dimensions of the Personal Performance Model (PPM).

PPM	Data-collecting methods	Components
Academic (self) (A)	Participation and self-reflection	Personal reflections (the researcher and one colleague)
Colleagues (C)	Elicitation	Interviews Questionnaire/Survey Card sorting
Management at university and faculty level (U)	Elicitation	Interviews survey
Online CMS use (O)	Measuring	Time sheets Log-file analysis Database analysis
Interventions (I)	Prototype	Walkthroughs Interviews

These data-collecting methods and components (Table 3) were applied in a series of studies which are described in the next section.

4.2 Studies to Analyse Academic's Actual Performance and Responses to a Potential Intervention

In Section 4.2.1 an overview is given of the specific studies and the methods used in each study. In Section 4.2.2 the studies are related to the Personal Performance Model, followed by Section 4.2.3 where the studies are related to the Research Questions.

4.2.1 Specific studies

In this section the various studies to analyse the teaching-related aspects for each dimension of the Personal Performance Model are defined. For each study the selected data-collection methods and components will be indicated together with some major characteristics of each study.

- **Study to explore the in-depth personal experiences of an academic (self) and one colleague (Dimension A)**

  To elicit and analyse the personal experiences of the researcher and one colleague a study was carried out in the year 2000 using self-reflection (Table 4).

  Table 4. Study to analyse personal self-reflections.

Code	Studies	Method used	Participants	Period
A1	Personal experiences	Personal-reflection	researcher and a colleague co-teaching a particular course	2000

- **Studies to analyse colleagues and support staff (Dimension C)**

  To analyse opinions and needs of instructors and support staff about teaching-related performance studies were carried out between 2001 and 2003 at the University of Twente (UT), at the CAH/STOAS Hogescholen, and at universities in seven (mostly European) countries (Table 5).

  Table 5. Studies to analyse opinions and needs of colleagues and support staff.

Code	Studies	Methods used	Participants	Period
C1	Study to analyse instructors' opinions at the UT	Interviews	6 instructors	Oct 2002-June 2003
C2	Study to analyse instructors' opinions at CAH/STOAS	Interviews	7 instructors	June 26, 2003
C3	Models of technology and change research	Survey	347 instructors (seven countries)	Nov 2001 - April 2002
C4	Models of technology and change research	Survey	154 support staff (seven countries)	Nov 2001 - April 2002

- **Studies to analyse university management (U)**

  To analyse university context of instructors as observed by university managers such as directors of educational programmes and decision makers two studies were performed between 2001 and 2003 to collect their opinions (Table 6).

Table 6. Studies to analyse university management's opinions about academics' performance.

Code	Studies	Methods used	Participants	Period
U1	Study to analyse management's opinions at the UT	Interviews	6 directors	Oct 2002-May 2003
U2	Models of technology and change research	Survey	189 decision makers	Nov 2001 - April 2002

- **Studies to analyse use of an online CMS (Dimension O)**
  To analyse the performance of instructors when using a CMS to develop and deliver their courses, three studies were carried out in 2001, of which two studies collect data about CMS usage during a short period of time, and a third study analyses a CMS database as a result of one year of use in a particular faculty (Table 7).

  Table 7. Studies to explore use of an online CMS (TeleTOP).

Code	Studies	Methods used	Participants	Period
O1	Pilot study of instructors' activities when using TeleTOP	Interviews Card sorting Questionnaire	6 + 18 instructors at the UT	Jan-June 2001
O2	Pilot study to analyse log-files of TeleTOP use	Log-files Interviews Timesheets	3 instructors at the UT	Jan-June 2001
O3	Study to analyse courses stored in TeleTOP	Database analysis	51 TeleTOP courses at the UT	Oct. 2001

- **Studies to explore support interventions (Dimension I)**
  In the development research methodology (Van den Akker, 1999; Reeves, 2000) the development of solutions with a theoretical framework is a logical next step after analysing a practical problem. To solve (part of) the performance problem of instructors an intervention may be a solution and such an intervention has to be selected and designed. Table 8 shows an overview of studies performed after the decision was made (see Chapter 7) to offer this intervention in the form of an EPSS. Four cycles of prototyping were carried out between 2002 and 2005 to elicit preferences of instructors and how support could best be offered to instructors.

  Table 8. Studies to explore an EPSS intervention.

code	Studies	Methods used	Participants	Period
I1	Prototype 1 of an EPSS	Walkthroughs Interviews	3 experts at UT	2002
I2	Prototype 2 of an EPSS	Walkthroughs Interviews	2 experts at UT 13 novice instructors at UT	2003
I3	Prototype 3 of an EPSS	Walkthroughs Interviews	2 instructors at UT	2004
I4	Final prototype of an EPSS	Walkthroughs Questionnaires Interviews	6 novice instructors (pilot) 11 instructors 3 directors of ed. programs 4 support-staff members (all at UT)	2004 - Feb. 2005

4.2.2 Relating the studies to the Personal Performance Model

The studies that are carried out in this research were listed (see Table 4 - Table 8) with a study code to identify each study. To relate the studies to the Personal Performance Model these study codes can be used to indicate the major focus of each study (see Figure 22).

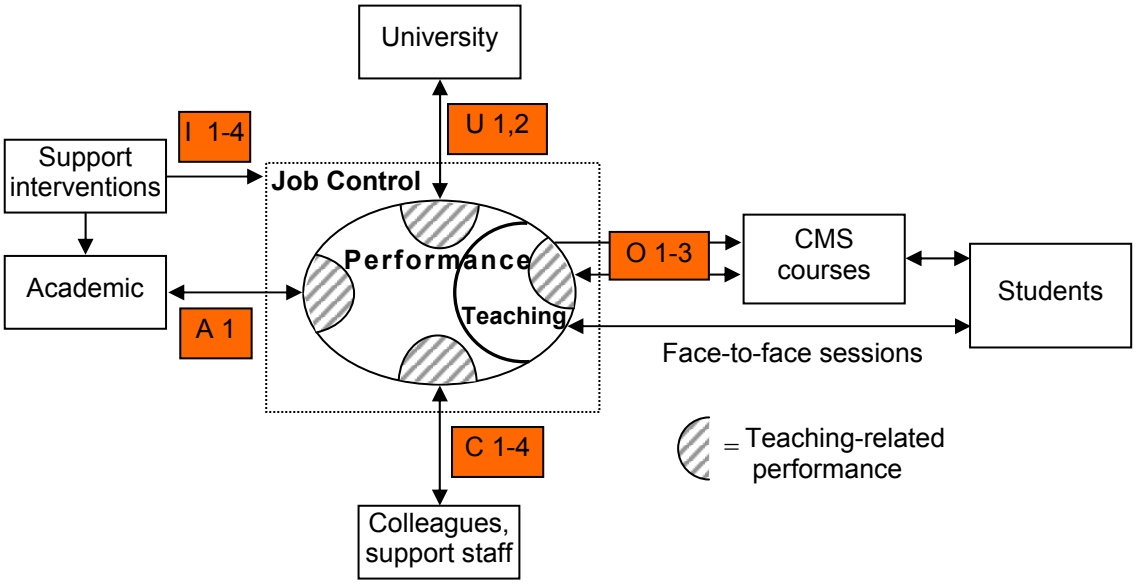


Figure 22. Personal Performance Model with study codes to indicate major focus of each study.

As can be seen from Figure 22 these various studies when put together cover all dimensions of teaching-related activities performed by academics that are represented in the Personal Performance Model. Performance related to all dimensions, except Academic, is researched in more than one study.

Table 9 summarises the methods that have been chosen for each study.

Table 9. Overview of studies and methods used.

Focus	Study Code	Methods							
		Self-reflect	Inter-views	Question naire/ survey	Card sorting	Time-sheets	Log-files	Data-base	Prototype walk-throughs
Academic	A1	X							
Colleagues/ support staff	C1		X						
	C2		X						
	C3			X					
	C4			X					
University	U1		X						
	U2			X					
Online CMS use	O1		X	X	X				
	O2		X			X	X		
	O3							X	
Intervention support	I1		X						X
	I2		X						X
	I3		X						X
	I4		X	X					X

Table 9 shows that eight methods are used in various studies and often in various combinations within studies to collect data. Johnson and Onwuegbuzie (2004) propagate the use of quantitative and quantitative methods to collect data. As Table 9 shows that in these studies quantitative methods are used such as self-reflections, interviews, and prototype walkthroughs, but also quantitative methods such as card sorting (in the way it was used in these studies), the international survey, timesheets, logfile analysis, and database analysis. In these studies the questionnaires are a mix of both quantitative and qualitative approaches as these combine questions to rate items and open-ended questions. Thus a mixed-method approach is used for the overall research and also within three studies (Studies O1, O2, and I4).

All studies shown in Table 9 were carried out at the University of Twente, except study C2 in which instructors of CAH/STOAS were interviewed, and studies C3-4 and U2 in which respondents from seven (mostly European) countries participated in an international survey.

When relating these studies to the HPT Model (see Figure 18) the studies can be regrouped into three major categories: one category that focuses on the actual performance of instructors; one category that focuses on the current situation more generally and on future trends related to expected work conditions of instructors and their teaching-related activities; and a category that explores possible interventions that may be useful to improve instructors' performance by offering support (Table 10).

Table 10. Overview of studies based on HPT model.

HPT model	**Study code**	**Study**
Actual performance (specific experiences)	A 1	Personal experiences
	O 1	Pilot study of instructors activities when using TeleTOP
	O 2	Pilot study to analysis log-files of TeleTOP use
	O 3	Database analysis of courses stored in TeleTOP
	C 1	Study to analyse instructors' opinions at the UT
	C 2	Study to analyse instructors' opinion at CAH/STOAS
	U 1	Study to analyse management's opinions at the UT
Current and expected future performance (survey overview)	U 2	Models of technology and change research: Decision makers
	C 3	Models of technology and change research: Instructors
	C 4	Models of technology and change research: Support staff
Exploration of interventions (prototyping)	I 1	Prototype 1 design and evaluation
	I 2	Prototype 2 design and evaluation
	I 3	Prototype 3 design and evaluation
	I 4	Final prototype design and evaluation; and implementation-plan design and evaluation

As can be seen from Table 10 seven studies are investigating actual teaching-related performance of instructors and three studies focus on current and expected future performance of instructors in an international survey. Four studies are exploring the use of interventions as a way to elicit additional information about how to support instructors.

4.2.3 Relating the studies to the Research Questions

Using development and action research methodologies appropriate data-collection methods were selected to be used in a set of studies. By analysing the dimensions of teaching-related activities identified in the Personal Performance Model by a mix of methods(see Figure 22 and Table 9), it is expected that these studies will give a thorough insight into the actual performance of instructors and that the gaps between actual and desired performance become clearer.

The methodology is directly related to the two general problem statements as discussed in Chapter 1.

The first general problem statement for this research is:

- *What are key aspects of academics' teaching-related performance that are coming under increased pressure in the changing university context?*

In Section 4.2.1 an overview was presented of studies that relate to the actual performance and needs of instructors. These studies are about self-reflection (Study A1), analysing actual performance through interviews and a questionnaire (Study O1) and log-file and timesheets analysis (Study O2). Also during interviews held at the UT and CAH/STOAS (Studies C1,C2,U1) questions are asked about current situations. By carrying out these studies and focussing on the performance of academics, the first problem statement can be investigated. The international survey Models of Technology and Change (Collis & Van der Wende, 2002) will broaden this investigation by also analysing the key aspects at an international (mostly European) level (C3-4, U2).

The second general problem statement for this research is:

- *How can an individual academic stay in control of these pressures?*

In Section 4.2.1 an overview was presented of studies that relate to the actual and expected future performance and needs of academics. For part these studies are the same as the studies to analyse the first research question, namely studies C1, C2, and U1, in which also questions were asked about expected future situations. The international survey (used in studies C3-4, U2) is also partly focussing on future trends. The most concrete information will come from the development and evaluation of prototypes. In four studies (I1-4) these prototypes will be evaluated and needs of instructors for performance support with teaching-related activities and with job control will be made progressively more concrete. By carrying out these studies, focussing on the needs of instructors, the second research question can be investigated.

In Chapter 3 the two general problem statements were analysed and a list of research questions was defined. In the next list the research questions are linked to the studies which will focus on one or more specific research questions.

Table 11. Research Questions linked to studies and chapters.

Number	Research question	Reference to study code(s) and chapters
- RQ1	*What are key aspects of personal performance of academics?*	Ch. 3 A1, C1-2, O1(Ch. 5)
- RQ2	*What is the desired personal performance for the current and future teaching-related activities of academics in the changing university context?*	Ch. 3 C3-4 (Ch. 6)
- RQ3	*What is the current level of personal performance in the teaching-related activities of academics in changing university environments?*	O2 (Ch. 5) C3-4, U2 (Ch. 6)
- RQ4	*What gap is developing between these current and desired levels, and which interventions can be selected to support the reduction of this emerging gap between the actual and desired personal performance in teaching-related activities of academics in changing university environments?*	Ch. 7
- RQ5	*What are criteria for such interventions to be effective and efficient?*	I 1-4 (Ch. 7)
- RQ6	*What are the results when a particular intervention is designed and evaluated?*	I 1-3 (Ch. 7) I 4 (Ch. 8)
- RQ7	*What recommendations based on this study can be given to support academics to stay in control when performing teaching-related activities?*	Ch. 9

In various studies the use of a CMS is part of the study and therefore in the next section the particular system involved in many of the studies will be introduced.

4.3 Introduction to the TeleTOP CMS System in Relation to the Studies

Before the studies to analyse current performance of academics' teaching-related activities are described in the next two chapters the TeleTOP CMS system is introduced here, as many of these studies relate to the use of TeleTOP. TeleTOP is used at the University of Twente as the CMS to offer courses and integrated facilities to its students (http://www.teletop.nl). In August 1997 the management of the Faculty of Educational Science and Technology decided to use a Web-based course-management system as a tool for systematic, managed change and pedagogical re-engineering throughout the entire curriculum. The goal was: "To systematically support the

professional development of its staff in terms of potential applications of telematics in their teaching, and to further support the re-design of all of its courses so that they become more efficient to experience, more enriched, and more flexible via innovative and appropriate applications of telematics, particularly Web-based tools and environments". Within one year, all of the instructors of first-year courses of the Faculty of Educational Science and Technology had to redesign their courses to fit the new philosophy and make use of the TeleTOP system. TeleTOP as a system and method is now in use throughout the University of Twente, and also at several other universities, in schools, and in military and corporate learning settings. TeleTOP is based on a number of integrated components (see http://www.teletop.nl) such as (a) a philosophy about education; (b) an analysis method for an instructor to use in re-designing his or her courses to fit the new philosophy; (c) a method of instructor engagement via rapid prototyping of course sites; (d) a decision support tool (De Boer, 2004); and (e) an innovative Web-based course-management system to support and make concrete all of the other components.

A typical TeleTOP window in general consists of three parts (Figure 23): (a) a navigation frame at the left of the screen with menu entries; (b) a title bar at the top of the screen with a logo, the name of the course, a drop-down menu for quick navigation between courses, and a help button; and (c) an information frame with detailed information about the menu item selected.

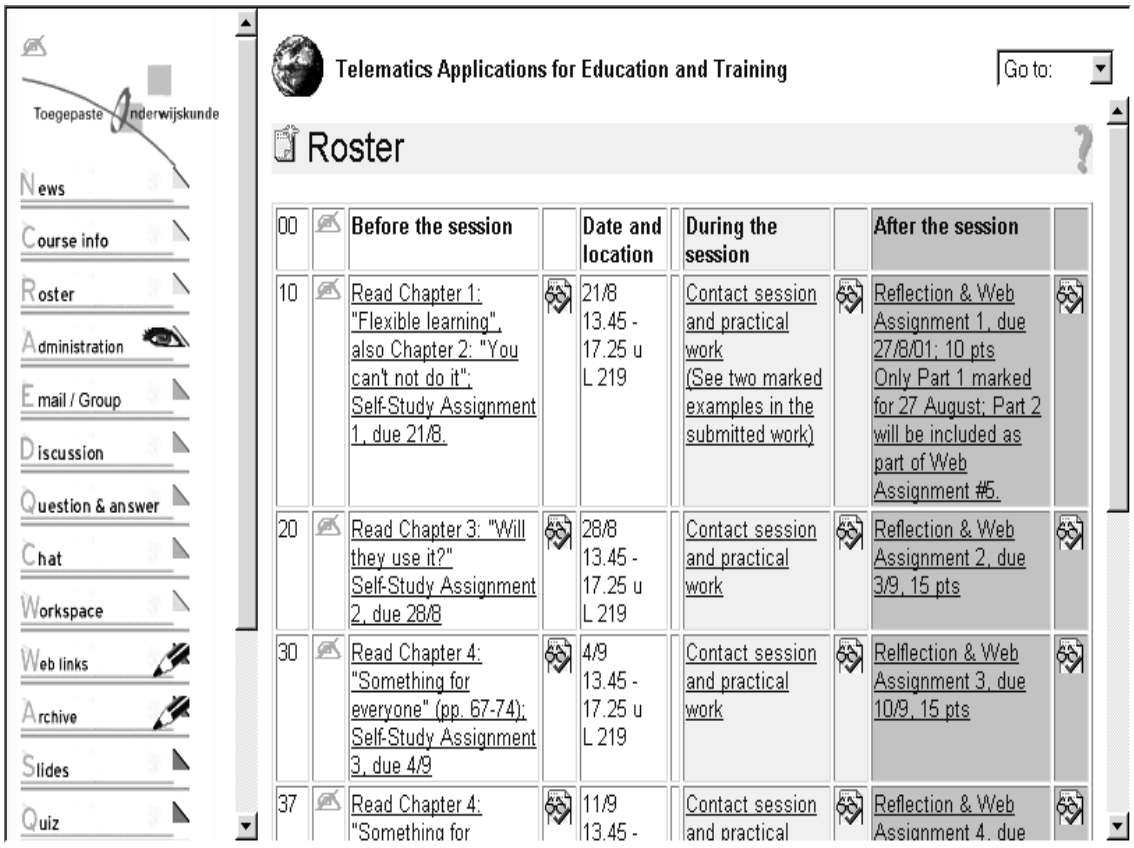


Figure 23. Example of a TeleTOP window, showing a navigation bar, a title bar, and an information frame (here menu entry Roster was selected).

The Roster (Figure 23) is the heart of a course where all sessions or virtual activities are described and where students can find what they need to do before, during and after a session. Also the Roster contains facilities for students to send in assignments, and for the instructors to send feedback to the students and mark their results. This roster has evolved as a key organisational structure for course support.

Apart from presenting information to the students via menu entries such as Course information, Sheets, Archive and Weblinks, active participation of students is stimulated in a course through facilities such as online Discussion. Workspaces are useful for groupwork, and communication among students and between instructors and students is available through E-mail.

To offer courses to students through TeleTOP, an instructor has to arrange a TeleTOP course environment and fill it with content and organisational course information. Then during course delivery the instructor interacts with the participating students though TeleTOP by adding new or updated information to the course site, by adding feedback to assignments, by contributing to online discussions, and much more. Although TeleTOP can be the single medium to communicate with students, in blended learning (Collis, 1998) also face-to-face meetings and sessions are used as effective means to deliver teaching and interact with students. These meetings and sessions also have to be developed and delivered in parallel with the TeleTOP-part of the course.

The TeleTOP system offers a wide range of features as menu entries, such as News, Course Information, Roster, Email, Online Discussions, and Weblinks. When TeleTOP is compared with 40 or more different Course Management Systems listed by EduTools (http://www.edutools.info) it shows that TeleTOP is not an atypical CMS. Thus findings from studies in which the use of TeleTOP courses is analysed can also be relevant for a broad range of CMSs.

4.4 Conclusion

In this chapter the development and action research was selected to analyse academics' performance and the design of appropriate interventions. Data-collecting methods were combined in various studies and in the following three chapters these studies will be discussed according to the three major phases related to the HPT approach as shown in Table 10:

- Actual performance (local institutions) in Chapter 5;
- Current and expected future performance from an international perspective in Chapter 6;
- Exploration of intervention prototypes in Chapters 7 and 8.

As a final phase in the research process, according to the development-research approach (Van den Akker, 1999; Reeves, 2000), recommendations and future research will be deduced from the studies. These will be presented in Chapter 9.

5 Analysis of Actual Performance and Opinions of Academics in Specific Settings

In Chapter 2 it was argued that to improve the job-related performance of professionals the desired performance and the actual and predicted performance have to be analysed and compared to reveal performance gaps. In Chapter 3 the desired teaching-related performance of instructors was analysed leading to a Personal Performance Model. In this chapter the actual performance of instructors in two specific settings will be analysed. These steps are highlighted in the HPT model in Figure 24.

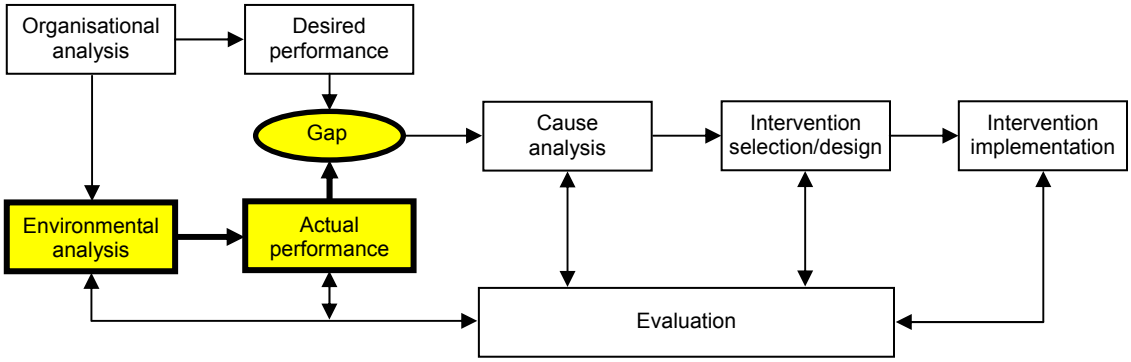


Figure 24. Schematic HPT model with components focussing on actual performance highlighted.

In this chapter Research Question 3 will be discussed in detail:

RQ3. What is current level of personal performance in teaching-related activities?

The actual performance of academics will be manifested in many ways, first of all as part of face-to-face interactions between instructor and students in a complex teaching and learning process, but also as a result of performing teaching-related activities, often at the instructor's desk. In this chapter, first a short introduction to actual performance is given (Section 5.1). In Section 5.2 the personal experiences of two instructors who started using the TeleTOP CMS eight years ago are described. In Section 5.3 the teaching-related performance of instructors at the University of Twente is analysed and how they control their time is investigated. In Section 5.4 a detailed analysis of TeleTOP use at the University of Twente is described based on logfile and timesheets analysis. In Section 5.5 TeleTOP use by instructors at the University of Twente is further studied by analysing the TeleTOP environments of courses and their contents. The current environmental conditions and actual performance of instructors were further analysed at two institutions for higher education in The Netherlands. This study is described in Section 5.6. In Section 5.7 management's opinions about actual performance by instructors at the University of Twente are analysed. In Section 5.8 conclusions are presented based on these studies to contribute to improving the future teaching-related performance of academics.

5.1 Introduction to Actual Performance

Actual performance refers to the environment in which people perform their activities, and how they actually perform activities that will result in products, for instance a course. Instructors perform their activities related to a course over a long period of time. This might take a year or more from the first idea to create a course until the final grading of the first group of students attending the course. Often, an instructor is involved in more than one course in various stages of development or delivery. Furthermore, academics also perform research and services.

To get a better insight into the actual performance of instructors the following aspects are analysed:

- Personal opinions of instructors (Studies A1, C1, C2)
- Activities that are performed (Study O1)
- Time planning and expenditure (Studies O2, O3)
- Use of CMS (Study O3)
- Managers opinions and perspective on instructors' performance (Study U1).

5.2 Personal Experiences (Study A1)

In this section the personal experiences of teaching via TeleTOP of two instructors (one of which is the researcher) are described[1]. This study is highlighted in the Personal Performance Model, and labelled A1 (Figure 25).

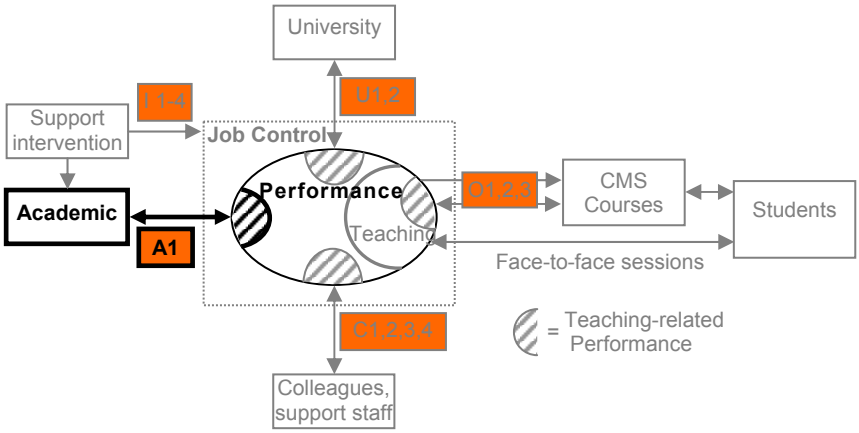


Figure 25. Personal Performance Model with personal-experiences study highlighted.

In Section 5.2.1 the personal experiences by two instructors of managing Web-based courses before the introduction of a CMS are described. Initial experiences with using TeleTOP are described in Section 5.2.2. An overview of perceived problems is offered in Section 5.2.3, followed by a discussion of the implications for this research in Section 5.2.4. The reflections are written from the personal perspective of the two instructors, thus a first-person narrative form is used.

[1] Based on an article by Collis and Gervedink Nijhuis (2000).

5.2.1 Pre-CMS performance

Before the introduction of a CMS we and a few other instructors at the University of Twente were using Web-supported courses, programmed using HTML, which offered functionalities relating to communication, course organisation, and management of student work in an systematic way. Our first-year course ISM-1 [Educational Instrumentation Technology, Part 1] was the major Web-supported course at the Faculty of Educational Science and Technology. The topic was multimedia design and it involved group-based projects. There were a large number of students (between 80-100) divided into groups of four. As we used the Internet it became possible to offer all course material to the students, and to support new types of collaborative-learning activities for on-campus students as well as others at a distance, even in other countries (Collis, 1997, 1998). For us as instructors, this helped us enormously with a number of management burdens associated with the course, particularly through the integration of all course resources via one website, but at the same time added new management burdens. We still spent a large amount of time on the course, but now much of that time was going into the management of the website.

To better control the teaching and learning processes within this ISM-1 course, we participated in a research project (Van der Veen, 2001; Van der Veen, Jones, & Collis, 2000) in which we experimented the use of a Web-based workflow tool called *Livelink* (http://www.opentext.com/livelink/) during one academic year. The workflow tool helped us to strengthen the planning and co-ordination of the students, helped students better to divide tasks among themselves, and helped both students and us as instructors by providing visualisations of the progress of the students (Van der Veen, 2001; Van der Veen, Collis, Van Diepen, & Andernach, 1997). It also helped to strengthen our own planning and the co-ordination among ourselves. The workflow flowcharts represent various steps in the design process, both in a graphical and in an interactive way. Figure 26 shows an example of a visualisation of a group process as generated by the *Livelink* groupware tool.

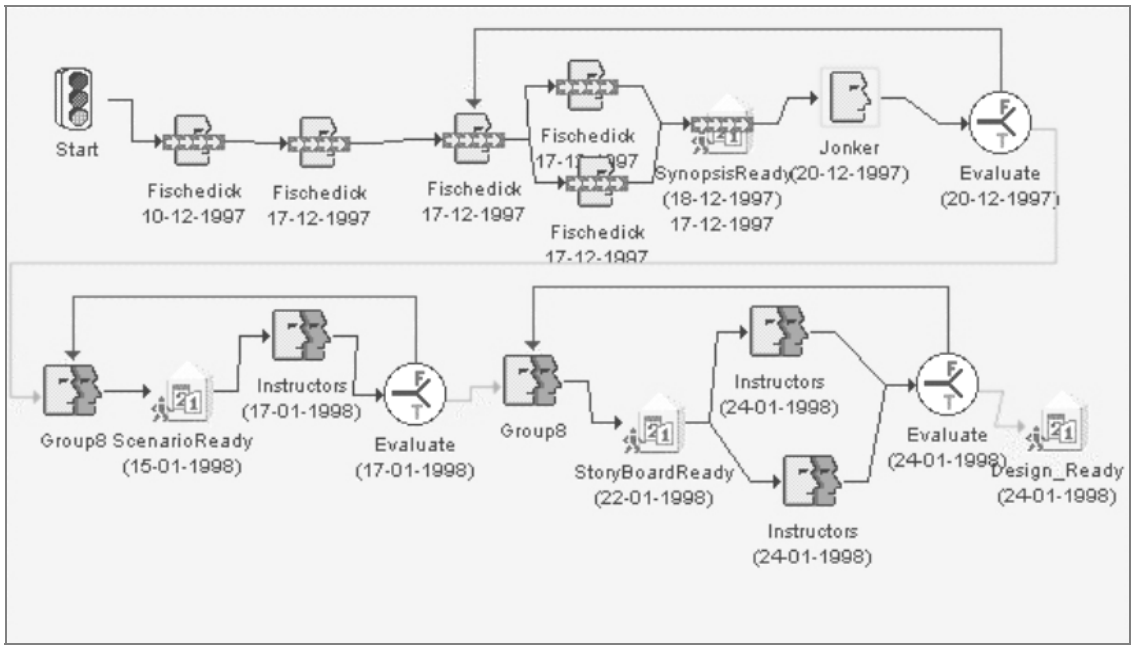


Figure 26. A graphic representation of the design process of a student group in the ISM-1 course, using the workflow tool *Livelink*. In the figure the steps in the process, the deadlines, and the persons involved are represented as icons, with a date when the step was approved.

In flowcharts such as shown in Figure 26 instructors and students could see which steps had been already executed and whether feedback had been received for a specific step in the process. For instructors it was hard to keep track of collaboration between students at a distance and to monitor group and individual progress where groups often worked together in flexible ways outside of a classroom setting. This way of visualisation and monitoring was greatly appreciated by students and by us. However, the groupware tool was not taken up by the university after the pilots because of cost considerations, so we lost the benefits of the functionality.

5.2.2 Introduction to TeleTOP use

At the start of academic year 1998/1999 TeleTOP was introduced in our faculty as an integrated Course Management System (CMS) that could store and present all relevant information in a uniform way. Before we started to use TeleTOP we had to learn how to incorporate such an environment within our courses, although we had already considerable experience with managing stand-alone Web-supported course environments. The next three topics describe the deployment of TeleTOP in our own teaching from learning to use TeleTOP, via starting to actually use TeleTOP, to the on-going use of TeleTOP with sometimes a need for additional support.

- **Learning to use TeleTOP**
  During the development phase of the TeleTOP system, so before the implementation phase, instructors could attend workshops and lunch meetings where the TeleTOP system was introduced and many of its components were demonstrated. Overall, approximately ten workshops were organised with an average of about 20 instructors per session, which was about 50 % of all instructors within the faculty.

- **Starting to use TeleTOP**
  We started to use TeleTOP by arranging a course environment for the ISM-1 course in TeleTOP. We decided what menu entries would be needed, such as News for news messages, Course Info for a general course description, Roster for a timetable, E-mail for communication, Discussion for online discussing topics, and Weblinks to access external websites. A first version of an embedded Decision Support Tool (DST) (De Boer, 2004) was used to make it easier for us as instructors to create an environment, but in the beginning we had to select the entries ourselves. We then filled in all the necessary information into the site and created e-mail groups for easy communication, workspaces for group work, and templates relating to submissions and assessment. It was reassuring that it was also possible to change the selection of menu entries at any time by adding or removing entries from the navigation bar. For us it was relatively easy to create a new course and use all the TeleTOP components, but some of our colleagues were reluctant to use TeleTOP or had trouble transferring their pedagogical approaches into a CMS (for a detailed analysis, see Chapters 7 and 8 of Collis & Moonen, 2001).
- **Support when using TeleTOP**
  As TeleTOP was developed in our Faculty of Educational Science and Technology, the development team of TeleTOP was always available to help when a (technical) problem occurred. We could also ask for extra support from student assistants who were able to set-up a course environment and fill it with information already available from the traditional courses, such as study-guide information, articles in course readers, PowerPoint presentations, and a paper-based timetable from the Bureau Educational Affairs (BOZ). In 1997-98 there were only about 20 courses transferred to TeleTOP so we had no problem getting help when needed, at least during office hours.

5.2.3 Teaching-related performance problems

During these initial experiences with managing a CMS we experienced some performance problems. These will be discussed here in a set of four points.

- **Finding relevant websites**
  Because of the Web, we wanted to add hyperlinks to our course environment that refer to external websites. Search engines were limited in our early days with Web-based course support so it took considerable time to find good references. We exchanged website addresses (URLs) with our colleagues but most of the time the usefulness of the links for our courses was limited. Later on search engines such as *Alta Vista*, *Yahoo* and *Google* made life easier, but still it takes much effort to find interesting, reliable, and relevant information on the Web and to ensure that what is linked to the course site stays active and relevant.
- **Keeping up with our courses**
  Because of time constraints we often were not able to have the site and all its areas ready at the start of a course. So during the course we still had to add instructions about what students had to do, sometimes only a week in advance. On one hand it was good pedagogically, because we could give up-to-date information and refer to problems students had met during the last week's activities, but at the other hand, it was an enormous managerial problem to keep up with the course process and also have instructions available in time. After several years of experience with the CMS

we have come to organise our course sites in such a way that we need less time for site preparation.

- **Interaction problems**
  As instructors we put many small assignments in the course to be sent in by our students on a weekly basis and to let students submit reports and half-products of major assignments. As a consequence however, students expected to get feedback or remarks about everything that they sent in. So we had to send them feedback on every detail, had to mark all the reactions from students, and had to maintain records of all the results. In general it became very time consuming for us to handle all these assignments. We had similar experiences with general interactions and discussions. To be able to give an adequate reaction to something sent in by students, one has to know about messages and products received earlier before the message at hand. Because we wanted to keep track of all messages we had to develop techniques to arrange our archives ourselves. But even with a well-organised archive, one has to read each message, then read some previous messages again from the same sender or group before a reaction can be composed. This will take more and more time especially when the interactions between instructors and students are intensified. During the years we have learned to give increasingly strict instructions in our courses about the way to communicate via the CMS and this has helped considerably. However, this requires having clear and complete instructions in the website to which students must learn to refer.
- **Monitoring problems**
  For monitoring groupwork, instead of the workflow management tool we also let students send in progress reports and let them store half-products on the TeleTOP server so we could monitor their reports and their products directly via the TeleTOP system. But for the efficient management of progress of students and groupwork it took us much effort and time; too much, we often felt. Sometimes problems occurred because students in a group disagreed or they get stressed when a deadline has to be met. How can the instructor monitor these problems when students are working at different times and locations? We were only able to react properly when a group member consults us electronically or when someone from the group visits us to discuss the group's problems. Apart from urging students to report their problems before they get out of hand, we feel we did not manage this well enough. In our own roles as instructors, we shifted from primarily being the facilitators of student acquisition of knowledge to primarily being the designers and moderators of student activity, particularly in collaborative groups. This brought new tasks, and took more time than before.

Perhaps one of our major lessons learned relates to our awareness of the potential burden that CMS-management tasks place on the instructor and student as they participate in new forms of education and make use of new technologies.

5.2.4 Implications for the overall research questions

As indicated the implementation of TeleTOP implied that we had to learn to use TeleTOP in itself, but also how to incorporate such a CMS in our own courses. In general the use of TeleTOP is very useful to deliver courses to on-campus and off-campus students. TeleTOP also offers an archive and communication tool that is of great help for us as instructors. Various new activities had to be performed, and also

various new and demanding problems occurred. One of the ways we handled some of these problems was to specify more strictly the requirements students had to follow, but then we as instructors also had to observe these rules. As a consequence our agenda and time planning changed accordingly, because for some parts of the course, the submissions of assignments replaced scheduled face-to-face sessions. What we missed was a tool such as Livelink to help us work in a systematic, controlled way, with a visual overview of work that should be performed and deadlines to show when deliverables should be finished. Overall, the incorporation of TeleTOP in our courses was not a big problem for us as we were pioneers in Web use in the pre-TeleTOP era. When a problem did occur the TeleTOP development team was available. In general, human support was available during a period of two years after the introduction of TeleTOP, for technical support the developers of the TeleTOP system were available, and for transferring a 'traditional' course to a TeleTOP-course environment student assistants were on call. This intense support was a result of our faculty being the developer of the TeleTOP system. This is not the regular, day-to-day situation at other faculties or universities, and not even at our faculty after 1999. This puts a large burden on the individual instructor to manage all teaching-related activities involving the use of the CMS, apart from the regular face-to-face sessions and meetings that will still go on.

5.3 Actual Performance when Using TeleTOP (Study O1)

To analyse what activities instructors are performing when using TeleTOP and how much time these activities take according to the instructors, a pilot study was set up. First an introduction of this study is given (Section 5.3.1), followed by a description of the study: the research questions, methods, participants and procedures (Section 5.3.2). In Section 5.3.3 findings of this study are presented, followed by an analysis and a discussion about the implications of this study in Section 5.3.4.

5.3.1 Introduction to this study

To analyse the actual performance of other instructors besides ourselves, a pilot study was set up to analyse what constitutes teaching and teaching-related activities and get a better insight in the time they spend to perform these activities. This study, under the direct supervision of the researcher, was carried out by two students of the Faculty of Educational Science and Technology as part of their course "Onderzoeksopdracht" [Research experiment] (Arentsen & Wieland, 2001).

In Figure 27 the link between this study and the Personal Performance Model is highlighted.

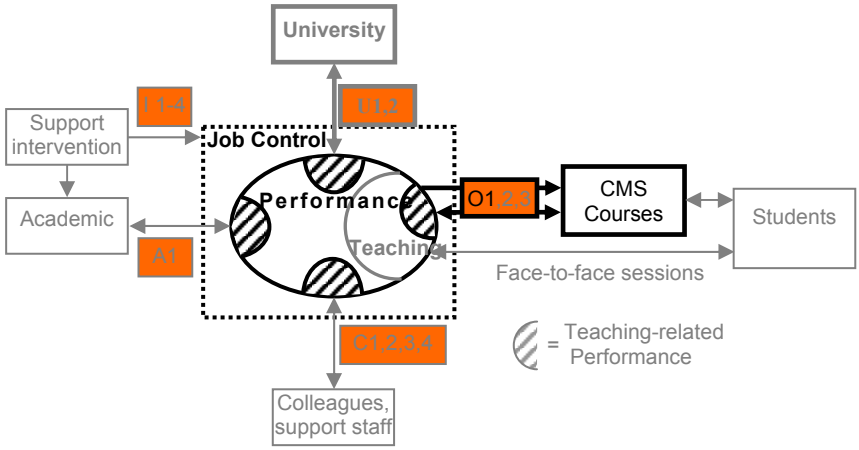


Figure 27. Personal Performance Model with performance study highlighted.

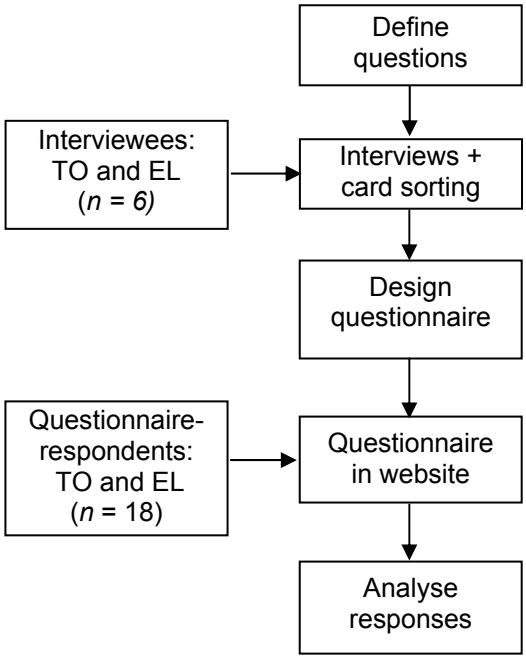
5.3.2 Description of the study

The main research questions for this pilot study were to investigate on a small scale what constitutes teaching-related activities according to instructors, how much time these activities take, what tools are used for teaching and support, and what type of support instructors prefer when performing teaching-related activities. To be able to analyse the actual performance of instructors data were collected using the following methods (see Section 4.2.2, Table 9):

- Interviews with instructors to gather data about the sort of teaching-related activities performed by instructors
- Card-sorting to categorise the teaching-related activities performed by academics, where each card shows one of many possible teaching-related activities
- A questionnaire to gather data from a larger group of instructors.

Instructors were selected who work at two distinct faculties at the University of Twente: the Faculty of Educational Science and Technology [TO for short] and the Faculty of Electrical Engineering [EL for short]. Interviews were held with five instructors from TO and one instructor from EL. For the questionnaire all instructors at TO (n=100) were asked via email to participate and 20 instructors from EL. Of these instructors 18 instructors (13 in TO and 5 in EL) sent in their questionnaire (15 %).

The procedure carried out in this study to analyse instructor's performance is shown in Figure 28.



Note. TO = Faculty of Educational Science and Technology.
EL = Faculty of Electronic Engineering.

Figure 28. Procedure to analyse teaching and teaching-related activities performed by academics.

As shown in Figure 28, first questions were defined for the interviews. Then one instructor working at TO was interviewed in a pilot to test the questions. Based on this interview some small changes were made. Then the interviews with instructors were held using the amended set of questions. During the interview card sorting was used to let the interviewee categorise the predefined teaching and teaching-related activities using a set of 42 cards with one of these activities on each card. Examples of text on the cards included: Fill a CMS course environment; Manage to offer a session; Manage to offer written feedback; and Moderate an online discussion. Instructors were free to skip specific cards and add new cards by writing an unforeseen activity on a card. The interviews were recorded on audio tape and the piles of cards from the card-sort session copied to a Word file. After all interviews were held, the interviews were analysed. From the results of these interviews a questionnaire was designed to get insight into time expenditure of the instructors' teaching-related activities. This questionnaire was made available to participants through a website. Filled-out questionnaires were submitted by email and then analysed. The questionnaire, in Dutch, is given in Appendix 1.

5.3.3 Results

The teaching-related activities were categorised by the instructors through card-sorting, and it turned out that instructors categorised the activities in various ways, but that the differences were small and as a result a table of common teaching-related activities grouped under 11 main tasks could be assembled (Table 12).

Table 12. Categories of teaching-related activities based on card sorting during interviews (*n*=6) (based on Arentsen & Wieland, 2001, p. 41)

Manage preparing a course	**Collegial communication**
Search study material	Attend meetings at department level about educational affairs
Develop study material	Consult colleagues about a course
Develop assignments	Consult colleagues about a specific course session
Fill a CMS course environment	Consult colleagues about an exam
Handling resources	**Group communication**
Search for subject-matter and professional resources	Deal with remarks made during a session
Read subject-matter and professional resources	Moderate an online discussion or chat session
Archive subject-matter and professional resources	**Personal communication**
Support before and after a session	Communicate about subject matter
Prepare study material	Coach research or project groups
Make available assignments	Tutor-related activities
Communicate with students about logistics	Archive communication documents
Check and update CMS	**Examination**
Arrange audio-visual support	Develop an exam
Manage Face-to-face sessions	Prepare examination material
Prepare content	Monitor examination
Select and prepare session format(s)	Grade an exam
Develop overhead or PowerPoint sheets	Arrange alternative grading
Offer a session	Discuss examination results with student(s)
Manage assignments	**Administration**
Read assignments / reports	Create E-mail groups
Mark assignments	Administer absence/presence data
Mark a developed product	Manage time and appointments
Manage feedback	Administer marks
Offer written feedback	Archive materials
Offer oral feedback	

Table 12 shows that instructors were able to categorise their activities in a small number of major tasks, with subtasks for each major task. They differentiate between activities to be carried out before a course starts, such as manage preparing a course and handling resources; activities during a course, such as manage face-to-face sessions and handling assignments; managing various kinds of interactions with students, such as discussions and feedback; and interactions with colleagues, such as about a course or a session. Handling examinations and administration are also categorised as two major tasks.

The Web-based questionnaire was submitted by 18 instructors, 13 instructors from TO and 5 instructors from EL. These data were analysed using SPSS and findings about average time expenditure are shown in Table 13.

Table 13. Teaching and teaching-related activities with high average-time expenditure (*n*=17) (based on Arentsen & Wieland, 2001, p. 43).

Teaching / teaching-related activity	**Hours** ***M* (*SD*)**
Develop study material (per study unit)	10.27 (20.06)
Grade an exam	9.18 (13.45)
Prepare session content	5.26 (9.33)
Consult colleagues about a course	5.12 (4.78)
Develop an exam	5.00 (8.45)
Prepare examination material	3.71 (9.70)
Administer marks	3.61 (4.90)

Note. A typical course was 3 credit units

According to Table 13 instructors spend most of their time performing teaching-related activities that are very specific to their own professional knowledge, such as preparing study material, grading examinations, and preparing face-to-face sessions. Other activities are less specific, such as consulting colleagues, supplying examination material, and handling grading administration. These categories takes less time according to the respondents.

The instructors were also asked to indicate their time expenditure for each major category of teaching-related activities (Table 14).

Table 14. Time expenditure on average per major category of teaching-related activities (based on Arentsen & Wieland, 2001, p. 44).

Category	***n***	**Hours** ***M* (*SD*)**
Examination	10	33.40 (27.65)
Preparing a course	16	23.36 (28.21)
Face-to-face session	17	14.81 (22.76)
Assignments	14	11.45 (15.06)
Handling resources	6	11.33 (9.91)
Collegial communication	15	10.50 (6.88)
Support a session	15	9.18 (19.78)
Administration	16	8.81 (6.84)
Personal communication	14	7.23 (4.13)
Feedback	14	3.79 (3.96)
Group communication	13	2.02 (2.07)

On average the total time expenditure is 106 hours (SD=80.48 h), and from Table 14 it can be concluded that most of an instructor's time is spend on examinations and preparing a course. The in-between category consists of activities during a course, such as face-to-face sessions, assignments, collegial communication, and teaching-related activities to support a session. The activities in the bottom four rows of the table take just a few hours on average and this may be caused by the fact that these activities do not need much time or that these activities are performed only incidentally, which may be the case for group communication.

The instructors participating in the questionnaire were also asked to select up to 10 activities that take too much time and findings are shown in Table 15.

Table 15. Activities that take too much time according to instructors (*n*=18) (based on Arentsen & Wieland, 2001, p. 45)

Rank	Categories of teaching-related activities	Number of times mentioned
1	Offer written feedback	4
2	Read assignments / reports	4
3	Prepare content of a session	4
4	Use of a course database	3
5	Prepare overhead or PowerPoint sheets	3
6	Prepare study material	2
7	Major/minor aspects	2
8	Develop assignments	2
9	Arrange examination material	2
10	Manage time and appointments	2
11	Develop an exam	2
12	Select and prepare session format(s)	2
13	Grade an exam	2

According to Table 15 there is no consensus among instructors about what activities takes too much time as the frequency of specifying each activity is low, with a maximum of four. Also the table indicates that the most time-consuming activities are subject-matter specific and related to the professional knowledge of an individual instructor. Only two instructors explicitly stated that managing time and appointments take too much time.

In this pilot study also the need of instructors for support was analysed. Four categories of support were defined: technical, content, organisational, and administrative support. Respondents were asked to indicate their need for one or more of these support categories and their preference for one or more of three delivery formats: guidelines, procedures, and human (Table 16).

Table 16. Instructors' need for specific type of support (*n*=18) (based on Arentsen & Wieland, 2001, p. 46)

Type of support	Technical	Content	Organisational	Administrative	Total
Guidelines	2	2	6	2	12
Procedures	4	1	2	2	9
Human	5	2	4	4	15
Total	11	5	12	8	36

In Table 16, 'Technical' means that the instructors need support when using ICT, a CMS or related software programs; 'Content' refers to support instructors may need to select and create course content; 'Organisational' refers to support instructors may need from their organisation, such as secretarial support; and 'Administrative' support refers to extra management tasks, such as handling students signing in to a course, handling marks, or handling other administrative procedures. Most instructors indicate that they need organisational (*n*=12) and technical (*n*=11) support. The data also show that

support offered in-person, such as through a help desk, was valued highest, but offering guidelines was also valued highly (*n*=12).

5.3.4 Analysis and implications

From this study a list of teaching-related activities was distilled from the literature and categorised by the interviewees in 11 major tasks, of which many are not directly related to using a CMS. Some of these tasks refer to preparing a course, such as defining course content or structuring a course; other categories refer to offering a course, such as sending feedback or marking assignments. A third category of major tasks relate to interactions and communication with students, colleagues, and administration. From the results of the questionnaire it can be seen that most time is spent on content-related activities that are strongly related to the knowledge and way of working of individual instructors, such as writing study material or reading reports from the students. Support and administration take less time but play a role in each of these categories. Some of the activities that take too much time are related to using a CMS and maybe the time spent on these can be decreased. The way in which instructors are using ICT in content-related activities (searching and writing content) was not analysed further. From Table 16 it can be seen that instructors expressed a need for extra support especially for technical, organisational, and administrative support, but that support can be offered in various ways, as the total values for guidelines, procedures, and in-person are rather close to each other. Instructors indicated that they need extra support and "especially guidelines about the organisational aspects" (Arentsen & Wieland, 2001, p. 45).

5.4 Actual Performance: Analysing Time Expenditure Using Logfiles (Study O2)

To get more detailed insight into time expenditure of academics while using a CMS, another pilot study was carried out using logfile analysis. This study, under the direct supervision of the researcher, was carried out by two students of the Faculty of Educational Science and Technology as part of their course "Onderzoeksopdracht" [Research experiment] (Aartsen & Bouwmeester, 2001). First an introduction to this study is presented (Section 5.4.1), followed by a description of this study: research questions, methods, participants, and procedures (Section 5.4.2). Findings are presented in Section 5.4.3, followed by analysis and implications in Section 5.4.4.

5.4.1 Introduction to the study

At many universities a CMS system is used by instructors, and at the University of Twente, TeleTOP is used to offer courses to students on-campus and off-campus. When instructors perform activities using TeleTOP, all interactions between the TeleTOP system and the instructor's computer are recorded in a logfile. In a logfile the actions of all users of TeleTOP are stored. Thus, each time an instructor clicks a button to retrieve information from TeleTOP or a submit button to add information to TeleTOP this action is stored in a logfile. Each line in a logfile represents one server activity and it contains detailed information about for instance the action itself, the identity of the computer of the user (IP address), and the exact date and time when the action was performed. By analysing these log data, the time between two consecutive

actions can be calculated. Although users can be interrupted for instance by colleagues or a phone call, the calculated time can be considered an objective measure of the (maximum) time it took to perform the specific TeleTOP activity by the specific instructor in the given situation. By analysing a number of activities and more than one instructor, the expectation is that for some common activities this logfile analysis can offer a more detailed insight into TeleTOP use.

In Figure 29 the link between this study and the Personal Performance Model is highlighted.

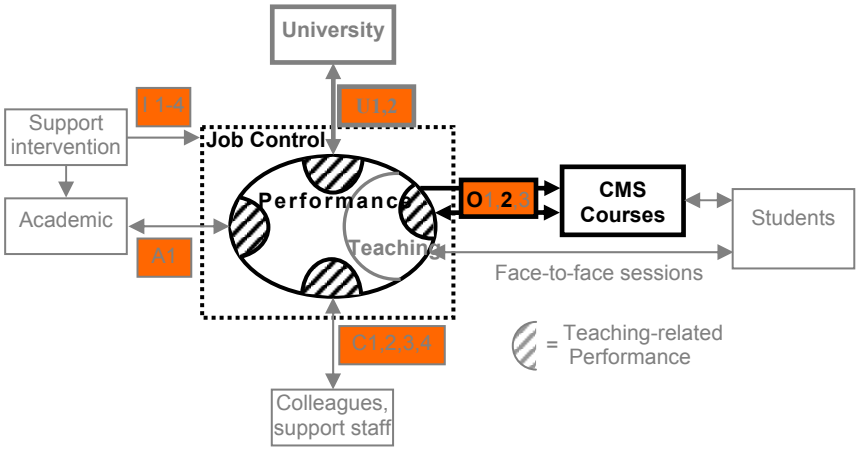


Figure 29. Personal Performance Model with Study O2 highlighted.

5.4.2 Description of this study

In this pilot study a mix of qualitative and quantitative approaches was used in an exploratory, descriptive case study (Yin, 1994) in which the following main research questions were analysed:

- Does TeleTOP use increase the teaching-related time usage of instructors?
- What categories of time expenditure can be seen?
- How much time is spent on each of these categories?
- How much time does it take to use TeleTOP for various categories of use?
- What are other activities performed while using TeleTOP?

To analyse these research questions, the following methods and tools were used (see Section 4.2.2, Table 9):

- Logfiles to analyse TeleTOP activities by specific instructors (quantitative)
- A category list of all functions available within TeleTOP
- Time sheets to let instructors record their time usage during TeleTOP use (quantitative)
- Interviews to elicit data about the way of working by instructors and their time usage (qualitative).

Participants were selected from three departments within the Faculty of Educational Science and Technology at the University of Twente. The candidates should be actively delivering TeleTOP-based courses during the research period to be able to analyse their logfiles. Only three instructors met these criteria and they were involved in this case

study, two women and one man. The procedure carried out in this study is shown in Figure 30.

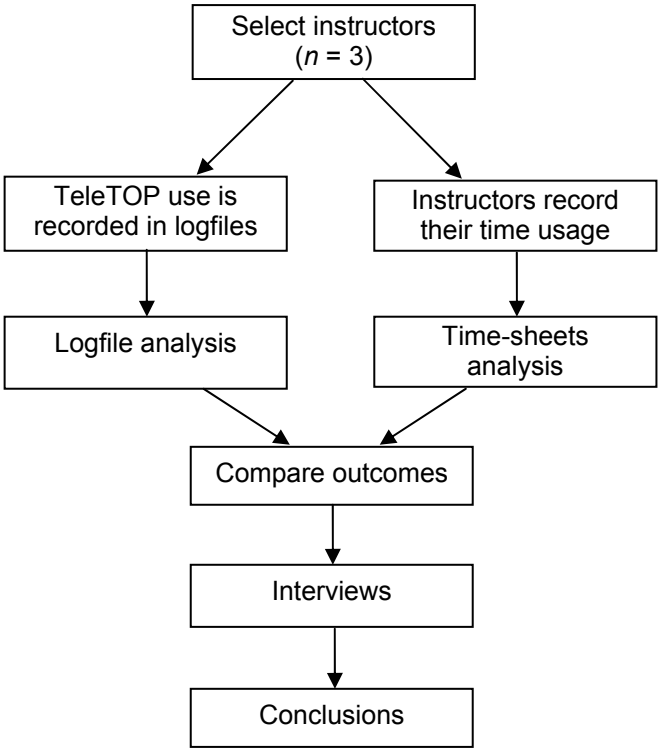


Figure 30. Procedure to analyse time expenditure of academics when using TeleTOP.

To get detailed insight into instructors' time usage two data-collecting methods were carried out in parallel: objective recording of TeleTOP use in logfiles and subjective record keeping by instructors using time-sheets.

During one week in April 2001 all TeleTOP activities of these three instructors were automatically recorded in a logfile, as well as the TeleTOP activities of all other instructors using TeleTOP during this week. Some problems had to be dealt with before these logfiles could be used for analysis. First, from the logfiles the specific data of the participants had to be extracted, filtering out all interaction records of other instructors and students. Secondly, a TeleTOP window consists of many graphics and textual components and when these components are transmitted to the user, each transmission of a component is recorded in the logfile. To be able to analyse only the actual instructor actions, this irrelevant data had to be filtered out using a macro (a short program added to Microsoft Word). After this filtering only the specific TeleTOP-related activities of the participants remained. Then the difference between each two consecutive instructor actions was calculated which is the time it took for an instructor to perform that particular TeleTOP activity (which includes reading the information or typing a responds). The TeleTOP activities with the time spent on each were then grouped according to the TeleTOP function. An example of the logfile-data analysis of one of the instructors is shown in Appendix 2.

Parallel to automatically recording their activities in a logfile, the instructors were asked to keep track of their TeleTOP activities by filling out time sheets. These subjective time sheets were then compared with objective calculations of time expenditure based on logfile analysis. The findings were then discussed with the

participants to get a better insight why some activities took them so long or so brief a time to carry out, and what caused discrepancies between their time sheets and the logfile data. Appendix 3 gives the coded results of these interviews.

5.4.3 Findings

Results show that time usage when performing teaching-related activities by using TeleTOP is not equally spread over each day of the week. One instructor for instance spent more than 2 hours using TeleTOP on one day and three days later only 9 minutes. The data also show that time usage per category of activities can vary extremely from 56 minutes at one day to 35 seconds at another day. Probably the course structure will dictate this time expenditure, for instance when a lecture has to be offered, or when a deadline for submitting an assignment has passed and these assignments have to be graded. The overall TeleTOP use during a course various strongly for the three participants: one instructor uses TeleTOP rarely, the second instructor about 20 minutes a week, and the third instructor some hours every day. When comparing the logfile data with the time sheets, it turns out that only one of the instructors recorded the TeleTOP activities accurately on the time sheets. For two instructors there was no match between these data, with an extreme mismatch of one instructor who recorded using TeleTOP for more than three hours, while the logfile shows that it was only about two hours. In interviews the participants indicated that during the use of TeleTOP there were interrupts and therefore the time spent on a TeleTOP activity according to the logfile data was inaccurate. While dealing with the interrupt, the connection with TeleTOP remained open, and thus the logfile will record a longer time to perform the TeleTOP activity than it actually took. Some of the interrupts mentioned in the interviews are shown in Table 17.

Table 17. Interrupts that occurred when using TeleTOP (based on Aartsen & Bouwmeester, 2001).

	Participants		
	A	**B**	**C**
Frequency of interrupts	regular interrupts; varies per day; in teaching: the more students the more interrupts	regular interrupts; stems from culture in faculty	regular interrupts
Who interrupts?	colleagues, students, own thoughts	colleagues, students	
Why the interrupt?	to make an appointment, information, to cancel a meeting, for advice	knocking at my door for something; because of the next appointment	because of the next appointment
Other causes	also receiving many e-mail messages	meetings at short notice, email, mail; problems with TeleTOP	
Consequences of interrupts		Interrupts are annoying and you have to postpone a deadline	

Two of the instructors indicated that they plan their activities in a rather structured way using an overall planning per day. The other instructor plans in a general way as late as possible, counting backwards from deadlines. The TeleTOP activities are not planned at all by two instructors, while the third instructor only plans TeleTOP use at the

beginning of a course. Two instructors use Microsoft Outlook to schedule their overall activities, the other instructor uses a paper-based agenda. All three instructors indicate that they cannot meet their planning. Participants indicated that their autonomy to structure courses and to perform their tasks is high, where two instructors refer to dependencies that have to do with bureaucratic procedures and curriculum planning. One instructor felt that "the more courses are offered through TeleTOP, the less freedom I will have to organise my work in my own way" (p. 12).

5.4.4 Analysis and interpretation

Using a CMS varies depending on the way an instructor is using a CMS in his or her courses: in this pilot study one instructor uses TeleTOP very frequently, the second instructor less frequently, and the third very few times. It also depends whether use is a course-developing phase or a delivery phase. And as was shown during delivery it again depends on the instructor, the variations within one week and variations among activities. Overall this study shows that it is very hard to give a general planning that will fit all instructors. In general logfiles are very useful to calculate exact time usage when developing and delivering courses and interacting with students. A drawback is that during an activity the instructor can be interrupted by someone or by other activities not related to the course. These interrupts cannot be derived from these logfiles and can only be given by instructors themselves. This would mean to fill out time sheets each day but recording time usage was perceived as a heavy burden by the instructors in this pilot. Also the goal or objective when performing a TeleTOP activity cannot be concluded when analysing logfiles. It was found that even when the instructors tried conscientiously to record their times, there were many discrepancies when compared with the logfiles. Thus either the logfiles or the instructor records or both are not fully reliable.

5.4.5 Implications for the overall research questions

Results in the pilot study show that using logfiles to analyse time usage is easy and objective, but that results offer a limited insight into how much time is actually spent, because of interrupts and the absence of information about why an activity is performed and what is being typed in or selected in the TeleTOP window. Results show that there is a large variance among instructors in the time they use TeleTOP, and each instructor uses TeleTOP in various ways over the days of the week.

5.5 Actual Online CMS Use: Analysing TeleTOP Courses (Study O3)

When instructors perform their teaching-related activities the part of their output that relates to using TeleTOP such as roster entries, assignments and feedback is stored in the TeleTOP database as part of a course. In this study the content and interactions stored in TeleTOP course environments are analysed and based on this data estimates are made about the time expenditure of instructors. In Figure 31 the link between this study and the Personal Performance Model is highlighted.

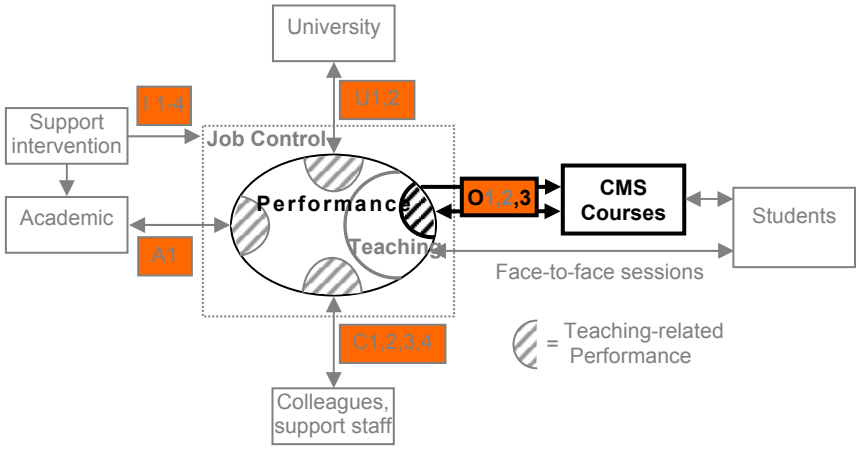


Figure 31. Personal Performance Model with Study O3 highlighted.

In Section 5.5.1 an introduction to the study is presented, followed by a description of research questions, methods used, and procedures (Section 5.5.2). In Section 5.5.3 the findings are presented, followed by Section 5.5.4 with an analysis and interpretation of these findings. Based on these findings time estimates per course are calculated and the instructor's time expenditure for an 'average' course is calculated. In Section 5.5.5 the implications of this study are discussed in Section 5.5.6.

5.5.1 Introduction to the study

When instructors use TeleTOP to set up a course and fill it with course material and other related information, the output is stored in the TeleTOP database. During the period of time a course is offered to the students, instructors add additional material to the course environment and also interact with students through TeleTOP, for instance by sending feedback or participating in online discussions. All information of a course that is stored in TeleTOP by instructors can be retrieved and analysed. But the fact that this information is stored in the TeleTOP database also implies that the instructor had to perform activities to submit these data. Performing these TeleTOP activities takes time and from their contributions to the site it is possible to deduce the time it took the instructors to create these contributions. For more details about this study see Gervedink Nijhuis (2001a, 2001b; Collis & Gervedink Nijhuis, 2000).

5.5.2 Description of this study

To get a better insight in the current use of the TeleTOP CMS at the University of Twente two research questions were formulated:

- What are the contributions of instructors to their TeleTOP courses?
- What time expenditure of instructors can be derived from their contributions to their TeleTOP courses?

The methods used were (see Section 4.2.2, Table 9):

- Database analysis: The TeleTOP database of the courses in the educational program of Educational Science and Technology at the end of academic year 2000-2001 was analysed.
- Time estimates: Based on the database analysis time estimates were generated using some general assumptions.

The TeleTOP database with courses offered at the Faculty of Educational Science and Technology at the University of Twente was used in this study. As all instructors have the privilege to access each others' courses, the researcher was able to analyse all courses. First a list of courses was derived from the TeleTOP database of those courses that were actually used during academic year 2000-2001. Course environments that contained only a set-up button to set-up the course, or course environments that contained some navigation buttons but no content were skipped. Then each course environment was accessed and information about content added by instructors and interactions performed by instructors were counted: frequency of use of each menu facility, length of each item submitted in number of characters. Then based on some assumptions about typing speed and time to access a TeleTOP feature, calculations were performed to estimate the time it took for an instructor to enter each item in the course.

5.5.3 Main findings

Of 64 TeleTOP-supported courses offered during the academic year 2000-2001, 51 courses contained navigation selections and at least some serious content. The 51 courses included all of the first-year courses (*n*=13), the second-year courses (*n*=13), and the third-year courses (*n*=8), and 17 courses out of 30 fourth-year (elective) courses. The courses in the faculty include conceptually oriented courses, courses based on group projects, courses based on design tasks, courses in statistics, and courses in the design and development of Web-based multimedia products. Approximately 70% of the courses were three credit units, meant to represent 120 hours of student work. The others were evenly spread in terms of being shorter or longer. For a quarter of the courses, only one instructor was involved, for another quarter there were two instructors or an instructor and a teaching assistant. The mean number of instructors and teaching assistants per course was 3.18 (SD=2.14). The average number of students with access to a course environment was 45.3 (SD=28.8).

The menu entries most often used in TO courses in TeleTOP are shown in Table 18.

Table 18. Top-12 menu choices by number of courses (*n*=51)

Menu choices	**Number of courses**	**Percentage**	**Number of courses containing contributions by instructors**	**Percentage**
Course info	51	100	50	98 %
Email and target groups	51	100	37	73 %
News	51	100	50	98 %
Roster	51	100	51	100 %
Weblinks	26	51	22	43 %
Sheets (PowerPoint)	23	45	19	37 %
Administration (feedback)	18	35	16	31 %
Workspace	15	29	10	20 %
Archive	13	26	13	26 %
Discussion	11	22	3	6 %
Question / Answer	9	18	3	6 %
Presentation	8	16	2	4 %

As shown in Table 18 instructors use Course info, E-mail, News, and Roster as menu entries in all their courses. Email is used in all courses but the names of the students and their email addresses are entered in the database by student administration, not the instructor. The instructor can add extra information such as target groups, and this was done in 37 courses (73%). In most of their courses instructors used Weblinks, Sheets, and Administration as menu entries, but less frequent than the presence of the menu entries suggest. Workspace, Archive, Discussion, Question/Answer, and Presentation were present in 30% to 15 % of the courses, but actual contributions by instructors were rare for Discussion, Question / Answer, and Presentation.

The average instructor's input into a TeleTOP course is shown in Table 19.

Table 19. Average content of TeleTOP courses in 2000-2001 (*n*=51).

Course elements	**Average number per course**
Number of menu entries chosen	7.9
Number of items /sub-items submitted	72.6
Number of attachments included with an item or sub-item	20.3
Total text length (in characters) entered, excluding attachments	36,621

As shown in Table 19 an average course contains 8 menu entries and these always include News, Course info and Roster. These three menu entries on average count for 49 items/sub-items submitted (from a total of 72.6 entries), and for 24,792 characters of text (from a total of 36,621 characters).

5.5.4 Analysis and interpretation

TeleTOP entries can be used and filled before a course starts or during a course. Many entries (Table 18) such as Course info, Email, Roster, Sheets, Workspace, and Archive score high and in general these entries can be added to the course before the course starts.

Other entries are often used during a course, such as News. News is used in all courses except one, which indicates that instructors try to inform students in an adequate way during the course. Content to Weblinks and Sheets (PowerPoint files) can be added in advance or during a course. This was not analysed in detail, but the impression is that most Weblinks were added before the course starts and Sheets just before a session. Interactivity through assignments (Administration menu entry) was used by instructors in 31 % of the courses, but other ways of interacting with students, such as Discussion and Question/Answer were only rarely used, either because instructors believe that they are not useful for a course or maybe instructors are not aware of or not skilled to use these functionalities in their courses. It may indicate that the instructors stick to the more-traditional ways of presenting a course and interacting with students.

5.5.5 Calculating time spent by instructors

Before this study, during the academic year 1999-2000 33 instructors from two different faculties (12 in the Telematics faculty and 21 in the Faculty of Educational Science and Technology) had been interviewed and asked to estimate their time expenditures for course preparation and delivery (Collis & Messing, 2001). Some of these instructors already had a year or more experience with using TeleTOP; others

were in their first year. The instructors admitted that they would just have to guess, but their perception was that a considerable amount of time was involved.

To get a better insight into the time usage of instructors to set up and deliver TeleTOP courses, the database analysis discussed in Sections 5.5.3 and 5.5.4 was also used to estimate time expenditure (Gervedink Nijhuis & Collis, 2003). Based on the content of the TeleTOP courses as described in the previous section calculations were made to estimate the time it would have taken an instructor to create the course as it was stored in the database. Some basic activities performed by an instructor to create a TeleTOP course are: adding menu entries to the course, typing information and feedback that is added to various menu entries, and also adding attachments to menu entries such as adding a PowerPoint file to Sheets. Using some general assumptions about selecting entries and typing speed the time instructors need to create each course was calculated. Figure 32 shows the variability of estimated instructor's time per course.

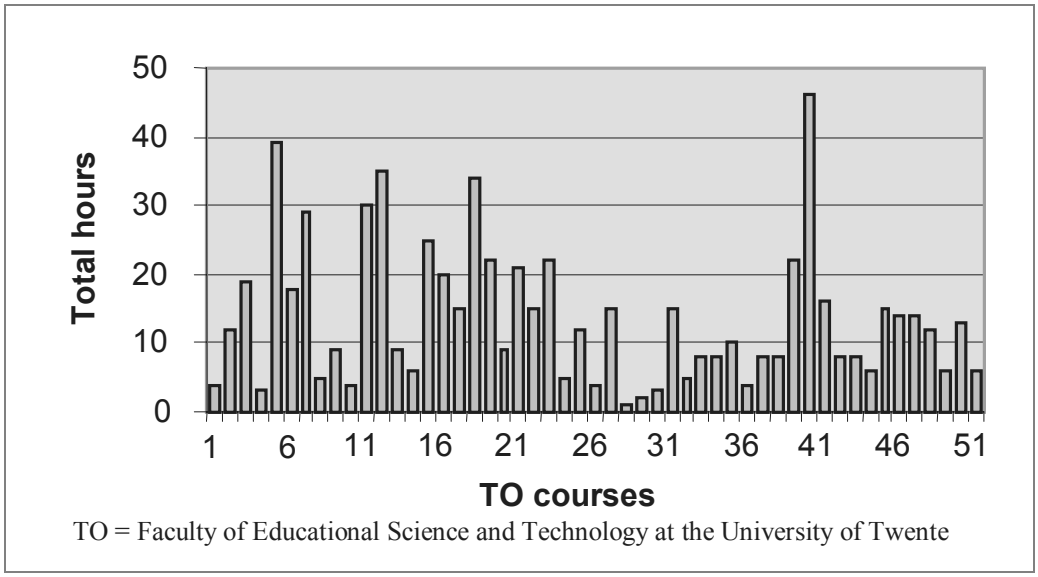


Figure 32. Estimated average time (in hours) spent by experienced instructors (*n*=51) on management tasks associated with the use of TeleTOP.

From these time estimates for all courses the total time for an 'average' course was calculated (Table 20).

Table 20. Estimated instructor time for an average course (*n*=51).

Activities	**Mean time per activity (in hours)**
Selecting menu entries	1.0
Submitting items and sub items	3.6
Adding attachments	1.7
Typing text and editing	7.6
Total time for an 'average' course	13.9 hours

Table 20 gives an overall average based on 51 courses. It should be emphasised that these time estimates relate exclusively to activities performed by instructors involving the use of TeleTOP. Face-to-face activities of instructors such as conducting class sessions or meeting in person with students, and content-related activities such as

selecting and preparing study resources and reading student submissions and providing evaluative comments (if not entered into TeleTOP) are not included.

Compared to instructors in a traditional setting the TeleTOP activities are primarily new management tasks that the instructor is carrying out. These occur in three major categories:

- **Planning**
  The results in this study about the activities performed by instructors when using TeleTOP and estimates about the time needed to perform these activities can be used to create a planning. Many instructor activities can be categorised in activities before a course begins, and activities during the time a course is delivered (Gervedink Nijhuis, 2001b).

- **Before a course**
  The average time an instructor should anticipate spending before a course begins, in terms of setting up a Web-based course environment, is shown in Table 21.

  Table 21. Average time to plan per menu entry before a course starts.

Menu entry	Average time (in minutes)
Set up a course environment	60
Set up and fill Course info	30
Set up and fill a Roster	147
Set up Email (groups)	17
Set up Workspaces	30
Set up and fill Weblinks	108
Archive (course resources)	72

- **During a course**
  The average time an instructor should reserve during a course related to the use of TeleTOP is shown in Table 22.

  Table 22. Average time to plan per menu entry during a course.

Menu entry	Average time (in minutes)
Add News	35
Administration (feedback)	133
Monitor Discussion	57
Monitor Question / Answer	19
Add Presentations	27
Add Sheets (PowerPoint files)	52

  Table 22 shows the time an average instructor spends on managing a course environment during the period that the course is running.

5.5.6 Implications

Strangely, in the literature there is relatively little direct discussion of these sorts of management issues, particularly in their relation to the available time and energy the instructor has to spend on a course. However, there is continual notice given to the

problem of time: a major reason given for limited use of technology in education is lack of instructor time (Reeves, 2002). The whole process often takes more time than the instructor has to give or is willing to give. The course-management tasks as discussed in this study are part of this time component. Thus, if the amount of time spent on management tasks relating to the use of technology in instruction can be reduced, this is likely to reduce some serious implementation concerns. This study shows how much time a course might be expected to take relating to its TeleTOP components. Other than the Set up and Roster, the components are typical to other CMSs.

5.6 Actual Performance Aspects According to Instructors (Studies C1, C2)

To get a more detailed insight into the actual situation of instructors and their teaching-related activities, the instructors themselves were interviewed. Two studies were carries out, one at the University of Twente (Study C1), the other at the CAH/STOAS Hogescholen in Dronten (Study C2). Both studies are similar in the research questions addressed and in the way these studies were carried out and therefore both are discussed in this section. In Section 5.6.1 an introduction to this study is presented. In Section 5.6.2 the research questions, methods, participants, and procedure are presented. In Section 5.6.3 findings from the UT interviews are shown, followed by Section 5.6.4 in which the findings from the interviews at CAH/STOAS are shown. In Section 5.6.5 the findings of both studies are compared. In Section 5.6.6 the implications of both studies on the overall research will be discussed.

5.6.1 Introduction to the study

To get insight into the work circumstances and performance aspects of instructors, instructors themselves were also involved in this research to analyse actual performance. Although performance of instructors can be observed through the use of video cameras or by direct observation, this was considered as too much a burden to instructors to participate. Also their teaching and teaching-related activities are scattered over the year which complicates direct observations. Therefore it was decided that it was appropriate to hold interviews and during these interviews asking the instructors about their work and from these to elicit information about actual performance and opinions. The candidates for the interviews should be performing part of their teaching through a CMS to get well-informed insights into the consequences of using a CMS on their performance. Therefore the instructors should be selected from a university or other institution of higher education that offers a CMS to their instructors and students. The University of Twente is using TeleTOP as its CMS to offer courses so instructors of this university will be involved. As the instructors at a university only perform part of their work teaching, it seems appropriate to also involve instructors who teach on a more day-to-day basis, and therefore two institutions of Vocational Education and Training [in Dutch: Hogeschool voor Beroeps Onderwijs (HBO)] were also involved: the Christelijke Agrarische Hogeschool (CAH) [Dronten Professional Agricultural University], and the STOAS Hogeschool [Agricultural Professional University for teachers], both located next to each other in the city of Dronten. Instructors from both institutions were invited to participate. Research findings from

instructors in both institutions will be grouped and indicated as CAH/STOAS. In Figure 33 the link of this study with the Personal Performance Model is highlighted.

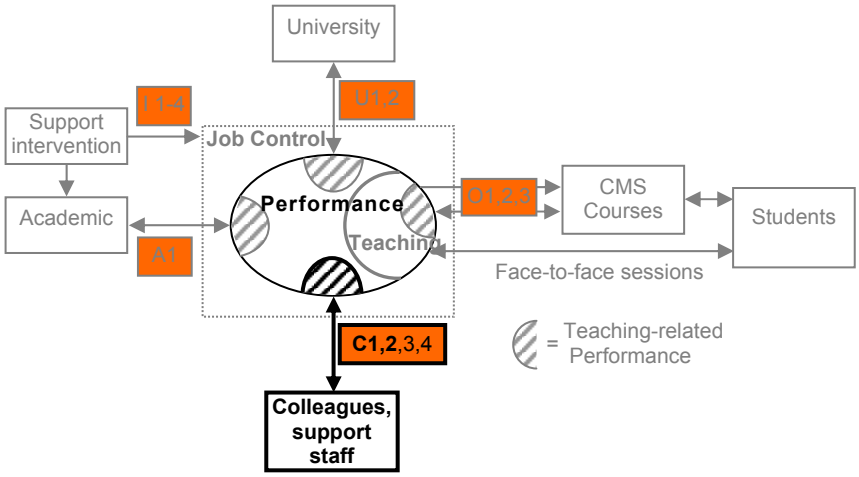


Figure 33. Personal Performance Model with actual-performance studies highlighted.

5.6.2 Procedure and participants for both studies

The main research questions investigated in this study are:

- What are current working conditions of academics, especially for teaching?
- How are instructors involved in using a CMS?
- How are instructors performing their teaching-related activities?
- How do academics manage and control their own time and activities?

Semi-structured interviews (Kvale, 1996) were considered the most-appropriate way to elicit information (see Section 4.2.2, Table 9). Some general, broad questions are asked and instructors were free to elaborated on these questions in the way they like and also address topics as they feel could extent the insight. Also the interviewer posed additional questions based on the "flow" of the interview.

To analyse these interviews a Grounded-Theory process (Alsop & Tompsett, 2002; Strauss & Corbin, 1990; Wester, 1984) was carried out to elicit all possible information that could be obtained from the remarks of the instructors. This analysis process consisted of a number of rounds in which first each interview was analysed in a very detailed way. A category list was set up and this list evolved and was fine-tuned after each interview. All significant remarks were categorised, not only full sentences, but also small bits-and-pieces, for instance when a specific part of a remark referred to another category than the rest of the sentence. When appropriate a new category was created. This categorisation was performed in many iterations because after each interview new insights were gained, with possible consequences for the category list, and thus the coding of previous interviews.

In Study C1 instructors from the University of Twente were involved. To select potential participants at the University of Twente, directors of educational programmes of two faculties were asked to select one or more instructors with at least some experience with using TeleTOP in their courses. Two instructors from another faculty

volunteered to also participate. The selected instructors were then invited to participate and they all accepted (Table 23).

Table 23. Overview of UT interviewees (instructors)

Institution	**University of Twente**					
Instructor label	A	B	C	D	E	F
Sex	male	male	male	male	male	male
Type of faculty	business	business	public admin	technical	technical	technical
Faculty code	TBK	TBK	BSK	IO	IO	INF
Date of interview	16-5-2003	19-5-2003	5-6-2003	17-10-2002	29-10-2002	9-10-2002

Note. TBK= Industrial Engineering and Management Science; IO= Industrial Design; INF= Computer Science.

The interviews were held at participants' office and lasted about 90 minutes. These interviews were recorded on audio-disc and afterwards transcribed literally to a text document in Word.

In Study C2 instructors at the CAH/STOAS institutions were selected by an educational professional who is an employee at CAH/STOAS. Each participant was expected to have at least some experience with using a CMS in their courses. The CMS used at these institutions was predominantly Blackboard. The selected instructors were then invited to participate and they all accepted the invitation (Table 24).

Table 24. Overview of CAH/STOAS interviewees (instructors).

Institutions	**CAH / STOAS**						
Instructor label	A	B	C	D	E	F	G
Sex	male	male	female	male	male	male	male
Institute	CAH / STOAS	STOAS	CAH	CAH	STOAS	STOAS	CAH
Date of interview	26 June 2003						

The interviews were held at CAH/STOAS and lasted about half an hour. These interviews were recorded on audio-disc and afterwards transcribed literally to a text document in Word by the researcher.

5.6.3 Findings from UT interviews (Study C1)

After analysing the interviews, the interview details were categorised in five major topics. These topics with some major findings are shown in Table 25.

Table 25. Summary of findings from UT interviews.

Topic	**Major findings**
Personal aspects	Workload is too high; own planning often not adequate
Organisational aspects	A bit negative feeling
Colleagues/collaboration	Neutral
Online CMS use	In general positive about TeleTOP
Job control	Planning should be improved

These topics (Table 25) will be discussed in more detail in subsequent sections (Sections 5.6.3.1 - 5.6.3.4). For a summary of all responses see Appendix 4.

5.6.3.1 *Personal aspects*

In this section an overview is given of answers and additional remarks to questions about personal aspects related to performance, such as own skills and knowledge, attitudes and experiences related to the elements of personal performance as discussed in Chapter 2 and 3.

All six instructors indicate that they suffer a too-high workload and two instructors even expect that their workload will increase. Working 55 hours or more a week is no exception (instB, instE) and "even feels quiet" (instE). Especially in teaching the many curriculum changes are felt as very frustrating, although instructors accept the consequences of being a teacher (instE). They felt they have to perform too much teaching, and often this will put the research part of their job under pressure or research will become too limited (instB). This is also due to the fact that teaching at least for a part consists of pre-defined scheduled sessions compared to unscheduled research activities. This high workload is felt as very frustrating (instD). To be able to challenge the assigned time for teaching, one of the instructors (instrF) voluntarily filled out timesheets and proved that he required two times the assigned time to offer his courses.

All instructors felt their skills to handle TeleTOP were very good and they are content with using TeleTOP. One instructor even indicated himself to be an enthusiastic user of TeleTOP (instC) and that he also tries new features offered by TeleTOP. Despite the positive feelings about TeleTOP during the interviews some remarks were made about technical flaws or perceived incompleteness of TeleTOP, but often these were made in a constructive manner.

5.6.3.2 *Organisation*

According to four instructors one of the major aspects in the current mission statement of their faculty is to implement TeleTOP in their educational programs, but one instructor explicitly indicated that the details are not known (instD), and another instructor (instF) remarked that management failed to communicate to faculty members why the implementation of TeleTOP would be beneficial. Another goal of the faculty mentioned by two instructors is to implement the new Bachelor/Master structure and the transition from a trimester structure to a semester structure of an academic year. In general faculties want to attract more students, and in the business-oriented faculty, they want to attract international students. In general there was no great effort to offer educational programs for distance students and this was emphasised by one of the technical-oriented instructors (instE).

According to instA, one of the current goals of the faculty is to assign no extra personnel, although one of the instructors (instE) in a technical faculty indicated that they are already understaffed. This understaffing may also cause the very high workload as mentioned in the previous section (Section 5.6.3.1). Another burden felt by instructors were the many administrative procedures and forms (inst A), maybe according to one of the instructors (instC) because the organisation has become too big.

The university uses a student/credit-unit model to assign budget to faculties and chairs. It turned out that this model was not well known to the instructors (for instance instA

and instC) and that it is far too limited to offer all teaching within these boundaries. As one instructor (instE) indicated that as a result "we surpassed the assigned budgets", and another threatened to "minimise teaching when forced to" (instC). One instructor (instF) predicted that in the near future teaching will have to be offered in one-third of the current assigned time. There will not be any flexibility in teaching anymore and according to one of the instructors (instC) the adage will become: "Only do what you are ordered to do". In general it seems that faculties were still in transition from a previous budgetary model to this new model, and instructors were very worried about the strict rules implied by the model.

All six instructors indicated that there are no specific requirements set by faculty management about how to use TeleTOP in their courses. The only requirement that was mentioned by instructors was that "there should be a site" (instC), but no further requirements about its content or educational or organisational quality. This was confirmed by another instructor (instF) who referred to a letter that was sent by faculty management to all instructors that they all should develop a site, but "instructors will not be able to find the letter. It even will take me an hour to find it." Also instructors were not confronted with requirements about personal time management as long as teaching is delivered on time (instA). According to an instructor of a technical-oriented faculty (instE) "restrictions by management will kill all initiatives". It seems that instructors do not have to follow specific requirements and that faculty management is not concerned about the quality of the course environment or the way instructors handle their time, as long as there is a site and that courses are offered on time. Also during the yearly evaluation meeting with their chair, no specific attention is paid to CMS use in teaching and instructors indicated that they did not have to account for their use of TeleTOP or the lack of it. They also noticed that management did not offer any incentives to promote the use of TeleTOP in their courses.

According to instructors the faculty had arranged support for them to implement TeleTOP in their courses. A few instructors (instD, instE) referred to the Dinkel Institute (a university institute to support educational use of TeleTOP) and valued their support. All three faculties set up a help desk to support instructors, but as one instructor (instB) emphasised, this was only available for two or three days a week, and one instructor (instA) indicated that he gets annoyed when support is not available right away. In the computer-science faculty (according to instF) the specific TeleTOP support was done by two student assistants, but that lasted for only two years. The vulnerability of in-person support was mentioned by instC who felt that "they were very lucky" with the support they got, but that the quality of the service heavily depends on the type of person who supports them. In the business faculty the support had strongly decreased (instA) after a while, and in the computer-science faculty the support was stopped after two years. Based on these interviews, it seems that after a short period when TeleTOP is introduced and management offers additional support (from the Dinkel Institute, or extra student assistants) instructors are left on their own.

5.6.3.3 *Colleagues and collaboration*

The instructors made no remarks about personal feelings about collaborating with colleagues. Probably this is because academics have the freedom to decide to offer a course with some colleagues or to offer it on one's own. All six instructors collaborated with colleagues in a team to develop and deliver one or more courses. Most instructors

also collaborated with an external colleagues (instB, instC, instD, instF), with external guest instructors (instE), or with a novice instructor (instD). Three instructors (instB, instD, instE) were also assisted by student assistants. Collaboration was organised and planned in a collegial manner by all instructors and had only a limited impact on their way of teaching, because all instructors indicated that they offered a specific part of a course and a colleague would offer another part (instB, instC). Probably in this way the work is based on the subject-matter experience of each of the instructors in the team. One instructor (instA) indicated that in one of his courses the work was divided in lectures being offered by a colleague, and organisational and managerial work being handled by himself. Planning was discussed in advance by all instructors, and a few instructors (instA, instB, instC) made specific arrangements about the way the TeleTOP course was set up and kept up-to-date during the course. There was no sign of a very strict hierarchy within teacher-teams. Problems that occurred were that sometimes you lack information because a colleague did not inform you (instA), or that it is not clear who will handle the interactive parts of TeleTOP, such as contributions to online discussions or to handle a question submitted by a student in the Question and Answer facility in TeleTOP. In the technical-oriented faculty they arranged their collaboration in a way that one instructor is offering the lectures, with a "back-up" instructor available who could take over when something unexpected would happen. In general it seems that instructors are collaborating with internal and external colleagues in a collegial but rather loosely defined way: "I do my part, you do yours". In this way planning is kept simple, and there is not much chance of conflicts.

5.6.3.4 *Job Control*

One of the instructors (instF) pointed out that a university is a professional bureaucracy, and thus in his view it is hard to control academics. Maybe that is the reason why all instructors indicated that they are free to perform their work in the way that suits them best. Some instructors remarked that TeleTOP had changed their work (for instance instA, instC) and another instructor (instB) remarked that "you have to manage your work yourself".

Half of the participants (instA,C,E) indicated that they are "not a planner" and sometimes this resulted in last-minute activities (instA). As one instructor remarked, that for many teaching-related activities they "just occur when needed, thus I don't get round to the tasks that are less important", and another instructor (instE) is rather fatalistic and remarked that "he does not want to know" the exact planning, because a planning will change anyway. This was supported by one of the instructors (instB) who is an expert on planning problems and noticed that "to plan teaching is almost impossible" because the planning problem for an instructor is different for each day of the week, which makes teaching "an ultimate example of planning under uncertainty". The same instructor (instB) also emphasised that "using a planning offers grip" but that planning demands great discipline of the instructors. Most of the instructors indicated that they often work overtime (instA,B,C,E,F), mostly at home. One of the instructors (instA) who is not a planner remarked that "there is always something you forget" in contrast to another instructor (instB) who plans more extensively, and maybe therefore indicated that "good planning decreases stress". This suggests that planning is beneficial for instructors, even though one of them sighed "when you are already overloaded an extra planning activity makes it even worse" (instE). InstF encountered a complete mismatch between scheduled time and actual time spent. The use of TeleTOP

in their courses "forces you to better plan your time" (instC), and they all plan specific TeleTOP-related activities, such as to prepare a course, a session, or a lecture (instA, instB), but the level of detail differs. These remarks suggest that planning one's time is not a high priority and although many teaching activities can be planned in advance, this is not frequently carried out in all detail, and as one instructor indicated "a detailed planning is in my head" (instA). When work pressure gets higher this might not be the most effective and error-free way of planning.

To control their time, all instructors indicated that they use Microsoft Outlook and one instructor (instD) emphasised the benefit of using Outlook because "it prevents chaos". Four instructors indicated that they use to-do lists (in Outlook or on paper) to at least list the highest-priority tasks (instA) or to not forget to perform these activities (instB). According to an instructor (instC) so many interrupts occur, "I could list a thousand examples", that in his opinion it will be very hard to control time expenditure. In contrast, another instructor (instD) observed that some of the many interrupts "could have been foreseen if I had thought about it beforehand". This was also supported by an instructor (instA) who indicated that interrupts caused by students dropping by were felt as very frustrating, and he also suggested that "it would be better to schedule these". This suggests that maybe part of these interrupts can be foreseen and planned beforehand if one is aware of these interrupts.

Support was requested by two instructors to set-up a new course (instA, instC). One of the instructors (instC) remarked that it is not efficient to spend time on trying by your own or to read a manual but instead to ask for support at a help desk. Another instructor criticised the attitude of his colleagues who put the burden on someone else and "shift the problem on to a colleague" (instD). Also instructor E noticed that often he has small problems or questions, and these are not important enough to ask someone else. A support tool might be able to offer additional support to instructors and one of the instructors (instC) was very much in favour of such a support tool. He also noticed that it "will be hard to develop, taking into account all the variables". In contrast, instructor A expressed his doubts about a support tool and yet another instructor (instB) would prefer an integrated system which would combine a CMS and a support tool.

To implement such a tool in an organisation, two instructors stressed that it should be done "first time right" otherwise they would not use it again. It would not need to contain "all kinds of fancy stuff" (instA), but at least it should support instructors, especially when performing new tasks (instB) and offer alternatives (instC). As one instructor (instA) expressed as advice: "Keep it very simple and very accessible". Four instructors would like a tool that could calculate the time required for a course, and offer an adequate planning with alternatives. Two instructors (instD, instE) indicated that they would like to have step-by-step plans. Most instructors find checklists very useful and efficient, especially for novice instructors (instB). Checklists could also be handy for unfamiliar instructional formats, such as online discussions (instB), and he continued that "when it [a support tool] makes you aware of special TeleTOP features it already saves time". He also suggested to offer hints and 'best practices' and another instructor (instF) suggested to also offer templates and time savers. The use of video to present new features or to show how to perform a task was valued as negative by instructor D "I dislike video". A facility that could be used to transfer a planning to

Microsoft Outlook "could be felt as 'pedantic'" by instructors, according to an instructor (instC).

A remark was made about TeleTOP by instructor A: "TeleTOP does not solve all my problems, and it will not save me 20% of my time, but often it's about these small operational activities: I have to send a message to all students, you could walk around for half an hour finding a secretary or someone else to help you to handle this. Now you just do it". This remark may also be valid for a support system.

5.6.4 Findings from CAH/STOAS interviews (Study C2)

The interviews held at the CAH/STOAS institutions were analysed in the same way as with the University of Twente responses. The findings were categorised within five main topics and these topics with major findings are presented in Table 26.

Table 26. Summary of findings from CAH/STOAS interviews.

Topic	Major findings
Personal aspects	Workload is too high; causes stress
Organisational	No specific requirements; short introduction to Blackboard
Colleagues/collaboration	Neutral
Online use of a CMS	In start-up phase
Job control	Planning can be improved

These topics and findings as shown in Table 26 will be discussed in more detail in subsequent sections (Sections 5.6.4.1 - 5.6.4.5), based on the interview results shown in Appendix 5 (in Dutch).

5.6.4.1 *Personal aspects*

All seven instructors indicated that they started to use a CMS on their own initiative. In most cases they started with using Blackboard, one instructor started with Lotus Learningspace and another with Livelink, but as one instructor (instF) noticed: "Once you are familiar with a specific CMS, you are familiar with all CMSs". At the time of the interviews all but one instructors were using Blackboard, although only two instructors had used Blackboard for more than one year in their courses. According to instD, some of his colleagues still "have cold feet" to use Blackboard, for part because they are not very skilled in using ICT.

Workload at CAH/STOAS is high, and all instructors complained that the assigned time for teaching is not enough to perform all the work. Five years ago the time to prepare a course was twice as much as today, according to one instructor (instE), and "eventually this will go wrong". Some of the consequences mentioned were that they could not keep the Blackboard course up-to-date (instA), or that there was no time to renew a course (instE). According to instG a general workload of 50 to 60 hours a week is rather normal. One instructor (instE) indicated that a backlog of handling students' assignments and course-related questions brings about a lot of stress.

5.6.4.2 *Organisational*

At CAH/STOAS one of their mission statements is to further implement the use of a CMS in their educational programs. To support and enforce this process an educational professional was appointed. He works in close contact with instructors to develop courses and also guide them to use new instructional formats. According to the

interviewees time is allotted for this development process. To introduce Blackboard, a few short meetings were arranged two years ago. To further deploy Blackboard, one of the instructors (instD) also stimulated his colleagues, and "when there are some enthusiasts, it's rather easy, but if not, you really have to work hard to convince them".

Within CAH/STOAS no explicit requirements for CMS use are stated, but expectations were transferred during the in-person support by the educational professional. In general management expects the site to be educationally sound, and the rest was left to the instructors to decide, for instance about content, course structure, and implications for the instructor.

Some instructors indicated that the administrative procedures are based on a project-management approach, where for instance a specific educational program is handled as a project and working hours have to be accounted to this project (instA). Also instructors became familiar with projects because they supervise students during their apprenticeship which is also organised as a project.

5.6.4.3 *Colleagues/collaboration*

Some instructors indicated that they collaborate with colleagues, for instance instA to develop a new course, and instE to collaborate with colleagues at another location. To easily communicate between instructors in a course team, one of the instructors suggested to also use Blackboard to facilitate this. No specific remarks were made about collaborating with colleagues, probably because almost all sessions with students are face-to-face and instructors are at the institutions all day which makes it much easier to arrange a meeting or have an informal chat during the day than when collaborating with external colleagues at a distance.

5.6.4.4 *Online use of a CMS*

The use of Blackboard was still limited at the time of the interviews and in general the instructors filled their courses with for instance study material, a Roster, PowerPoint presentations, assignments, and external links to resources. Online discussions were not used much, because these are very hard to organise (instC), or because they take a lot of time (instG), much more than discussions in-class. According to two instructors (instB, instD) online discussions can only be carried out efficiently when all participants are informed about the procedure and follow the instructions. According to some instructors, the use of Blackboard was still difficult (instA) and three instructors would like to have better insight in procedures related to Blackboard for instance how to structure a course and where to store specific information.

5.6.4.5 *Job Control*

Also at the CAH/STOAS the instructors have a high level of autonomy (instF) and each instructor performs in the way he or she likes best, also "because we are all stubborn". According to two instructors (instD, instE) each instructor is currently busy to reinvent the wheel. To overcome this inefficiency, one instructor (instA) emphasised the use of a step-by-step procedure, or at least to structure your work within a framework (instE). This was also supported by an instructor (instG) who noticed that working in a structured way will prevent you from all sorts of interrupts, for instance each time some student submits an assignment.

To plan their time, all instructors used a paper-based agenda, probably because instructors and students are all at school and appointments are made during face-to-face sessions or meetings, without a computer at hand. One instructor (instA) stressed that "planning is a necessity, or you go crazy". Three instructors (instB,C,E) indicated that they plan as much as possible, and yet, checking assignments was not planned by instB, because "I just plan that in my head". He noticed that planning will be better for your health and will prevent stress. Other instructors indicated that they only plan face-to-face sessions and meetings and as a result teaching-related activities, such going through assignments, end up at the bottom of the list. Some instructors argued that they find it hard to plan because they do not know how much time to reserve for activities thus "we'll see" (instC). Especially the non-structured, time-independent nature of online discussions is hard to handle, according to instB. None of the instructors reserved time to look through their e-mail.

Most instructors indicated that they use checklists or have the impression that checklists could be very useful instead of a trial-and-error approach (instC). One instructor (instB) noticed that especially when you are a novice user of Blackboard checklists will be very useful, and another suggested that checklists about time usage could be handy. Also a paper-based to-do list was used by one instructor (instA) "otherwise half of the activities will be left unattended".

Support at CAH/STOAS was (and is) offered by an educational professional and this was valued highly by all instructors, as one instructor put it "in collaboration with an experienced person, you learn much faster and in less time". They also remarked that they consult a colleague when they need support (instA), but most of them also try on their own to solve a problem (instB,C,D,G). One of the instructors (instB) indicated that he felt "it is embarrassing to ask for help". This would suggest that a support system could be beneficial, also for another instructor (instC) who stated that she would like to have a Help system available. Two instructors (instD, instE) argued that nothing is arranged by management to organise the exchange of experiences and best practices.

5.6.5 Comparing results of UT and CAH/STOAS instructors

When comparing the findings of instructors at the University of Twente, and the two agricultural universities in Dronten, the first thing that can be observed is the fact that all instructors complain about their workload and that working 50 to 60 hours a week is no exception. As a consequence, they indicate that they do not pay enough attention to teaching-related activities, because these activities are not strictly planned. They also indicate that teaching and using a CMS, such as TeleTOP or Blackboard, takes more time than before. Planning has become much more important because of infrequent nature of submissions and online discussions. To collaborate with colleagues does not create specific problems, partly because instructors are still autonomous to decide whether to collaborate or not, and also because of the way work is split up and each instructor performs his own part. The universities do not state specific requirements about teaching or using a CMS. Support is available, especially during the first two years, when student-assistants or educational professionals coach the instructors. At CAH/STOAS they are still in the start-up phase and an educational professional is still available, but at the University of Twente, this intense support was decreased to general help-desk support. As some instructors argued, the in-person support is preferred, but

not always available, it depends on the willingness and skills of this person, and for some instructors it is even embarrassing to ask for help.

5.6.6 Implications

These interviews suggest that instructors get support during the start-up period of using a CMS and from educational professionals. But that for teaching-related activities they are more-or-less left on their own, for instance how to organise their daily work when using a CMS, how to plan and control their time, and how to develop and deliver courses that are effective and efficient as there are only general constraints and requirements set by faculty management or students. Some instructors would like to have procedures to structure their work and have a better insight into how much time these activities take. Also they would like to get guidelines where best to store specific information in a CMS and how to handle infrequent submissions of assignments and online discussions. Checklists and to-do lists were suggested to overcome some of the practical problems. A support system may be a solution to some of these problems, and they all are willing "to give it a try".

5.7 Actual Performance Aspects According to Management (Study U1)

Instructors are employees in an organisation and perform their teaching within educational programmes under the direction of directors of educational programmes. To get more detailed information about the actual situation of instructors and their teaching-related activities from the administrative perspective six directors of educational programmes and programme co-ordinators at the University of Twente were interviewed. An international survey that addresses instructors' performance according to university managers will be discussed in Chapter 6. In Figure 34 the link of this study with the Personal Performance Model is highlighted.

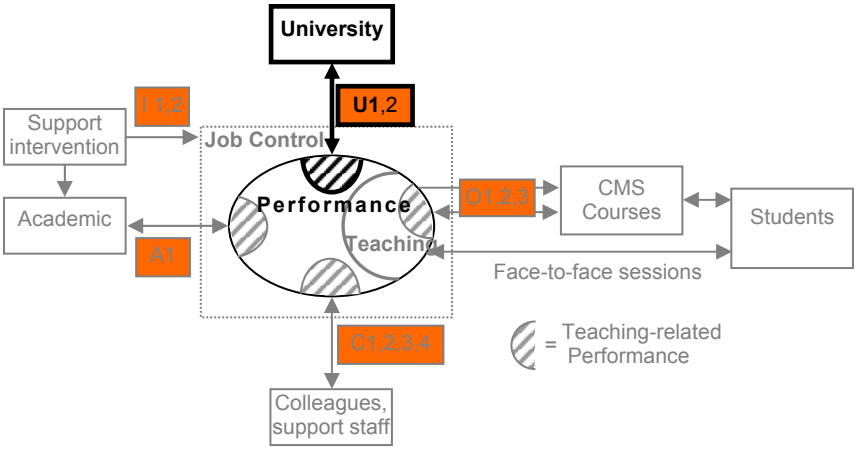


Figure 34. Personal Performance Model with Study U1 highlighted.

In Section 5.7.1 an introduction to this study with the research questions for this study are presented. In Section 5.7.2 the participants in this study and the research procedure are given. In Section 5.7.3 the results are shown, followed by an analysis of these results and their implications in Section 5.7.4.

5.7.1 Introduction to the study

To get insight into work circumstances and performance aspects of instructors, the directors of educational programmes and programme co-ordinators were involved in this research. In the following sections these participants will be called 'managers'.

The main questions to investigate were:

- What are current working conditions of academics set by the organisation, especially for teaching?
- How are academics performing their teaching-related activities according to programme managers?
- How are academics supported?

"Semi-structured" interviews (Kvale, 1996) were used (see Section 4.2.2, Table 9) in which the interviewees were able to give more-elaborated answers and also to address topics as felt to be important by the interviewees.

5.7.2 Participants and procedure

The directors of educational programmes in the University of Twente of four faculties were asked to participate in this study. Two programme co-ordinators were also invited to participate because they may have more insight into student-specific aspects. One of the co-ordinators was accompanied by an administrative staff member of Bureau Educational Affairs. An overview of these managers is shown in Table 27.

Table 27. List of interviewees: managers in the University of Twente.

Code	A	B	C	D	E	F
Faculty code	TEL	WB & IO	EL	TN	BSK	TEL
Type of faculty	technical	technical	technical	technical	public admin	technical
Role	director	director	director	director	programme co-ordinator	programme co-ordinator + a member of Bureau Educational Affairs
Date of interview	2-10-2002	11-10-2002	8-11-2002	13-5-2003	1-10-2002	7-10-2002

Note. TEL= Telematics; WB= Mechanical Engineering; IO= Industrial Design; EL= Electrical Engineering; TN= Applied Physics; BSK= Public Administration and Public Policy; BOZ= Bureau Educational Affairs.

Each interview was transcribed literally to a text document in Word. Then each interview was analysed in the way described for instructor interviews (see Studies C1, C2) and remarks were categorised. This categorisation process was performed in many iterations, because new insights were gained after each interview. The responses are summarised in Appendix 6.

5.7.3 Findings

After analysing the interviews with the managers in detail, the findings were categorised within five main topics. These topics with major findings are presented in Table 28.

Table 28. Summary of findings from interviews with UT managers.

Topic	Major findings
Instructor's personal aspects	Workload is too high; causes stress
Organisational	No specific requirements; No incentives to use TeleTOP
Colleagues/collaboration	No remarks
Online use of a CMS	No specific problems
Job control	Instructors are autonomous; no influence by management; no requirements except student/credit-unit model
Support	workshops offered to introduce TeleTOP

These topics and findings as shown in Table 28 will be discussed in more detail in subsequent sections (Sections 5.7.3.1 - 5.7.3.6) based on interview-results shown in Appendix 6.

5.7.3.1 *Personal aspects of instructors*

According to the managers most instructors are highly skilled to use TeleTOP in a technical sense, although in their courses they only use basic features of TeleTOP (mngrE). Overall managers had the impression that instructors are too stubborn to change when they do not see a direct benefit of something new. Instructors also want to do their teaching in their own way (mngrF). It was also noticed (mngrC), that some instructors are more innovative than others. One manager (mngrF) pointed out that a fundamental attitude of academics is that they do not want to admit that they can not solve a problem themselves.

All managers indicated that in their opinion the workload of instructors is too high and that working 50 to 60 hours a week is very common for most instructors, whereas 40 hours is the standard. One manager (mngrE) even called the workload of instructors 'immense', and another manager (mngrC) remarked that the whole academic community in his faculty seems overstrained and that pressure on instructors is far too high. Manager B mentioned that this is caused by low budgets that imply not enough time for teaching and as a consequence, instructors have to work during the evening or the weekend. Especially teaching-related activities are performed at home (mngrB,C,D). Teaching has become very vulnerable, according to manager B, for instance when an instructor gets ill because of a high workload or stress. Another consequence is that there is no time for innovations in teaching or to improve TeleTOP use (mngrC), because as one manager cited an instructor "I have enough on my plate already" (mngrF). Manager D indicated that pressure on instructors will still increase "because of for instance major changes in curricula, low budgets, less assigned teaching-time, and a strong demand to perform at an ever higher level".

5.7.3.2 *Organisational aspects*

The managers of these technical and public admin faculties mentioned that there were no specific plans in their faculties to attract distant students who could study via TeleTOP. Also it seemed that there were no strict plans developed to guide the implementation and deployment of TeleTOP. In general management initiated the use of TeleTOP, but the implementation process was carried out in a gradual and rather informal way (for instance mngrA,E). At two faculties a few workshops or presentations were held (mngrA,E), but in general there was not much specific introduction to the academic community as a whole. Instead, in three faculties extra personnel were appointed (mngr A,D,E), in two faculties as an extra employee in the support staff (mngrA,E) and in another faculty (mngrD) as an extra instructor with a specific commission to implement ICT and TeleTOP. To support instructors and make it as easy as possible to transfer their courses to TeleTOP (mngrB), a similar process (mngrE) was carried out as had been successful at the Faculty of Educational Science and Technology, the first faculty to use TeleTOP. To stimulate instructors to start using TeleTOP, two faculties (mngrA,C) funded extra hours needed by their instructors to transfer course material to TeleTOP, and one faculty (mngrC) also funded extra educational support offered by the Dinkel Institute. The implementation was carried out in a very informal way where instructors could 'just call' and they were served, but as one manager (mngrA) remarked 'This was pure luxury". At all faculties the extra support phased out after a while (for instance mngrA,E) and currently (at the time of the interviews) it has become part of help-desk support and instructors "are left on their own" (mngrF). These remarks show that there should be a clear commitment set by management and that it helps when extra in-person support is offered, although this is much too expensive for a long period of time.

Some managers referred to the concerns they had about the way instructors would react to the implementation of TeleTOP in their faculty. They expected instructors to be sceptical (mngrA,B) and would refuse to use TeleTOP because of a 'not invented here' syndrome (mngrC) or because they would have to give up their self-developed websites (mngrB). Manager C remarked that instructors have to be convinced of the benefits, but in another faculty, these were not communicated well (mngrF). It seems necessary to take special notice of the way the instructors are informed about the benefits of a change.

Requirements set by faculty or university management were indicated as rather general by the managers, for instance that instructors have to teach according to the curriculum (mngrA) or that they should follow the right administrative procedures (mngrD, F). As one manager (mngrE) remarked, "guidelines often occur by accident", not in a systematic way and without much guidance offered to the instructors. All managers indicated that the major constraint that is put on instructors' work stems from the new budget model. This student/credit-unit model is used to refund money based on the number of students that completed a course and the length of the course expressed in credit-units, where one credit-unit is 40 hours of study. As one manager (mngrC) noticed, budget is decisive: "available budget fixes teaching time, instead of required teaching time that fixes budget". This was supported by manager E who also remarked that budget is decisive, even more than efficiency. Some managers (for instance mngrA,B,C) remarked that budget can still be converted to teaching time, and according to manager C one student / credit-unit equals about 2.1 hours teaching time

of an instructor, but this norm may decrease when budgets drop further. Two managers (mngrA,C) noticed that they expect that departments and chairs will be transformed to a kind of business unit and will have to manage their own budgets, but still have to "produce courses" as agreed upon (mngrC). As a result of budget limitations, instructors will limit their teaching efforts and at least limit time-consuming teaching-related activities, such as offering assignments and marking these, or they have to work more effectively and efficiently.

Requirements set by management about the use of TeleTOP are also very general, for instance that there should be a course environment in TeleTOP. No further standards were set and instructors are free to structure a TeleTOP course the way they like (mngr A,C), which may result in some sites with no content at all (mngrF). Some managers (mngrB, E) explicitly remarked that it is the responsibility of the instructor what the content and quality of a course is. Four managers noticed that students will force instructors to improve and innovate their sites and to structure good-quality course sites, but still there is no policy set by management (mngrF). One manager (mngrF) was worried about the copyright issues of offering study material through TeleTOP, and that instructors currently are not aware of these issues. Overall, there are no specific TeleTOP requirements, which could result in bad-quality sites and leaving instructors without guidance.

None of the managers indicated specific incentives or penalties for instructors related to TeleTOP use. No quality-control of the TeleTOP sites was carried out by managers (for instance mngrA,B,E) and TeleTOP use was not part of a yearly performance interview with individual instructors (mngrD). As some of the managers indicated (mngrB,C) the use of TeleTOP has become commonplace. This may be true, but the lack of incentives will not stimulate instructors to use TeleTOP or to improve the quality of the courses.

5.7.3.3 *Collaboration*

Collaboration between instructors was mentioned by all managers. They indicated that in all faculties there are curriculum consultations about common interests, such as the distribution of courses over the year and over the chairs and about the structure of these courses, for instance to balance lectures, assignments, and groupwork. During an academic year semester or trimester consultations are arranged to discuss actual problems and experiences. Managers indicated that when required, instructors collaborate with colleagues within their faculty and also with colleagues from other faculties or other universities. This could mean that they offer courses in a teacher team (mngrD) or that they invite guests (mngrB), even from other countries, such as Germany (mngrB). Division of work was left to the teacher team (mngrD), but collaboration will imply more co-ordination efforts and thus related planning problems (mngrE). It seems that although instructors often collaborate in course teams, in general they deliver their part of a course, as a more-or-less stand-alone unit, encapsulated within the course. This reduces co-ordination and planning problems.

5.7.3.4 *Online CMS use*

Almost all courses have a TeleTOP site according to the seven managers interviewed and the use of TeleTOP to offer courses had become commonplace. They felt that instructors are satisfied with the use of TeleTOP. All managers indicated that instructors find it easy to use, but that there is a great variety among instructors in the way they use TeleTOP for their courses and it also varies per course. Most instructors

fill TeleTOP with for instance rosters and PowerPoint sheets, but online discussions are hardly offered. One manager (mngD) noticed that there is not much interactivity in current courses. Another manager (mngrD) suggested that instructors should use TeleTOP in a much more-uniform way, but that implies that they should know where to store the specific course information. In one faculty (mngrF) to register for a TeleTOP course or to have access to TeleTOP is not mandatory for students, which may cause great difficulties for instructors. They might develop a TeleTOP course for a course for which 40 students sign in, of which only two students use the TeleTOP environment (mngrF). This will cause much extra effort and will frustrate instructors.

5.7.3.5 *Job control*

All managers indicated that instructors are free to organise their work in the way they like best. There are no specific requirements except that they have to offer their courses according to the roster. Their planning will be based on the roster, but according to manager B "often instructors just let it happen and say: we'll see". He also noticed that instructor often prepare a session the night before. This might explain why instructors (according to mngrD) often are surprised by teaching-related activities and as a result "lock themselves up for three days" to catch up. Specific planning problems occur (mngrD) while instructors do not have information about the number of students that will attend a course prior to the start of the course. Instructors also strongly rely on their memory and the invariability of course content. They do not prepare their lectures weeks ahead when these are similar to last year (mngrB).

5.7.3.6 *Support*

All managers confirmed that instructors have to solve their own problems and that apart from a technical-oriented helpdesk there is no additional support offered. The use of student assistants was not so clear, because some managers (e.g. mngrA) indicated that there is no budget for a student assistant or a technician, while another manager (mngrE) considered the suggestion to decrease budget by arranging extra student assistants as they are cheaper than instructors. Student assistants might also be useful to handle teaching-related activities when they are instructed well beforehand. Overall there were no plans for additional support of instructors and especially novice instructors are "thrown in at the deep end" (mngrA). According to the managers instructors will ask a colleague when they need support but that instructors are unaware of the best practices of their colleagues and that they do not exchange tips and tricks (mngrE).

Managers were a bit reluctant about the willingness of instructors to use an extra performance-support tool. According to one manager (mngrB) offering tips and guidelines might help to support instructors to perform more effectively and efficiently. The tool should be specifically designed to meet their specific needs, because otherwise instructors will refuse to use it (mngrC). One manager (mngrF) suggested to merge TeleTOP and the VIST database (used at the University of Twente for course descriptions) to prevent an overlap of activities to perform. Overall the impression of the managers is that when a performance-support tool is presented to the instructors in such a way that they can see the benefits of using the tool, that instructors will give it a try.

5.7.4 Analysis and implications

According to the managers the attitude of instructors at the University of Twente can be described as positive towards ICT and the use of TeleTOP, but they have to be convinced of the benefits. Managers indicated that almost all instructors complain about their workload which they perceive as far too high and which will still increase in coming years. It was felt by the managers that pressure on instructors will increase even more because of changes in curricula, and low budgets. Managers indicated that budgets have become decisive and that the time that can be made available for teaching will be fixed by those low budgets. It was the impression of the managers that most instructors work during the evening and weekend to catch up and especially do their teaching-related activities. Managers were aware of the fact that there is an end to this as instructors already work 50 to 60 hours a week, where the norm is 40 hours. Many of the managers feared that all this will cause great stress on instructors and that teaching will become very vulnerable.

The implementation of TeleTOP was not a big problem and did not drastically increase workload. During the introduction period of TeleTOP use, instructors could get support from additional personnel, and also educational support from the Dinkel Institute. When the use of TeleTOP consolidated the additional support was removed although instructors only used basic features of TeleTOP and there was not much interactivity in their courses yet. Management is not offering any incentives and no guidelines how to use TeleTOP or how to arrange one's work. As one manager noticed "they are left on their own" and especially novice instructors are "thrown in at the deep end". There are no plans to change this and offer more support. Managers agreed that a support tool might be useful to offer additional support to instructors but they are a bit reluctant whether instructors will start using it.

5.8 Conclusions

From the studies described in this chapter major findings related to performance gaps are summarised (Table 29). The dimensions as defined in the Personal Performance Model (see Chapter 3) are shown in the first column. The last column shows a label to indicate a gap between desired performance and actual or expected performance, or a need for resources to be able to perform as desired.

Table 29. Summary of findings related to performance gaps.

PPM dimension	Study code	Findings related to performance gaps	Gap / lack of:
Academic (A)	A1	Colleagues reluctant to use TeleTOP	Implementation plan
	A1	Instructors have to learn how to use TeleTOP	Planning
	A1	To keep a course-site up-to-date is a problem	Implementation plan
	A1	Procedures how to use educational formats not clear	Support
	A1	Procedures how to use TeleTOP not available	Support
	A1	Instructors sometimes need support	Procedures
	A1	More-and-more instructor on his own	CMS procedures
	A1	Instructors have no control on time expenditure	CMS procedures

Table 29 continues …

Table 29 continued

Colleagues ©	C1	Instructors like to have templates available	Guidelines
	C1	Instructors find checklists useful but they are not available	Information
	C1	Instructors find to-do-list per task useful but they are not available	Guidelines
	C1	Management offers no incentives related to TeleTOP use	Job control
	C1	Instructors like to get hints / tips	Job control
	C1	Instructors are not informed adequately by management	Procedures
	C1	Instructors not informed about student / credit-unit model	Job control
	C1	Instructors like to use step-by-step plans and procedures but they are not available	Planning
	C1	Instructors find work procedures within teams unclear	Information
	C1	Instructors forget to perform activities	Admin procedures
	C1	Instructors find administrative procedures and forms a burden	Procedures
	C1	Instructors are not informed about requirements related to time expenditure, TeleTOP use, and quality constraints	Support
	C1	Instructors need support: about new educational formats and how to plan their time	Information
	C1	Instructors forget to plan activities	Implementation plan
	C2	Instructors find checklists useful but not available; about activities, time, Blackboard use	Guidelines
	C2	Instructors feel a need to be informed about experiences and best practice by colleagues	Planning
	C2	Instructors find project-management approach useful	Information
	C2	Instructors would like to get CMS procedures but they are not available	Job control
	C2	Instructors would like a framework or step-by-step procedures	Job control
	C2	Instructors have problems to keep course site up-to-date	Planning
	C2	Instructors do not know about requirements related to Blackboard use	CMS procedures
	C2	Instructors do not plan teaching-related activities	Procedures
	C2	Instructors have no time to change a course or start a new one	CMS procedures
University	U1	Instructors find guidelines useful but not available	Planning
	U1	Instructors experience that there is no exchange of info, best practice, tips, and tricks	Planning
	U1	Directors do not facilities/procedures how to follow administrative rules	Information
	U1	Directors prefer that TeleTOP is used in a more-uniform way	Procedures
	U1	Directors do not offer instructors requirements related to TeleTOP use, time use, quality	Information
	U1	Directors do not offer specific support: instructors are left on their own	Job control

Table 29 continues …

Table 29 continued

	U1	Instructors do not plan adequately	Information
Online	O1	Activities in TeleTOP are 'conservative', not much interaction	procedures
	O1	Instructors need guidelines, procedures	Job control
	O1	Support needed for administrative, organisational, and technical	Planning
	O2	Instructors are not well aware of their time expenditure, not even when time sheets are filled	CMS procedures
	O2	Instructors do not stick to their planning	Support
	O2	Many interrupts occur of which some could be planned in advance	Guidelines
	O2	Instructors do not plan TeleTOP activities	Support
	O2	Instructors' time expenditure diverse: per course, per instructor	Planning
	O2	Instructors' time expenditure for teaching-related activities very diverse per day/week	Planning
	O3	Instructors place course information at the wrong place	CMS procedures
	O3	TeleTOP use by instructors very diverse	Planning
	O3	Instructors use TeleTOP in a 'conservative' way, not much interaction in a course	Support
	O3	Instructors do not put much effort in developing and delivering TeleTOP courses	Guidelines

In Table 29 findings are summarised and some aspects in current performance are or will become problematic and when appropriate this is indicated in the last column. Some of the problems may be caused by a gap between current and desired performance such as new educational structures and formats that have to offered, others are caused by a lack of support for instance to better plan their time, or supportive material such as a set of CMS procedures, or a set of requirements/guidelines. This will be discussed in Chapter 7.

Based on these findings the following conclusions can be summarised:

- Many instructors complain about their workload and this was confirmed by their managers
- Managers at the UT offer no requirements how to use TeleTOP and no guidelines about quality. There are also no incentives to stimulate TeleTOP use or improve quality.
- Instructors perform their work in various ways; a rather common way to categorise their work is in activities before, during and after a course, combined with interactions and exams.
- Instructors use TeleTOP in various ways; there is great variety in their TeleTOP time usage; their ideas about actual TeleTOP usage are inaccurate when comparing time sheets and logfiles.
- The analysis of TeleTOP courses showed that there is a great variation in course content, but mostly basic features; when calculating invested time, TeleTOP does not take so much time during a course, also because few interactivity options are chosen.
- There is a great variety in time usage of instructors; often they plan only face-to-face sessions

- The UT instructors are left on their own with no additional support after an initial period
- The CAH/STOAS instructors are getting intensive in-person support, but based on the UT experiences, this may soon decrease or even vanish because of budget reasons.
- Collaboration with colleagues and support staff is often unstructured, with no specific planning.
- Instructors feel they are not in control

In all, instructors work in the way they like, with no requirements, no incentives, no additional support. Still workload is too high and increasing, with new demands emerging because of changing curricula and lowering budgets. Many interviewees fear that this will cause stress and make teaching vulnerable.

Offering a support tool might help according to these studies and instructors are willing to give it a try when it is designed specifically for instructors and implemented in a proper way.

6 Performance and Needs of Academics in an International Perspective

In Chapter 2 it was argued that to improve performance the desired performance and the actual performance have to be analysed and compared. In Chapter 3 the desired performance was analysed from the literature leading to a Personal Performance Model. In Chapter 5 actual performance in The Netherlands was analysed. In this chapter the actual and expected future performance and needs of academics in seven (mostly European) countries will be analysed using survey results. By "expected or predicted performance" was meant the respondents' idea of how their work situations would be like in 3-5 years. This is not the same as the "desired performance" analysed from the literature in Chapters 1 and 3 but instead is a sort-of extended actual performance. Figure 35 shows the emphasise of the chapter in terms of the HPT model.

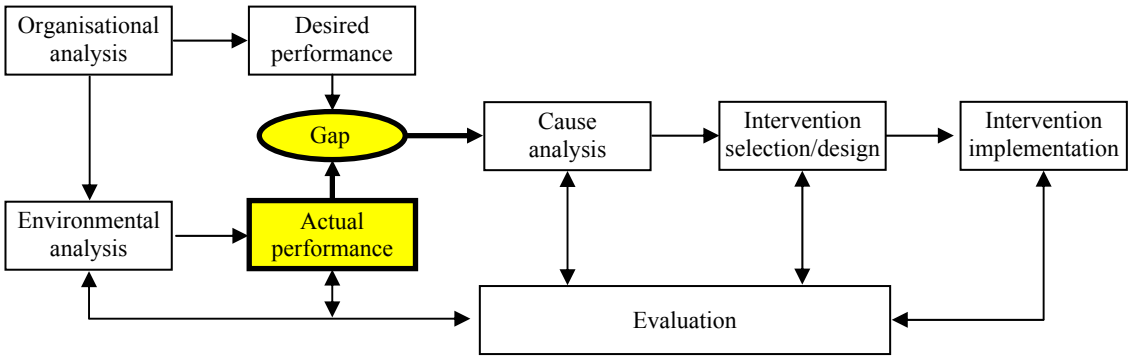


Figure 35. Schematic HPT model with major focus of this chapter highlighted.

First, the research questions for the international survey are related to the research questions of this dissertation (Section 6.1). Then the international survey is described (Section 6.2). Findings are described in five sections: instructors' characteristics (Section 6.3), colleagues and support-staff aspects (Section 6.4), University aspects (Section 6.5), Online-teaching aspects (Section 6.6), and aspects related to support and Interventions (Section 6.7). In Section 6.8 findings are analysed and interpreted, that lead to conclusions (Section 6.9).

6.1 Research Questions for this Survey (Studies C3-4, U2)

In Chapter 1, the main problem areas for this PhD research were stated:

1. What are key aspects of academics' teaching-related performance that are coming under increased pressure in the changing university context?
2. How can an individual academic stay in control of these pressures?

As universities all over the world are in the process of implementing course-management systems to bring about online teaching support, the problem can also be analysed from an international perspective. To analyse the international situation of academics performing their teaching and teaching-related activities, part of a large-scale international survey was designed to address the following research question:

"In a changing university context, what are the implications of various choices / models for technology use, views on teaching and learning processes, and time, workload, and satisfaction of staff?.

More-specific research questions were:

- How do instructors in various countries perceive their tasks?
- How do they perceive their workload and time usage?
- How do they manage their planning and performance?

These questions deal with teaching and teaching-related activities as already discussed in Chapter 3. The relation of this international study with the Personal Performance Model is shown in Figure 36 with the international survey highlighted. Further details of the international survey are discussed in Section 6.2.

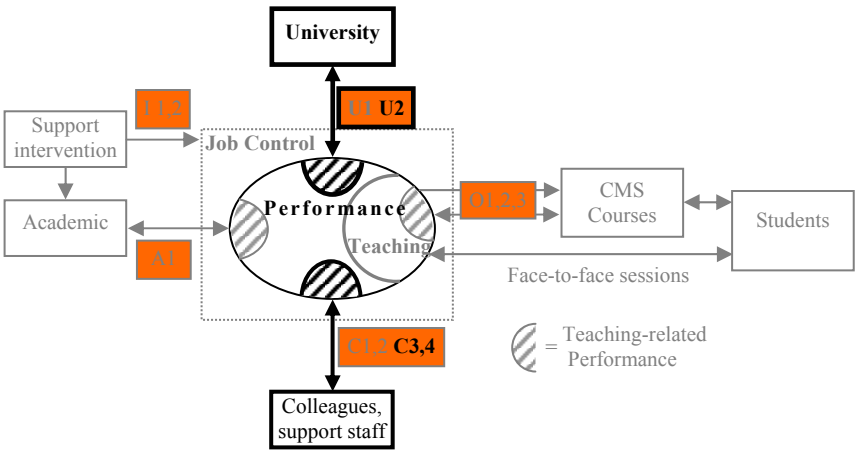


Figure 36. Personal Performance Model with international study highlighted.

6.2 Introduction to the International Survey

In 2001 an international comparative study on Models of Technology and Change in Higher Education was launched by CHEPS (the Centre for Higher Education Policy Studies) and the Faculty of Behavioural Sciences (formerly known as Faculty of Educational Science and Technology) of the University of Twente in the Netherlands (Collis & Van der Wende, 2002). The study was co-funded by SURF (the support agency for technology in higher education in the Netherlands), the Bertelsmann Foundation, Germany, and the Norwegian Ministry of Education. The survey examined four future scenarios for educational delivery (Collis & Moonen, 2001) as shown in Figure 37.

Scenarios of the future in which flexible learning will be part of a setting …

	Where local and face-to-face transactions are highly valued	*Where global and network-mediated transactions are the norm*
In which the institution offers a program and ensures its quality	**Scenario A** Quality control of a cohesive curriculum, experienced in the local setting (current situation) ***Back to the basics***	**Scenario B** Quality control of a cohesive local curriculum, available globally ***The Global Campus***
In which the learner chooses what he wants and thus takes more responsibility for quality assurance	**Scenario C** Individualisation in the local institution ***Stretching the mould***	**Scenario D** Individualisation and globalisation ***The New Economy***

Figure 37. Four scenarios for educational delivery (Collis & Moonen, 2001; Collis & Van der Wende, 2002).

Figure 37 shows four scenarios: **Scenario A** *Back to Basics* is the current dominant situation for many traditional post-secondary institutions, but many universities are starting to experiment with distance participation in their established programs. This can lead to **Scenario B** *The Global Campus*. **Scenario C** *Stretching the Mould* relates to increased flexibility with or without changing the underlying pedagogical model within the institution. Many traditional universities are now moving toward some forms of *Stretching the Mould*, by offering more flexibility for participation within their pre-set programs. **Scenario D** *The New Economy* is the most radical; a systematic example of it does not yet seem to be available in most traditional universities and yet it is increasingly being seen as the way of the future. The scenarios had been developed as a result of research within the University of Twente. The purpose of the survey was to test the validity of these scenarios in a broader context and the questions in the survey were based on these scenarios. Specific questions related to the current and future work of instructors were included for the Personal Performance research (Gervedink Nijhuis, 2002).

6.2.1 Instrument

Based on the scenarios discussed in the previous section, three questionnaires were designed tailored to three actor groups: instructors (Study C3), support staff (Study C4), and decision makers (Study U2) (see Appendix 7 for the instructors' questionnaire). Major categories of questions were: mission and general ICT aspects; policy and leadership processes; student aspects; staff aspects; technology aspects; external environment; perceived impact of technology use; and predictions for the near future. The survey was carried out in 2001/2002 and the then near future was indicated

as the year 2005. The general term ICT which also covers Web-based course-management systems was used to be able to also elicit the opinions of those respondents who are using ICT but are not using a CMS. Analyses of items relating to the instructors' usage of different ICT tools and systems showed that a CMS was in the 'average-used' group of technology use (along with word processing, PowerPoint and email) (Collis & Van der Wende, 2002). Thus, although the results are stated in terms of ICT they can be translated in terms of a CMS.

Each of the three questionnaires contained a core set of 36 common items for instance about: teaching aspects in mission statements of the institutions; current use of ICT in teaching; the support offered to instructors; and predicted use of ICT in teaching in the near future. Specific questions related to the current and predicted work of instructors were added, for instance about their attitude towards technology; their workload; their planning; their feelings about current and future time expenditure; the current and future teaching settings; the organisational demands and incentives; the use of ICT and CMS's in teaching; and the support available to instructors. Individual items will be shown in the Results sections (Sections 6.3 - 6.7). All items were answered in a five-point Likert-type scale, with "1" the lowest value and "5" the highest positive value.

6.2.2 Procedure

Seven countries were involved: The Netherlands, Germany, Norway, the United Kingdom, Australia, Finland, and the USA+Canada. The respondents were selected based on their job and organisational position via information from institutional ICT co-ordinators. Three actor groups participated in the survey: instructors, decision makers, and support staff. Respondents were offered access to a website and then asked to select the proper questionnaire for their actor group. After filling out the questionnaire, respondents submitted their responses via the Web-based form and these were automatically stored in a database. The survey started in November 2001 and ended in April 2002 when the data-analyses process started.

6.2.3 Respondents

A total of 693 respondents representing 174 institutions submitted their responses to one of the questionnaires. Three respondents were rejected, because their countries were not involved in the survey, leaving a total of 690 respondents. The distribution of respondents over countries is shown in Table 30.

Table 30. Overview of number of respondents by actor group and country.

Actor group	**Country**							**Total**
	Germany	Norway	Australia	Nether -lands	Finland	UK	USA + Canada	
Instructors	207	45	41	13	23	9	9	347
Decision makers	94	20	14	24	14	9	14	189
Support staff	63	21	21	20	15	13	1	154
Total	364	86	76	57	52	31	24	690

In the following sections, main results relating to academics' performance aspects as depicted in the Personal Performance Model (Figure 36) will be presented.

6.3 Instructors' Characteristics (A)

From the survey some insight into instructors' characteristics and attitudes towards ICT can be distilled. First the teaching experience of instructors is shown (Table 31).

Table 31. Years of teaching experience in higher education of instructors (*n*=339).

How many years of teaching experience in higher education do you have?	**Percentage**	**Cumulative Percentage**
Less than 1 year	1.5 %	1.5 %
1-5 years	21.8 %	23.3 %
6-10 years	24.2 %	47.5 %
11-15 years	15.9 %	63.4 %
More than 15 years	36.6 %	100 %

From Table 31 it can be concluded that more than 75 % of instructors have more than five years of teaching experience in higher education, and still a majority (52.5 %) has more than 10 years teaching experience. This may indicate that many of the instructors did not start their teaching careers using ICT.

Table 32 reports other instructor characteristics related to attitudes towards technology.

Table 32. Attitude of instructors towards technology (*n=347)*.

To what extent is each of the following like you?	***M* (*SD*)**
My interest in technology in general	4.07 (1.01)
My self confidence in technology	4.05 (.94)
My willing to make use of ideas found on the Web	3.71 (1.07)
My tolerance for problems related to using technology	3.62 (1.03)
I feel comfortable and confident about my use of ICT for teaching-related work.	3.93 (.98)
My experience in using ICT in teaching	3.59 (1.09)
My satisfaction with respect to working conditions related to the use of ICT	3.27 (.92)

Note. Scale:1=not at all, 3=somewhat, 5=very much.

It can be seen (Table 32) that instructors' interest in technology is high. Instructors indicate that their self-confidence in technology is high and their tolerance for technical problems is rather high. Instructors have a moderate experience in using ICT in teaching but are willing to make use of ideas found on the Web. In general instructors are willing to use ICT, also for their teaching-related activities. The neutral score on satisfaction about the working conditions related to ICT use indicates that working conditions should be improved for instructors.

6.4 Colleagues (C)

The survey also analyses the job-control aspects of instructors at institutions of higher education in seven countries. Their perceptions about workload, autonomy, time aspects, and planning will be discussed in the next list.

- **Workload**

  The respondents were asked about their workload in general and their workload with respect to teaching for the current situation and what they predict for near future (Table 33).

  Table 33. Current and future workload according to instructors (*n*=347).

For each of the following, which term best describes your feelings about your current / future situation?	**Current, 2002** *M* (*SD*)	**Predicted, 2005** *M* (*SD*)
Workload in general	2.89 (1.07)	2.88 (1.06)
Workload with respect to teaching	3.16 (1.02)	3.14 (.99)

Note. Scale: 1=serious problem, 3=neutral, 5=very satisfactory.

  In general, the respondents were neutral about the general workload as they perceive it, now and in the near future, which was also the case for the perceived teaching workload now and in the near future. A paired t-test does not show significant differences ($p>.05$) for both questions. This implies that instructors do not expect big changes. When asked about the current balance between research and teaching the results indicate that the balance is slightly more towards teaching (*M*=3.25, *SD*=.94).

- **Autonomy**

  When in this survey instructors were asked about their freedom concerning when and how to use ICT instructors indicated that they were very positive (*M*=4.07, *SD*=0.88). Because of this autonomy to use ICT instructors are responsible to use ICT in an efficient way. Table 34 shows to which extent instructors feel they have become more efficient by using ICT.

  Table 34. Extent to which instructors have become more efficient by using ICT (instructors' perceptions) (*n*=347)

To what extent would you say you have become more efficient in the following tasks through your use of ICT?	**Instructors (*n*=347)**
	M (*SD*)
Finding resources to use in my courses	4.16 (.83)
Managing administrative data about my students	3.79 (.94)
Doing routine tasks relating to my teaching	3.75 (.93)
Doing tasks relating to planning and managing my agenda in general	3.57 (.93)
Giving feedback	3.50 (.93)

Note. 1= much less efficient, 3=neutral, 5=much more efficient.

  As shown in Table 34 instructors feel they have become more efficient in using ICT for their teaching-related activities in all aspects (with *M*>=3.50), of which finding resources, managing administrative data, and doing routine tasks related to teaching score highest. Instructors indicate that doing tasks relating to planning and managing their agendas have not become more efficient. When asked in another

question about the extent to which planning tools influence actual teaching practice, instructors indicate that they have little influence (*M*=2.63, *SD*=1.13).

Table 35 shows current feelings about ICT related to teaching.

Table 35. Current feelings about ICT use related to teaching according to instructors (*n*=347)

To what extent is each of the following the case for you?	**Instructors** *M* (*SD*)
The use of ICT is becoming a normal part of the way I do my teaching-related work	3.74 (1.08)
Using ICT is facilitating new forms of learning in my courses	3.57 (1.07)

Note. 1=Definitely not, 3=Neutral, 5=Definitely yes.

Table 35 shows that instructors indicate that the use of ICT is becoming part of the way they do their teaching-related work (*M*=3.74), but it is far from being definitely so, which suggests that instructors are not in the habit of using ICT for all their teaching-related activities. Also their perception about ICT facilitating new forms of learning scores between neutral and somewhat, which may indicate that instructors are rather reluctant in using such new forms.

- **Time aspects**

  First the general impact of technology is analysed for the current and future situation (Table 36).

  Table 36. Impact on time and patience when using technology (current and predicted), according to instructors (*n*=347).

Which term best describes your feelings about your current situation?	**Current, 2002** *M* (*SD*)	**Predicted, 2005** *M* (*SD*)
Impact on your time and patience when using technology in general	3.14 (.99)	3.30 (.96)

Note. Scale: 1=serious problem, 3=neutral, 5=very satisfied.

Table 36 shows that instructors are more or less neutral about current impact, and expect a more satisfying situation in the near future. This difference is significant (*p<.05)* based on a paired t-test.

Instructors were also asked to indicate how they feel about the amount of time they need to perform specific (ICT-related) duties in their current situation and in the near future (Table 37).

Table 37. Feelings of instructors about the amount of time to perform typical instructor's duties both current and predicted (*n*=347).

The following are typical duties of an instructor. Indicate your feelings about the amount of time these activities take for you, currently and in the near future.	***M* (*SD*)** - current - predicted
Answering questions from students	3.74 (.86) -
Dealing with e-mail	3.56 (1.21) 3.42 (1.26)
Learning to use new technology	3.21 (1.03) 3.30 (.98)
Managing exceptions for individual students (in assignment, tests, meeting times, etc)	3.09 (.94) 3.23 (.95)
Managing course facilities (setting up the classroom, seeing that computer facilities are available, etc)	3.08 (1.04) -
Marking and grading and giving feedback	3.08 (.87) 3.16 (.94)
Using a course-management system	3.02 (.83) 3.33 (.89)
Making changes in your courses because of institutional changes	2.92 (.93) -
Attending meetings related to your courses (curriculum planning, programme-related discussions, etc)	2.90 (.95) -
Responding to unexpected interruptions	2.73 (.93) -
Solving technical problems	2.65 (1.10) 2.97 (1.03)

Note. Scale: 1=I am very annoyed by the time needed, 3= Neutral (or not applicable), 5=I am very satisfied about the time needed. A dash indicates that instructors were not asked to predict this activity.

According to Table 37 instructors perceive the current situation rather satisfying for the time they need to answer questions from students, handling E-mail, and learning new technology. They have neutral feelings about managing exceptions for individual students, managing course facilities, marking and grading, using a course-management system, and making changes to courses because of institutional changes. But they are rather annoyed about the time needed to attend meetings, responding to unexpected interrupts, and solving technical problems. The current perception is of a generally non-complaining level of feeling about the time needed for typical instructors' duties.

Instructors predict for the near future (Table 37) that dealing with e-mail, learning to use new technology, managing exceptions, and marking and grading will all be rather satisfactory related to the time needed, but solving technical problem is expected to be neutral in the near future.

When comparing the current and future situation, all scores (those that were asked for both situations) are expected to be more satisfying in the future. Instructors' feelings about current and predicted time needs were also analysed using the paired t-test method. The paired t-test shows that instructors expect that they will be significantly less satisfied ($p<.05$) about the time they will need dealing with e-mail. Learning to use new technology showed no significant difference ($p>.05$).

Managing exceptions, marking and grading, and solving technical problems are expected to be significantly more satisfying ($p<.05$) in the near future. Most remarkable for this research is the significantly more positive feeling ($p<.05$) about the time instructors will need using a CMS in future, compared to the current situation.

- **Planning**

  In the survey the instructors were asked about planning aspects (Table 38).

  Table 38. Planning aspects of instructors.

To what extent is each of the following like you?	*M* (*SD*)
Desire to be well organised	4.26 (0.77)
Desire to be able to plan my time in advance	4.05 (0.90)
Planning tools, such as network-accessible agendas influence general teaching practice	2.05 (1.13)

Note. Scale:1=not at all, 3=somewhat, 5=very much.

Instructors indicate (Table 38) a high desire to be well organised and they want to be able to plan their time in advance. These findings suggest that a planning tool might facilitate both desires, but other factors may intervene.

6.5 University Aspects (U)

The organisational and management aspects that relate to academics' performance will be analysed and discussed in the following sections. The impact of ICT which also involves the use of CMSs will be emphasised. First, university aspects that relate to their missions and planned changes are analysed (Section 6.5.1). Then ICT policy is discussed in more detail (Section 6.5.2), followed by a section about teaching and teaching-related aspects (Section 6.5.3). The last section analyses the organisational demands and incentives (Section 6.5.4).

6.5.1 Mission and change

Respondents were asked about the importance of teaching aspects in the mission of their university for the coming years (Table 39).

Table 39. The importance of teaching aspects in the mission of the institution for the next 5 years according to the three actor groups.

Indicate in your view how important the following aspects are in the mission (statement) of your institution for the next 5 years	Instructors (*n*=347)	Decision makers (*n*=189)	Support staff (*n*=154)	Total (*N*=690)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Teaching 18-24 year old	4.69 (.74)	4.75 (.64)	4.51 (.92)	4.66 (.77)
Innovation in teaching and learning	4.11 (.92)	4.28 (.82)	3.78 (1.12)	4.08 (.96)
Teaching international students	3.75 (1.18)	3.65 (1.14)	3.66 (1.16)	3.70 (1.16)
Providing lifelong learning	3.20 (1.24)	3.63 (1.21)	3.35 (1.33)	3.35 (1.26)

Note. Scale: 1=Low, 3=Moderate, 5=High.

Table 39 shows that teaching 18-24 year-old students is still a major focus for universities' teaching mission. However, teaching international students and providing lifelong learning are each valued more than moderately important, which indicates that universities are changing their mission from offering their programs to 'traditional' cohorts, towards offering their education in a diversity of ways to various cohorts, of which the category '18-24-year old' is one. This is enhanced by the strong emphasis on innovation in teaching and learning. For instructors this will imply that they will face innovations in teaching, and that teaching to international students and for lifelong learning will become important issues in the near future. All actors agree upon the order of importance of each teaching aspect. When comparing instructors with decision makers and support staff, instructors rate the importance of teaching to 18-24 year-old students significantly higher ($p<.05$) than support staff. In contrast, instructors rate the importance in the mission statement related to innovation in teaching and learning significantly lower ($p<.05$) than decision makers, and also rate providing lifelong learning significantly lower ($p<.05$) than both decision makers and support staff.

6.5.2 ICT policy

Respondents were asked about the formally stated policy with respect to ICT (Table 40).

Table 40. Current formally stated ICT policy by actors.

Which of the following best describes the formally stated policy with respect to ICT in your institution?	**Instructors (*n*=340)**	**Decision makers (*n*=168)**	**Support staff (*n*=151)**	**Total (*N*=677)**
	Percentage	Percentage	Percentage	Percentage
There is none	3.5 %	3.8 %	1.3 %	3.1 %
Perhaps there is policy but I am not aware of it	18.2 %	3.8 %	21.2 %	14.9 %
Bottom-up: faculty or department-level policies with no link to institutional-level decision-making	21.5 %	17.7 %	16.6 %	19.4 %
Combined: institutional-wide policy serving as a framework for faculty-specific plans	47.6 %	68.3 %	52.3 %	54.4 %
Top-down: institutional-wide policy to be implemented in all faculties	9.1 %	6.5 %	8.6 %	8.3 %
Total sample	100 %	100 %	100 %	100 %

Table 40 shows that according to nearly 22 % of the instructors there is no ICT policy (3.5 %), or that they are not aware of any policy (18.2 %), and this view is supported by approximately the same percentage of support staff. But according to the decision makers 92.4 % indicate that in their institutions there is either a bottom-up, combined, or top-down policy. This indicates that the institutions have an ICT policy, but that this policy is not communicated in an adequate way to the instructors and support staff. The majority of all respondents who are aware of a ICT policy agree on the approach: a bottom-up (19.4 %), combined (54.4 %), or top-down (8.3 %) approach to ICT policy. For instructors this implies that at most universities they perform their activities in line with the ICT policy. This is shown in more detail when the objectives of ICT policy that relate to work and teaching are discussed (Table 41).

Table 41. Objectives of ICT policy related to work and teaching (current and predicted).

To what extent is each of the following an objective of ICT-related policy in your institution, currently and in the near future?	**Instructors (*n*=347)**	**Decision makers (*n*=189)**	**Support staff (*n*=154)**	**Total (*N*=690)**
	M (*SD*) - current - predicted	*M* (*SD*) - current - predicted	*M* (*SD*) - current - predicted	*M* (*SD*) - current - predicted
Enhancing the quality of teaching and learning	3.92 (.99) 4.14 (.87)	4.21 (.76) 4.49 (.63)	3.80 (.92) 4.17 (.84)	3.97 (.93) 4.24 (.82)
Enhancing flexibility	3.66 (.98) 3.99 (.85)	3.89 (.90) 4.31 (.80)	3.84 (.95) 4.22 (.79)	3.76 (.96) 4.13 (.84)
Increasing efficiency	3.58 (.94) 4.02 (.87)	3.76 (.91) 4.03 (.85)	3.58 (.88) 4.10 (.80)	3.63 (.92) 4.04 (.85)
Widening access to the traditional (18-24 year-old) student base	3.13 (1.14) 3.48 (1.00)	3.50 (1.09) 3.86 (.94)	3.57 (1.00) 3.86 (.88)	3.33 (1.11) 3.67 (.98)
Enhancing cost-effectiveness	3.13 (1.10) 3.72 (1.04)	3.23 (1.14) 3.75 (1.03)	3.27 (1.05) 3.80 (1.05)	3.19 (1.10) 3.74 (1.04)
Creating more opportunities for international students	3.00 (1.15) 3.56 (1.04)	3.09 (1.18) 3.55 (1.07)	3.18 (1.06) 3.59 (1.01)	3.06 (1.14) 3.56 (1.04)
Creating more opportunities for lifelong learning	2.99 (1.08) 3.57 (1.00)	3.43 (1.15) 3.93 (.91)	3.21 (1.17) 3.69 (.99)	3.16 (1.13) 3.69 (.98)

Note. Scale: 1=Low, 3=Moderate, 5=High.

As shown in Table 41, according to all respondents, enhancing the quality of teaching and learning is valued highest, followed by enhancing flexibility, and increasing efficiency. In addition, enhancing cost-effectiveness is scored as more than moderately important. Except for the score of instructors on creating more opportunities for lifelong learning, all ICT aspects score more than moderate, which indicates the importance of using ICT in all aspects of work and teaching. When comparing instructors with decision makers instructors rate the current objective of ICT-related policy significantly lower ($p<.05$) for enhancing the quality of teaching and learning, enhancing flexibility, increasing efficiency, widening access to the traditional student base, and creating more opportunities for lifelong learning. These last two are also rated significantly lower ($p<.05$) by instructors than by support staff. In general instructors value the current ICT policy lower than decision makers and support staff.

Table 41 also shows that for the future all objectives are valued higher than moderate, of which enhancing quality of teaching and learning, enhancing efficiency, and enhancing flexibility score highest for all respondents and for each actor group. When comparing the current situation with the future situation (Table 41) the instructors indicate that in the future, increasing efficiency will be more important than enhancing flexibility, although for both variables the scores are almost equal, both for the current situation (M=3.66 and M=3.58 respectively) and also for the future situation (M=3.99 and M=4.02 respectively). For the three categories of actors and for all aspects the scores for the future situation are significantly higher ($p<.05$) than for the current situation. This indicates that ICT use will be even more important in the future than today. When comparing instructors with decision makers instructors rate the ICT policy significantly lower ($p<.05$) on enhancing quality of teaching and learning, enhancing flexibility, widening access to the traditional target group, and creating more opportunities for lifelong learning. When comparing instructors with support staff

instructors rate the ICT policy significantly lower (p<.05) on enhancing flexibility and widening access to the traditional target group. In general instructors are the least positive about ICT policy both currently and in the near future, compared to decision makers and support staff.

6.5.3 Teaching and teaching-related aspects

First the general opinion about what contributes to good teaching will be discussed (Table 42).

Table 42. Aspects contributing to good education.

In your view, to what extent do the following aspects contribute to good education in your institution?	**Total (*N*=690)** *M* (*SD*)
Face to face contact	4.57 (.67)
Contact with the instructor when needed by the students	4.30 (.76)
Communication among students	4.14 (.86)
Pedagogy related to group work	3.86 (.96)
Appropriate use of ICT for teaching and learning support	3.83 (.89)
Time and place independent learning	3.30 (1.06)
Individualisation for different student characteristics	3.26 (1.03)

Note. Score: 1=very little, 3=some, 5=very much.

Table 42 shows that the four most-valued aspects that contribute to good teaching are general aspects that may or may not refer to traditional or innovative teaching practice. Appropriate use of ICT for teaching and learning support is obviously related to ICT and all participants give it a moderately high score (M=3.83, SD=.89). Apart from face-to-face contact, these aspects can be implemented partly or in full using ICT or a CMS. The extent to which current teaching involves the use of ICT is shown in Table 43.

Table 43. Extent to which teaching involves the use of ICT (currently and predicted).

Indicate in your view the extent to which the following aspects involve the use of ICT in your institution, currently and in the near future?	**Instructors (*n*=347)**	**Decision makers (*n*=189)**	**Support staff (*n*=154)**	**Total (*N*=690)**
	M (*SD*) - current - predicted	*M* (*SD*) - current - predicted	*M* (*SD*) - current - predicted	*M* (*SD*) - current - predicted
Innovation in teaching and learning	3.25 (1.06) 3.95 (.85)	3.70 (1.01) 4.31 (.73)	3.37 (1.08) 4.15 (.83)	3.40 (1.07) 4.09 (.83)
Teaching 18-24 years old	2.97 (1.04) 3.96 (.92)	3.33 (.92) 4.36 (.71)	3.36 (1.00) 4.18 (.74)	3.16 (1.02) 4.12 (.85)
Teaching international students	2.64 (1.15) 3.50 (1.10)	2.78 (1.11) 3.70 (1.06)	2.85 (1.13) 3.75 (1.08)	2.72 (1.14) 3.61 (1.09)
Providing lifelong learning	2.54 (1.16) 3.58 (1.12)	2.88 (1.24) 4.10 (1.00)	2.74 (1.16) 3.79 (1.05)	2.68 (1.19) 3.77 (1.09)

Note. Score: 1=Low, 3=Moderate, 5=High.

From Table 43 it can be seen that ICT is highly involved in innovating teaching and learning, and also moderately in teaching 18-24 year-old students. Using ICT for teaching international students and providing lifelong learning score below moderate, which may indicate that probably education is not offered to such students at a distance,

because otherwise ICT would have scored much higher as a medium to communicate with these sort of students. From Table 43 it can be concluded that teaching 18-24 years-old students and innovations in teaching and learning have the highest score, but providing lifelong learning and teaching international students also score more than moderate (M>3.5). When instructors are compared with decision makers instructors rate the current use of ICT significantly lower (p<.05) for innovation in teaching and learning, teaching 18-24 years-old students, and providing lifelong learning. Instructors also rate teaching 18-24 years old significantly lower (p<.05) than support staff. In general instructors' view on current ICT use is less positive than the view of decision makers.

Table 43 also shows that the use of ICT in the near future will be a moderately important to important aspect in teaching as the scores for all aspects range between M= 3.5 to M=4.36. When comparing the predicted scores of instructors with the scores of decision makers the instructors score significantly lower (p<.05) on all aspects. When compared with support staff the instructors also score significantly lower (p<.05) on all aspects except on providing lifelong learning. Thus also for the predicted use of ICT the instructors are less positive than decision makers and support staff. When comparing the current and predicted use of ICT all scores for all actors are significantly higher (p<.05) which implies that the use of ICT will further increase.

Table 44. Extent to which typical learning settings occur now and in the future (N=690).

In your view, to what extent will each of the following be a typical learning setting in your institution?	**Current, 2002**	**Future, 2005**
	M (*SD*)	*M* (*SD*)
On-campus settings for course activities ("Back to the Basics")	4.55 (0.75)	4.26 (0.80)
Many variations in where and how students participate in courses, but campus-based settings remain the basis ("Stretching the Mould")	3.34 (1.21)	3.96 (0.95)
Many students are attending at a distance ("The Global Campus")	2.05 (1.16)	2.80 (1.19)
Students use the home institution as a base but pick and choose their courses from many locations ("New Economy")	1.85 (0.98)	2.81 (1.10)

Note. Score: 1=little or none, 3=some, 5=very much the case.

Table 44 indicates that according to all respondents, on-campus settings for course activities and campus-based variations score highest in the current situation, but will significantly be lower (p<.05) in the near future, although still on campus remains the dominant learning setting. It also shows that significant changes (p<.05) are predicted for the near future relating to variations where and how students participate, to attending at a distance, and to freedom for students to pick and choose courses. Overall, there seems to be a shift towards much more flexible ways to offer courses to students that are campus-based, at a distance, or who want to pick and choose their courses. This will imply a much more flexible setting in which instructors will be offering their courses.

6.5.4 Organisational demands and incentives

Academics will be affected by organisational demands and incentives as discussed in Chapter 1. When instructors know that using ICT counts towards promotion and tenure or that using ICT is an integral part of regular staff assessment then these will be strong incentives for them to use ICT or to use ICT for more than complementary support for traditional core practices. Also, academics are influenced when management uses ICT competencies as criteria for selection and recruitment of new staff, when professionalisation in ICT competencies is demanded, and when there are financial incentives. In Table 45 an overview is given of the responses of instructors and decision makers about the presence of such policy incentives.

Table 45. Organisational demands and incentives, compared by views of instructors and decision makers.

To what extent does ICT play a role in the following aspects of your institution's personnel policy?	**Instructors *n*=347**	**Decision makers *n*=189**
	M (*SD*)	*M* (*SD*)
ICT competencies are systematic criteria for selection and recruitment of new staff	2.50 (1.15)	2.85 (1.10)
ICT use in education is part of regular external quality assurance exercises	2.17 (1.11)	2.32 (1.11)
ICT use in education is an integral part of regular staff assessments	2.02 (1.13)	2.06 (1.04)
Professionalisation of staff in ICT competencies is mandatory	1.86 (1.09)	2.02 (1.10)
ICT use in education counts towards promotion and tenure	1.84 (1.03)	2.00 (1.05)
ICT use in education is mandatory	1.77 (1.13)	1.95 (1.22)
Financial incentives to individual staff are provided for development of ICT use in education	1.73 (1.04)	2.14 (1.18)

Note. Score: 1 = Not at all, 2 = a little, 3= some, 4= much, 5= very much**.**

In general Table 45 shows that ICT use plays only a modest role in institutions' staffing policy and is often only valued as having little to no role. Instructors indicate that there is little or no strict policy towards professionalisation of staff (*M*=1.86). In their responses, instructors are significantly more negative ($p<.05$) about ICT competencies being used as systematic criteria for selection and recruitment than decision-makers. Instructors were also significantly less ($p<.05$) positive about financial incentives offered to individual staff for development of ICT use. As all scores are less than 'some', these results show that using ICT in education is not a major issue in staffing policy in most institutions and consequently that the necessary incentives and reward for staff are lacking.

6.6 Use of ICT and CMSs in Teaching (O)

The international survey contained questions about the use of ICT and CMSs in teaching, flexibility aspects, and which technologies are used in teaching. In the following list these topics will be described.

- **Teaching**

  In Table 46 the teaching practices that are most common in respondents' institutions are shown.

  Table 46. Extent to which teaching practices are common according to the three actor groups.

In your opinion, to what extent are the following teaching practices common in your institution?	**Instructors (*n*=347)**	**Decision makers (*n*=189)**	**Support staff (*n*=154)**	**Total (*N*=690)**
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Lectures	4.44 (.85)	4.59 (.76)	4.75 (.62)	4.55 (.79)
Practice activities (labs, field work, practical exercises)	3.88 (1.14)	4.29 (.86)	4.36 (.87)	4.10 (1.04)
Participation in project work, group work	3.47 (1.02)	3.71 (.98)	3.85 (.97)	3.62 (1.01)
Studying via a CMS	2.28 (1.01)	2.88 (1.11)	2.68 (1.14)	2.53 (1.10)
Studying via (non-Web based) computer software	2.28 (1.03)	2.79 (1.10)	2.71 (1.11)	2.51 (1.10)

Note. Scale: 1=very uncommon, 3=somewhat common, 5=very common.

Table 46 shows that delivering lectures is still the most common teaching practice according to all respondents, followed by two formats of direct participation of students and instructors. Studying via (non-Web based) computer software and via CMSs are much less common, especially according to instructors. Instructors score significantly less ($p<.05$) on all teaching practices when compared with decision makers and support staff. This implies that decision makers and support staff are not well aware of common teaching practice as executed by instructors. In Table 47 some teaching aspects related to the use of ICT in courses are listed.

Table 47. Web-oriented ICT use outside the classroom according to the three actor groups.

In your opinion, to what extent is ICT being used in your institution…	**Instructors (*n*=347)**	**Decision makers (*n*=189)**	**Support staff (*n*=154)**	**Total (*N*=690)**
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
For course preparation or organisational purposes	3.68 (1.05)	4.02 (.86)	3.79 (.92)	3.80 (.98)
For communication with and among students and instructors	3.47 (1.09)	3.86 (.96)	3.71 (1.06)	3.63 (1.06)
To support group activities and project work	2.93 (1.13)	3.28 (1.00)	3.14 (1.14)	3.07 (1.11)
Via a Web environment or CMS used outside of classroom activities	2.57 (1.15)	3.15 (1.14)	3.01 (1.11)	2.83 (1.17)

Note. Scale: 1=rarely, 3=some, 5=extensively.

All actor groups rank the use of ICT in the same order (Table 47) and ICT is used most extensively for course preparation or organisational purposes. Instructors score significantly lower ($p<.05$) when compared with decision makers. When instructors are compared with support staff the instructors score significantly lower ($p<.05$) on the use of a Web environment or CMS and on communication with and among students and instructors. Especially the low level of Web environments and CMS used outside of classroom activities indicates that at an international scale the use of Web environments and CMSs is not (yet) common.

In Table 48 the feelings of instructors about the use of ICT in their courses is shown.

Table 48. Feelings of instructors about using ICT in their courses.

To what extent is each of the following the case for you?	**Instructors (*n*=347)**
	Mean (SD)
Using ICT is facilitating new forms of learning in my courses	3.57 (1.07)
I am satisfied with the results of using ICT in my courses	3.44 (0.97)
I am satisfied with the way I use ICT in my teaching	3.28 (1.04)

Note. Scale: 1=Definitely not, 3=Neutral, 5=Definitely yes.

Although instructors indicated (Table 48) that to their opinion ICT use is facilitating new forms of learning in their courses, they are less satisfied with the results of using ICT in their courses. Instructors rate their satisfaction on the way they use ICT in their teaching as neutral which is a rather low score when institutions want to stimulate innovations in teaching (see Table 39).

Instructors were also asked about the ICT support of different instructional orientations they offer in a typical course (Table 49).

Table 49. The extent to which ICT is used to support certain orientations in a typical course according to instructors.

To what extent do you use ICT to support the following instructional orientations in your typical courses?	**Instructors (*n*=347)**
	M (*SD*)
Students producing/creating reports and products using ICT tools	3.58 (1.32)
Knowledge transfer	3.57 (1.16)
Providing feedback on assignments	3.33 (1.30)
Skill development	3.23 (1.27)
Connecting to prerequisite knowledge	3.19 (1.27)
Developing positive attitudes towards the discipline	3.05 (1.28)
Students planning their own learning processes	2.77 (1.28)
Giving guidance / Informally monitoring progress and effort	2.74 (1.30)
Motivating on-going participation	2.71 (1.30)
Giving feedback after formal assessments	2.65 (1.30)
Testing and other formal assessments	2.04 (1.15)

Note. Scale: 1=rarely, 3=some, 5=extensively.

Table 49 shows that the ICT use in a typical course is only slightly above 'Some'. The more interactive aspects of ICT are only sometimes used and giving feedback after formal assessments and testing using ICT are rarely used. In general this may indicate a conservative use of ICT.

- **Flexibility**

  Instructors offer courses to their students, but the extent to which they offer options to students may vary. In Table 50 an overview is given of various options.

  Table 50. Options offered to students in their courses according to instructors (*n*=347).

To what extent do you offer options relating to each of the following to students in your own courses?	**Current, 2002**	**Predicted, 2005**
	M (*SD*)	*M* (*SD*)
Learning resources	3.40 (1.07)	3.71 (1.05)
Times for submitting assignments and interacting within the course	2.76 (1.21)	2.94 (1.18)
Topics of the course	2.76 (1.16)	2.96 (1.04)
Ways in which the course is experienced (face-to-face; group, individual, combinations)	2.68 (1.23)	3.11 (1.23)
Assignments required for the course	2.47 (1.10)	2.86 (1.16)
Orientation of the course (theoretical, practical)	2.26 (1.05)	2.48 (1.05)
Assessment standards and completion requirements	2.15 (.97)	2.36 (1.08)
Times for starting and finishing a course	1.82 (1.02)	2.29 (1.16)
Language to be used during the course	1.80 (1.09)	2.50 (1.25)

Note. Scale: 1=no flexibility, 3=some, 5=extensive flexibility.

  According to instructors (Table 50) they offer currently the highest flexibility in options relating to learning resources, followed by some flexibility in times to submit assignments, topics of the course, and ways in which the course is experienced. More external related aspects such as orientation and assessment are much less flexible ($M<2.5$).

  Comparing future scores with current ones reveals that all scores are significantly higher ($p<.05$) for the future situation. Most notably, the ways in which the course is experiences will be much more flexible. For the instructors flexibility will be increased in the near future, especially related to planning aspects, such as assignments and ways in which the course is experienced, but the start and end date will still be fixed in most courses, and thus a course structure will still be the common way programmes are offered.

- **Tools**

  In the survey the extent to which technologies influences general teaching practice was also asked (Table 51).

Table 51. The extent to which technologies currently influence general teaching practice.

To what extent do the following technologies influence general teaching practice in your institution?	**Instructors (*n*=347)**	**Decision makers (*n*=189)**	**Support staff (*n*=154)**	**Total (*N*=690)**
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
E-mail systems	3.94 (1.08)	3.97 (1.06)	3.88 (1.13)	3.94 (1.08)
Web resources	3.77 (1.01)	4.10 (.84)	3.93 (.95)	3.90 (.96)
Web-based course management systems (CMSs)	2.24 (1.23)	2.86 (1.29)	2.78 (1.29)	2.53 (1.29)
Planning tools, such as network-accessible agendas	2.05 (1.13)	2.57 (1.10)	2.63 (1.13)	2.32 (1.15)
Externally available courses or modules, accessible via the Web	1.99 (1.07)	2.28 (1.12)	2.29 (1.08)	2.13 (1.09)
Conferencing tools (video, audio, chat)	1.85 (1.04)	2.06 (1.10)	2.27 (1.07)	2.00 (1.07)
Wireless solutions	1.59 (.93)	1.97 (1.02)	1.91 (1.05)	1.77 (1.00)

Note, Scale: 1=very little, 3=some, 5=very much.

Table 51 shows that e-mail systems influence general teaching practice most. The instructors score significantly lower ($p<.05$) than those of the decision makers, for all technologies, except for e-mail systems where there is no significant difference. Compared to support staff the instructors also score significantly lower ($p<.05$), except for e-mail systems and Web resources where there are no significant differences. As before, the instructors have a less positive view on using ICT in their teaching, and this remains so for the technologies asked in this survey, except for e-mail systems which score high for all actor groups.

Support staff was specifically asked about the current use of technologies within their institutions (De Boer, 2002) and findings are shown in Table 52.

Table 52. Current technology use according to support staff (*n*=132-148) (De Boer, 2002).

To what extent do you estimate each of the following are being used within your institution?	***M*(*SD*)**
Information presentation tools	3.53 (1.19)
Personal bookmark collections	3.37 (1.37)
Database tools	3.08 (1.15)
Authoring tools	2.74 (1.15)
Course planning tools	2.63 (1.15)
Newsgroups	2.58 (1.13)
Course management systems (CMSs)	2.52 (1.26)
Instructional design tools	2.52 (1.21)
Testing tools	2.21 (1.01)
Tools for analysis and tracking student performance	2.20 (1.17)
Chat	2.19 (1.11)
Groupware	2.17 (1.10)
Whiteboards	2.13 (1.14)
Tools for on-line marketing	1.95 (1.01)
Desktop video conferencing	1.70 (0.86)

Note. 1=very uncommon, 3=somewhat, 5=very common

Table 52 shows that presentation tools (such as PowerPoint), personal bookmark collections, and database tools are most popular but only scoring just above "somewhat". The actual use of other available tools and applications (except e-mail and Web resources) are used only to a very limited extent (between "very little" and "somewhat"), and this includes course planning tools and CMSs. From Table 51 and Table 52 it can be concluded that CMSs are used on a limited scale.

6.7 Support and Interventions (I)

In the survey the three actor groups were asked to give their opinion about level of support available to instructors with respect to the use if ICT for teaching purposes (Table 53). The instructors were also asked to predict the level of support in the near future and this is added to the table under Instructors.

Table 53. Current level of support for instructors using ICT for teaching purposes.

In your opinion, the level of support for instructors with respect to the use of ICT for teaching purposes in your institution is?	**Instructors (*n*=347)**	**Decision makers (*n*=189)**	**Support staff (*n*=154)**	**Total (*N*=690)**
	M (*SD*) - current - predicted	*M* (*SD*) - current	*M* (*SD*) - current	*M* (*SD*) - current
Level of support for instructors	2.96 (1.09) 3.37 (.98)	3.14 (1.01)	3.15 (1.06)	3.03 (1.06)

Note. Scale: 1=very low, 3=average, 5=very high.

Table 53 shows that the current level of support available for instructors with respect tot the use of ICT for teaching purposes scores about average. Instructors are significantly less positive ($p<.05$) than the other two groups as according to decision makers and support staff the current level is slightly above average. Instructors expect that in the near future this support will significantly improve ($p<.05$), although still just above average ($M=3.37$). Overall the level of support is valued as average which indicates that more support should be offered to instructors.

The available types of support for instructors, according to instructors and support staff are shown in Table 54.

Table 54. Extent to which various types of support are available for instructors.

To what extent are each of the following types of support available for instructors in your institution with respect to using ICT in their teaching?	**Instructors *n*=347**	**Support staff *n*=154**
	M (*SD*)	*M* (*SD*)
Material made available via the Web	3.29 (1.16)	3.54 (1.01)
An ICT technical unit or helpdesk	3.19 (1.16)	3.64 (1.13)
Short courses or workshops	3.04 (1.17)	3.35 (1.17)
Handbooks for self-study, or other printed reference material supplied by the institution	2.72 (1.15)	3.17 (1.11)
A pedagogical-support unit	2.36 (1.32)	3.05 (1.40)

Note. 1=not at all, 3=some, 5=major feature.

Table 54 shows that instructors are slightly positive about the support via material made available via the Web, and also the availability of an ICT technical unit or

helpdesk. Short courses or workshops are rated neutral, whereas handbooks and the availability of a pedagogical support unit are rated a bit negative, respectively rather negative. The instructors score significantly lower ($p<.05$) than support staff in all cases. This may suggest that support staff believes that they offer these types of support in a very positive way, but that instructors are not well aware about these types of support. Or the low ratings of the instructors ($M<=3.29$) may suggest that the support is not offered to instructors in a way preferred by instructors.

6.8 Analysis and Interpretation

Based on findings described in previous sections an overview of results is listed in Table 55. Findings are organised according to the dimensions shown in the Personal Performance Model defined in Chapter 3. The last column shows a label to indicate a gap between desired performance and actual or expected performance, or a need for resources to be able to perform as desired.

Table 55. Overview of findings from the international survey.

Dimension	aspect	Findings related to actual performance	Gap/ lack of:
Academic (A)	Teaching experience	Most instructors have more than 5 years of teaching experience	-
	ICT use	Their interest and self-confidence in using technology are high	-
		They are willing to make use of ICT and especially of ideas from the Web	-
		Their experience in using ICT in teaching is high	-
Colleagues and support staff (C)	Working conditions	Working conditions related to the use of ICT are neutral	-
	Workload	Their workload is about neutral and no significant changes predicted for the near future	-
	Autonomy	Autonomy when and how to use ICT is very high	-
	Time	Impact on time when using technology is neutral	-
		Dealing with email will significantly become annoying	Procedures
		Instructors are annoyed by technical problems	Procedures
	Planning	Instructors are annoyed by and responding to unexpected interrupts	Planning
		They have a very high desire to be well organised and plan in advance	Job control
		Planning tools are not used much	Planning
University (U)	Mission and change	Teaching 18-24 year-old students remains most important	-
		Teaching to international students and supporting lifelong learning emerges	Procedures
		Climate for change is more than moderate	-
	ICT policy	Institutions have an ICT policy but instructors are not aware of it	Information
		Enhancing efficiency is a major objective in ICT policy, this will become significantly more important in the near future	Planning
		Enhancing flexibility is a major objective in ICT policy, this will become significantly more important in the near future	Procedures

Table 55 continues …

Table 55 continued

University (U)	ICT policy	Enhancing quality is a major objective in ICT policy, this will become significantly more important in the near future	Job control
	Teaching	ICT is used for innovation in teaching and learning, but still rather low for international students and lifelong learning; for the near future this will strongly increase	Procedures
		New educational formats emerge gradually	Procedures
		On-campus teaching is and will be the norm, but this will decrease significantly towards more variations for students in where and how to participate in courses	Procedures
	Demands and incentives	Incentives offered to instructors related to the use of ICT score very low (M<=2.50)	Implementation plan
On-line teaching (O)	Format	Lecture still most common	-
		ICT mostly used for course preparation and communication	-
		Satisfaction of instructors about the use of ICT in their courses is just about neutral	-
	Flexibility	Flexibility offered to students is still rather low	-
	Tools	E-mail and Web-resources influence teaching most	Procedures
Support (I)	Level	Level of support offered to instructors is rated neutral	Support
	Availability	Materials made available on the Web and an ICT helpdesk score about neutral, other types of support score low.	Support

In Table 55 findings are summarised and some aspects in current performance are or will become problematic and when appropriate this is indicated in the last column. Some of the problems may be caused by a gap between current and desired performance such as enhancing flexibility or quality, others are caused by a lack of supportive material, such as a set of procedures, or a need for higher incentives to use ICT. This will be discussed in Chapter 7.

6.9 Conclusions

If institutions want to increase efficiency and enhance flexibility and cost-effectiveness in the coming years (see Chapter 1), this will also have an impact on the way instructors should perform their work and have to account for their time expenditure.

This chapter analysed current and expected future aspects of using ICT in teaching and learning. In the overall study (Collis & Van der Wende, 2002) one of the major findings was that "institutions are gradually 'Stretching the mould' ; they change their procedures and models as a process of change from within." (p. 7).

Another major conclusion about the situation for instructors was:

Overall, the instructor is still there, but doing more with technology with no particular reward. Instructors are less concerned/interested in/hopeful about technology than those not on the "front line" (the decision makers and support staff). Instructors are not

particularly concerned about ICT, and not very much changing their ways of teaching even though they use ICT in different ways. (Gervedink Nijhuis, 2002, p. 37)

Thus the instructor is also "stretching the mould" with ICT use as part of daily practices. While there are no serious concerns about this, and a generally positive feeling about ICT's effect on personal work conditions and efficiency, there also are little or no systematic rewards to move instructors to do more than the gradual "stretching". Also, instructors--the ones on the front line of actual ICT use--are less impressed about it than those not on the front line. Consistently, instructors have significantly lower perceptions than the decision-makers and support staff in their institutions as to the support and incentives for ICT use.

From the summary of findings presented in Section 6.8 it can be concluded that instructors are more-or-less left on their own with no incentives and an average level of support available to use ICT in their teaching. Maybe because of this, the use of ICT in their courses is rather conservative without much interaction. Also their own perception of their ICT use in courses shows a neutral level of satisfaction. When institutions have innovation in teaching and learning as one of the major objectives in their ICT policy then management should offer instructors more incentives, stimulate the use of ICT (and CMSs) in their courses using more facilities and features, and organise a higher level of support.

In Chapter 7 interventions will be analysed to offer an additional way to support instructors in their teaching-related activities.

7 Concretising a Support Tool for Academics

In the two previous chapters the actual performance of instructors was analysed in various studies (Chapter 5) and also through an international survey which offered insights into the current and expected future situation of instructors in seven (mostly European) countries (Chapter 6). In this chapter the gaps between these findings and the desired performance described in Chapter 3 will be further discussed and cause analysis will lead to ideas and constraints of possible interventions to overcome these gaps. To be able to analyse the problems of academics in more detail, it is argued that a concretised intervention is a promising method to elicit extra information from academics and thus get a better insight into how best to support instructors. This leads to the development of an electronic performance support system (EPSS) to support instructors, of which various versions (from rudimentary, basic, and enhanced prototypes towards a final version) were designed and evaluated. The major steps described in this chapter are highlighted in the HPT (Figure 38).

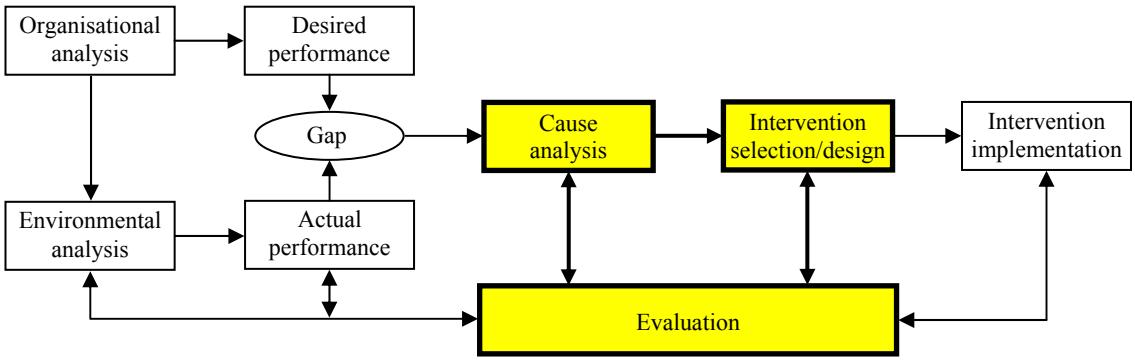


Figure 38. Schematic HPT model with major focus of this chapter highlighted.

In Section 7.1, a gaps and cause analysis is carried out to analyse the gaps between desired and actual performance. In Section 7.2 after discussing various categories of interventions, three specific sorts of interventions are selected as promising: an expert system, a job aid, and an electronic performance support system. The prototype approach to design and develop an intervention is introduced in Section 7.3. In the next three sections (Sections 7.4, 7.5, and 7.6) three rounds of prototyping are presented that lead to the development of the final version (Section 7.7). This final version will be used as a research tool and its evaluation will be described in Chapter 8. The conclusions and implications resulting from this process to concretise a support tool for academics are discussed and described in Section 7.8.

7.1 Cause Analysis

As was described in previous chapters (see Chapters 5 and 6) findings show that the actual performance of instructors is different from the desired. In Section 7.1.1 these gaps will be analysed. In Section 7.1.2 it is argued that specific documented research is lacking about the best way to support instructors to help them to bridge these gaps,

which leads to the conclusion that to analyse this further a concretised support tool can be a desirable method.

7.1.1 Possible causes of performance gaps

At the end of Chapter 3 an overview was presented of academics' desired teaching-related performance and at the end of Chapters 5 and 6 overviews were presented of gaps between this desired performance and the actual (and expected) performance and needs of instructors. In this section these problems are categorised according to the support these instructors are lacking (Table 56).

Table 56. Overview of possible causes based on findings of specific studies.

Lack of:	Findings related to performance gaps	See Study
Admin procedures	Instructors like to have templates available	C1
CMS procedures	Procedures how to use TeleTOP not available	A1
CMS procedures	To keep a course-site up-to-date is a problem	A1
CMS procedures	Instructors have problems to keep course site up-to-date	C2
CMS procedures	Instructors would like to get CMS procedures but they are not available	C2
CMS procedures	Instructors place course information at the wrong place	O3
Guidelines	Instructors are not informed about requirements related to time expenditure, TeleTOP use, and quality constraints	C1
Guidelines	Instructors find administrative procedures and forms a burden	C1
Guidelines	Instructors do not know about requirements related to Blackboard use	C2
Guidelines	TeleTOP use by instructors very diverse	O3
Guidelines	Instructors find guidelines useful but not available	U1
Implementation plan	Colleagues reluctant to use TeleTOP	A1
Implementation plan	Instructors have to learn how to use TeleTOP	A1
Implementation plan	Management offers no incentives related to TeleTOP use	C1
Implementation plan	No incentives offered to ICT use	C3-4,U2
Information	Instructors are not informed adequately by management	C1
Information	Instructors like to get hints / tips	C1
Information	Instructors not informed about student / credit-unit model	C1
Information	Instructors feel a need to be informed about experiences and best practice by colleagues	C2
Information	Instructors not aware of ICT policy	C3-4,U2
Information	Support needed for administrative, organisational, and technical	O1
Information	Instructors do not plan TeleTOP activities	O2
Information	Instructors' time expenditure diverse: per course, per instructor	O2
Job control	Instructors find checklists useful but they are not available	C1
Job control	Instructors find to-do-list per task useful but they are not available	C1
Job control	Instructors forget to perform activities	C1
Job control	Instructors find checklists useful but not available; about activities, time, Blackboard use	C2
Job control	Instructors find project-management approach useful	C2
Job control	Desire to be better organised	C3-4,U2
Job control	Enhancing quality major objective	C3-4,U2
Job control	Instructors do not stick to their planning	O2
Job control	Many interrupts occur of which some could be planned in advance	O2

Table 56 continues …

Table 56 continued

Planning	Instructors have no control on time expenditure	A1
Planning	Instructors forget to plan activities	C1
Planning	Instructors do not plan teaching-related activities	C2
Planning	Instructors have no time to change a course or start a new one	C2
Planning	Enhancing efficiency major objective	C3-4,U2
Planning	Not-much use of planning tools	C3-4,U2
Planning	Unexpected interrupts	C3-4,U2
Planning	Activities in TeleTOP are 'conservative', not much interaction	O1
Planning	Instructors need guidelines, procedures	O1
Planning	Instructors do not put much effort in developing and delivering TeleTOP courses	O3
Planning	Directors do not offer instructors requirements related to TeleTOP use, time use, quality	U1
Planning	Directors do not offer specific support for instructors: on his own	U1
Planning	Directors prefer that TeleTOP is used in a more-uniform way	U1
Planning	Instructors do not plan adequately	U1
Procedures	Procedures how to use educational formats not clear	A1
Procedures	Instructors find work procedures within teams unclear	C1
Procedures	Instructors like to use step-by-step plans and procedures but they are not available	C1
Procedures	Instructors would like a framework or step-by-step procedures	C2
Procedures	Enhancing flexibility major objective	C3-4,U2
Procedures	Handling email serious problem	C3-4,U2
Procedures	New educational formats emerge gradually	C3-4,U2
Procedures	Solving technical problems	C3-4,U2
Procedures	Teaching to international students and support lifelong learning emerges	C3-4,U2
Procedures	Instructors are not well aware of their time expenditure, not even when time sheets are filled	O2
Procedures	Instructors' time expenditure for teaching-related activities very diverse per day/week	O2
Support	Instructors sometimes need support	A1
Support	More-and-more instructors on their own	A1
Support	Instructors need support: about new educational formats and how to plan their time	C1
Support	Level of support only neutral	C3-4,U2
Support	Instructors use TeleTOP in a 'conservative' way, not much interaction in a course	O3
Support	Directors do not facilities/procedures how to follow administrative rules	U1
Support	Instructors experience that there is no exchange of info, best practice, tips, and tricks	U1

Table 56 offers an overview of performance gaps found in studies described in Chapters 5 and 6. The gap categories indicate specific performance aspects or the lack of specific resources. In the following section possible solutions to bridge these gaps and handle these causes are discussed.

7.1.2 Bridging the performance gaps

Based on the overview in the previous section, the categories of causes can be analysed further to lead to possible solutions. As indicated, instructors indicate a lack of information about work procedures, so it seems natural to offer them more insight. Also when instructors indicate that they lack information, the solution might be to offer many kinds of information, such as reports, documents, or forms. In Table 57 for each cause some possible solutions are presented.

Table 57. Overview of causes and possible solutions

Cause	Possible solutions
Lack of procedures	Offer procedures related to work, new educational formats, collaboration
Lack of information	Offer access to internal policies, reports, objectives
	Offer access to background information, websites, portals
Lack of guidelines	Offer guidelines and requirements specifically oriented towards instructors
	Offer insight and additional information
Lack of planning	Offer planning insight
	Offer planning tools
	Offer overviews of time estimates
Lack of job control	Offer planning tools
	Offer quality-control procedures and checklists
	Offer checklists
	Offer tips, tricks, best practice examples
Lack of CMS procedures	Offer procedures
	Offer additional support
Lack of admin control	Offer procedures
	Offer templates, forms
Lack of support	Offer support
	Offer training
	Offer tools
Implementation plan	Offer an implementation plan (see Chapter 8)

Table 57 shows categories of causes and possible solutions to handle these causes. From the literature there are not many clues for how to support instructors in their organisational and teaching-related activities. The following aspects need further investigation:

- Unclear how instructors can be helped in the best way
- Unclear whether an intervention can be of any help
- Unclear if instructors can visualise such an intervention
- Unclear if they will use it
- Unclear how this intervention should be implemented.

To develop a solution for these aspects and in an iterative way refine the solution are key aspects of design research and development research (Van den Akker, 1999; Reeves, Herrington, & Oliver, 2003, 2005) as well as iterative rapid prototyping (Moonen, 1996). A computer-based intervention can concretise these aspects and serve as a 'research tool' to further analyse how to design and implement an intervention, and in an iterative way get a better insight in the usefulness of an intervention to support instructors. In the next section possible interventions and the selection process to select the most appropriate intervention will be discussed.

7.2 Selecting Promising Interventions

In this section promising interventions are selected as candidates for the support of academics while performing their teaching-related activities. The relation of this selection and development of an intervention with the Personal Performance Model is shown in Figure 39.

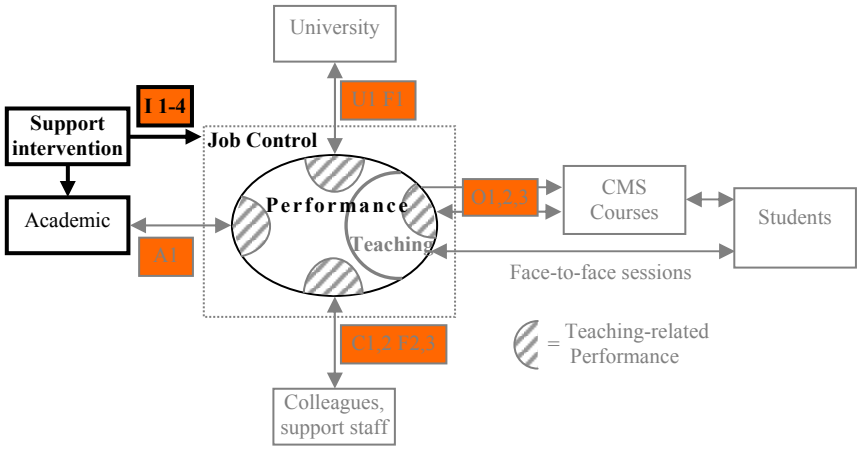


Figure 39. Personal Performance Model with intervention support highlighted.

In Section 7.2.1 the rationale to develop an intervention using an 'Analysis by synthesis' methodology is discussed. In Section 7.2.2 possible interventions are discussed, leading to a selection of three promising categories of interventions that are then discussed in more detail: about expert systems in Section 7.2.3, about job aids in Section 7.2.4, and about electronic performance support systems in Section 7.2.5.

7.2.1 Rationale to develop an intervention

As there does not yet appear to be a tool familiar to academics that offers in an integrated way support for their teaching-related needs, it is hard to discuss a virtual version of such a tool with instructors. Tessmer (1998) argues that an 'Analysis by synthesis' approach can be used to better understand what has to be analysed. Building a tool may be useful to better understand what academics need. The tool can be used to collect extra data to get a better insight into what is needed, and also discuss how such a tool can best be implemented in a university. Other benefits are to get a better insight into what the tool can contain and how the tool may come to look like in practice. In this way, the prototype tool becomes a data-collecting method, like a questionnaire or an interview, which can then be used as a "discussion" document. This analysis by synthesis approach differs from designing and developing a prototype in several evolutionary steps where the intention is to create a full-scale final version of a support tool. However, to be able to use a prototype as an analysis by synthesis method, prototype versions of the tool have to be designed and developed and this is discussed in the rest of this chapter. The final use of this tool for analysis and the evaluation results will be described in Chapter 8.

7.2.2 Overview of possible interventions

Langdon (1999b) argues that interventions can be categorised using two dimensions: performance change and level of performance. Performance change indicates whether the intervention is best used to establish performance, improve performance, maintain performance, or extinguish (bad) performance. The level of performance indicates whether the intervention is best used at the business-unit level, process level, work-group level, or at the individual level. Using these dimensions, Langdon, Whiteside, and McKenna (1999) present a matrix of 50 interventions that can be used to change performance at these four levels of performance. In their matrix of 50 interventions, they categorise 42 interventions that can be used to improve performance at the individual level. A closer look at this list shows a variety of interventions, so there is a need to assign extra categories to each intervention to indicate the primary focus of each intervention: to change the organisational environment, to analyse performance' consequences (output), to learning and training employees, or to offer direct support to individuals (Table 58).

Table 58. Interventions that improve individual performance (based on Langdon, Whiteside, & McKenna, 1999, pp. 36-37, with primary focus added)

Interventions	**Improve**				**Primary focus**			
	Business unit	Process	Work Group	Individual	Organisational change	Performance consequences	Learning and training	Offering direct support
360-degree feedback				•		•		
Accelerated learning				•			•	
Action learning	•	•	•	•			•	
Assessment centres				•		•		
Challenge education		•	•	•			•	
Change style preference models				•	•			
Cognitive ergonomics	•	•	•	•			•	
Communication	•		•	•	•			
Compensation systems			•	•	•			
Competency modelling			•	•	•			
Conflict management			•	•	•			
Critical thinking systems		•	•	•			•	
Cultural change	•		•	•	•			
Customer feedback	•	•	•	•		•		
Electronic performance support system		•	•	•				•
Employee orientation				•	•			
Expert systems		•	•	•				•
Flowcharts		•		•	•			
Fluency development				•			•	
Job aids		•	•	•				•
Leadership development programs				•			•	
Learner-controlled instruction				•			•	
Leveraging diversity	•		•	•	•			

Table 58 continues …

Table 58 continued

Mentoring/coaching				•			•	
Motivation systems			•	•	•			
Needs assessment			•	•		•		
On-the-job training				•			•	
Partnering agreements			•	•	•			
Performance analysis	•	•	•	•		•		
Performance appraisal				•	•			
Performance management			•	•	•			
Policies and procedures	•	•		•	•			
Recognition programs			•	•	•			
Reengineering	•	•	•	•	•			
Results-based management	•	•	•	•	•			
Safety management				•	•			
Simulation			•	•			•	
Structured writing		•	•	•			•	
Team performance			•	•	•			
Teaming	•	•	•	•			•	
Training			•	•			•	
Usability assessments		•	•	•		•		

Table 58 shows that the interventions can be subcategorised, based on the primary focus of impact. The impact of most of the interventions is of an indirect nature, such as for changing the organisation, reacting to feedback of clients, or offering training. Only three interventions offer direct support to the individual. These interventions are:

- Expert systems
- Job aids
- Electronic performance support systems.

These three interventions seem promising for the support of individual instructors. They will be discussed in more detail, first expert systems in Section 7.2.3, then job aids in Section 7.2.4, followed by electronic performance support systems in Section 7.2.5.

7.2.3 Expert systems

Estes (1999) cites Romiszowski as defining an expert system as "a computer program that simulates intelligent problem solving within a narrow area of expertise-an artificial decision maker" (p. 158). This implies that when a problem occurs that requires an intelligent approach an expert system can be consulted. Based on its built-in expertise, coded as rules and heuristics, the system gives an advice. As developing an expert system is very expensive, Estes argues that the use of an expert system is only appropriate when the following conditions exist:

- The task is complex
- The decision requires contextual judgment (heuristics)
- The task has a high payoff value
- The problem can be represented in rules.

For instructors, their overall task can be considered as complex, and the context will require contextual judgement, but a payoff value is probably hard to define, at least for

that part of their job that can be captured by an expert system. Whether the problem can be represented in rules will depend on the topics, where for example factual data about time planning will be easier to capture in rules than for instance advice relating to interpersonal feelings and belief between instructors and students.

Estes (1999) indicates that an expert system can be thought of as an intelligent electronic job aid (see Section 7.2.4) and that they are usually part of for instance a performance support system (see Section 7.2.5).

7.2.4 Job aids

A job aid is defined by Lineberry and Bullock (1980) as "anything that, when added to the work situation, improves job performance by guiding, facilitating, or reminding the performer in his or her accomplishment of job tasks" (p. xi). Such a job aid can improve the performance of employees who have not enough prior knowledge of how to perform a task, but it can also be used by more experienced employees so that they are able to perform more effectively or efficiently. They argue that even a work sheet that organizes information to be filled in, and then used by an employee to make a decision, is a job aid. Langdon (1999a) lists a number of common classes of job aids:

- Step-by-step lists and procedures
- Flowcharts
- Algorithms
- Decision charts and tables
- Checklists
- Forms
- Work sheets
- Outlines
- Evaluation criteria (p. 192).

Langdon (1999a) argues that a job aid is especially useful when performance requires guidance, and when time is not a critical factor, as it would be in a dangerous situation. Also he indicates that a job aid will be appropriate when the task is performed infrequently, or when there is a chance of forgetting information that is needed to perform the task.

7.2.5 Electronic performance support systems (EPSSs)

Gery (1991) and others have defined an EPSS as a system to integrate a knowledge base, learning experiences, and guidance to provide individuals the ability to perform at a higher level in the workplace. Among other terms used are: Performance Support, Online Performance Support, Performance Support Tool, Performance Support Engineering, Performance Centred Design, and Embedded Support. A general observation about support is made by Gustafson (2000):

> As the rate of change accelerates, even experts may have to struggle to maintain their level of performance. With the now almost ubiquitous presence of the computer in the workplace, it becomes possible to provide a variety of new forms of support to aid worker performance and potentially reduce the amount of training they require (p. 38).

According to Gery (1991) an EPSS includes four elements: an information base, some form of advisor, tutorials, and tools to assist the user. Gustafson (2000) indicated that "as EPSS design has matured, information bases may now include multiple knowledge sources; advising may take on features of expert systems or artificial intelligence; tutorials may be extensive and contain contextual multimedia instruction; and the tools have become more sophisticated. There is every reason to believe these trends will continue as more experience is gained in creating EPSSs." (p. 38).

A more-recent definition of an EPSS is given by Gery and Jezsik (1999): An *electronic performance support system* (EPSS) is software that provides integrated, on-demand access to information, advice, learning experiences, and tools to enable a high level of job performance with a minimum of training and support from other people. (p. 142).

This definition consists of two parts, the first part indicates that an EPSS offers integrated, on-demand access to all kinds of material that may be needed to perform, and the second part indicates that using an EPSS makes a user more-or-less self-supporting, with minimum need for additional training, or support from others.

Gery and Jezsik (1999) also indicate circumstances when an EPSS could be appropriate, of which some are listed here:

- When the task complexity is wide and deep
- When the system must support both novice and advanced performers
- When inadequate performers present significant business consequences
- When redesigning an old system or developing a new system
- When there is a large performer population
- When performers must create and share knowledge

These circumstances all refer to situations that are also valid for instructors.

According to Gery and Jezsik (1999) an EPSS binds the following elements:

- *"Task structuring:* Representing and sequencing the activities necessary for accomplishing a task or procedure. Optimizing the work process is a major contributor to performance improvement.
- *Knowledge:* Content; rules; and relationships associated with the task, thinking, or process. Knowledge may be represented through some combination of text, graphics, sound, and animation. Examples, explanations, tips, facts, and numerous other methods can depict knowledge. Rules are typically embedded in the system logic.
- *Data:* Quantitative information related to the task. This could include such elements as sales volumes, demographics, population growth, and temperature.
- *Tools*: Programs that support (or perform) specific functions. Given the performers' input, the EPSS will provide information or carry out a task. This may range from something as simple as built-in calculating fields to more complex programs for analyzing variables, performing database queries, or operating peripheral equipment.
- *Communications:* Ways for performers to share information among themselves or with experts. This could be something as simple as an *electronic watercooler* that allows performers to swap anecdotes and experiences. Using e-mail, chat,

video conferencing, or other tools, people can interact to allow faster and more accurate responses to situations. Sophisticated groupware applications permit collaborative work across time and space.

An EPSS is intended to improve performance by affecting the work as well as the worker. By providing performers with the tools they need and improving the work flow, an EPSS can provide a significant return on investment." (p. 143-144).

Binding all these elements requires a user interface that will integrate all these elements into one system.

7.2.6 Conclusions about intervention selection

From possible interventions three promising interventions: expert systems, job aids, and EPSSs, were selected in Section 7.2.2, and these were then discussed in more detail. For instructors an expert system (Section 7.2.3) may be useful when it is used for a small area of knowledge and when decisions have to be made based on rules and heuristics. A job aid (Section 7.2.4) can be appropriate for instructors as it offers a collection of all kinds of resources and support, but with no structure or integration between these elements. In an EPSS (Section 7.2.5) all kind of elements can be stored that may also be found in expert systems or job aids, but the main advantage is that an EPSS integrates all these in one system.

Probably instructors need integrated support at various levels, as their work is complex and when performing instructors use various resources, knowledge, and heuristics. As Gery and Jezsik (1999) put it: "An EPSS, because it is incorporated into the work process, enables individuals to get up to speed quickly and work more efficiently. It manages complexity and work flow for the user, and it is capable of supporting diverse working styles. In addition, it enables performers to share knowledge." (p. 143). This seems quite appropriate for instructors to improve their performance. Therefore, an EPSS which may incorporate aspects of expert systems and job aids seems the most beneficial. In Section 7.3 the process to design such an EPSS will be described.

7.3 Prototype Approach to Design an Intervention

In Section 7.3.1 a design model is described. In Section 7.3.2 the prototype approach is discussed. In Section 7.3.3 an overview is presented of the various prototypes designed and tested during this research.

7.3.1 Design model

One design approach commonly used in software engineering (Sommerville, 2004) is the analytical approach where it is assumed that all requirements and needs can be analysed and specified before development starts. Specific methodologies such as SDW (Jansen & Jacobs, 1996) are used to specify software features and to document all steps in detail during the development process. This approach is often used for developing very complex systems, but it is also based on a clear understanding of what has to be developed (Smith, 1991). Given the results of the cause analysis at the beginning of this chapter (Section 7.1), these requirements and needs about the tool for this research, its user interface, and content are not well known. Thus the traditional analytical approach seems less useful. An approach where requirements and needs can evolve over time

seems to be a better approach (Moonen, 2002). A design model that builds upon previous designs and evaluations seems most promising (Figure 40).

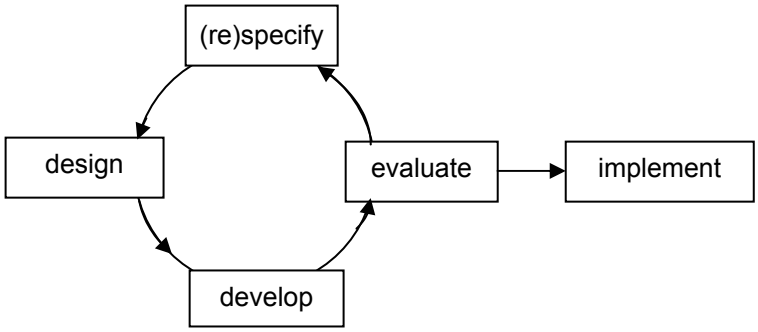


Figure 40. Cyclic design model.

The cycle as shown in Figure 40 can be repeated many times until a final version that is evaluated as satisfactory can then be implemented. A common cyclic approach is to design a number of prototypes (Smith, 1991) that will go through a cyclic development process until a final state is reached.

This cyclic approach is in line with the design research approach (Reeves, Herrington, & Oliver, 2005) where one of the major characteristics is to test and refine environments in a cyclic way also to reveal new design aspects. In Chapter 4 the development research approach (Reeves, 2000) was discussed in which also a refinement loop is part of the model to be able to refine problems, solutions, and methods. A cyclic process of designing, testing, and refining seems an appropriate method to reach optimal results.

The cyclic prototype approach will be described in the next section.

7.3.2 Rationale for a prototype approach

A software prototype is defined as a preliminary version of all or part of a system (Smith, 1991). Smith indicates that prototyping is used for elicitation, demonstration, and evaluation of various aspects related to the product such as:

- Data requirements and structure
- Function requirements
- Operation and performance
- Organisational needs and issues. (p. 42).

An important argument to use a prototype approach is, that "the prototype itself will serve as the formal statement of needs" (p. 45) and that each prototype version can be used for needs elicitation. In a prototype approach a simplified model of a foreseen final product is created and this model is tested. The model may have some of the attributes implemented and some others only indicated or even left out. In this way it will offer an impression of the final product, its look and feel and how a user can use the product. Product attributes, such as screen design, navigation, and content, can be tested in early stages of development and based on the results of tests the model can be improved or a new model constructed and tested, until a full-scale model is tested and results are satisfactory, then the final stage of development is reached.

Various prototype strategies can be used, such as:

- "Rapid prototyping: design methodology that quickly develops new designs, evaluates those designs, then "throws-away" the prototype when the next new design is developed along with a new prototype.
- Reusable prototyping: also known as evolutionary prototyping; effort used in constructing the prototype isn't wasted because parts (or all) of the prototype can be used to make the actual product. Mostly used in software development.
- Modular prototyping: also known as Incremental Prototyping; new parts are added on as the design cycle progresses." (Hom, 2004).

A rapid-prototype approach is best used when litle is known about the system to develop, but from the cause analysis (see Section 7.1) some of the features that are needed by instructors are known, and the researcher is also active as an instructor. Therefore a 'throw-away' approach is seen as not very appropriate. A modular approach is most appropriate when each part can be developed as a module and then added to the tool, but again for each module the requirements should be fully specified. For vague and unclear requirments and needs, a reusable prototype approach seems most promising and this approach is used in this research.

7.3.3 Prototype versions in this research

During the design and development of various versions of a support tool, four cycles of prototype development occurred:

- First cycle: Rudimentary EPSS prototype, Prototype 1, year 2002
- Second cycle: Basic EPSS prototype, Prototype 2, year 2003
- Third cycle: Enhanced EPSS prototype, Prototype 3, year 2004
- Fourth cycle: Final version of EPSS prototype, Prototype 4, year 2004/05.

In the following sections these cycles will be discussed in detail (Figure 41).

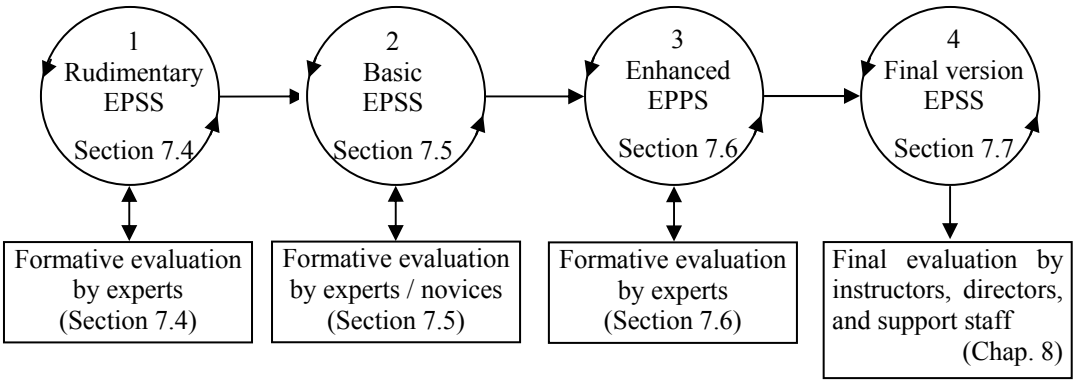


Figure 41. Four cycles of prototype development.

For each prototype (Figure 41), design considerations can be specified, based on a set of requirements to start with, and then gradually specifying enhanced or additional criteria and skipping less useful or effective criteria during this development process of these various prototypes (Moonen, 2002; Reeves, Herrington, & Oliver, 2005).

7.4 Rudimentary EPSS, Prototype 1 (2002, Study I1)

In this section, the design and development process of the first prototype is described. First design considerations are discussed (Section 7.4.1), followed by a description of the design and description of the first prototype (Section 7.4.2). The evaluation process is described (Section 7.4.3). The analysis of these evaluations, led to new insights and implications for a next version (Section 7.4.4).

7.4.1 Functional and design considerations

In Section 7.2, after an overview of various interventions, an EPSS was selected as the most promising intervention to offer support to instructors. It was argued that expert systems and job aids also enable support to instructors, but that the advantage of an EPSS is that it can integrate all these in one system. To get a better insight of what might be the best way to integrate aspects of expert systems and job aids within an EPSS approach, a rudimentary prototype was developed and evaluated.

In Chapter 5 and 6, one of the major findings was that instructors are not well aware of time planning and time expenditure. Their teaching time can be categorised in three categories:

- Activities of which the time expenditure is known in advance, such as scheduled lectures
- Activities that can be foreseen in advance, but of which the time expenditure is not well known, such as offering feedback on assignments, and
- Activities of which time expenditure is not known in advance because they occur "on the fly", such as appointments with students, or lively discussions.

To plan the first category of activities, factual data can be used to calculate the time expenditure. For instance the time expenditure to offer lectures in a course can be calculated as multiplying the number of lectures by the time per lecture. For the second category heuristics might be available about time expenditure from the previous year. For the last category, heuristics may also be used, based on experiences of last-year's course or intuition. An expert system as discussed in Section 7.2.3, which captures these factual data and heuristics in rules, seems a promising way to advise instructors about their time expenditure. In Chapter 5 the TeleTOP database was analysed, and based on counts of instructor's contributions to a course, time expenditures to create these contributions were calculated. These values can be viewed as default values and used as heuristic data in the expert system.

Teaching is a process consisting of various steps in which the objective is to offer courses to students. Taking course delivery as the central focus point, an intuitive way of dividing this process, after planning the course, would be to split it up in three main phases: before a course starts, during course delivery, and after the course has been delivered. These phases are shown on a timeline in Figure 42.

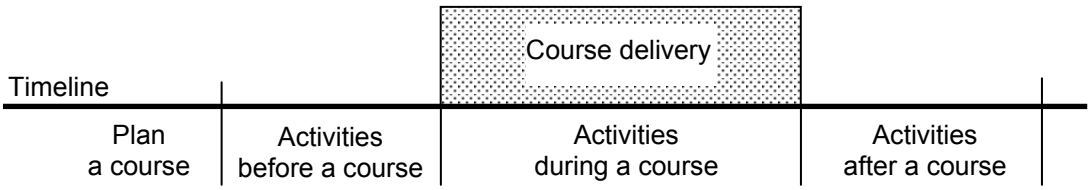


Figure 42. Timeline of phases in a teaching process.

This categorisation (Figure 42) can be used to offer a structured way to present supportive information to instructors, for instance information about which activities to perform in each phase, or related material. These activities within a phase are related to each other and in an ideal situation should be performed in a specific order. This can be seen as a workflow approach (Van der Aalst & Van Hee, 2002) at an individual level. This workflow can be visualised in a schematic way, such as a flowchart (Reding, Ratiiff, & Fullmer, 1998).

According to Stolovitch and Keeps (1999), it was found in cognitive science that humans use two types of knowledge: procedural knowledge and declarative knowledge. Procedural knowledge is used to "master job-related tasks that can be accomplished in discrete steps or stages" (p. 86). Declarative knowledge is for instance knowledge that can be used to understand why things happen or how things can be improved. When people perform their work, both procedural and declarative knowledge are used together. Therefore it seems appropriate to show the steps to perform a task, but also to add to these steps the declarative knowledge that goes with that task. As all these aspects are related to teaching and strongly relate to each other, an integrated way to offer task steps and associated resources to the users seems most appropriate.

To offer instructors insight in their time expenditure, rules and heuristics can be used as support (see Section 7.2.3). This information can be based for part on the database analysis of TeleTOP course environments that was discussed in Chapter 5. An expert-systems approach is a way to use such knowledge to advise users and a rudimentary version of such an expert-system is implemented in this prototype to offer advise about planning. The conceptual structure of the planning component is shown in Figure 43.

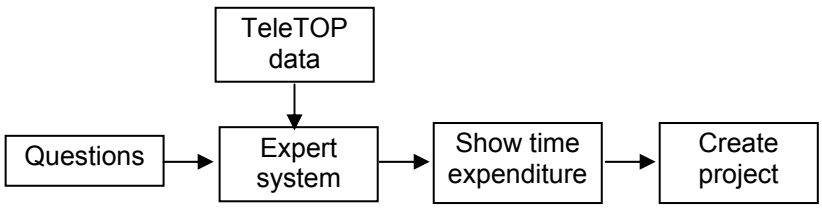


Figure 43. Prototype 1: Conceptual scheme of the planning component which includes a rudimentary expert system.

Figure 43 shows, that first the instructor is asked to input specific values of variables that will influence time expenditure. Then the rudimentary expert system uses these values together with data from database analysis of TeleTOP courses (see Section 5.5, Study O3) to calculate time expenditure, and this is shown to the instructor. The results can then be transferred to Microsoft Project (Marmel, 2000) to create a graphical overview.

Some general functional and design considerations are defined by Reeves (1993) and a selection that is relevant for this prototype is presented in Table 59.

Table 59. Prototype 1: Functional and design considerations.

Main component	**Design aspects**
Overall functionality	Offer support especially for planning
Information presentation	Planning insight, documents, checklists, TeleTOP procedures
Media integration	Text, graphics
Navigation	Simple, intuitive, using before, during, and after
Screen design	Attractive, simple

7.4.2 Design and description of Prototype 1

For a first prototype, the tool is designed as a small-scale version to better understand the effort it will take to develop a more elaborated support tool, and also to get some first impressions about the overall usefulness of a tool to support instructors (Tessmer, 1998). The chief intended functionalities for the instructor are:

- A Planning part, to produce time estimates based on instructor's input data and TeleTOP database analysis
- Quick tours, to offer a general overviews of activities
- Roadmaps, to show graphical workflows of activities and their interrelations
- Checklists of task and activity aspects to control own performance
- Documents and other kinds of resources to offer easy access
- Time savers to suggest efficiency improvements
- Technical help about how to use TeleTOP.

The prototype was developed as a website with Web pages for each topic. The website was programmed using HTML [Hypertext Markup Language] to present the text and graphics. JavaScript was used (Goodman, 1998) for navigation, interactions, and calculations. The overall structure of the tool was based on categorising the instructors' activities in four main categories of tasks: planning a course, before a course, during a course, and after a course. For each task, related activities and resources are shown to the instructor. For novice instructors it is important to get an overview of the major activities involved in each phase, and therefore a short introduction is offered as a quick tour. A sitemap of this first prototype is presented in Figure 44.

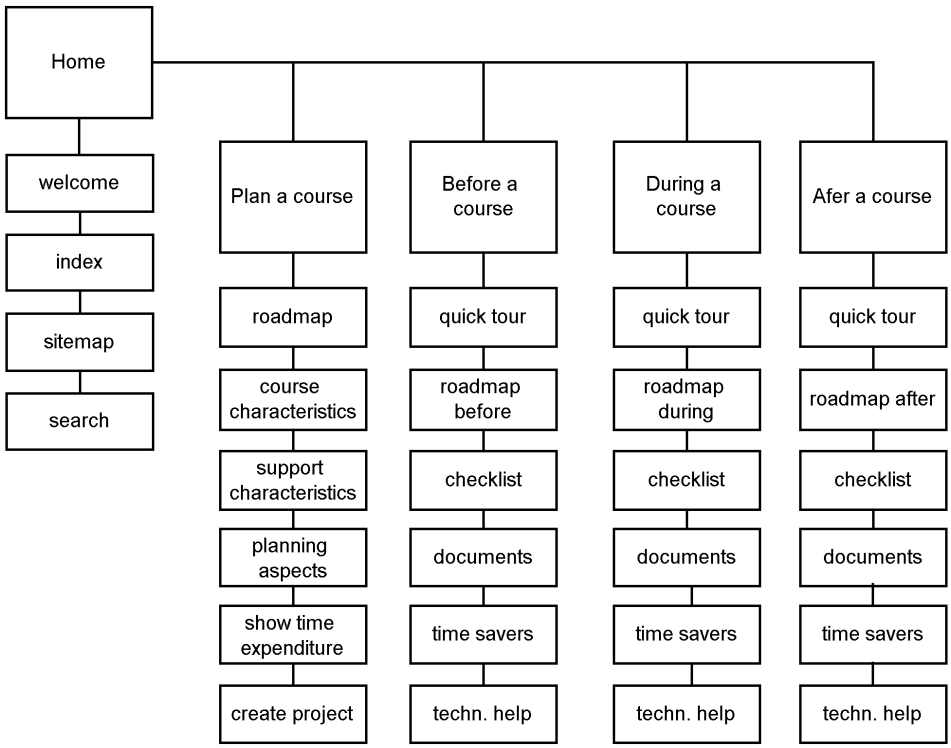


Figure 44. Prototype 1: Sitemap of main structure.

Figure 44 shows that each main task has a "roadmap" presented as a flowchart, which also offers access to some relevant documents and procedures. To offer reminders and checks to prevent instructors forgetting things, checklists are incorporated in the tool. Access to all documents specific for each phase is offered which can be selected when performing activities. To inform instructors about ways to work more efficiently and prevent procrastination, checklists are available. To help instructors when using a course-management system, more specifically using TeleTOP, technical help is offered. Next, some examples of pages in this first prototype will be presented, to highlight the specific aspects of the functionality and to give an impression of the look-and-feel and navigation of the tool.

7.4.2.1 *Entry page and Welcome page*

When an instructor starts the program, first the Entry page is shown (Figure 45).

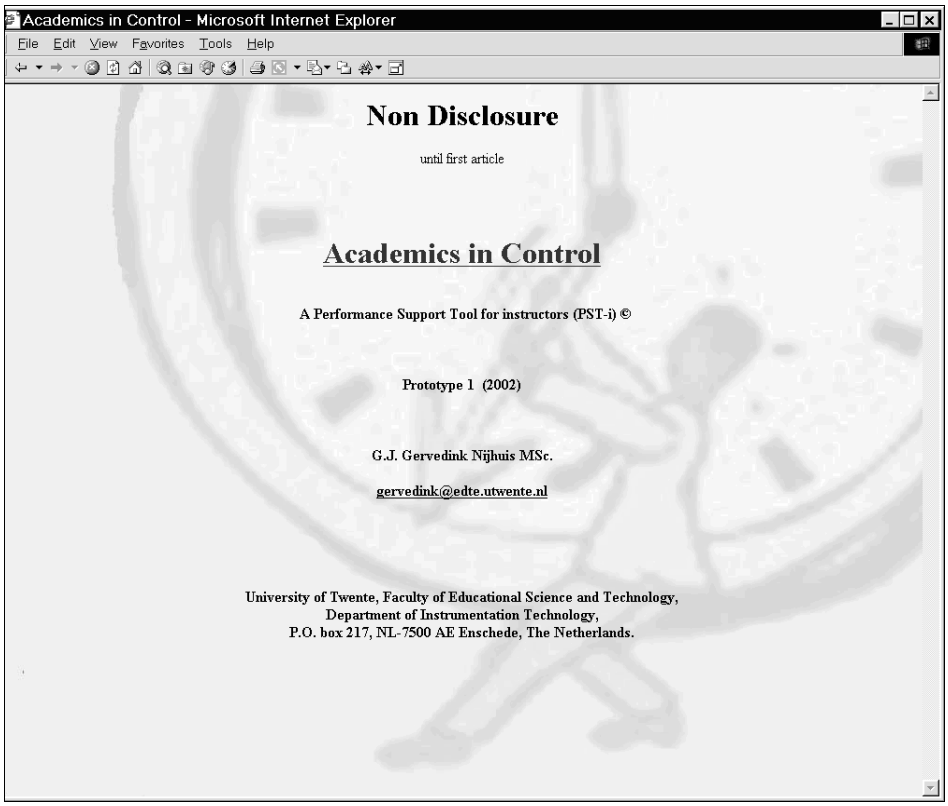


Figure 45. Prototype 1: Entry page.

The Entry page (Figure 45) shows a background image where a man is desperately trying to stop a clock. This metaphor is used to indicate that part of the support relates to planning and time management. The main objective of this Entry page is to indicate that this tool is part of a research project. The title of the project Academics in Control is also a link to the tool, and beneath this text a prototype version number and a date are shown. The author's name and a reference to the faculty indicate the origin of the program and an instructor can use this information to contact the author. The text "Non disclosure" is to indicate to participants involved in evaluations not to violate copyright. By clicking on the link Academics in Control the instructor goes to the Welcome page of the program (Figure 46).

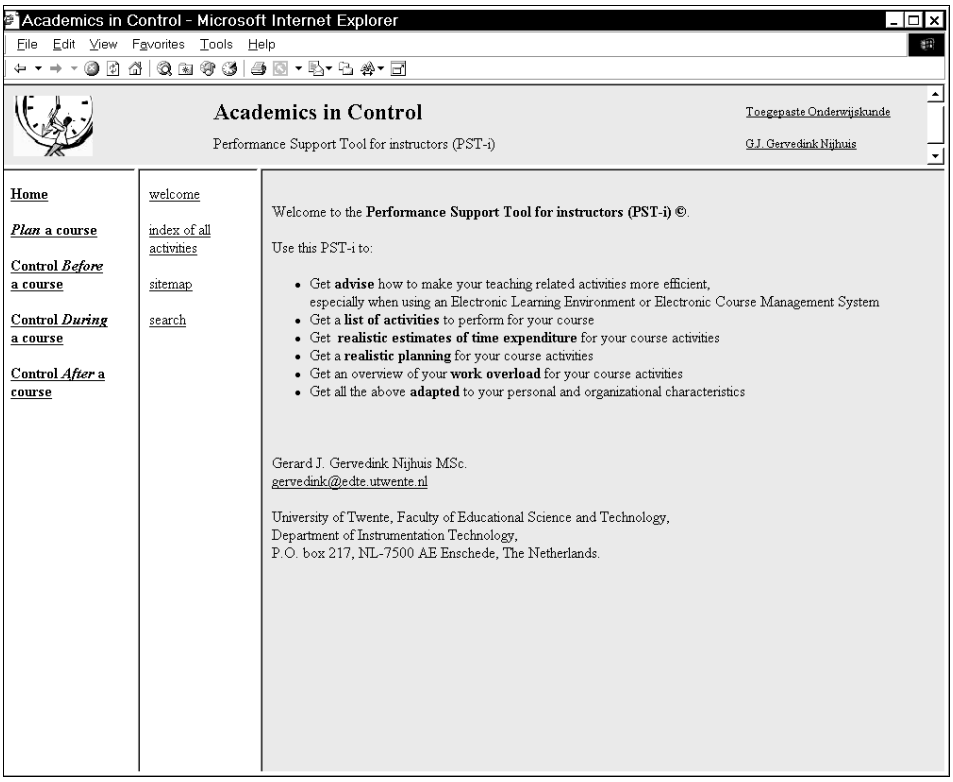


Figure 46. Prototype 1: Welcome page.

This Welcome page (Figure 46) introduces the tool and indicates what the tool has to offer to instructors, and it also shows the overall screen design of the tool pages.

The general screen design as shown in the Welcome page presents a frame structure that consists of four parts:

- A banner at the top of the window. This banner consists of
  - a picture that is identical to the background of the Entry page, except for the brightness of the colours; this is a link back to the Entry page;
  - the title and sub-title of the program (PST-i for short);
  - a link to the faculty for general information about the faculty; and
  - a link to send an email message to the researcher.
- A navigation bar at the far left of the window, with five main entries that link to:
  - Home to go back to the Welcome page;
  - Planning a course, to specify planning aspects;
  - Control before a course starts to control all activities before the start of a course;
  - Control during a course to control all activities during the delivery of a course;
  - Control after a course to control all activities to close a course.
- A sub-navigation bar next to the navigation bar, with detailed links that relate to the main entry that an instructor can select
- An information frame filling the rest of the window, with text and media related to what the user has selected as main entry and as sub-entry.

7.4.2.2 *Planning phase*

In this prototype, the first entry in the navigation bar is Plan a course, as in general planning activities are done before the performance of the activities (Figure 47).

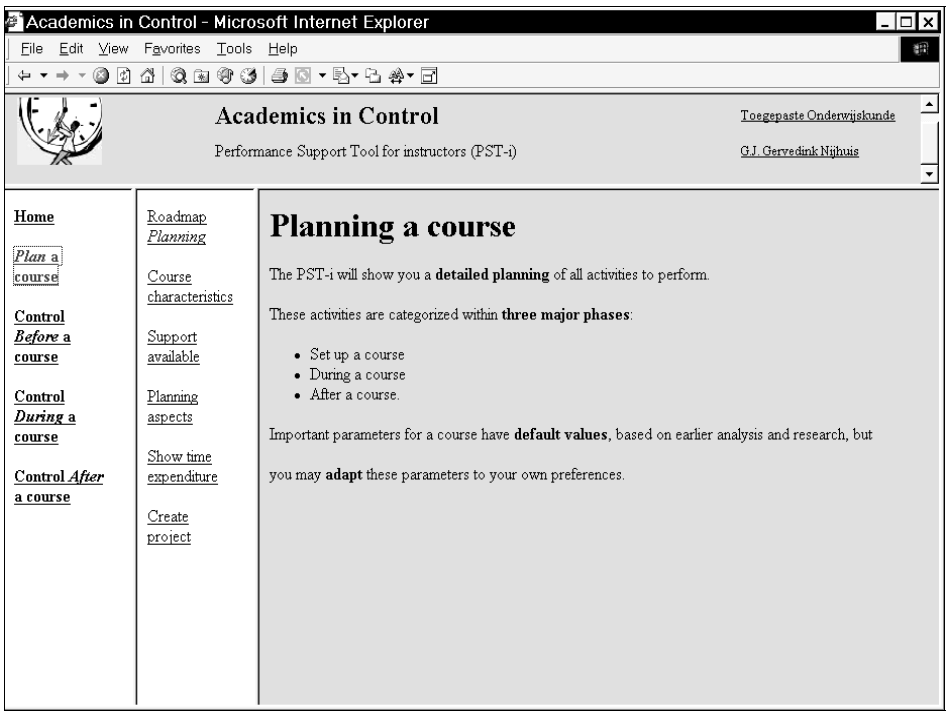


Figure 47. Prototype 1: Introduction to planning a course.

After this introduction to the planning part (Figure 47), the sub-navigation menu first shows a link to a Roadmap which is a graphical representation of the steps that are related to planning. The steps are shown as links in the sub-navigation menu and each will link to specific questions which relate to course characteristics, such as number of lectures; whether support, such as a student assistant, is available or not; and personal planning preferences, such as a preference to plan activities as soon as possible, or as late as possible. An example of a planning page with questions about teaching-related activities (in this case about setting up a course) is shown in Figure 48.

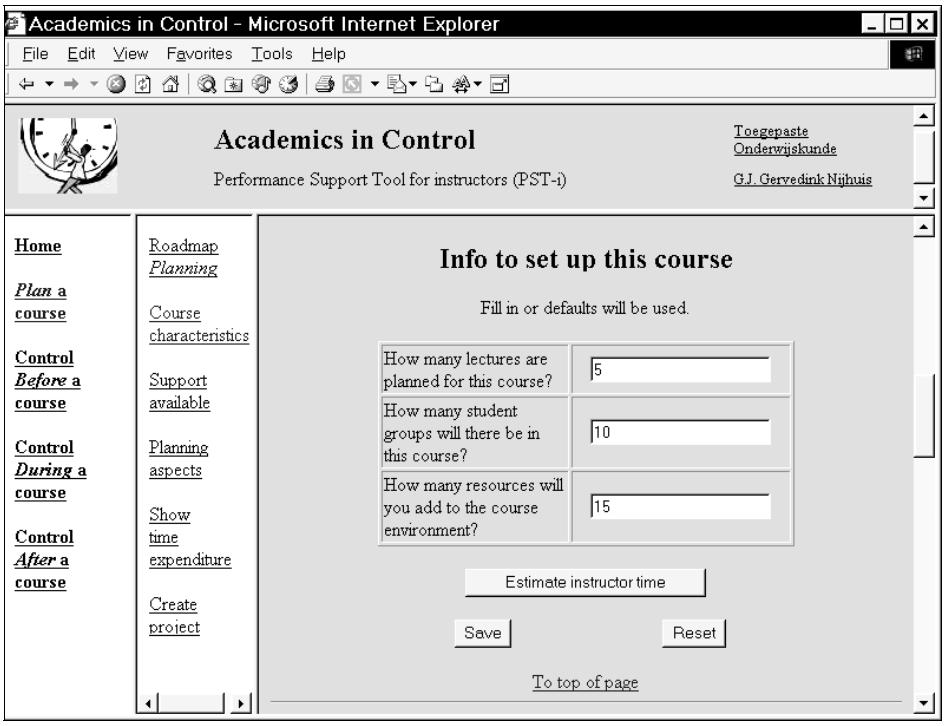


Figure 48. Prototype 1: An example of a planning page with questions about course characteristics, in this case to set up a course.

These questions about course characteristics (Figure 48) and those about support available, and personal planning preferences offer information about for instance the number of lectures, the number of students attending the course, the number of attachments to be uploaded in TeleTOP, and the number of assignments. Based on these data, rules and heuristics are used to calculate time expenditure and output advice. This rudimentary expert system uses results from the TeleTOP-database analysis (Section 5.5) as default values for specific activities that relate to TeleTOP use. Then the user can select 'Show time expenditure" to get an overview of activities and the time needed to perform all activities (Figure 49).

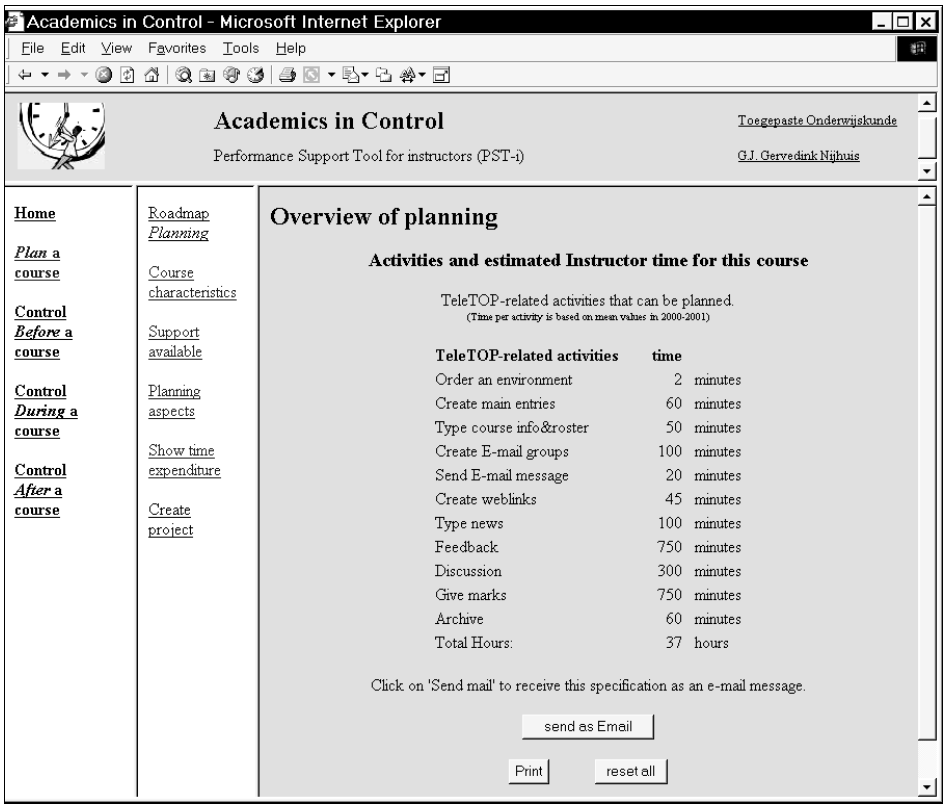


Figure 49. Prototype 1: Example of output from the expert system about estimated time expenditure.

From Figure 49 it can be seen that the overview shows a list of activities and the associated time to perform each activity. According to this example the instructor will be busy for 37 hours to carry out the whole course.

7.4.2.3 *Major phases to deliver a course*

To present the major phases of course delivery (before, during, and after; see Figure 44) in more detail, for each phase a specific page offers an introduction to that phase and a sub-navigation bar with six entries that related to that major phase (Figure 50).

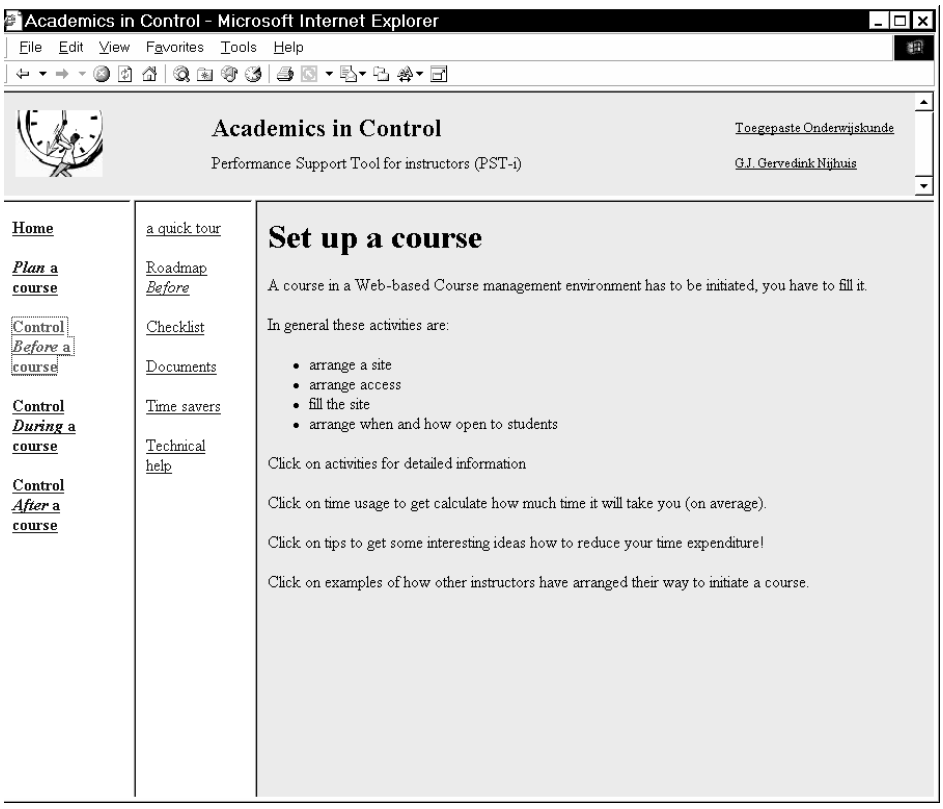


Figure 50. Prototype 1: Example of the screen layout of one of the three major tasks, in this case Before a course, with information how to set up a course.

The screendump (Figure 50) shows the screen layout of one of three major phases of course deliver -- before, during, and after a course -- and its presentation of the introductory information is similar in structure and intent to the other two phases.

The sub-navigation bar shows the following entries:

- A Quick tour, to offer a short overview of activities
- A Roadmap, to show a graphical workflow of activities and their interrelations
- A Checklist of task aspects an instructor should not forget when performing
- Documents, all kind of resources related to the major task
- Time savers as suggestions to improve efficiency
- Technical help about how to use TeleTOP.

As an example, the Roadmap of the major activity 'Control before a course' is shown (Figure 51).

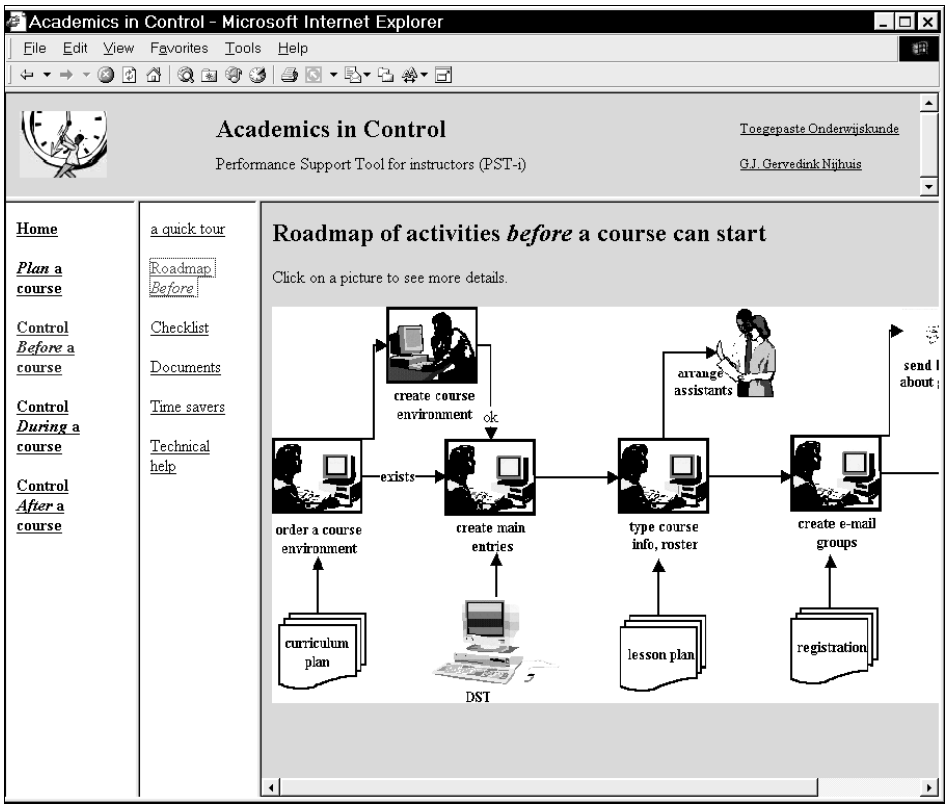


Figure 51. Prototype 1: Roadmap showing part of the activities to perform before a course can start.

In Figure 51 an example of a graphical representation is shown when the user selects 'Control before a course starts' and then selects 'Roadmap before' from the submenu. The roadmap presents a flowchart of activities an instructor can perform before a course starts. The activities are presented in a specific order that an instructor can carry out. Resources are linked to some of these activities when instructors may need these resources when performing the activity the icon points to. In a final project for her Master of Science degree supervised by the researcher, Corbalan Perez (2002) designed a variant of the screen representation showing activities and resources on a timeline (Figure 52).

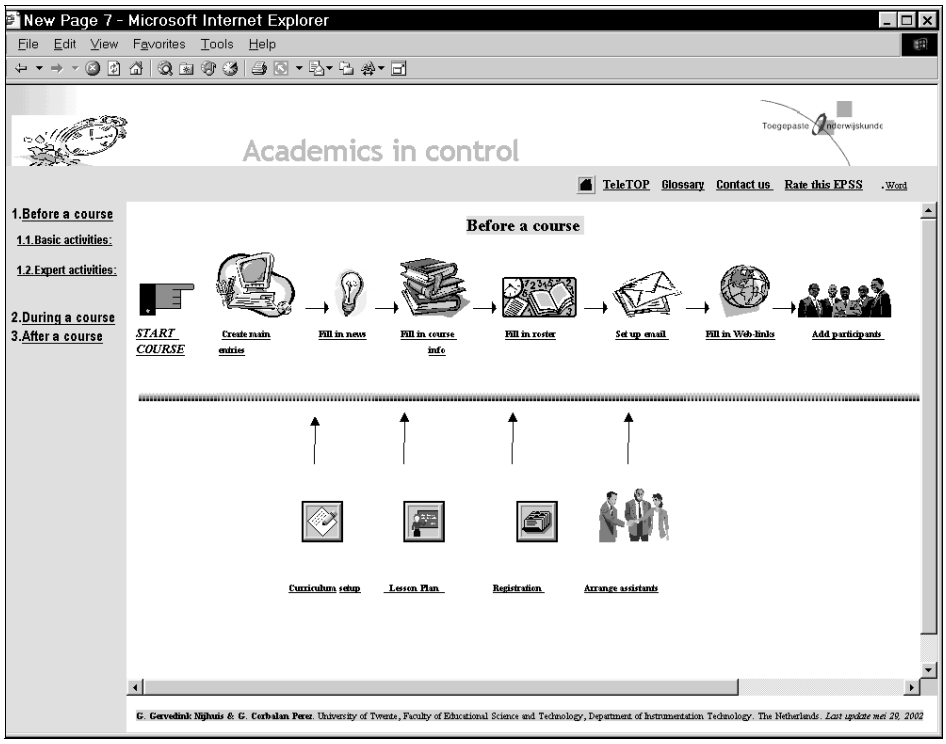


Figure 52. Prototype 1: Alternative representation of a roadmap showing activities to perform before a course can start (Corbalan Perez, 2002).

Such a task breakdown is also useful to structure the way various job-aid elements, for instance checklists, documents, and links to other resources can be offered to instructors. An example of a checklist is shown in Figure 53, followed by partial screendumps of the Documents, Time savers, and Technical help pages (Figure 54).

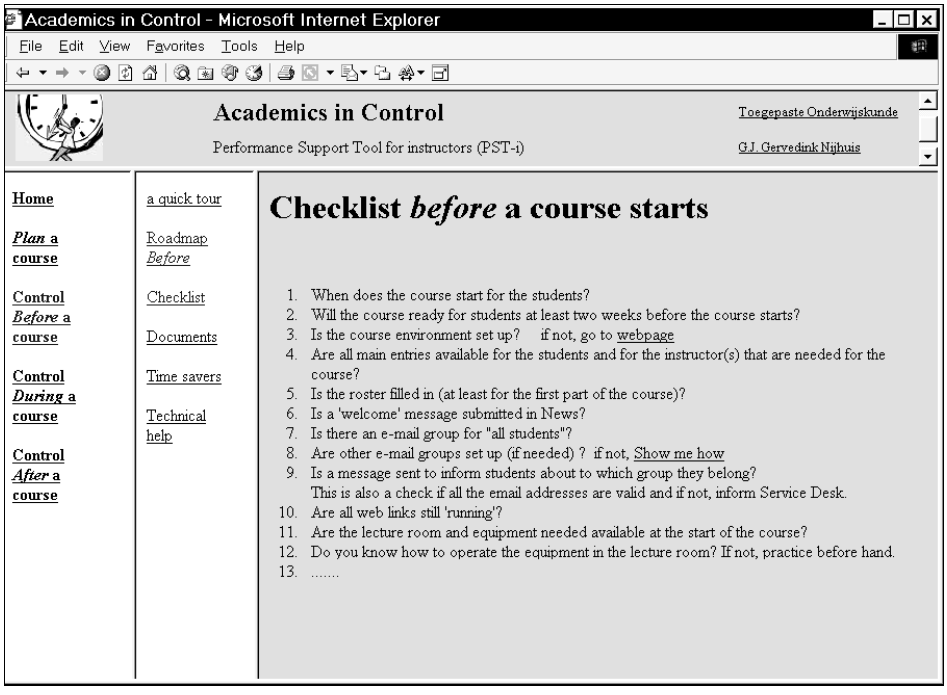


Figure 53. Prototype 1: Example of a checklist page.

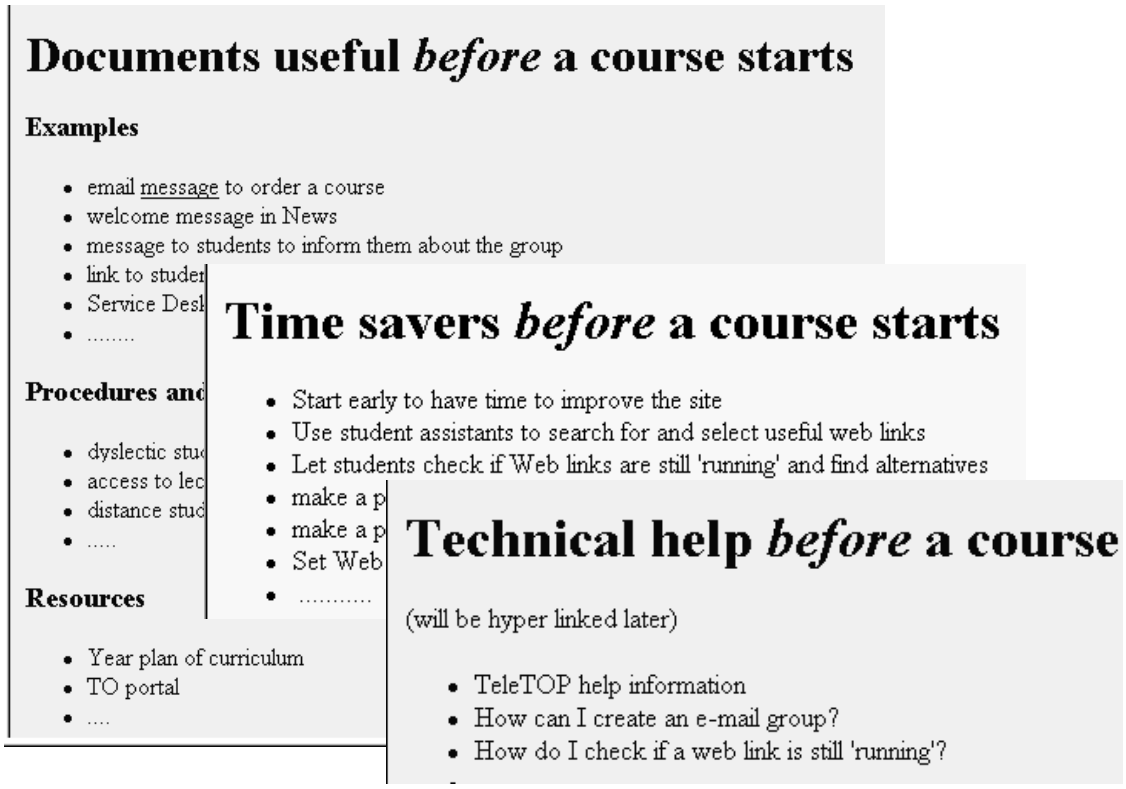


Figure 54. Prototype 1: Examples of a Documents page, a Time savers page, and a Technical help page.

In this way (Figure 53 and Figure 54), the system offers more than just a database of resources, it also relates these documents to the delivery phase of the course. When an instructor carries out a specific task relative to the course (before, during, or after), only those resources relevant for that phase are shown, hiding documents that are irrelevant for that phase. Therefore the access to these resources is more systematic and structured.

7.4.3 Formative evaluation

This prototype was evaluated by three experts who are also experienced instructors (coded exp1, exp2, and exp3) at the Faculty of Behavioural Sciences. The formative evaluations took place in March and June 2002 and the experts performed a walkthrough through the tool. While doing so, they talked aloud while evaluating various elements of the tool. Their comments were recorded and grouped. A summary of the remarks follows.

7.4.3.1 *Entry page*

When evaluating the Entry page two evaluators (exp1, exp3) suggested to add a clue how to proceed and clearly indicate to click on the title 'Academics in Control'. After the evaluators proceeded to the Welcome page, the functionality of the sub-navigation bar was not understood by two evaluators (exp1, exp2). One of them (exp2) explicitly stated that the sub-entries related to Home were not clear, and all three evaluators were confused about one of these entries, the index to activities, and did not understand the relation with the main entries in the navigation bar. They suggested to incorporate the sub-entries in the main navigation bar. Also the way to navigate was felt to be

confusing, as for instance Home and Welcome link to the same page, and sometimes it was not clear what the path to this page had been (exp2). The sitemap to get an overview of the tool, and to directly link to a specific page, was valued very positive by two evaluators (exp1, exp2).

7.4.3.2 *Planning component*

An introduction page before planning starts was valued by one evaluator (exp1), but a second evaluator (exp2) indicated that the text was not consistent with the main phases in the navigation bar. On the pages where questions are asked about specific course characteristics, available support, and personal planning preferences, the evaluators were not sure about the meaning and functionality of default values, although one evaluator indicated the user friendliness of presenting default values. Suggestions were made to introduce the questions and explain the origin and consequences of these default values. One evaluator (exp3) felt irritated by the number of questions without knowing where they would lead, and suggested to only ask those questions that are strictly needed. All three evaluators were surprised by the output of the rudimentary expert system, after the input data was used to calculate time expenditure as more activities were listed in the output than could be expected based on the questions asked, offering "a much broader frame of reference" (exp1). One evaluator (exp2) would like to get insight into the "internal process of the expert system to better understand the output." The link to Microsoft Project was valued as potentially useful (exp3), but the evaluator argued that few instructors are using Microsoft Project and he even wondered why not use Microsoft Project instead of this tool.

7.4.3.3 *Activities and roadmap*

To structure the activities according to before, during, and after a course were accepted as one way to divide the teaching process, but one evaluator (exp2) mentioned the fact that instructors have their own habits in the way they teach and perform their teaching-related activities. The roadmap to visually show the workflow within each phase was not valued very positively, as the picture was hard to read (exp1), or it was hard to understand what the time line showed (exp2). One evaluator (exp2) indicated that it is a mix of content and didactics, and that some of the activities, such as Accept defaults, were not clear. Not all icons in each roadmap were clickable and this was felt as a drawback by one evaluator (exp1). A second evaluator (exp2) suggested to present the documents and websites that are linked to these icons in new windows, to clearly distinguish between the information within the tool and these (external) documents. One evaluator (exp3) felt no need to have links to documents and websites. Two evaluators (exp2, exp3) indicated that the tool is specifically referring to activities to perform when using TeleTOP, and thus suggested that when instructors would use another kind of CMS the system has to be amended.

7.4.3.4 *Overall usefulness*

Two evaluators made some general remarks about the usefulness of the tool and these are listed in Table 60.

Table 60. Prototype 1: Remarks about overall usefulness.

Participants	Remarks
exp1	It is adaptable to my situation.
exp2	Tool could be made adaptive using previous experiences of instructor
exp2	Major remark: the questions are currently ordered by category of TeleTOP activities. I prefer a more chronological ordering: when do I offer which topic to the students and in what instructional format.
exp2	Is it possible to combine this tool with other management information systems?
exp2	In essence the tool is great, but to make a full-scale version will be very hard
exp2	Tool offers a transparent overview of tasks I have to perform. Especially a clear view of preparatory work will offer me peace of mind.

7.4.4 Analysis and implications

From these evaluations it can be concluded that the Entry page and the Welcome page are potentially useful (see 7.4.3.1), but that more has to be explained about the tool and the way the teaching process is divided in various phases. The general impression of the user interface was that the main entries in the navigation bar are clear as to what users can expect to see when they click on them, but that the sub-navigation bar is not clear, and the evaluators' suggestions to show the sub-entries in the main navigation bar seem a better solution to implement in the next prototype version.

The planning component was valued as potentially valuable to support instructors to better plan their time, but the way this was implemented in the tool was valued rather negatively. Evaluations indicate that experts found the expert-systems approach (discussed in Section 7.4.1) a bit difficult, as they were not able to clearly understand it's output. Although additional information can be added to the questions to support instructors, they disliked the fact that a number of questions are asked without a clear understanding of why these questions are asked. Another major drawback was that the expert system generated additional output that was not directly linked to questions that had to be answered. For instance, the tool did not ask the instructor to specify the time needed to set-up a TeleTOP environment because all instructors have to perform this activity and it involves mainly going through a fixed list of TeleTOP options. As the time to go through this list is almost independent of the specific characteristics of a course, a default value was fixed as a rule in the expert system and then shown in the output. The fact that these experts were surprised indicates that they expected a more-direct link between input and output.

To structure the main activities of an instructor in three phases, as before, during, and after a course, seems not the most common way instructors handle their courses. Although each instructor may have his or her own habits in teaching and performing, the tool is rather strict in categorising activities according to a specific timeline. This feeling is in line with the fact that participants were reluctant about the value of a roadmap as it shows activities along a timeline. They found such a roadmap hard to understand. Also here again they remarked that such a roadmap does not take into account different ways of teaching by various instructors. It seems that instructors need more flexibility in the order in which the activities are presented and structured.

The evaluators suggested presenting documents and websites in new windows. This seems a good suggestion as it differentiates the information stored in the tool from

information from outside the tool, such as administrative forms, or external websites. Some small remarks were made about the use of colours and the quality of various images, thus efforts should be made to improve this in the next prototype. For instance the colour scheme should be changed to become more compatible with the Entry page.

Evaluators were aware of the fact that this prototype was a rudimentary version to get some first insights into what a tool might look like. From 7.4.3.4 it can be concluded that the EPSS approach is valued as useful and as a good start to support instructors, but as one expert remarks "it will be hard to realise" (exp1).

7.5 Basic EPSS, Prototype 2 (2003, Study I2)

In the previous section, a rudimentary EPSS was described and evaluated. This led to a second round of prototyping, using the results from the first round to develop a basic version of the tool.

In this section, the design and development process of the second prototype is described. First design considerations are discussed (Section 7.5.1), followed by a description of the design and description of the second prototype (Section 7.5.2). The evaluation process is described (Section 7.5.3). The analysis of these evaluations, leads to new insights and implications for a next version (Section7.5.4).

7.5.1 Functional and design considerations

Using the results of evaluations carried out in the first round of prototyping (see Section 7.4), some functional and design criteria needed to be changed. One of the main conclusions was that the break down of activities in three phases relative to a course (before, during, and after a course) did not match common practice, as for example some instructors have not yet prepared all their lectures before a course starts. Therefore a new way to divide the instructor's activities is suggested in this Prototype 2. According to Schuller (1995), instructors in a changing university will perform various tasks subdivided in two main categories that are more distinct than in traditional education: they develop courses, and they deliver courses. Although in a broad sense a course cannot be delivered when it is not first developed, at a more-detailed level, activities belonging to these major tasks can be more inter-twined. For instance during delivery of a course, an instructor can still develop the next lecture, as long as it is ready before the lecture starts. When an instructor prefers this just-in-time development, instead of performing all development-related activities before a course starts, the tool should offer this flexibility. A task break-down in two major tasks, Develop and Deliver, offers both a sequential approach and also a more-parallel approach as shown in Figure 55.

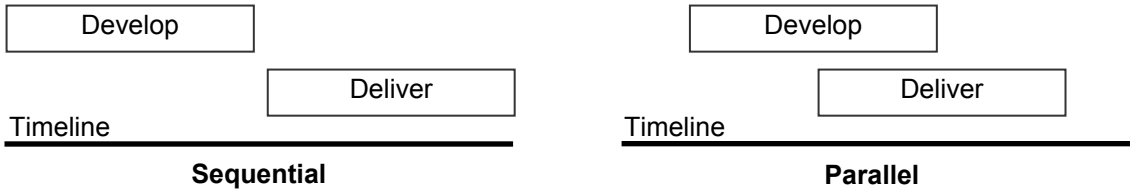


Figure 55. Two alternatives to develop and deliver a course.

In the new prototype both approaches shown in Figure 55 should be offered to the instructors to accommodate their ways of developing and delivering courses.

The chief intended functionalities for the new prototype are:

- to offer a systematic overview of teaching related activities
- to offer key resources and documents related to these activities
- to offer overviews of activities when using a Course Management System (CMS)
- to offer planning and control information about teaching-related activities in a systematic way
- to offer print options for a planning overview, a checklist, and a project plan.

When there is no longer emphasis on the timeline, also the way the activities are presented should change. The roadmap in Prototype 1 suggested too much of a strict sequence. Another way to present activities is to use a list format. In a list the items are presented in a sequential order, but there is not a direct connection to a timeline.

As the evaluators in the first round valued the resources that are associated with a specific task, this feature will remain. To show these resources, the list of activities can be represented as a column in a table, and for each activity a row can show the activity with its related resources.

The evaluation of the first prototype (see Section 7.4) showed that the general screen design was appreciated, but that the sub-navigation bar should be skipped and the sub entries merged with the main entries. To show the entries in one navigation bar, the items could be listed in one long sequence. The major drawback is that instructors will not have a clear overview of major and sub-tasks, and that the list will be too long when more sub-entries are added. A way to overcome this problem is to show the main entries, and when the user clicks an entry, a pop-up menu will show the sub-entries.

A summary of functional and design considerations for Prototype 2 based on findings during the evaluation of Prototype 1, and their implications are listed in Table 61.

Table 61. Prototype 2: Summary of functional and design considerations.

Main components	Consideration	Implementation in Prototype 2
Tasks	Add subtasks to main menu	Pop-up under main task
	Add task aspects to information	Add tabs at top of info frame
Planning	Focus less on TeleTOP details	Focus on planning a course, including TeleTOP use
User interface	Structure entries according to main tasks, not on timeline	Define, develop, deliver
Output	Present output as summaries	Buttons at bottom for planning, checklist, and report
Screen design	Consistent colours	Consistent pastel colours used
	Picture in banner less sharp	Blur picture
	Adapt links in banner	Link to TO deleted, help added
	Add information about the tool	Show help as main entry at top of navigation bar

7.5.2 Design and description of Prototype 2

To emphasise the objective of this prototype and its target group the tool is called "Performance Support Tool for instructors" (PST-i). The overall structure of the tool is based on the task division of teaching according to Develop and Deliver. To be able to also input some planning information, a Define menu entry is offered, and to support the use of the tool, a "PST-i" main entry can be clicked which offers help on how to operate the tool and background information related to this research (Figure 56).

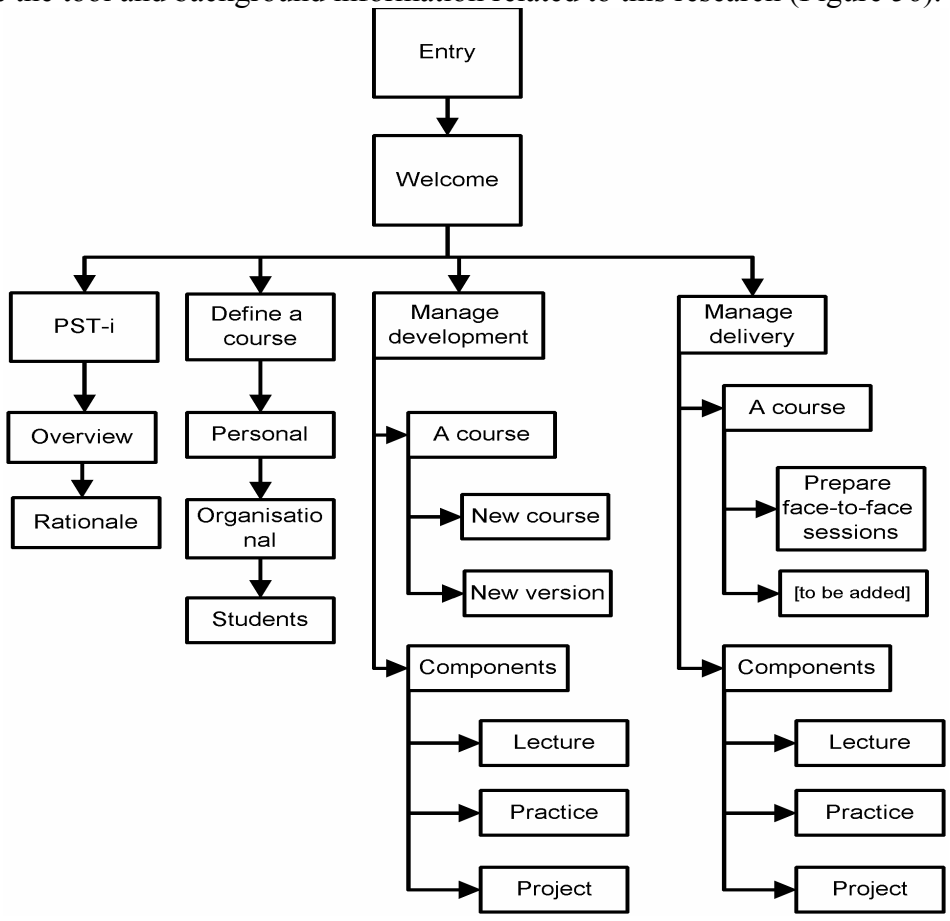


Figure 56. Prototype 2: Sitemap of main structure.

The sitemap (Figure 56) shows that the tool starts with showing the Entry page, followed by the Welcome page. Then the instructor can select tool-related entries (Home, Overview, and Rationale), and three major tasks: Define a course, Manage development, and Manage Delivery.

7.5.2.1 *Entry and Welcome page*

The Entry page of Prototype 2 is identical to the Entry page of Prototype 1 (see Figure 45) and therefore not repeated here. The Welcome page is shown in two versions in Figure 57.

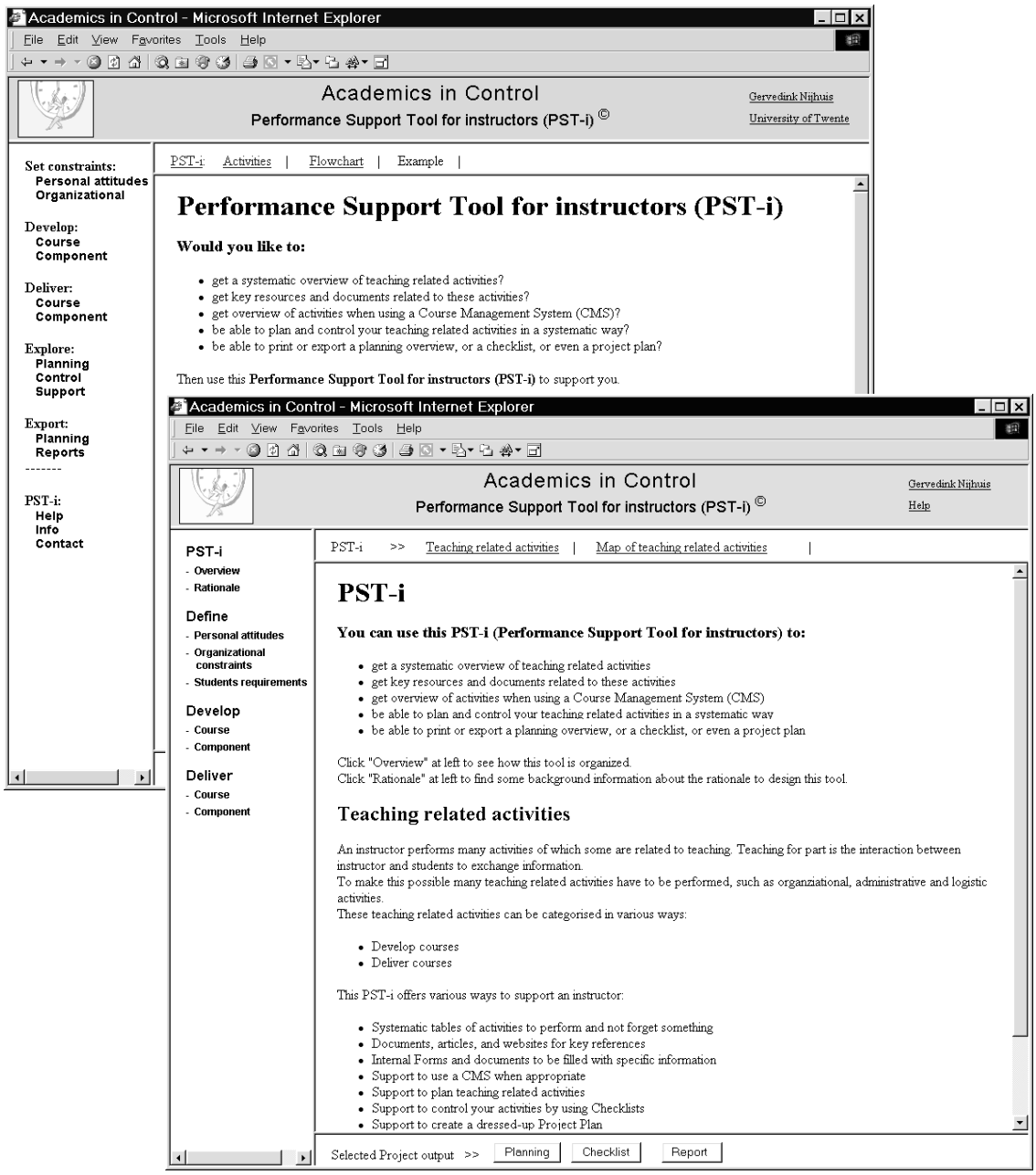


Figure 57. Prototype 2: Screen design of Welcome page of two consecutive versions (September version in background; October version in foreground).

Figure 57 shows that in both versions the screen design consists of five frames. The top frame of the Welcome page shows the title of the research and the subtitle Performance Support Tool for Instructors to indicate the objective of the tool and its target group. The left frame shows the navigation bar with a few main menu entries. The navigation bar of the September version (Figure 57, background) shows six main categories of entries, whereas the October version (Figure 57, foreground) shows 4 main categories. The September version starts with Set constrains to define planning characteristics, and this entry was renamed Define in the October version. The next two categories, Develop and Deliver, refer to the main tasks of teaching and are offered in both versions. The Explore entry in the navigation bar of the September version is a remnant from Prototype 1, and skipped in the October version. The Export entry was replaced by an output sub frame at the bottom in both versions, but the menu entry was still in the navigation bar of the September version. The PST-i entry (with help and background information) is placed at the bottom in the September version and placed at the top in the October version.

The right frame is subdivided in a small sub-frame at the top with some textual links that depend on the selected main entry, a large information frame with information about the menu entry selected, and at the bottom a small sub-frame with three output buttons, to print an activity overview with planning information, a checklist, and a project plan. As an example, the information frame of the Welcome page of the September and October version are shown in Figure 57. The text of the main entries themselves in the navigation bar were not clickable in the September version, but after the evaluations held in September (see Section 7.5.3.1), these entries were made clickable in the October version. For each main entry there are two or three sub-entries that are clickable. When a sub-entry is clicked the general information that relates to the sub-task is shown in the information frame, but also additional sub-submenus appear that can be selected to speed up the selection process. Apart from these differences in the navigation bar and the Welcome page, the September version and the October version are almost identical. Therefore in the rest of this section, the October version will be described in detail.

7.5.2.2 *PST-i related entries*

The first main entry PST-i, offers help and background information about the tool. When the user clicks PST-i, the Welcome page is shown, thus this entry is used as a Home entry (which was missing in the September version). The overview sub-entry offers help about how to use the tool (Figure 58), and the rationale sub-entry shows background information about project management, time management, and human-performance technology that are the bases for this tool.

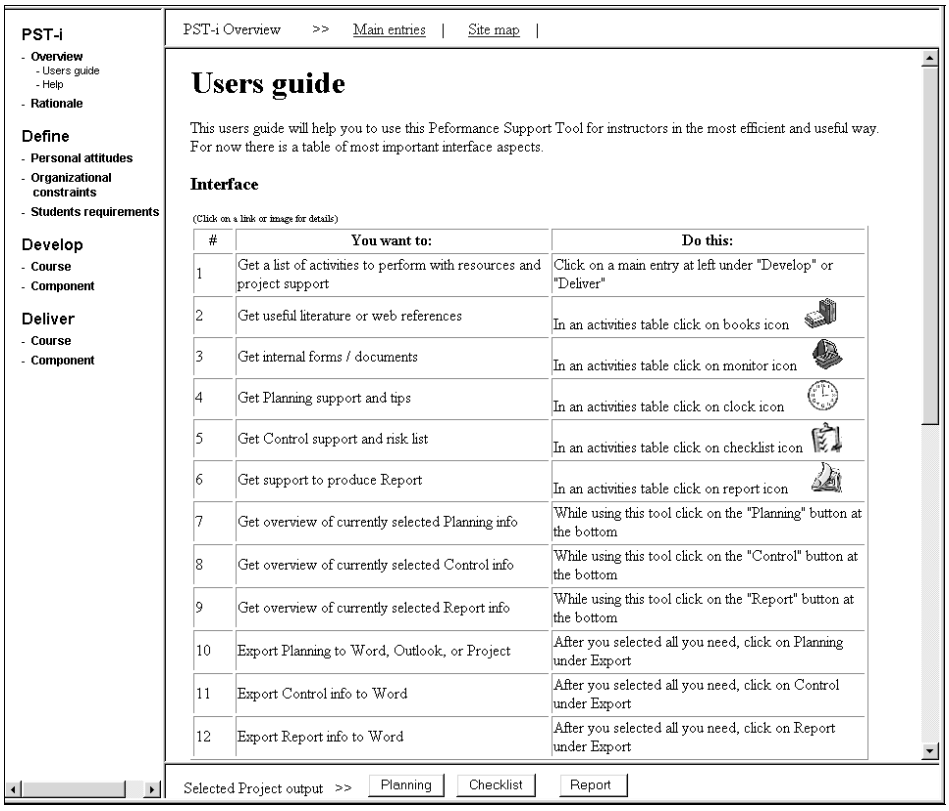


Figure 58. Prototype 2: User guide.

7.5.2.3 *Define course aspects*

The next main entry (Define) refers to defining constraints that are relevant for planning and controlling a course (Figure 59).

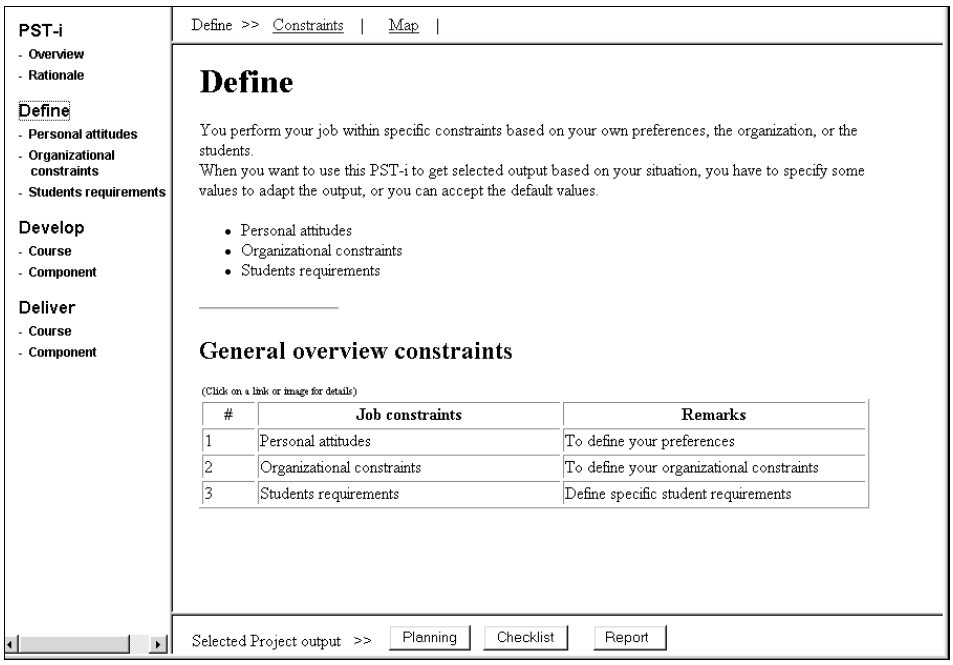


Figure 59. Prototype 2: Define phase.

The subentries are personal attitudes, organisational constraints, and student requirements, but the last was not developed during Prototype 2 (Figure 60).

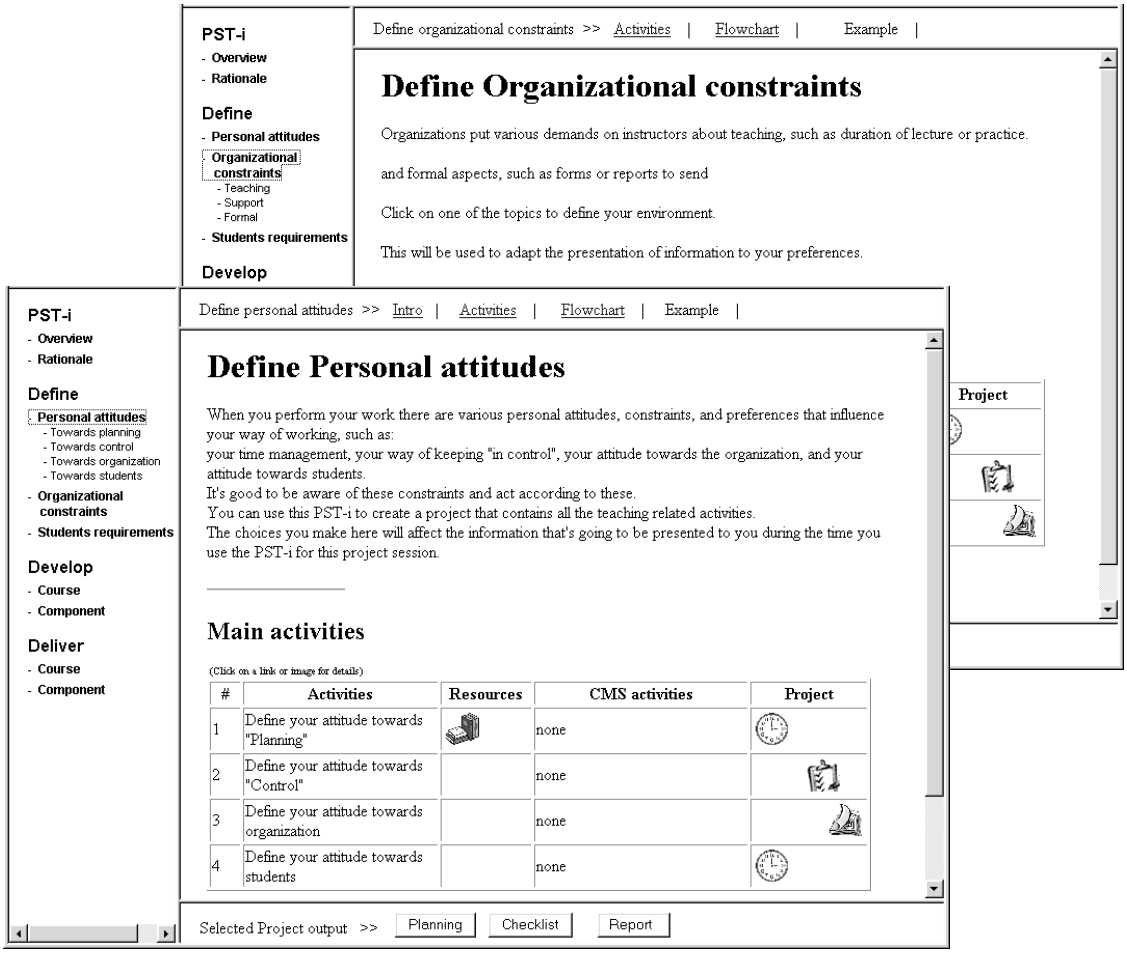


Figure 60. Prototype 2: Define personal attitudes and organisational constraints.

Each sub-entry page (Figure 60) contains input fields to specify for instance the level of detail at which an instructor wants to plan the teaching-related activities, or the duration of a lecture.

7.5.2.4 *Manage development and delivery*

In the navigation bar of Prototype 2 text-links are shown that link to two major tasks: Develop, and Deliver. As an typical example of a main-task page, the Develop page is shown in Figure 61.

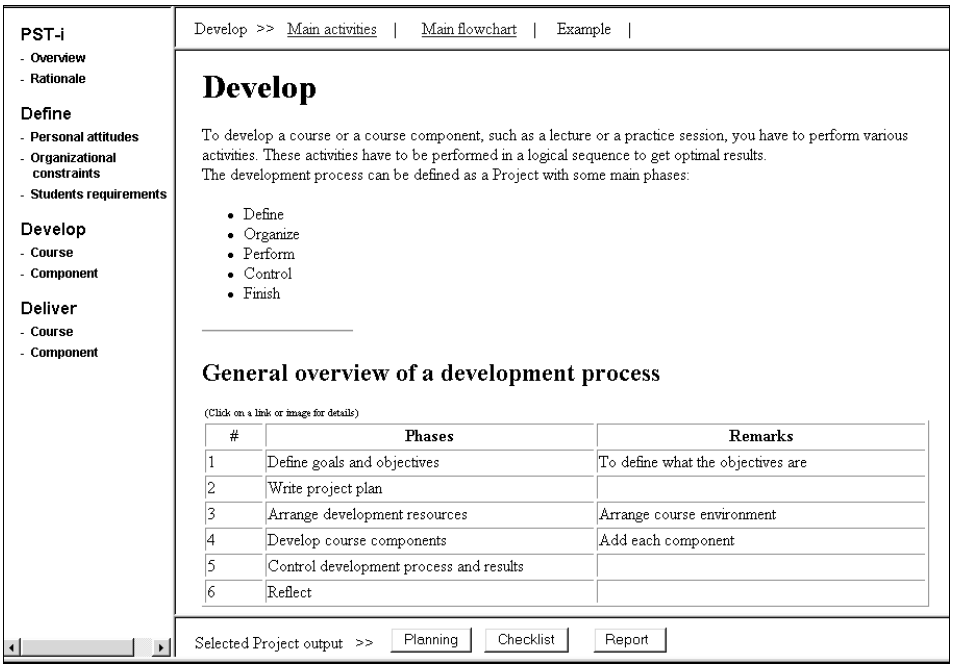


Figure 61. Prototype 2: Example of a main-task page, in this case Develop.

The main task page Develop consists of all activities that relate to developing a course or one or more of its components, such as lectures. When under Develop the sub-menu entry Course is clicked, two subentries pop up to select New course to develop a new course, or New version to develop a new version of an existing course (Figure 62).

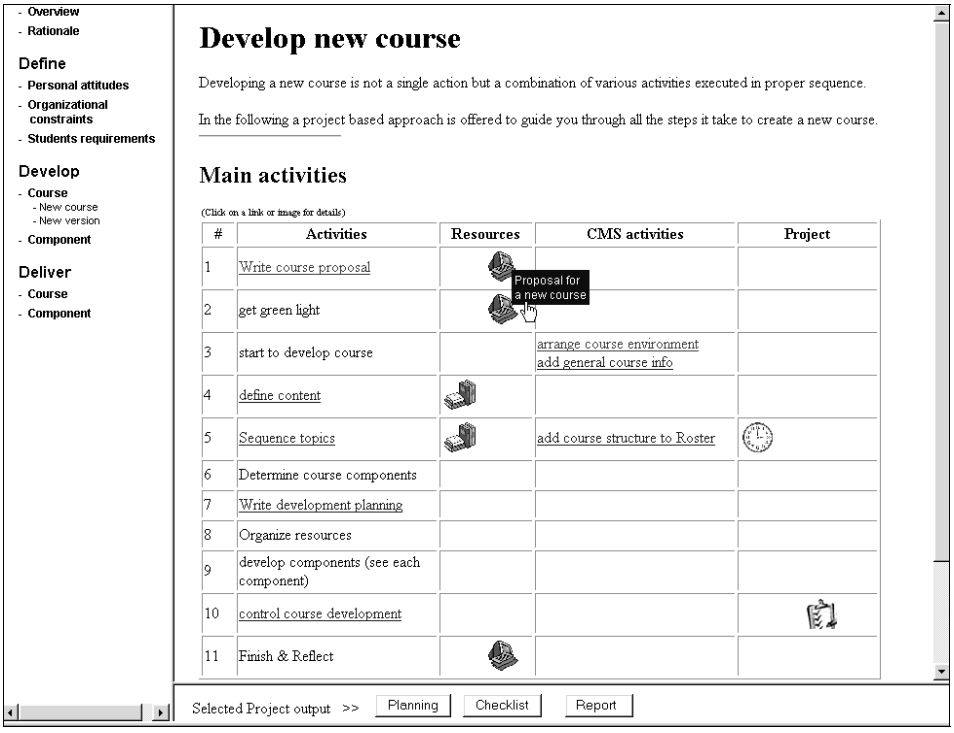


Figure 62. Prototype 2: Example of a sub-entry page, in this case Develop new course.

Figure 62 shows a sub-entry page Develop new course as a typical example of such pages in this prototype. The page shows a short text about the task, followed by an Activity table of main activities. This list of activities serves as an overview to show instructors what activities to perform and in what preferred sequence.

In the Activity table the Resource column shows an icon when one or more resources are available that are related to the specific activity. In the CMS column, text links are shown that link to sub-pages with detailed activities to perform that relate to using a CMS. The Project column shows icons that link to planning details (clock icon), checklists, and administrative forms. When the instructor clicks on an icon a pop-up menu is shown, with a selection menu of links to additional information or a form, and the user can then click on one of the items in the selection menu after which the linked file is opened, either an internal or external Web page, or a document. In Figure 62 the user clicked on the resource icon that is associated with main activity 'Write course proposal' and then a Word document is shown as a template for a letter to the educational program director to propose a new course.

Some of these activities are linked to a page with detailed information about the specific activity, and can contain supportive information at a more-detailed level.

When a main activity consists of many sub-activities, the activity is linked to a page with additional information. When an instructor clicks on the activity, indicated in blue and underlined, the extra information is shown (see Figure 63).

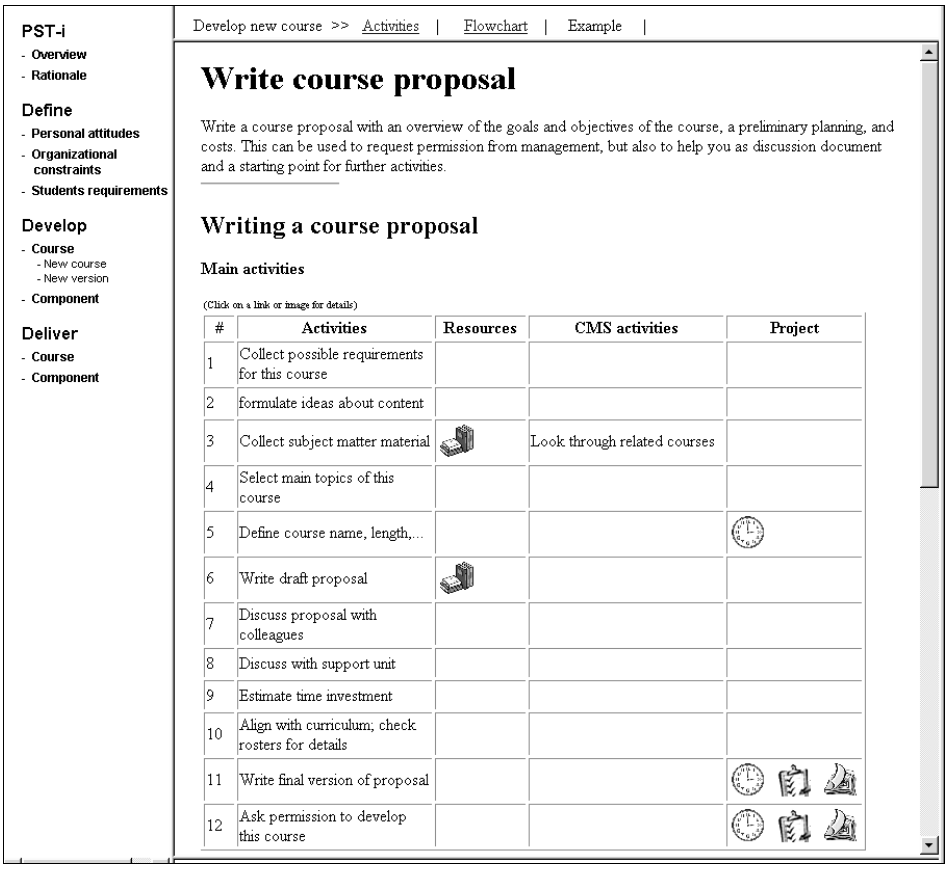


Figure 63. Prototype 2: Example of a subtask 'Write course proposal'.

Figure 63 shows an example of the information an instructor will see when in the activities column (see Figure 62) the activity 'Write course proposal' is clicked. It shows detailed information about activities to perform when proposing a new course. It also shows that all main tasks and subtasks are presented in the same format, with a task description and a table of activities, with resources, CMS activities, and project columns that may contain an icon when appropriate to link to additional information (two examples shown in Figure 64).

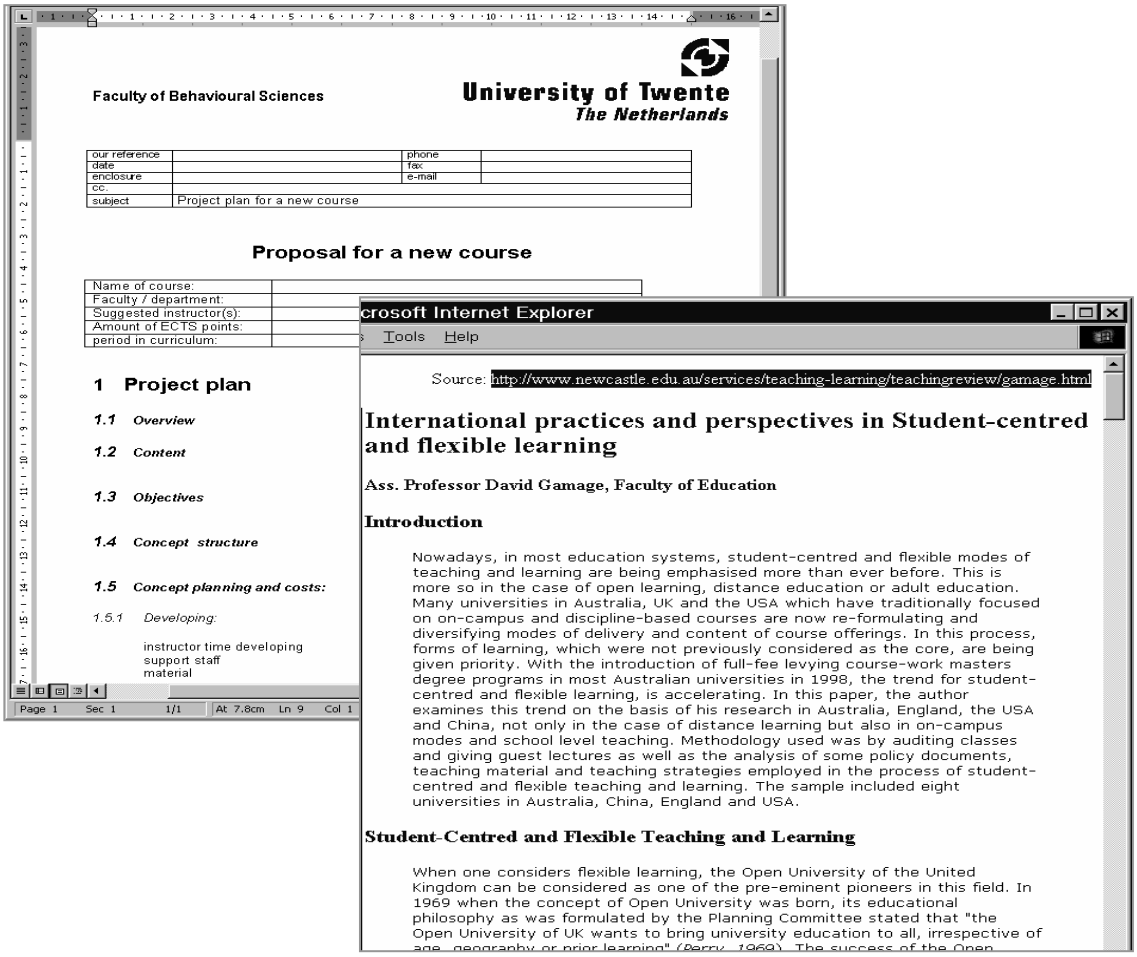


Figure 64. Prototype 2: Two examples of resources: a form template to propose a new course and an external document (http://www.newcastle.edu.au/ services/teaching-learning/teachingreview/ gamage.html).

Figure 64 shows an example of a letter to propose a new course that can be amended and then sent to the director of educational programs. In the foreground an example of an external resource about student-centred and flexible learning that is linked to the main activity Define content.

7.5.2.5 *Manage course components*

To develop course components, similar pages as those of Develop a new course are shown to the instructor (Figure 665).

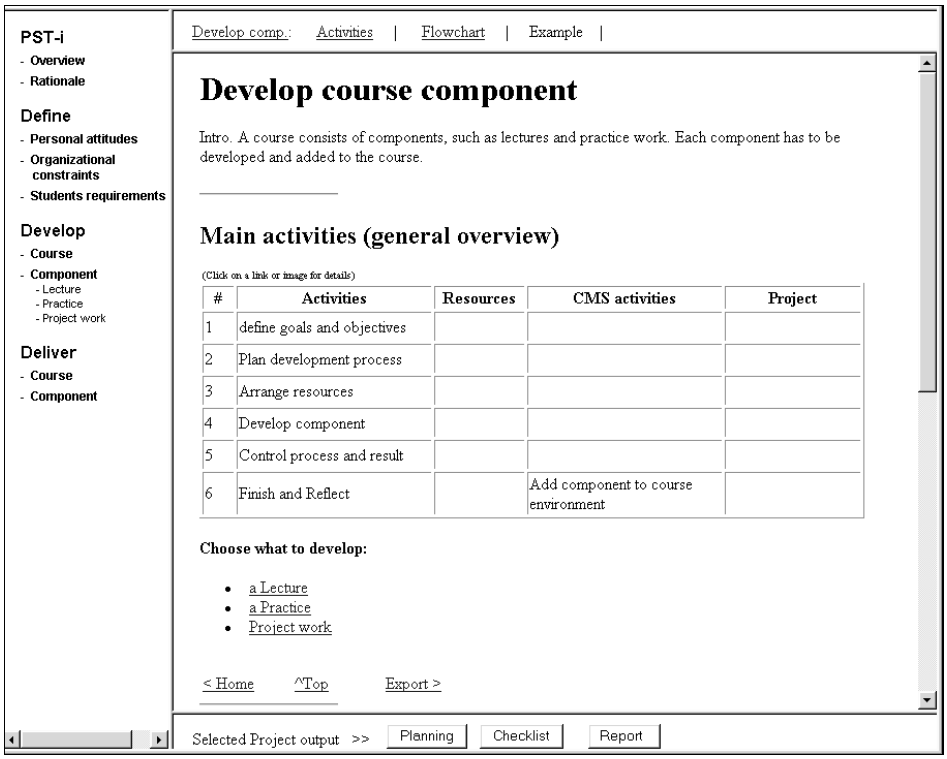


Figure 65. Prototype 2: Develop course component.

As shown in Figure 65, the 'Develop course component' page is similar in layout to Develop a new course, but the Activity table lists the general activities that relate to developing a course component. In the navigation bar the instructor can select which component to develop. Three course components are included in this prototype: Lectures, Practice, and Project work. As an example of a component page, in Figure 66 the Develop a lecture page is shown.

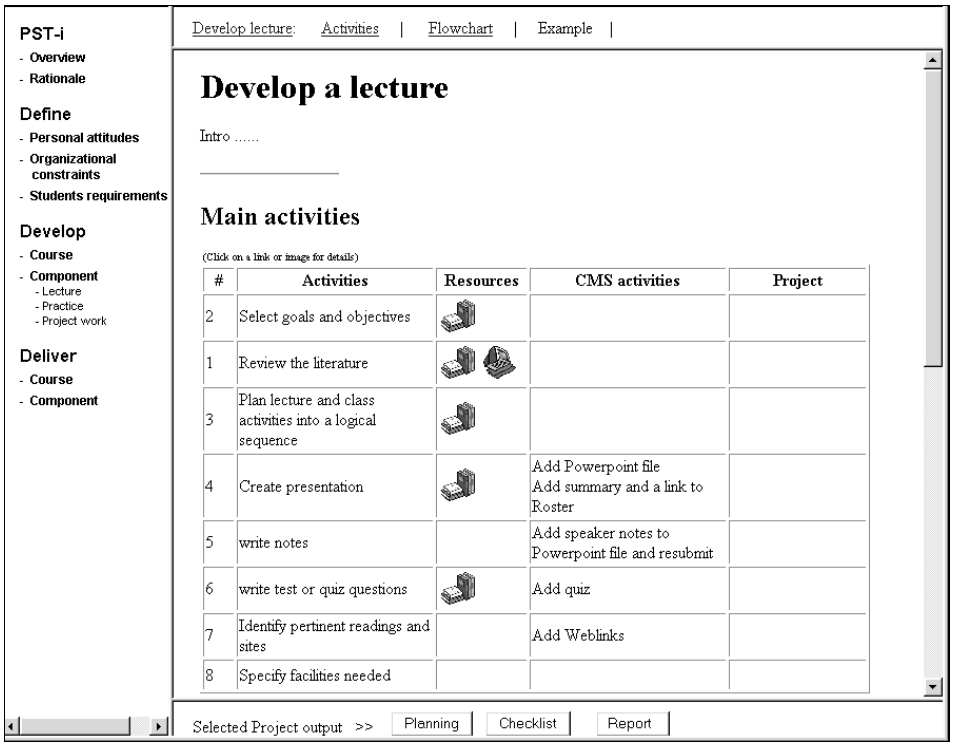
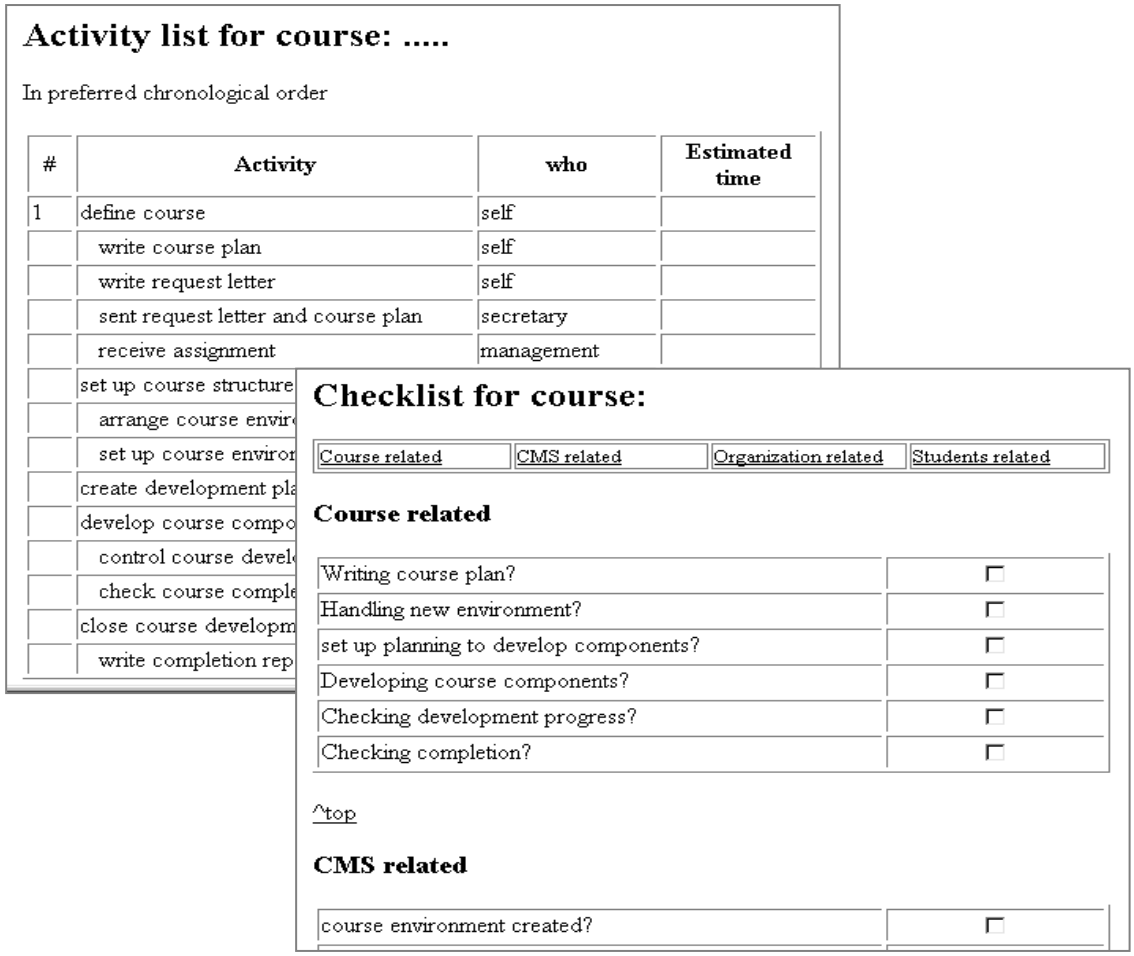


Figure 66. Prototype 2: Example of a course component page, in this case Develop a lecture.

The 'Develop a lecture' page (Figure 66) structures the work to develop a lecture, and offers an overview of activities to perform, in the proper order, and with additional supportive information.

7.5.2.6 *Output*

At the bottom of each page are three buttons: Planning, Control, and Report. When the user clicks one of these, examples of possible output are shown (Figure 67).



Activity list for course: .....

In preferred chronological order

#	Activity	who	Estimated time
1	define course	self	
	write course plan	self	
	write request letter	self	
	sent request letter and course plan	secretary	
	receive assignment	management	
	set up course structure		
	arrange course envir		
	set up course environ		
	create development pla		
	develop course compo		
	control course devel		
	check course comple		
	close course developm		
	write completion rep		

Checklist for course:

Course related | CMS related | Organization related | Students related

Course related

Writing course plan?	☐
Handling new environment?	☐
set up planning to develop components?	☐
Developing course components?	☐
Checking development progress?	☐
Checking completion?	☐

^top

CMS related

course environment created?	☐

Figure 67. Prototype 2: Examples of output: an activity list and a checklist.

These output pages (Figure 67), are to suggest to the users how actual output may look when a full-scale version would be used. The planning output will show a list of activities, a column that indicates who is involved in specific activities, and a column that indicates the estimated time per activity. The checklist is a list of reminders a user should not forget and a column that can be used by the user to check when an activity is completed. The project output suggests a full-scale project plan generated by the system which then describes the course planning, a work plan, and other project-management information. In this prototype the output of planning, checklist, and project are not based on actual data from the user or the system.

7.5.3 Formative evaluation

The tool was evaluated by two experts and 13 novices. On 15 September 2003 the tool was evaluated by one of the experts (exp1) working at the University of Twente. This evaluation took place at the office of the researcher. The expert was asked to carry out a walkthrough and comment on various aspects of the tool and to make suggestions about how to improve the tool. During the evaluation the researcher made notes on paper. Then the tool was evaluated by 13 novice instructors with some experience in TeleTOP use. These were students participating in a Master programme called TAET

[Technology applications in education and training] at the University of Twente. This evaluation took place on 16 September 2003 in a lecture room. The tool was demonstrated to the students and then a questionnaire was filled out. After these evaluations some changes were carried out to overcome some of the navigation problems and misunderstandings. Then the tool was evaluated by a second expert (exp2), also working at the University of Twente, who carried out the same evaluation procedure as the first expert on 7 October 2003. The two prototype versions evaluated in September and October were almost identical, but when in the following sections there is a need to differentiate between these two prototype versions, these versions will be specified as the September version and the October version. For details see Appendix 8.

7.5.3.1 *User interface*

The Entry page and the Welcome page (see Figure 57) were valued as useful by both experts, and exp1 indicated it is a motivating introduction, but they suggest to offer a bit more guidance to the user of what to expect in the rest of the tool. In the September version the welcome page (see Figure 57, background) was interpreted by one expert (exp1) as a help page and it was not clear what the link was between the navigation entries and the welcome text (see Figure 57, foreground). In the October version the text on the Welcome page was changed, but one expert (exp2) still thought it could be improved by specifying what the user should do or select. The overall frame structure with five frames was valued positively by exp1. The navigation frame was valued rather negatively in the September evaluations, as there were some entries that were not clickable such as under Deliver various delivery formats. Although these entries were added to indicate future functionality, the evaluators did not appreciate this. In the October version these suggested future entries were skipped. In the September version, exp1 would like a sitemap in the tool and as it was already valued as very positive in Prototype 1 (see Section 7.4), a small scheme was added again in the October version. The two experts also questioned the value of the small frame above the information frame with two sub-entries of the selected entry in the navigation bar. They found it confusing and when clicked the information was not presented in a consistent way: the link Activities links to text on the same page, whereas Flowchart links to a new page. Suggestions were made to indicate where the user is within the tool (exp2). Also it was felt (exp1, nov11) that the links to Top, Home, and Next at the bottom of the information page were redundant and it was suggested to skip these. In general the user interface was valued as friendly and comfortable (for instance nov8, nov11, nov13).

7.5.3.2 *Planning component*

The tool offers the facility to specify specific planning aspects in a systematic order under Define, such as personal attitudes, organisational aspects, and student requirements (Figure 60). It was not clear to the expert evaluators that these questions related to planning and that there were a number of these planning-related questions in three sub-entries under Define. Exp2 suggested to leave out the student-requirements questions, and nov8 suggested to add "some things about the cost plan". Also exp2 wondered how it would be possible to offer an adequate planning to an instructor "as there are a lot of combinations you can make but how best to support me?". In contrast, exp1 indicated that it is very powerful "to be able to tailor variables that affect your own planning". Output planning (Figure 67) was not clear for nov13, and it was suggested by expert 1 to indicate very clearly that Planning, Control, and Report at the

bottom of the screen will show overviews based on choices that were made under Define, or in the Project column in activity tables (see Section 7.5.3.3). Expert 1 also wondered what would happen when a user would quit the planning part before all planning data were entered and how that would influence the planning output. Nov3 felt that an output organiser "could be great" and also "a direct connection to TeleTOP in order to upload the outputs automatically".

7.5.3.3 *Tasks and activities*

When evaluating the task pages (Figure 62 and Figure 66) Exp2 expected a more elaborated text about each task, and he suggested to describe each task in a clear, determined, and short way, taking into account that users are already familiar with teaching. Also he suggested to take into account the teaching style of individual instructors, and that the ways instructors organise their teaching and interact with students can vary among instructors. Both experts indicated that they got a bit confused with the hierarchical levels of tasks, subtasks, and activities. One expert (exp1) suggested to use colour coding to differentiate between various levels. Exp2 discussed that the level of detail of specifying all activities to perform is a dilemma, as some activities are so common that they can be grouped under a broader, more-general activity. Exp1 observed that the activity tables are very visual and attractive, and liked very much the interface of these matrices, with icons that "communicate". For exp2 it was not clear that these icons could be clicked, and suggested to add a bit more supportive information so the user knows what to expect, and also suggested to use more attractive, easy-to-recognise icons.

The resources (Figure 64) that showed up when the evaluators clicked on the icons were valued very positively. The links to literature were valued by expert 1 as good and also that there can be more than one reference linked to an icon as really handy. As one expert (exp2) said "How did you find them? I should read them!". Two novice (nov3, nov7) also mentioned that the information offered is excellent, and that it is a very good approach "to include so diverse information" (nov3). Also the CMS procedures were valued as useful (exp2), as were the forms and templates (exp2). One expert (exp2) emphasised to take note of a new quality-control process that will be introduced in the faculty.

7.5.3.4 *Overall usefulness*

Novice instructors were also asked to rate their impression of the overall usefulness and results are shown in Table 62.

Table 62. Prototype 2: Rating by novice instructors of four tool aspects.

Aspect	***N***	***M* (*SD*)**
Overall usefulness	12	4.58 (.67)
Content	13	4.46 (.52)
Layout	13	3.85 (.55)
User interface	12	3.75 (.87)

Table 62 shows that the overall impression of novice instructors for these four aspects were all rated as positive, with overall usefulness as the highest mean score.

During the evaluations in September and October, the evaluators made general comments about the overall usefulness. These comments are shown in Table 63.

Table 63. Prototype 2: General remarks about overall usefulness.

Participants	Remarks
exp1	One function is to help you think more systematically about all the steps
exp1	Second function is to give you archival readings or forms that help you relate to a certain step
exp1	Third function is to tailor the bottom output to your own situation relative to that step.
exp1	Very nice. I admire it very much.
exp2	I like it. Many very useful links. It is very good focussing on instructors. It is goal driven. Maybe instructors need a bit more explanation.
exp2	Maybe it is possible to integrate this tool with management information systems.
nov1	Clear steps about how to use and useful, necessary, short information
nov1	Content: in my opinion all the necessary aspects are available, short and understandable text
nov2	Content gives more details on performance support function tools. Give explanation on all the icons which can be used. A lot of questions arose our interesting on this tool.
nov2	It is useful to get performance support from this tool.
nov3	Very important site to aid teachers in their planning, developing and delivering activities. Some training has to be carried out for teachers to get advantage from this site. Or some improvements have to be done to the site to make it a self use tool for teachers.
nov4	Content is very clear .
nov7	The content just focus on the field of education and for us it is good assistant to know something about it
nov7	Very useful for the professional experience of the lecturer in this field
nov8	Contents are plentiful.
nov8	Most of the item list in the Web pages are useful to the instructor, but I think if the steps for developing and delivering become less complex it will be more useful.
nov9	You can add a help file on the website to give a overview of this system for the instructor
nov10	It is really very useful tool for instructors
nov11	It covers all aspects for helping instructor in her job
nov12	As a lecturer, I would definitely use such an environment, especially if it is linked to a CMS
nov12	Seems to have everything necessary present, but it is somewhat hard to decide, as some things are not yet functional.
nov13	I think that future users should to be taught about the process of create (development) the course and its parts. Because many of them don't have knowledge in instructional design. That's why they probably could not be able to understand some items in this tool.

According to remarks made during evaluations (Table 63) the overall usefulness was valued as high.

7.5.4 Discussion and implications

During the evaluation of Prototype 2 no critical remarks were made about splitting the teaching job into two major tasks: Develop and Deliver. From this it may be concluded that this division of tasks is appropriate. Suggestions that were made to improve this Prototype 2 are listed next:

- This prototype is much more focused towards the instructor than the previous one.
- Take a closer look at the activities from the perspective of the instructor to describe each aspect in a short format.
- The resources are attractive and very useful.
- The tool can be a personal management tool that can also be linked to a management information system on education, program planning, accreditation, and quality management.
- Important aspect is that it should be very easy for instructors to find and fill in the forms that are required by management (such as micro-planning, Course description).
- It could be very useful for an instructor to use this tool to quickly find some articles or guides about, for instance 'What is a good lecture'. Also to quickly find a form. You do not need to think where to look for that form.
- It is attractive that the instructor can use the system in various ways (not only in a strictly sequential way).

In a new cycle of prototyping an enhanced EPSS was developed that is described in the next section.

7.6 Enhanced EPSS, Prototype 3 (2004, Study I3)

In the previous sections, two versions of an EPSS prototype were described and evaluated. This led to a third round of prototyping, using the results from the first and second rounds to develop an enhanced version of the tool.

In this section, the design and development process of the third prototype is described. First design considerations are discussed (Section 7.6.1), followed by a description of the design and description of the third prototype (Section 7.6.2). The evaluation process is described (Section 7.6.3). The analysis of these evaluations, leads to new insights and implications for the final version (Section 7.6.4).

7.6.1 Functional and design considerations

As was found in the second round of prototyping, evaluators valued the job break-down in two major tasks: Develop and Deliver. This structure was therefore also used in this third prototype.

The subdivision of these major tasks was not systematically worked out and implemented in the previous round. In the two previous prototypes some references were made towards looking at teaching as performing a project and both tools offered a feature to export tasks to Microsoft Project. But these links to project were only seen as a side effect. To handle the Develop and Deliver tasks in a better way and structure their sub activities in a systematic way, a project-management approach will be used in Prototype 3 to sub-divide the tasks.

According to Weiss and Wysocki (1992) a project can be sub-divided in five project phases: Define, plan, organise, control, and close (Figure 68).

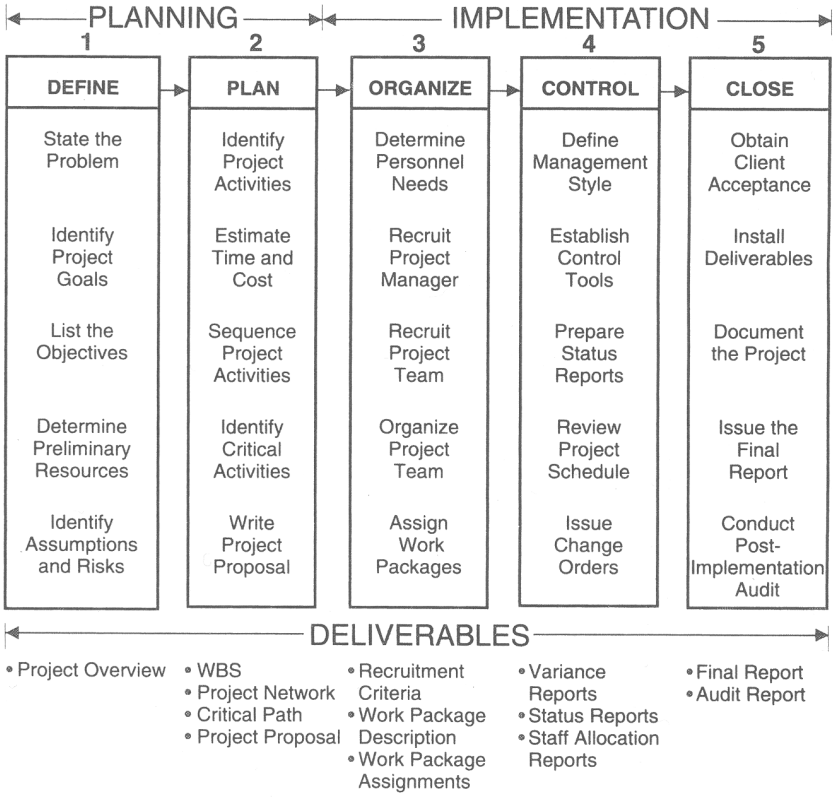


Figure 68. Five phases of a project management life cycle (Weiss & Wysocki, 1992, p. 5).

The five phases shown in Figure 68 belong to Planning or to Implementation, and all five can produce deliverables, such as plans and reports. These five phases do not include the actual production of a product. According to Kerzner (2003) a project lifecycle can be presented in a curve (Figure 69).

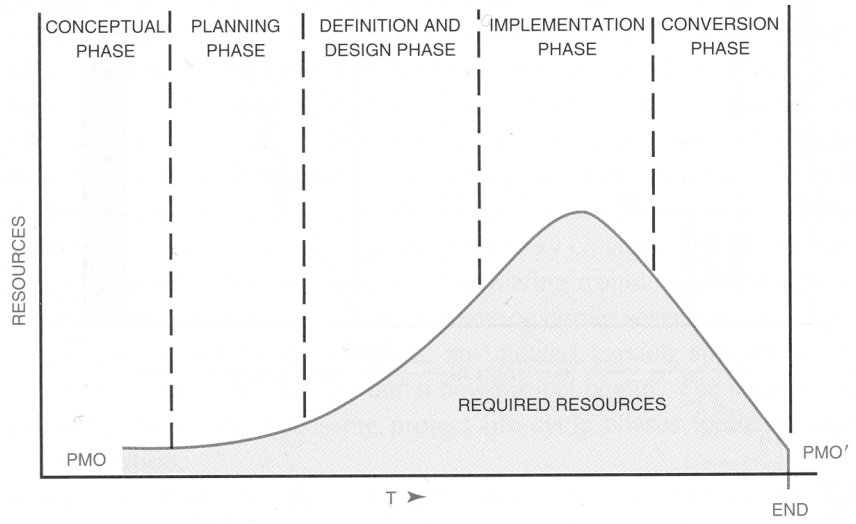


Figure 69. A project life cycle (Kerzner, 2003, p. 74).

In Figure 69 Kerzner (2003) also defines five project phases, starting with a conceptual and a planning phase to prepare the production, then a design phase, followed by an implementation phase, and ending with a conversion phase. The wording is slightly different from Weiss and Wysocki (1992), but also Kerzner offers many definitions of sub-dividing a project life cycle depending on the work environment or product at hand, and therefore indicates that "it might be possible for different definitions of life-cycle phases to exist" (p. 74).

In this prototype the five steps will be defined as:

- Define
- Prepare
- Execute
- Test
- Close.

During evaluations of previous versions of the tool, some evaluators did not like the way planning was defined and presented. In both prototypes, the users had to answer a number of questions related to planning, and then some output was presented that was not clear to the evaluators. To overcome these problems, in this third round, the planning will be directly related to each activity. Therefore in the activity table, a new column will be added for planning data.

The resources that were shown in the table next to an activity were grouped in three columns in the previous version with CMS links shown as text links. It seems more appropriate to also use an icon to represent CMS links, and as a planning column will be added, all the resources will be shown each in a separate column with the following functionalities:

- References, for links to libraries, articles, reading material
- Requirements, for links to documents or lists of requirements set by the organisation
- CMS procedures, to list the activities and other relevant information when using a CMS
- Control, to offer checklists and reminders
- Account, to offer templates of letters, documents, and reports that are used in administrative processes.

A summary of design considerations as a result of evaluating the previous prototype (Prototype 2) is shown in Table 64.

Table 64. Prototype 3: Summary of functional and design considerations.

EPSS elements	**Considerations for Prototype 3**
Planning	Offer planning per activity
Task structuring	Specify two major tasks: Develop and Deliver; Specify two sub tasks: course and component; Specify related activities per sub-task and offer resources
	Offer more-detailed description of each task
Resources	Offer options to select resources in a sequential order or directly using a table
	Show activities in a table with five categories of resources: references, requirements, planning, CMS, control, and account.
User interface	Structure it in a more-systematic way

7.6.2 Design and description of Prototype 3

In the first half of 2004 a new prototype version was developed. This Prototype 3 starts with an entry page similar to previous versions (see Entry page of Prototype 1, Figure 45). Then the Welcome page is shown as an introduction to the tool (Figure 70).

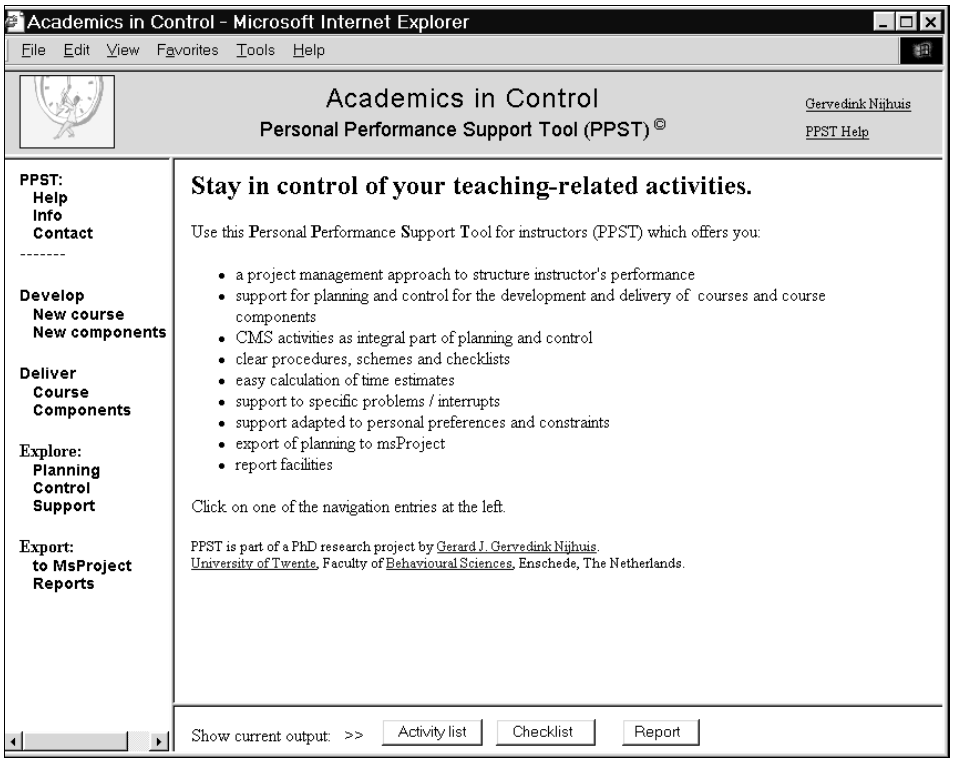


Figure 70. Prototype 3: Welcome page.

The Welcome page (Figure 70) shows the general layout of the tool and the navigation. The name of the tool has changed from previous versions and is now called the Personal Performance Support tool (PPST) to stress the fact that this tool is intended to support, and be used by an individual instructor. It is still frame based, but a major change is in the navigation bar where the main tasks are now categorised by the Development phase, with Develop new course and Develop new components; and the Delivery phase, with Deliver a course, and Deliver components. Explore offers overviews of specific content of the tool, such as planning, control, and support. This exploration is not further implemented in this prototype, it was shown to suggest a possible extension to the tool. The Export to Microsoft Project is available to transfer information about the planning of the course and its components to Microsoft Project for graphical representations, such as a Gantt chart or Pert chart, and various overviews and reports such as schedules and project summaries. The information frame offers an introduction to the program with a text to indicate the importance of using the tool and to stimulate instructors to actually use it. Figure 71 shows an example of a task page 'Develop a new course' with a overview of tasks to perform and related resources.

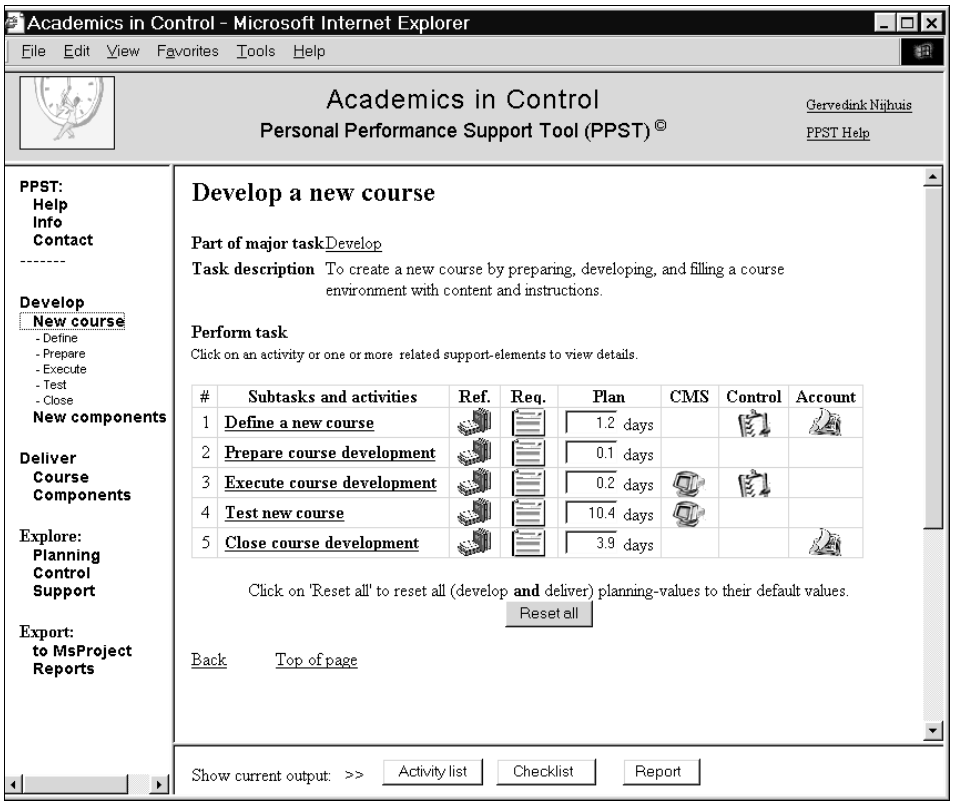


Figure 71. Prototype 3: Screendump of Develop a new course, as an example of a task page.

When the instructor clicks in the main menu on Develop new course, a submenu under Develop new course is shown in the navigation bar, with five steps that refer to a project-management approach, namely Define, Prepare, Execute, Test, and Close (Figure 71). In the information frame the task is described in general terms. Then a table is shown with these five sub-tasks in proper order that can be clicked to see a new page with detailed information about the task that was selected. For each sub-task, planning information is shown as the number of days this task will take. To be able to reset the values to their default values a Reset button can be clicked. At the bottom of the navigation bar the instructor is able to get help about the tool, a sitemap to go directly to a specific page, background information similar to Prototype 2, and contact information about the researcher and a copyright note of the tool. As an example of a sub-page the Define a new course is shown in Figure 72.

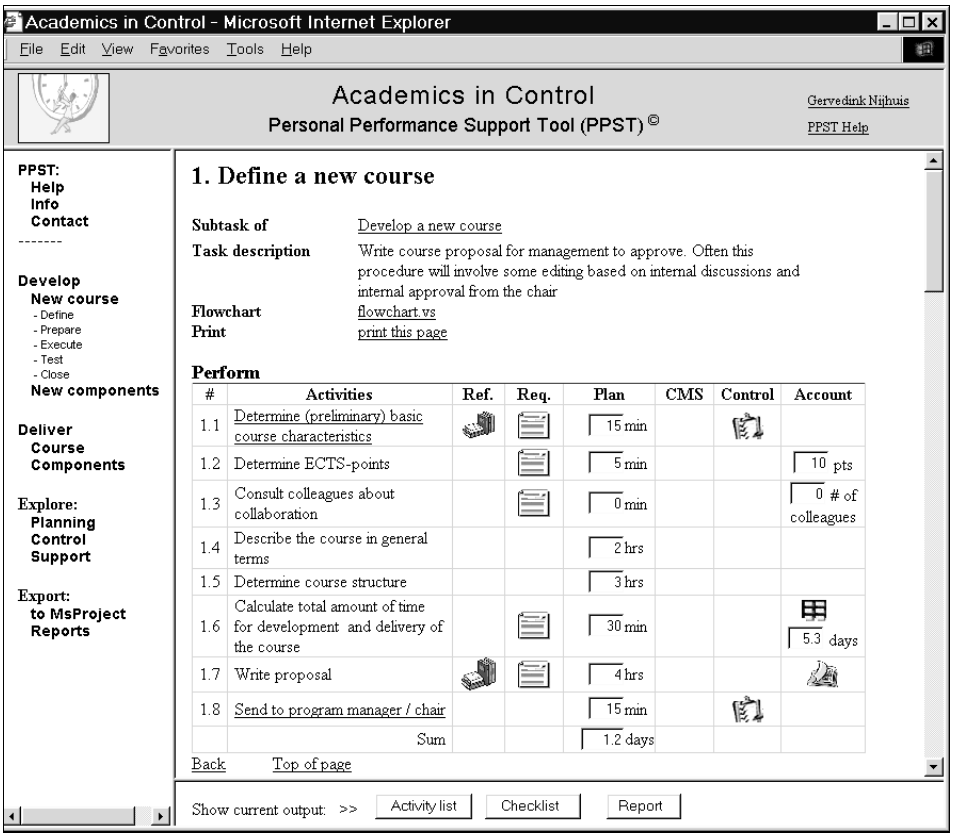
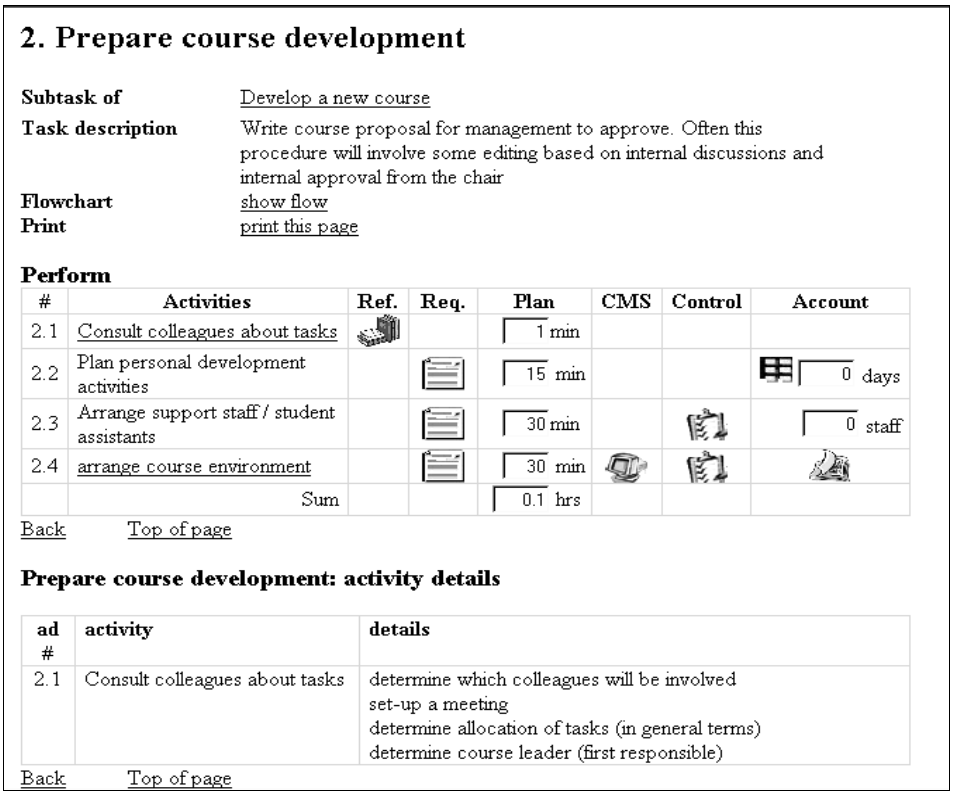


Figure 72. Prototype 3: Screendump of Define a new course, as an example of a sub-task page.

Figure 72 shows the information that will be shown when the instructor selects Define a new course, either from the main menu after clicking on Develop new course, or by selecting Define a new course from the Develop new course page (as was shown in Figure 71). The layout of each main task and subtask is similar. First a link to the main task is shown to go up in the task hierarchy, in this case Develop a new course. Then a description of the task follows with a link to a flowchart of the task. A table of activities shows a list of activities that relate to Define a new course. The order of activities reflects the way the task can best be performed although instructors may choose to change the order or perform some of these activities in parallel. Six columns are shown that are associated with the activities and links to resources and other supportive material. The first column is References ("Ref.") and contains links to articles, reports, and books. The second column is Requirements ("Req.") which offers links to requirements and guidelines set by management or others. The next column, Plan, shows the default values for each activity, and the instructor is able to change each value. The tool adds these values and presents the total value in a different colour to indicate that the value is based on previous values and cannot be changed in a direct way. The CMS column offers links to procedural information and remarks that relate to using a Course Management System, more specifically the use of TeleTOP. The Control column offers links to checklists and reminders to support instructors to stay in control. The last column Account offers document templates and forms to be filled out and sent to the administration to help instructors to account for their performance, time usage, and other documents required by management and administration.

The other tasks to perform when developing a new course are Prepare (Figure 73), Execute (Figure 74), Test (Figure 75), and Close (Figure 76).



2. Prepare course development

Subtask of Develop a new course
Task description Write course proposal for management to approve. Often this procedure will involve some editing based on internal discussions and internal approval from the chair
Flowchart show flow
Print print this page

Perform

#	Activities	Ref.	Req.	Plan	CMS	Control	Account
2.1	Consult colleagues about tasks			1 min			
2.2	Plan personal development activities			15 min			0 days
2.3	Arrange support staff / student assistants			30 min			0 staff
2.4	arrange course environment			30 min			
	Sum			0.1 hrs			

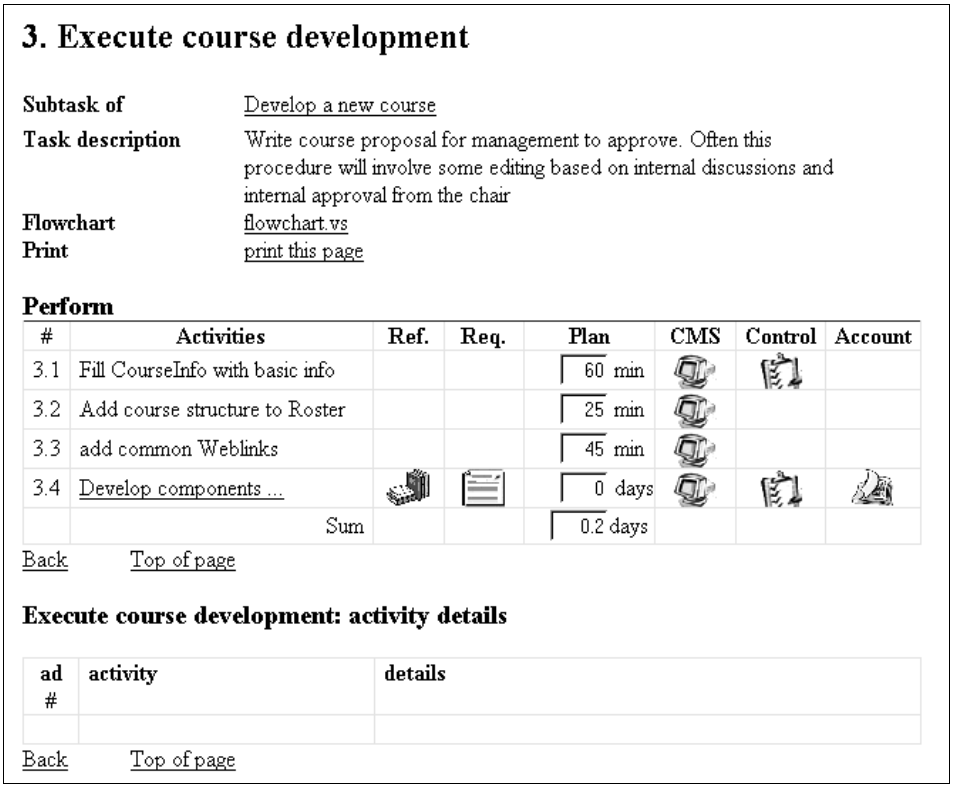
Back Top of page

Prepare course development: activity details

ad #	activity	details
2.1	Consult colleagues about tasks	determine which colleagues will be involved set-up a meeting determine allocation of tasks (in general terms) determine course leader (first responsible)

Back Top of page

Figure 73. Prototype 3: Screendump of Prepare course development.



3. Execute course development

Subtask of Develop a new course
Task description Write course proposal for management to approve. Often this procedure will involve some editing based on internal discussions and internal approval from the chair
Flowchart flowchart.vs
Print print this page

Perform

#	Activities	Ref.	Req.	Plan	CMS	Control	Account
3.1	Fill CourseInfo with basic info			60 min			
3.2	Add course structure to Roster			25 min			
3.3	add common Weblinks			45 min			
3.4	Develop components ...			0 days			
	Sum			0.2 days			

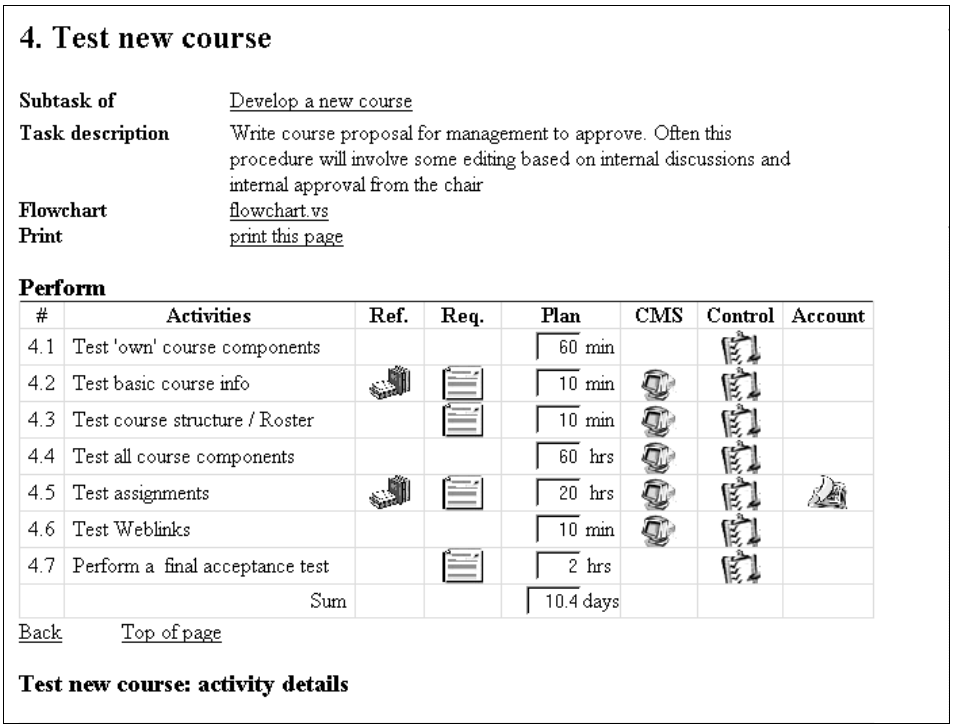
Back Top of page

Execute course development: activity details

ad #	activity	details

Back Top of page

Figure 74. Prototype 3: Screendump of Execute course development.



4. Test new course

Subtask of Develop a new course
Task description Write course proposal for management to approve. Often this procedure will involve some editing based on internal discussions and internal approval from the chair
Flowchart flowchart.vs
Print print this page

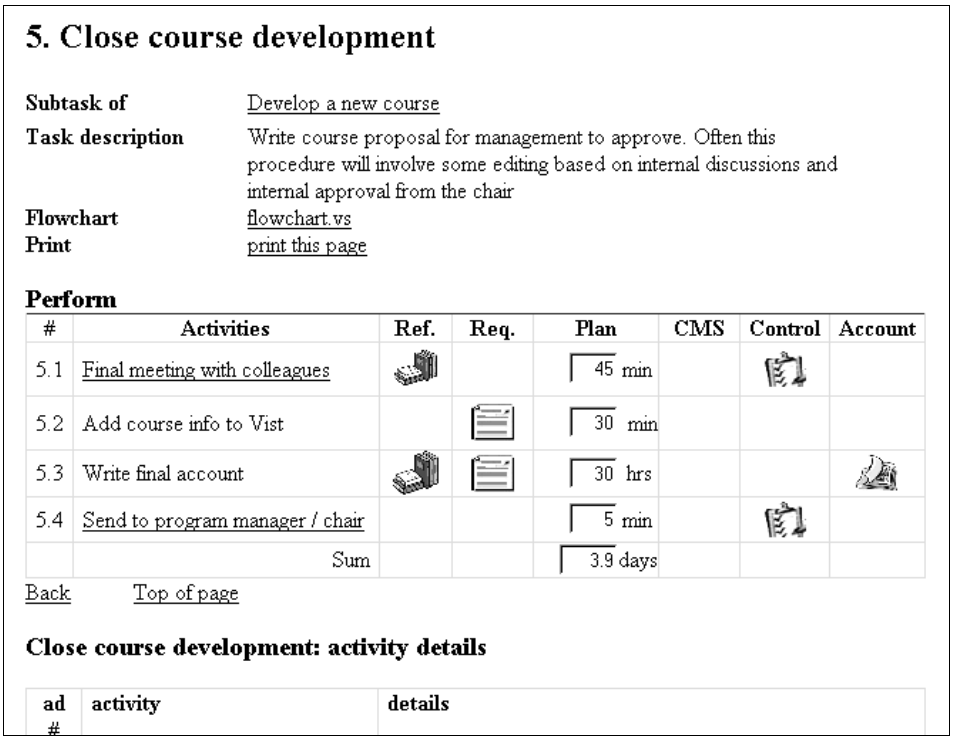
Perform

#	Activities	Ref.	Req.	Plan	CMS	Control	Account
4.1	Test 'own' course components			60 min			
4.2	Test basic course info			10 min			
4.3	Test course structure / Roster			10 min			
4.4	Test all course components			60 hrs			
4.5	Test assignments			20 hrs			
4.6	Test Weblinks			10 min			
4.7	Perform a final acceptance test			2 hrs			
	Sum			10.4 days			

Back Top of page

Test new course: activity details

Figure 75. Prototype 3: Screendump of Test a course.



5. Close course development

Subtask of Develop a new course
Task description Write course proposal for management to approve. Often this procedure will involve some editing based on internal discussions and internal approval from the chair
Flowchart flowchart.vs
Print print this page

Perform

#	Activities	Ref.	Req.	Plan	CMS	Control	Account
5.1	Final meeting with colleagues			45 min			
5.2	Add course info to Vist			30 min			
5.3	Write final account			30 hrs			
5.4	Send to program manager / chair			5 min			
	Sum			3.9 days			

Back Top of page

Close course development: activity details

ad #	activity	details

Figure 76. Prototype 3: Screendump of Close course development.

Figure 73-Figure 76 show the four tasks to develop a new course that can be performed after the course has be defined (shown in Figure 72), and the director of educational programmes has agreed that the course can be developed. As can be seen the layout is kept consistent within the five steps of the development process. Similar pages were created for the delivery phase.

A course can consist of various educational formats, such as lectures, assignments, and discussions. To develop these components the instructor can first click on Develop new components and then select a component from a list (Figure 77).

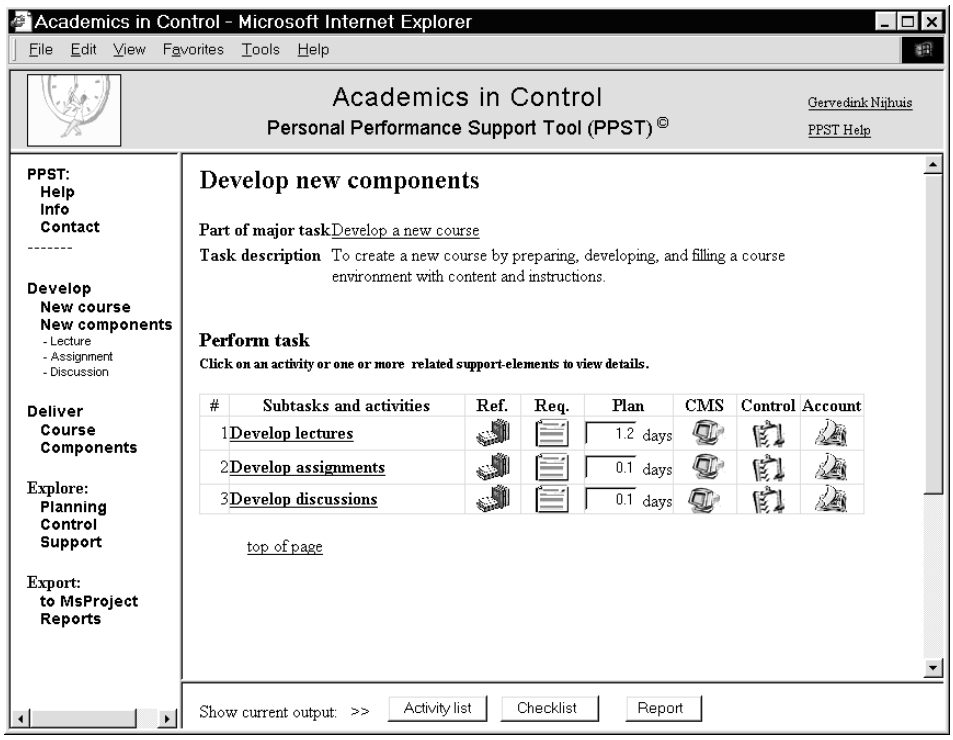
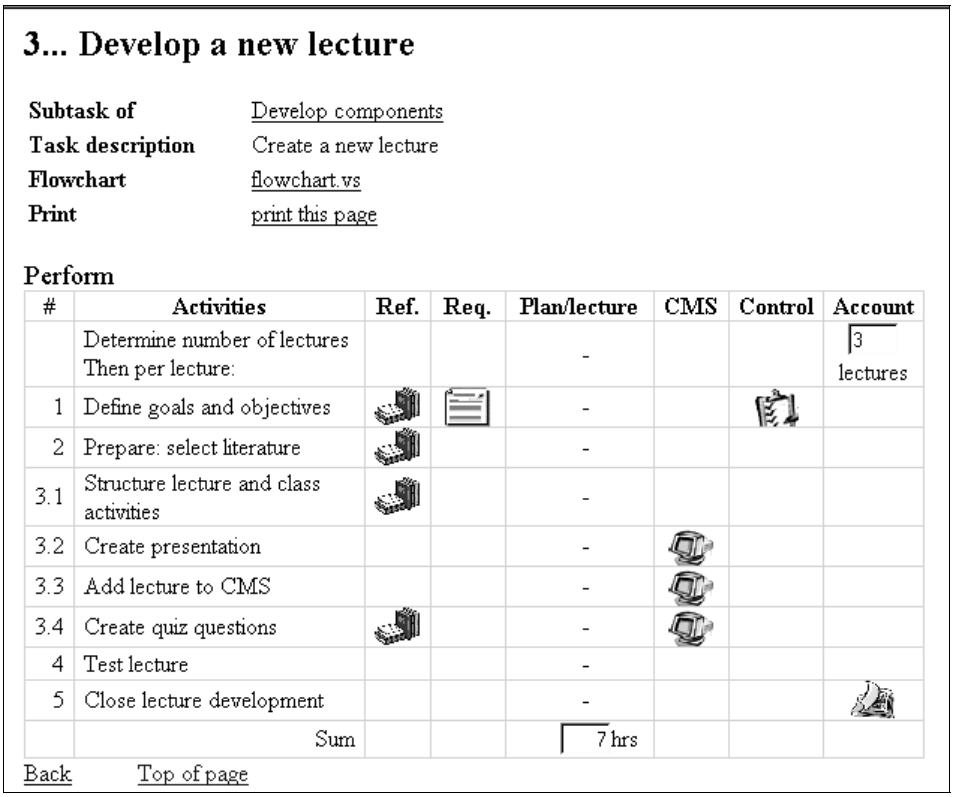


Figure 77. Prototype 3: Screendump of Develop new components.

Figure 77 shows the major task to develop components. This Develop components page offers a general overview of available components with major resources and overall planning. In Prototype 3 links are available to three course components: Lectures, Assignment, and Discussion (see Figure 78, Figure 79, and Figure 80 respectively).



3... Develop a new lecture

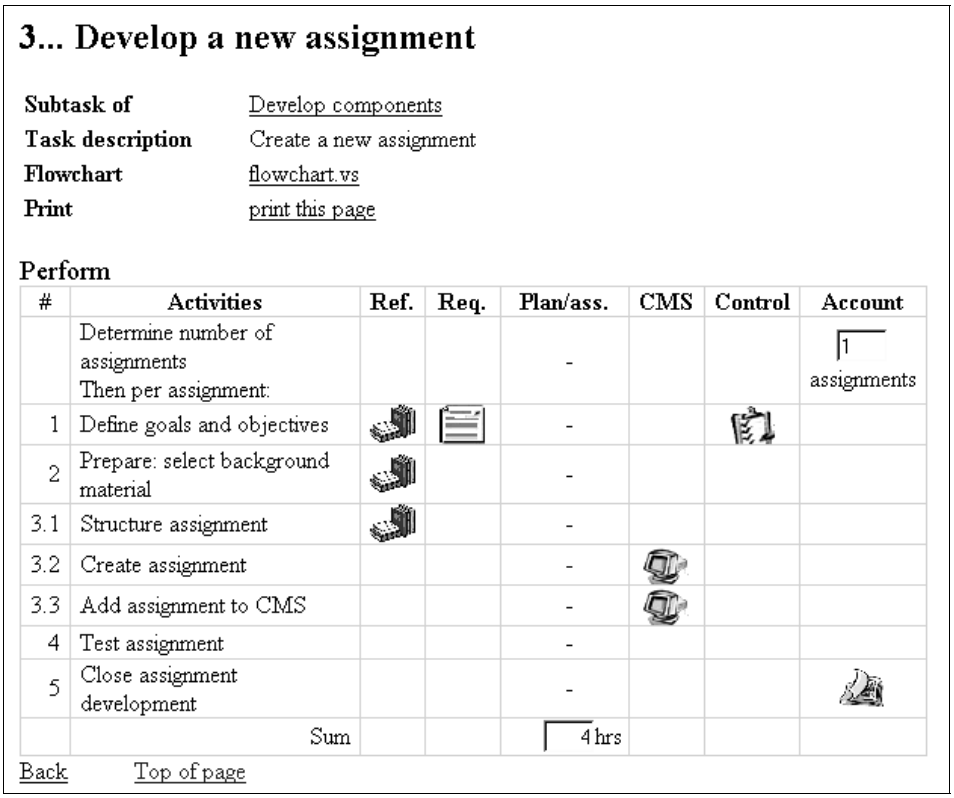
Subtask of Develop components
Task description Create a new lecture
Flowchart flowchart.vs
Print print this page

Perform

#	Activities	Ref.	Req.	Plan/lecture	CMS	Control	Account
	Determine number of lectures Then per lecture:			-			3 lectures
1	Define goals and objectives			-			
2	Prepare: select literature			-			
3.1	Structure lecture and class activities			-			
3.2	Create presentation			-			
3.3	Add lecture to CMS			-			
3.4	Create quiz questions			-			
4	Test lecture			-			
5	Close lecture development			-			
	Sum			7 hrs			

Back Top of page

Figure 78. Prototype 3: Develop a new lecture.



3... Develop a new assignment

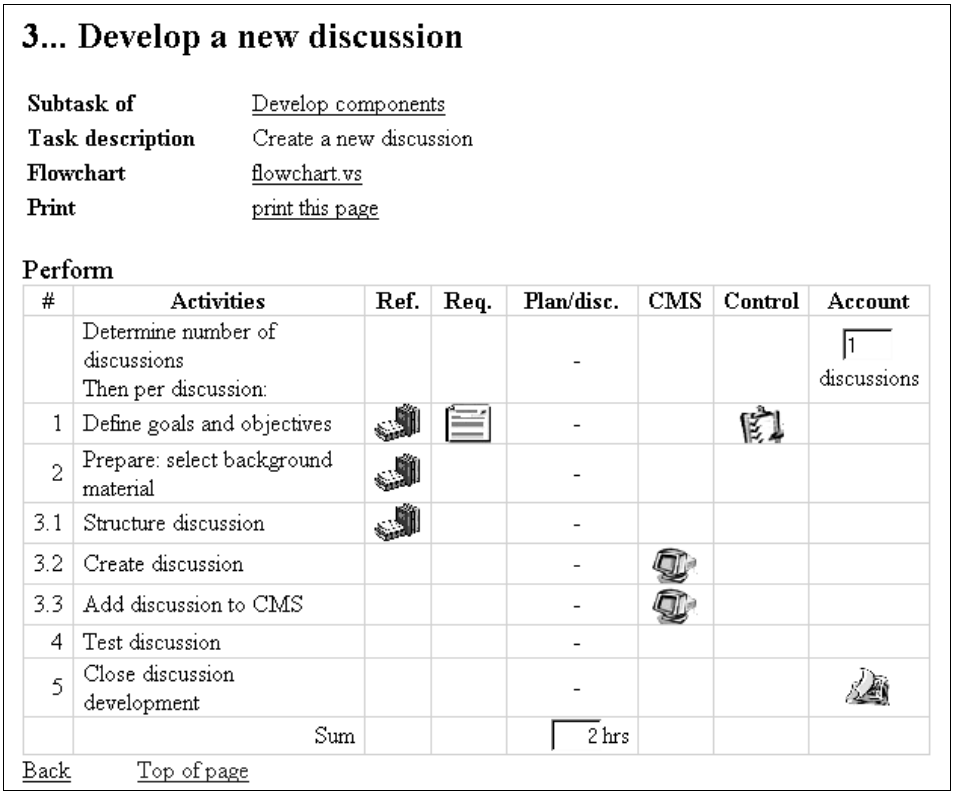
Subtask of Develop components
Task description Create a new assignment
Flowchart flowchart.vs
Print print this page

Perform

#	Activities	Ref.	Req.	Plan/ass.	CMS	Control	Account
	Determine number of assignments Then per assignment:			-			1 assignments
1	Define goals and objectives			-			
2	Prepare: select background material			-			
3.1	Structure assignment			-			
3.2	Create assignment			-			
3.3	Add assignment to CMS			-			
4	Test assignment			-			
5	Close assignment development			-			
	Sum			4 hrs			

Back Top of page

Figure 79. Prototype 3: Develop a new assignment.



3... Develop a new discussion

Subtask of	Develop components
Task description	Create a new discussion
Flowchart	flowchart.vs
Print	print this page

Perform

#	Activities	Ref.	Req.	Plan/disc.	CMS	Control	Account
	Determine number of discussions Then per discussion:			-			1 discussions
1	Define goals and objectives			-			
2	Prepare: select background material			-			
3.1	Structure discussion			-			
3.2	Create discussion			-			
3.3	Add discussion to CMS			-			
4	Test discussion			-			
5	Close discussion development			-			
	Sum			2 hrs			

Back Top of page

Figure 80. Prototype 3: Develop a new discussion.

The planning output in Prototype 3 is similar to the previous prototype version (see Figure 67) and it offers an impression of what could be the actual output when a full-scale version is developed and implemented.

7.6.3 Formative evaluation

A formative evaluation was carried out by two experienced instructors (coded here as exp1 and exp2), both working at the Faculty of Behavioural Sciences. The evaluations took place on 15 June 2004 (exp1), and 25 June 2004 (exp2) in the office of the researcher. The remarks made by the two evaluators were recorded on mini-disc and transcribed to a Word file for analysis.

In the following paragraphs a summary of their evaluations is given. For a full overview of their remarks see Appendix 9.

The Entry page which is similar to the Entry page in previous prototypes (see Entry page of prototype 1, Figure 45), was valued by both evaluators as attractive and the background image was valued as also "schematically meaningful" (exp1), although maybe the readability could be improved a bit. After going to the next page, the Welcome page, one of the evaluators (exp1) wondered how to return to the Entry page. It seemed not obvious that the icon in the left top corner is clickable and will take the user back to the Entry page.

As the Welcome page (Figure 70) is presented in the standard frame structure of the tool, the evaluators started to comment on the various frames:

- The top frame with the title also offers a link to Help and a link to send an email message and one evaluator (exp1) indicated that this is all very logical.
- The information frame at right shows an introduction to the tool and this was clear to the evaluators, although one evaluator (exp1) thought that there would be a mapping of the list of features on the menu-entries, and as this was not intended it was not well understood. The other evaluator (exp2) suggested to show this page only once, because after the first time users will know how the tool can support them. To further introduce the tool's features a screencam movie might be used, as one evaluator suggested (exp1).
- The bottom frame shows three buttons to output results, and one evaluator (exp1) indicated that this frame was confusing, as it was not introduced in the information frame. This is true because these buttons were no longer operational and should have been removed before the evaluation.
- The navigation frame was valued as a functional way to navigate through the system and one evaluator (exp1) indicated that it also shows the structure of the program. Both evaluators suggest to change the first entry 'PPST' which links to the Welcome page, to 'PPST home'. The current sub-entries of PPST, Help and Info, would better be presented as sub-entries of a new entry 'PPST help' at the bottom of the navigation bar. Also both suggest to rename the sub-entry Info to Background information so people will know that this refers to conceptual information. One evaluator (exp1) observed that sub-entries pop-up and users will have to become familiar with this dynamic approach.

The navigation bar shows an entry to the major task Develop right underneath the home entry. One evaluator (exp1) indicated that in general there is a logical tendency of users to go in order from top to bottom and thus Develop is presented first, followed by Deliver and obviously that was considered the best order by both evaluators. When they clicked Develop (or Deliver) this task page with a description of the major task and a table with links to Course and Components was valued by both instructors as a sort of menu page. One evaluator (exp2) suggested to introduce the development process a bit more.

As the evaluators went through the navigation bar from top to bottom the next page after clicking Develop was 'Develop a new Course', and this page was evaluated as illustrative for all the task pages in the tool, such as Develop Components, Deliver a Course, and Deliver Components. To show that Develop and Deliver are part of one's teaching job was valued as superfluous by one evaluator (exp2). Both evaluators were confused to see on this page the instructions about how to operate the tool again, as it offers the same functionality that is already available under PPST-Help. They both suggested to take instructions away from the major task pages Develop and Deliver.

After commenting on the Develop page, the evaluators both clicked on the link in the task table of this page to go to Develop a new course (Figure 71). This task page was evaluated as illustrative for other task pages in this tool, such as Develop components, Deliver a course, and Deliver Components. One of the evaluators (exp1) called this a one-page sort of job aid and rated it as good, although the structure of the page came as a surprise because "there was no sort of mental preparation for it". The common structure of the subtasks was valued as positive (exp1). The fact that planning data could not be changed manually was commented on by one of the evaluators (exp2) and

a suggestion was made to offer a visual clue to the users of what values can be changed manually and which values are based on calculations by the tool. The Reset button was clicked by an evaluator (exp1) and then the tool showed the Welcome page when it was expected that the current page would remain visible. This was considered a bug. The icons link to resources that are stored on the associated subtask pages and this was valued as very unclear, especially because much more information is shown on that page than could be expected by the clicked icon. For both evaluators this caused much confusion about the navigation between resources that were linked from task and subtask pages where that information resided, and how to go back.

On the sub-task pages (Figure 72), such as Define a new course or Prepare a new course (Figure 73), the evaluators valued the fact that these pages were all structured in a similar way. One evaluator (exp1) commented that the structure itself of these sub-task pages could be improved, and suggested to add a heavy horizontal line underneath the table to clearly divide the activity table and the linked resources underneath. The first sub-task to define a new course was commented on by one evaluator (exp2) who said that some of these activities are at such a detailed level, that instructors perform these activities right away without planning, such as Determine a Dutch course name, or in the context of a broader activity, such as fill out a microplan form, for instance specifying the course characteristics, such as lecture or practice based. This evaluator (exp2) suggested to structure the sub-task Define a new course in accordance with a sort of table of contents of a proposal for a new course.

The activity table was experienced as a very handy tool to access resources (see for instance Figure 73 and Figure 77), and evaluator exp1 suggested to give an explanation that the user can either use this page as an overview or select a specific resource. The way these resources are linked by internal links was found unsatisfactory by both evaluators. When evaluators clicked on an icon, a table was presented with a number of resources, only one of which was associated with the activity that was selected in the activity table. For both evaluators this was not clear as all these resources were on the same page. Also the scrollbar suggested that they had to scroll this page, instead of using the icons. Both evaluators (exp1, exp2) strongly urged to change this way of presenting resources and to use a kind of pop-up-window instead. They felt that using pop-up-windows would keep the activity table visible at the same place, and also limit the presentation of resources to only those that are relevant to the selected activity. Some of the resources were accessed by the evaluators and they valued these highly, with maybe some clarification as to why and how to fill out a form.

Both evaluators indicated that the navigation by internal links to information on the same page is confusing, because sometimes nothing happens when the text is already visible (exp1) or much more information is shown than is asked for (exp1, exp2). Instead of using internal links, both evaluators suggest showing additional information in a pop-up window.

7.6.4 Discussion and implications

During the evaluation sessions by two experiences instructors remarks were made as discussed in the previous section (Section 7.6.3). Main findings are summarised in the following list:

- The project-management approach to divide the two major tasks Develop and Deliver into tasks, sub-tasks, and activities was appreciated as a structured way to present supportive information and resources
- The table format to present an overview of activities and associated resources was approved by both
- One evaluator called each task and subtask page a one-page job aid which is what was intended
- Evaluators indicated that the navigation should be improved, especially links from a task page to a subtask page and the links to resources on the same page
- The Welcome page was evaluated as not attractive
- The help information on each task page should be removed
- Suggestions were made to improve readability, to add navigational clues, and to remove obsolete entries
- Evaluators suggest to move the PPST help to the bottom of the navigation bar
- Evaluators valued the easy access to many useful resources as very positive.

Many remarks relate to the way the information is presented and the look and feel of the navigation. It seems feasible to overcome these problems. No remarks were made about adding additional functionalities or to move away from this approach. Especially the structured way of dividing major tasks into tasks and activities was valued highly. Also to present activities, time estimates, and associated resources in a table format was appreciated as both a sequential and a random way to select information.

In general the results of the evaluations were promising but the prototype version still needs improvements to meet instructors needs (see next section).

7.7 Final EPSS, Prototype 4 for Use with Implementation Plan (2004-Febr. 2005, Study I4)

In the previous sections, three rounds of prototype development were described and evaluations of these prototypes lead to improvements. In this section, the design and development process of the fourth (and final) prototype is described. First design considerations are discussed (Section 7.7.1), followed by a description of the design and description of the final prototype (Section 7.7.2). The final evaluation will be described in Chapter 8.

7.7.1 Functional and design considerations

In the final version the findings from previous evaluations were taken into account and the parts that were valued highly remained. Based on previous remarks about improvements that still had to be made (see Section 7.6.4) some changes in the functionality and design were made.

Main functional and design changes were:

- Adding various resources
- Replacing links to resources on the same page by pop-up windows for easier access and to keep the Activity table visible
- Improving Output of planning data to the printer or Microsoft Project and offering a selection list to choose which tasks to transfer.
- Revising the Welcome page to make it attractive and screendumps were added, including a sitemap
- In the navigation frame the PPST help info was moved to the bottom; the obsolete entry 'Explore' was removed; and the word Export changed to Output
- Amending the top frame: instead of a link to the researcher a link to the helpdesk
- Improving readability by changing the font from Times Roman to Arial
- Help info on each task page was removed
- Carrying out many small changes.

7.7.2 Description of final version

The main functionalities included in the final Prototype 4 will be:

- Task procedures of activities to perform
- Time estimates to plan one's time
- Activity details, such as documents, lists of requirements, TeleTOP procedures, and checklists
- Administrative forms and templates
- A personalised planning based on instructor's input data
- Export of personalised planning to Microsoft Project to get a graphical overview and to add task specific dependencies, personnel, and costs for reports
- Help about the PPST and how to use it
- A Sitemap of the PPST
- Research background and contact information.

In the next subsections the final version will be described.

7.7.2.1 *Entry page*

The Entry page that appears when the instructor starts the PPST tool is shown in Figure 81.

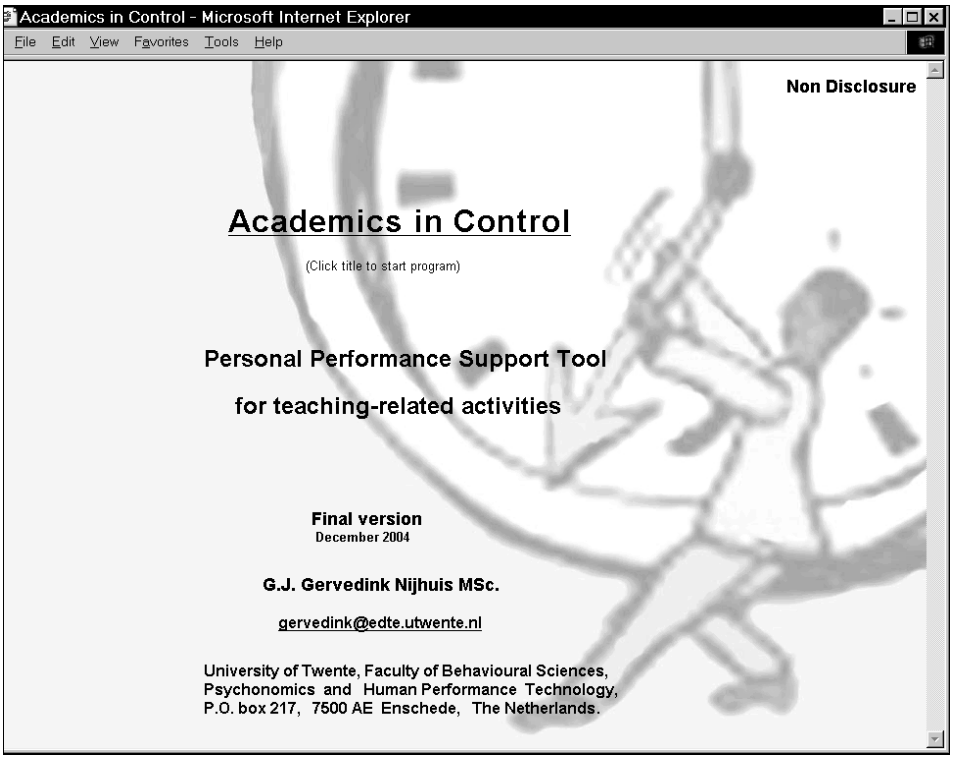


Figure 81. Final prototype: Entry page.

The Entry page (Figure 81) is similar to the Entry page in previous prototype versions, except that the font was changed to Arial and the version information was updated.

7.7.2.2 *Welcome page*

After the user clicks on Academic in Control on the Entry page the Welcome page is shown (Figure 82).

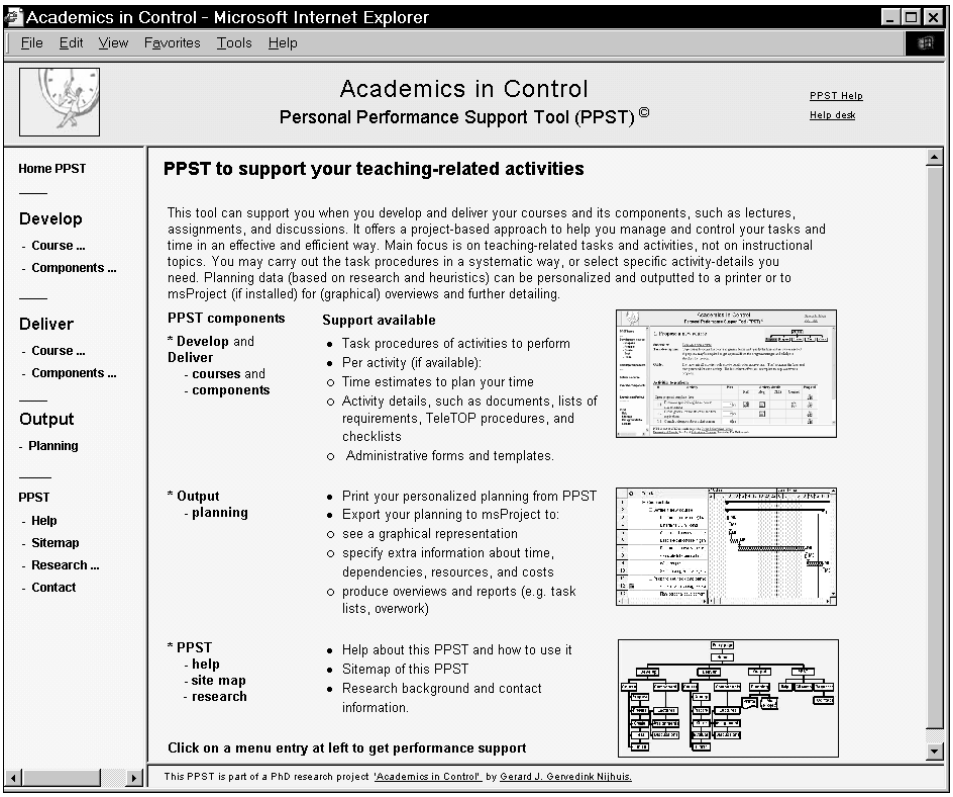


Figure 82. Final prototype: Welcome page.

As can be seen in Figure 82 the Welcome page is renewed to show what the tool can offer to the user and screendumps were added to offer the user an impression of the look and feel of the PPST. A sitemap was also added to offer an overview of the structure of the PPST. The navigation bar at the left shows that the PPST help and background information is now situated at the bottom, and only a Home entry remained at the top. Major tasks Develop and Deliver remained and the tasks Course and Components also remained as entries.

7.7.2.3 *Task and Sub-task pages*

Examples of a major task and a task page are shown in Figure 83, Develop process, and Figure 84 shows the Develop a new course page.

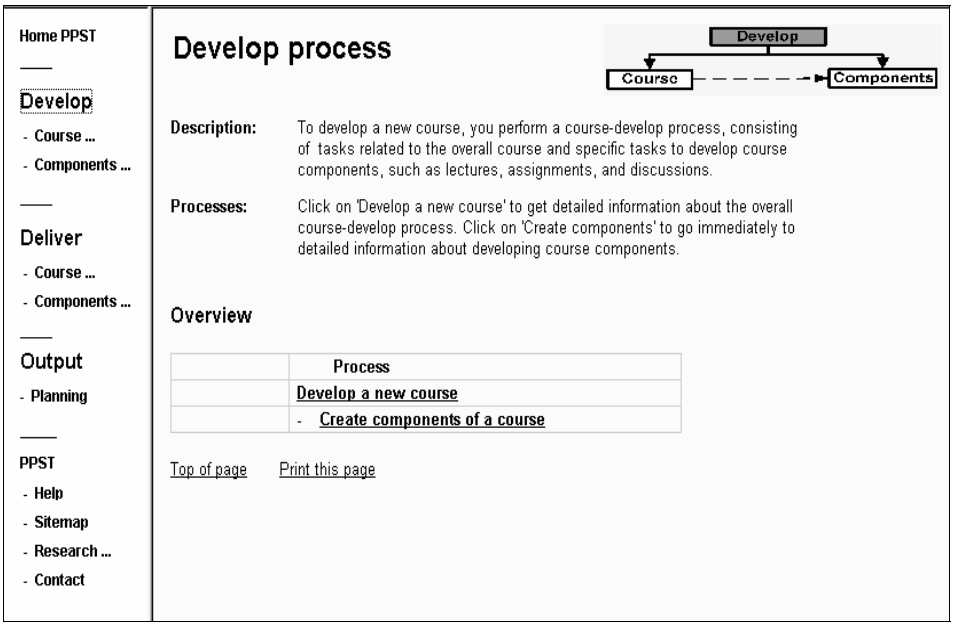


Figure 83. Final prototype: Develop-process page.

The Develop-process page (Figure 83) offers an overview of tasks and it offers a description of the Development phase. Instructors can click on the links Develop a new course and Create components, but more experienced users will select these links directly from the navigation bar.

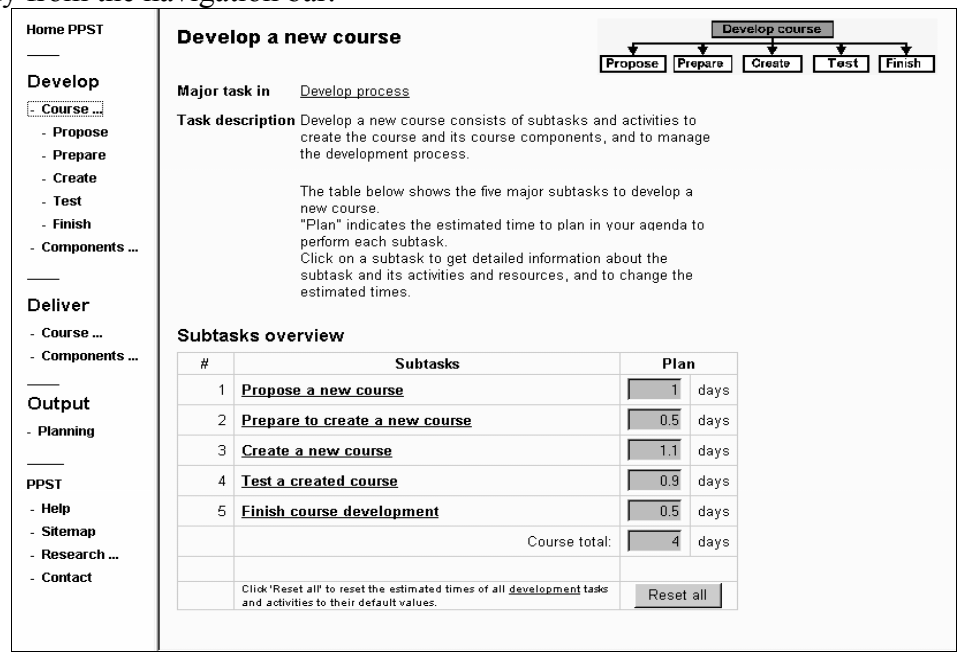


Figure 84. Final prototype: Develop a new course.

Develop a new course (Figure 84) is an example of a task page. It offers a description of the task and then an overview of the subtasks. The estimated time expenditures per subtask are totals. Their values are calculated on each subtask page. Therefore the planning values are shown with a different background colour than the rest of the table to indicate that these values can not be changed at this page. When an instructor clicks such a value a message is shown to indicate that the value is the result of calculations

and that the user has to go to the associated sub-task page to be able to change the planning estimates.

7.7.2.4 *Sub-task page*

From a task page the instructor can select a sub-task and by clicking the sub-task page is shown. As an example of a sub-task page Propose a new course is shown in Figure 85.

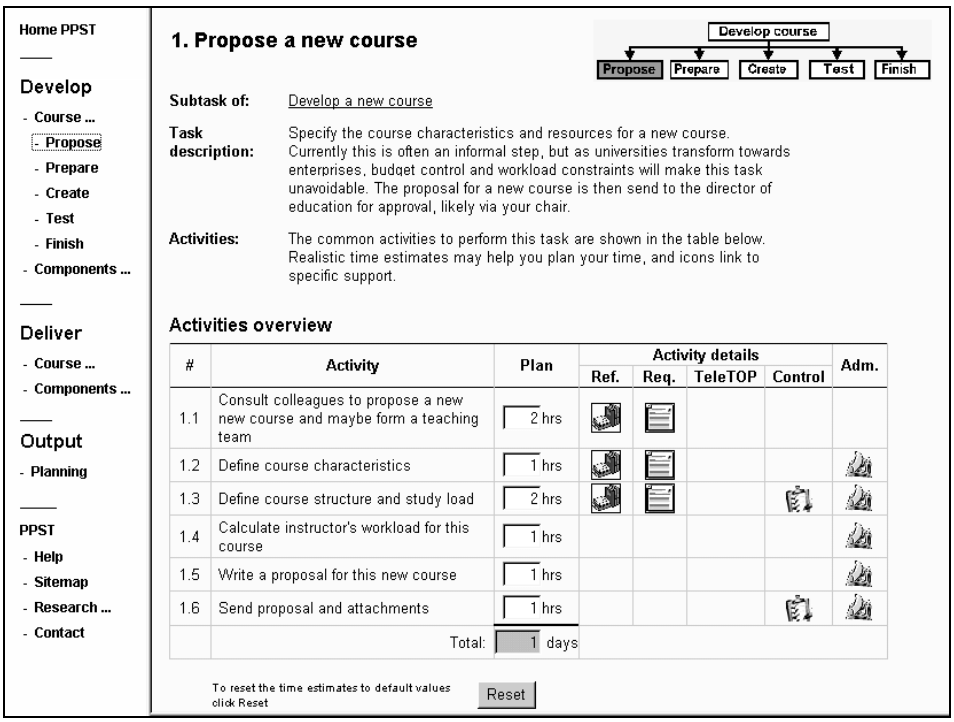


Figure 85. Final prototype: Example of a sub-task page: Propose a new course.

As shown in Figure 85 a sub-task page also offers a description of the task and an activity table that offers an overview of activities associated with the sub-task. These activities are presented in the most appropriate order. For each activity an estimate of the time it will take to perform the activity is shown but these values can be changed by the user based on previous experiences or preferences. Also for each activity associated resources are accessible when an icon is presented in one of the columns References, Requirements, TeleTOP, Control, and Administration. When a user clicks on an icon a pop-up window shows up to present the links or to present a list of links to documents, websites, forms, or instead of a link it lists a procedure or offers a checklist. The total planning time is recalculated each time the user changes a value and the total time is copied to the Develop a new course page (see Figure 84). In the right-top corner a graphic shows the hierarchical structure of the tasks and the elements are clickable to easily navigate to another component or back to the higher level task.

7.7.2.5 *Components pages*

An example of an educational-component page, in this case the Create lectures page is shown in Figure 86.

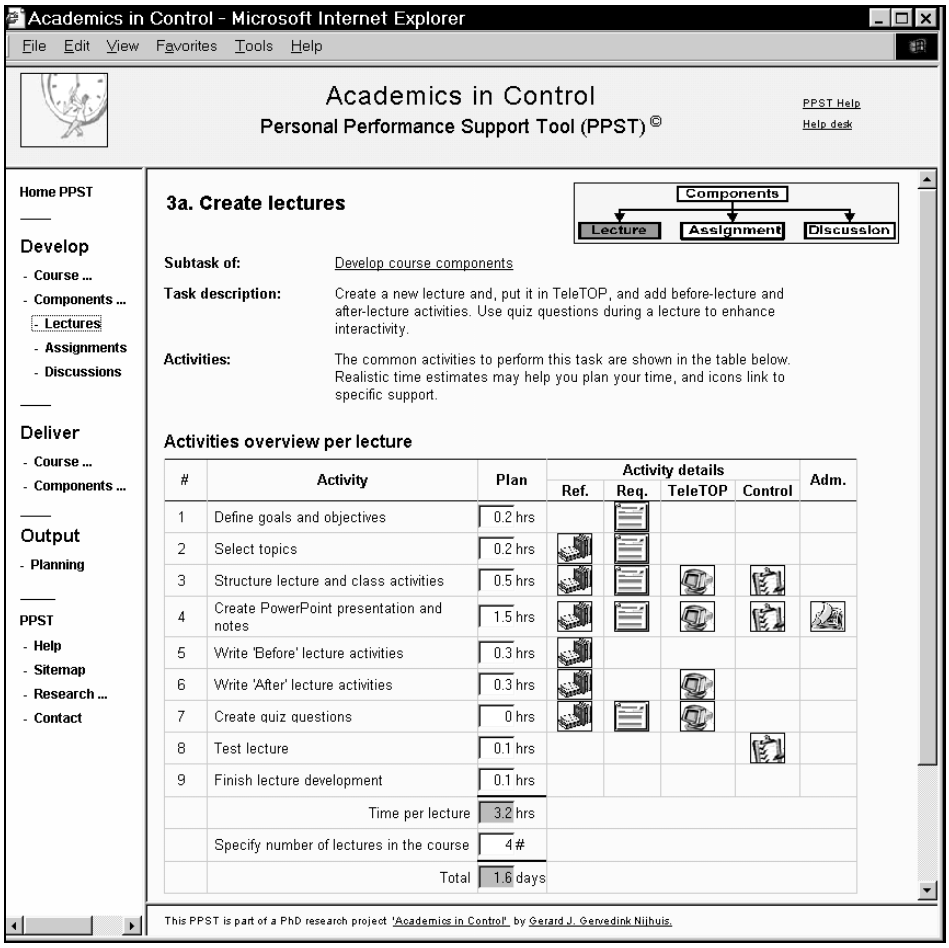


Figure 86. Final prototype: Example of a component page: Create lectures.

A component page (Figure 86) has the same look and feel as a task or sub-task page. The activity table shows the activities to perform in the most appropriate order. Per activity an estimate of the time expenditure is offered which can be changed by the instructor. Resources are indicated by an icon and when the user click on an icon a pop-up window shows up with links or a list of tips, a checklist, or a useful remark. The activities refer to creating one component and these activities can be repeated for each component included in a course. The user can also specify the number of lectures in a course and the PPST then calculates the estimated total amount of time. In the right top corner a graphic shows the hierarchical structure of the tasks and the elements are clickable to easily navigate to another component or back to the higher level task.

7.7.2.6 *Output to Microsoft Project*

The planning data of estimated time expenditures can be transferred from the PPST into Microsoft Project. Figure 87 shows an example of a Microsoft Project Gantt chart based on data from the PPST.

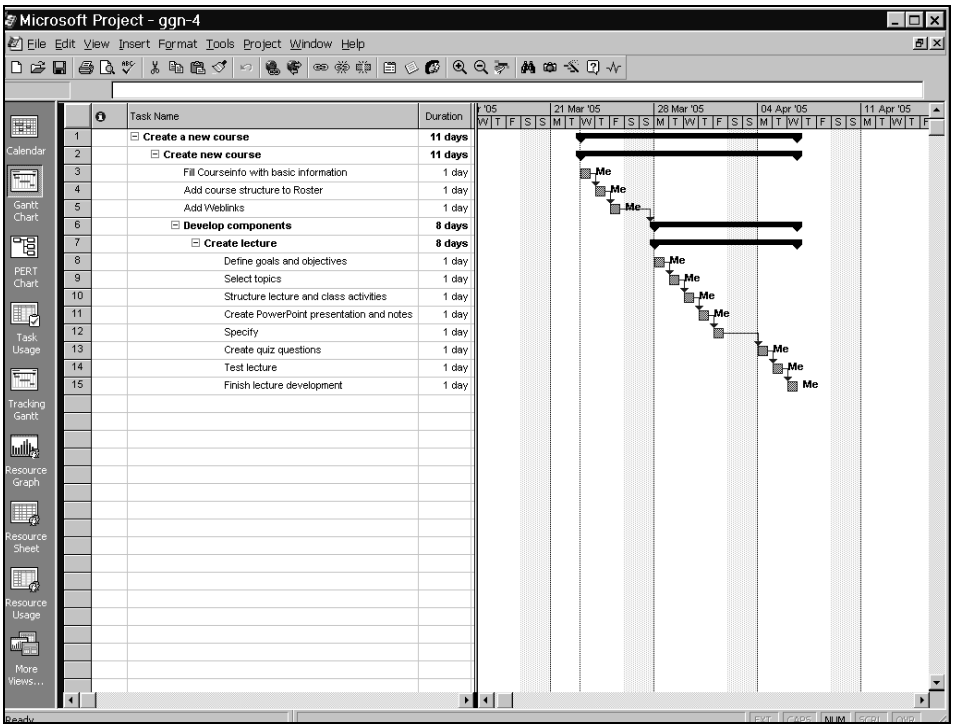


Figure 87. Final prototype: Microsoft Project Gantt chart as a result of PPST data.

In Figure 87 a Gantt chart shows a graphical representation of the data that was transferred from the PPST into Microsoft Project. The activities are shown in the left column with a hierarchy of activities shown by indenting activities at a lower level. The time span for a task is shown as a thick line in the graphic and the data and duration for each activity are shown as a rectangle. Pointed-lines indicate the appropriate order of activities and their interrelations. Using Microsoft Project the data transferred from the PPST can be further amended, but it is also possible to add financial data to calculate costs. Also during the execution of the development or delivery process the instructor can record progress in Microsoft Project and at the end produce useful reports for instance detailed overviews of time expenditure, costs, and used resources.

7.8 Conclusions

During four rounds of prototype evaluations it can be concluded that the use of an EPSS to support academics seems promising. Also during this process, insight was evolving as to how the tool should be structured and what the content should be to offer support to instructors. The flexibility of the tool also evolved and in the final version instructors are able to select tasks, activities, and resources both in a systematic, sequential way, but also in a random way by selecting just that what they need.

In Chapter 8 the evaluation of the final version of the PPST will be described. Also in Chapter 8 a PPST implementation plan is developed. The final version of the PPST and the PPST implementation plan were evaluated by instructors, directors of educational programmes and support staff and findings will be described in the next chapter.

8 PPST Implementation Plan and Final Evaluation of the PPST and Plan

In studies carried out as part of this research (see Chapters 5 and 6, and indirectly in Chapter 7), participants discussed their experiences with the implementation process of a Course Management System and its impact. In this chapter, based on these findings, a PPST implementation plan is designed and used for evaluation, together with the final version of the PPST (Section 7.7). There is a close relationship between the PPST and the PPST implementation plan, also because the PPST combines various components that have to be implemented in the organisation as part of the PPST to form an integrated system. The final evaluation of the PPST and the PPST implementation plan will be described and findings will be discussed. The relation of this chapter with the HPT model is shown in Figure 88.

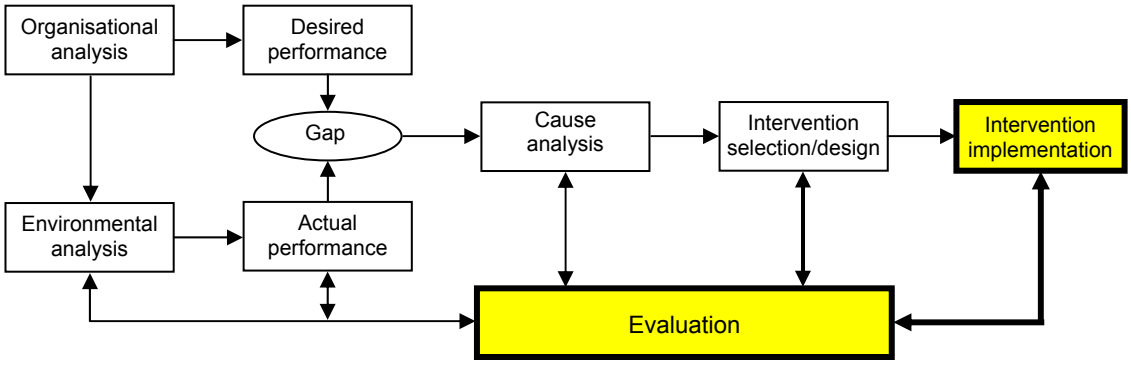


Figure 88. Schematic HPT model with major focus of this chapter highlighted.

In Section 8.1 the PPST implementation plan is designed. In Section 8.2 the evaluation methodology will be described, followed by Section 8.3 in which the background and current situation of participants in the evaluation are described. In Section 8.4 the final evaluation of the PPST tool itself is described. In Section 8.5 reflections of participants about the PPST and the PPST-implementation plan are described. In Section 8.6 findings will be discussed, leading to an enhanced Personal Performance Model and an adjusted PPST implementation plan. Section 8.7 describes overall conclusions and consequences from these findings.

8.1 PPST Implementation Plan (Study I4)

During the various studies in the analysis phase, many remarks were made about the implementation of a support tool. Local studies were described in Chapter 5, and the international survey was described in Chapter 6. Also during the evaluation of various prototypes as described in Chapter 7, suggestions were made by participants about a possible implementation process. Synthesising these, some key aspects that relate to the implementation of a support tool are brought together to form an implementation plan. In Section 8.1.1 general principles of an intervention implementation are described. In Section 8.1.2 the university context for an intervention implementation is described,

with a short introduction to the TeleTOP-implementation approach, followed by a discussion of implementation-related remarks made during various studies (see Chapter 5). Based on these findings, in Section 8.1.3 the design of a PPST implementation plan to successfully implement a PPST in an organisation is described.

8.1.1 Intervention implementation

Implementing an intervention, whether at company or department level, will cause organisational changes in work procedures. Dormant (1999) discusses four dimensions of change:

1. "the change itself
2. the users and their perspective on the change
3. the network of organisational people who can bring power and influence to bear on the change
4. Factors in the organisational system that may have an impact on the change and the change effort." (p. 237).

With regard to Point 1, the purpose of an intervention is to bring about a change in the organisation, so the first dimension is rather obvious. With regard to Point 2, the users and their perspectives on the change can be influenced by understanding the way an innovation-diffusion process is perceived by users (Rogers, 1995). Rogers indicates that the rate in which users adopt to an innovation is influenced by the characteristics of the innovation:

- Relative advantage compared to the current situation
- Compatibility with current experiences and needs of potential users
- Complexity: how easy it is to understand and use the innovation
- Trialability: to be able to experiment with the tool and experience its use
- Observability: to be able to see the results of an innovation.

Dormant (1999) also lists five characteristics, but instead of the last two, trialability and observability, he lists:

- Adaptability to fit specific situations
- Social impact in the relation to other people

The more these characteristics are available, the faster the users will adopt such an innovation.

Dormant (1999) advocates that users should be guided to accept the change. She lists a number of steps in the process of change acceptance that are in accordance with the Concerns-Based Adoption Model (CBAM) approach (Loucks & Hall, 1977):

- Awareness
- Curiosity
- Visualisation
- Tryout
- Use.

In general, people will move through these stages from awareness to use. These stages relate to the affections of people about an innovation. For each affective stage there is also an associated behavioural stage. These levels of use categorise how people are actually using an innovation. It consists of eight categories (Table 65).

Table 65. Levels of use of an innovation (Loucks & Hall, 1977).

Level	Description
1. Non-user	The user has no interest, is taking no action
2. Orientation	The user is taking the initiative to learn more about the innovation
3. Preparation	The user has definite plans to begin using the innovation
4. Mechanical use	The user is making changes to better organise the use of the innovation
5. Routine use	The user is making few or no changes and has an established pattern of use
6. Refinement	The user is making changes to increase outcomes
7. Integration	The user is making deliberate efforts to co-ordinate with others in using the innovation
8. Renewal	The user is seeking more effective alternatives to the established use of the innovation

Table 65 shows from top to bottom the levels a user will move through when using a new tool. The more a user becomes familiar with using a tool the more it will become routine and finally the user seeks a broader innovation.

Given these general theories about change, a translation has to be made towards a university context.

8.1.2 University context

At the University of Twente, a CBAM-like approach was used in 1997 and 1998 to introduce instructors to the use of a new tool, the Course Management System named TeleTOP (Collis & Moonen, 2001). This TeleTOP Implementation Method was characterised by a low-level introduction, gradually moving towards faculty and university-wide use (Collis & De Boer, 1999). After the TeleTOP system was developed in 1997, the system was introduced through workshops and lunch meetings where various aspects of the tool were demonstrated and hands-on experience was offered. Also instructors who were willing to try and use the tool were supported by a team to set-up a course environment and transfer all relevant documents and files to the TeleTOP-course environment. After three years, support was moved from the TeleTOP-support team to the regular help-desk.

During the various studies described in Chapters 5, 6, and 7, participants referred to the way the implementation process was carried out to implement TeleTOP at the University of Twente or to implement Blackboard at the CAH/STOAS Hogeschool. Some participants expressed what they liked or disliked. Just like with CMSs, such as TeleTOP and Blackboard, a PPST is also intended to be used by instructors and to have an impact on an instructors' work, therefore these remarks can be used as a starting point for a plan to implement a PPST at a faculty or university level (Table 66).

Table 66. Implementation-related remarks involving the university context during previous studies in this research.

Implementation aspects	**Remarks**		
	UT instructors (*n*=6) (see Section 5.6)	**CAH/STOAS instructors (*n*=7) (see Section 5.6)**	**UT directors (*n*=6) (see Section 5.7)**
Initiative to use CMS	- By organisation (2) - Self (4)	- By organisation (2) - Self (5)	- By organisation (2) - Self (3)
Commitment		- Management should commit itself	- We provided budget (=time)
Implementation team		- Someone should take the lead	- We assigned a co-ordinator
Adaptation to program or the local aspects	- 'Blokonderwijs' [a period of intense teaching] - Project-based learning - Part-time students - Foreign students - Bachelor or Master phase - Trimester or semester structure - Different course structures - Different administrative procedures - May be different per discipline	- Less face-to-face sessions - Educational program based on competencies - Problem-based learning	- We use various documents - Various educational formats - Varies per discipline - We use complex educational formats - Teaching first-year students is different from second-fourth year
Deployment approach		- Gradual approach - Start with highly-motivated people	- Use a TeleTOP approach - Via pioneers
Stimulation	- They convinced me that it would be beneficial - Stimulated by examples	- Just do it - Some are afraid to try it	- Propagate
Workshop strategies	- Usefulness differs per faculty - One workshop is enough - Never attended one	- I attended a workshop - Asked for a workshop - Program is so intuitive you don't need a workshop	- A few sessions - No need for training
How to learn to use	- I explored it and then tried it in a course	- You have to get used to it - Step-by-step approach	
Adaptiveness	- I want to be able to change it	- Sometimes I submit material to be added to the tool	
Support available	- Help desk is available	- Is available - Is needed	- Available in the beginning

Note. When mentioned by more than one participant, the number of responses is shown between brackets.

Table 66 shows that many aspects are related to the context-specific implementation of a tool. Thus, based on these findings, the design of a PPST-implementation plan to implement a PPST at a faculty or university will be described in the next section.

8.1.3 Design of a PPST implementation plan

Based on the discussions in Sections 8.1.1 and 8.1.2, an implementation plan for a faculty or university to implement a PPST to support academics was designed. It consists of four key steps and various sub-steps that relate to PPST elements. The key steps in the implementation plan are:

1. **Analyse**
   Within a faculty or university, first the need for a PPST and the willingness to use such a tool has to be analysed. The need can come primarily from management as a new policy or way to organise the organisation and work. The need can also arise from bottom-up by the instructors as they feel the need to better perform their activities.
2. **Get commitment**
   To install a PPST in a faculty or university involves financial support, thus management has to commit itself to resources. But management should also commit itself to stimulate day-to-day use.
3. **Prepare**
   Each faculty and university has its own specific work procedures, its own way of working. Also within these procedures, some resources may differ from faculty to faculty, not only the specific requirements by management but also detailed procedures to handle TeleTOP and administrative forms. Therefore the PPST should be tailor-made for a specific faculty. To co-ordinate these adaptations, a team of instructors needs to be created. This team can guide the adaptation process, and also decide what to put in or leave out when opinions among instructors differ. At the end of this process, a full-scale, up-to-date, tailor-made PPST should be installed on a server and made available to the instructors. Of course it should be error-free.
4. **Deploy**
   It is not enough to put a tool on a server. The users should be made aware that the tool is available. But as this tool is new to them and is not replacing an obsolete tool, the users should be encouraged to use it and be informed about the advantages of the tool for them personally. For some instructors a workshop may be the right way to get familiar with the tool to start using it. After this initiation phase, the users will start using the system and may encounter problems. From the TeleTOP approach it became obvious that users want to have support on-demand, so a helpdesk should be setup for troubleshooting. But while using the system, instructors will want to make adjustments or suggest a new functionality. The more users have the feeling that they are supported by a help-desk and can influence the system, the more they will value the tool.

Based on these steps, the PPST Implementation Plan is shown in Table 67. The activity details refer to the activity table in the PPST with components to support instructors, such as references, requirements, TeleTOP procedures, control, and administration.

Table 67. PPST Implementation Plan.

#	Key steps	PPST aspects	Description
1	Analyse		Analyse the need to implement a PPST
2	Commitment		Let management state their commitment and offer budget to implement this PPST, and also to effectuate day-to-day use
3	Prepare	Tasks and activities	Form a team of experienced on-line instructors at university or faculty level to adapt tasks and activities to common practice
		Planning	Adapt default-time estimates per activity to common practice.
		Activity details:	
		References	Adapt references to research articles and reports to reflect the institution's own educational practice
		Requirements	Adapt requirements to reflect organisational constraints and desired performance
		TeleTOP	Adapt TeleTOP procedures to reflect best practice
		Control	Adapt checklists to improve efficiency, effectiveness, and quality within the specific organisation
		Administration	Adapt administrative procedures and forms to reflect common practice
4	Deploy	Access	Offer access to all users, such as instructors, support staff, and administrative personnel
		Instruct	Instruct all users during a workshop about this PPST and stimulate day-to-day use.
		Suggestions	Stimulate users to suggest new activities and add support material to improve the PPST

A visual representation as a flowchart of the PPST Implementation Plan is shown in Figure 89.

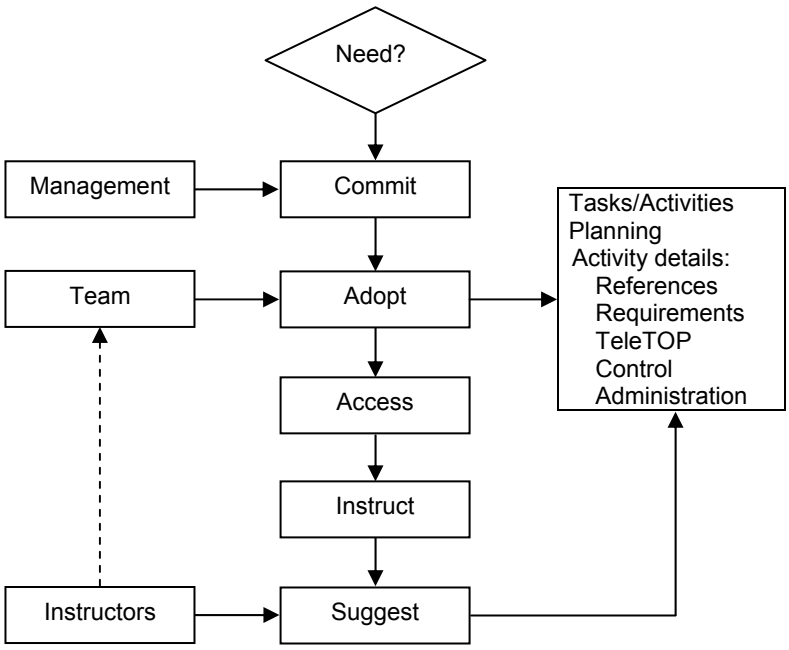


Figure 89. Scheme of the PPST Implementation Plan.

During the evaluation process, this PPST implementation plan will be part of the evaluation as is the latest version of the PPST tool. This will show whether the plan needs adjustments before it is ready to use in a specific context.

8.2 Evaluation Methodology (Study I4)

In this section, the evaluation process for the final prototype of the PPST and the PPST Implementation Plan will be described. In Section 8.2.1 the problem statement for the final evaluation is defined, followed by a discussion about the participants that will be involved (Section 8.2.2). Section 8.2.3 describes the instruments used during the evaluation process, and Section 8.2.4 describes the evaluation process and data collection.

8.2.1 Problem statement

The purposes of evaluating the final PPST prototype and the PPST implementation plan are:

- to investigate the opinions and suggestions about the PPST itself and its components.
- to investigate the potential usefulness of the PPST and its components to support and improve performance of teaching-related activities by instructors
- to investigate the willingness of instructors to use a PPST to support their teaching-related activities
- to investigate the potential usefulness of the proposed PPST implementation plan to successfully implement a full-scale PPST at faculty or university level.

8.2.2 Participants

According to Virzi, as cited in Rubin (1994), it does not take many participants to identify trends during prototype testing. He indicated that four to five participants will expose 80 percent of the usability deficiencies of the product, and this 80 % will represent most of the total set of problems. As instructors will be the main users of the PPST, the target audience for the evaluation process are the instructors, but as educational managers and support staff are also involved in the support of instructors and the implementation of the support tool, they are also considered as participants. Table 68 shows the overall plan for roles and faculties of participants.

Table 68. Overview of roles and faculties of participants (general).

Role	**University of Twente faculties**		
	Faculty A	Faculty B	Faculty C
Instructors	X	X	X
Directors of educational programmes	X	X	X
Support-staff members	X	X	X

For this evaluation process, the participants will be employees of the University of Twente. Three faculties will be involved in this evaluation process: a business-oriented faculty ('bus' for short), a technical-oriented faculty ('tech' for short), and a social science-oriented faculty ('soc' for short). A specific aspect of the technical-oriented faculty is that their teaching is organised in 'blocks' of four weeks, during which an instructor is fully occupied with teaching face-to-face. The instructors who were selected for the evaluation work within these specific faculties (coded bus1,2,3; tech1,2,3; soc1,2,3,4,5). Three directors of educational programmes working at these three faculties also participated (coded dir1,2,3). Support-staff participants were

selected based on their professional jobs in which they can be a supplier of PPST resources: they are a librarian, a TeleTOP-support person, an educational administrator, and a quality manager at the university level (coded sup1,2,3,4). Support staff at the University of Twente can be employees of a faculty or be part of the ITBE (Institute for Information Technology, Library & Education). Codes for instructors, directors, and support-staff members are used instead of names to keep findings anonymous. An overview of roles and organisational units of the participants in the evaluation is shown in Table 69.

Table 69. Overview of roles and faculties of participants.

Role	**Faculties**			**ITBE**
	Business	**Technical**	**Social science**	**Support**
Instructors	3	3	5	
Directors of educational programmes	1	1	1	
Support-staff members	1 (TeleTOP-assistant)		1 (Administrator)	2 (Librarian; Quality-manager)

Table 69 shows that the TeleTOP help and the administrator are employees of a faculty, whereas the librarian and the quality manager are employees of the ITBE.

8.2.3 Instruments

To evaluate the PPST and the implementation plan, four instruments will be used to collect data:

- A background questionnaire
- Walkthroughs of the PPST by participants
- An evaluation questionnaire about the PPST
- Structured interviews with participants.

These instruments will be discussed in detail in the next four sub-sections.

8.2.3.1 *Background questionnaire*

The goal of the background questionnaire is to retrieve demographic information and opinions about variables whose values might be expected to have an influence on the perceived usefulness of the PPST:

- Demographics: sex, age, years of teaching experience, and TeleTOP experience
- Job context: workload in general, teaching workload, TeleTOP workload
- Job control: level of autonomy, level of detail of management specifications, level of incentives
- Teaching: number of courses, number of EC points, number of TeleTOP courses
- Experience with using TeleTOP: skilled in ICT, skilled in TeleTOP use, use of TeleTOP, use of full functionality of TeleTOP.
- Experience with performing teaching-related activities: Use of a standard set of procedures, planning, use of reference material, requirements, procedures when using TeleTOP, manage and control performance, inform administration.

- Current support for instructors: offered towards teaching-related activities, (new) work-related procedures, planning and job control, subject-matter information, requirements, TeleTOP, administrative procedures
- Engagement towards a support tool: willingness to try and use new ICT applications, use a support tool, and need for additional support.

See Appendix 10 for the background questionnaire.

8.2.3.2 *Walkthrough*

A walkthrough is a way to get to know a program or application (Moonen, 2002; see Section 4.2). The participant is free to try and use the program in any way and use the components in any order. The researcher can support the user to get to know the full functionality of the tool. Also the participant can ask for help or ask for background information. Also the researcher can demonstrate / emphasise specific functionalities of the PPST in order:

- To let the participant become aware of all aspects of the tool
- To make it easier for the participant to answer the questions of the questionnaire and during the interview.

The researcher will demonstrate the product and its components, and occasionally will intervene to emphasise aspects that are being overlooked during the walkthrough or that need extra attention to get a clear insight of the potentials of the tool. There can be vivid interaction between researcher and participant, but duplication of remarks by participant or researcher during the walkthrough should be avoided.

8.2.3.3 *PPST evaluation questionnaire*

The goal of the evaluation questionnaire is:

- To retrieve opinions about the look and feel, and the (potential) effectiveness of the PPST product as a whole, its tasks, components, navigation, screen design, screen content, and resources, and the potential overall usefulness and effectiveness to support instructors and improve their performance
- To collect useful suggestions to improve the PPST or a comparable support tool.

The questionnaire asks participants' opinions about usability aspects (Nielsen, 1993) and focuses on the features offered by the PPST:

- Are teaching tasks and activities (potentially) structured and adequately ordered?
- Is navigation (potentially) adequate?
- Is screen design(potentially) adequate?
- Is the planning information (potentially) useful?
- Are the activity resources (potentially) useful?
- Are components to support the use of the PPST itself (help, mail, background info) (potentially) useful?
- What elements are (potentially) missing?
- Is the overall impression to use the tool as a support system (potentially) positive?

The structure of the questionnaire is based on the order in which the PPST-features will be accesses when the PPST is used in a structured and sequential way, for instance Develop before Deliver, and course level before components level. As noticed before

the PPST can also be used in a random way. For each usability aspect there is a five-point scale on which participants can rate their opinion and per group of related questions participants can give their own remarks. See Appendix 11 for the full questionnaire.

8.2.3.4 *Structured post-test interview*

To elicit additional information and opinions of the evaluators about the PPST a structured post-test interview was held.

The goals of the structured post-test interview are:

- To retrieve general reflective feelings about the PPST, its usefulness to support instructors, and its ability to improve performance
- To discuss a PPST Implementation Plan which relates to:
  - Commitment of management
  - Preferred procedures to create a full-scale PPST adapted to the organisation
  - Preferred procedures to deploy the PPST in an organisation
  - Preferred ways of informing instructors about the PPST
- Suggestions to how the PPST can be improved during use.

To reflect these goals, during the post-test the following questions were asked:

a) What is your general impression of the (potential) usefulness of the PPST to support instructors at higher education for their teaching-related activities?
b) If this tool would be generally available as a completely filled system, would you or your colleagues use it for your teaching-related activities? Why, or why not?
c) To your opinion, what should be added to the tool to make it (more) useful for instructors to perform their teaching-related activities?
d) How would a successful procedure to implement such a tool as a complete system look like? What steps in which order?
e) I have here a draft of an implementation plan. Please comment on this plan (i.e. is it well structured? Is it adequate? Will it lead to success?).
f) Will the use of this PPST stimulate you and your colleagues to standardise your work procedures according to the content of this PPST?
g) Will instructors be better equipped to stay in control for their teaching-related activities?

The participants can to a certain extent elaborate on each question. See Appendix 12 for the post-test interview scheme.

8.2.4 Procedure

The evaluation procedure was as follows. First, the background questionnaire was sent by email to each participant one week before the evaluation session. If the questionnaire was not submitted two days before the session, a reminder was sent. If the questionnaire was not received before the session, the background questionnaire was filled out at the beginning of the evaluation session.

The evaluation was done in the office of the researcher at the Faculty of Behavioural Sciences. The PPST was installed on the computer before the session and it was used during the walkthrough. When the participant was filling out the evaluation form and

also during the interview, the system was still available to be used to point out specific aspects or as a memory aid to remember how the system presented itself. The only additional equipment was an audio-recorder to review and extract data during the interview.

In order to make sure that the participant had a clear view of the features of the PPST, the following scenario was used as a template for the evaluation session (see Table 70).

Table 70. Scenario for the final evaluation session.

Step	Focus	Become aware of, or ask for:
1	Welcome and introduction	Objectives and context of tool
2	Experiment to get an impression of the 'look and feel'	General aspects of navigation, screen design, tool support, content
3	Focus on developing a course and its components	Specific opinions and suggestions about the sub-tasks, activities, resources,
4	Focus on delivering a course and its components	Specific opinions and suggestions about the sub-tasks, activities, resources, and job control
5	Focus on output to Microsoft Project	Special features of integrating PPST and Microsoft Project
6	Focus on tool-support aspects	Specific opinions and suggestions about the help, background info, contact info
7	Reflect	Overall opinions and suggestions about the tool, its components, screen design, navigation, and content. Opinions about usefulness, effectiveness, and possible enhancements
8	Interview	Reflective opinions about the tool and remarks on the implementation plan
9	Thank you	

The evaluation session started with a welcome to the participant, a short introduction of the objectives of the research and the PPST, and the context in which this tool can be used in daily life. Then an overview was given of how the session is organised and what is expected of the participant (see Table 70). The participants were asked to focus on teaching-related activities which are related to organising one's own work, and the use of TeleTOP. It was emphasised that the tool is a prototype, so that incomplete, and is not intended to support didactical and pedagogical problems or aspects.

During the session, the researcher performed various roles, including those of administrator, monitor, and observer. For consistency, the researcher monitored all the tests. The role of the monitor was to sit near the participant in order to see what actions are taken and to hear any questions and remarks the participant might have.

After a short introduction of the walkthrough, the participant received the evaluation questionnaire that he or she could fill out during and directly after the walkthrough. During the walkthrough there were interactions between participant and researcher to clarify specific aspects or discuss remarks made by the participant. When the participant had explored the tool for a while, the researcher stimulated the participant to experience the tool in a more-systematic way, by starting with the steps involved in developing a course, then moving to the steps involved in delivering a course, and after that, steps that relate to sending planning output to a printer or Microsoft Project. In this way the participant experienced all teaching-related components of the PPST. Although

participants may not feel the need to select specific PPST-support parts, such as Help, Sitemap, and Research Background, they were stimulated to have a look. The researcher made sure that participants also selected Output where they could click to output planning data to a printer or to Microsoft Project. After the participant selected which tasks, sub-tasks, and components to output, the participant could click on Send planning. Because the PPST is written in JavaScript, in which it is not possible to create a file, the planning data were sent as an email message to the researcher. The researcher then used Microsoft Outlook to open the email message and copied the planning data to Notepad to save it in a text file. This text file was then imported into Microsoft Project using a specific template. The participant was now able to view the selected planning data as a Gantt chart. As most instructors were not aware of the features of Microsoft Project, the researcher demonstrated how planning details can be added or changed, how costs and hour rates can be specified, and how various reports can be generated. Appendix 13 shows an example of this output.

After the walkthrough, participants were asked to fill out the evaluation questionnaire or when they had already filled out part of the form during the walkthrough, to finish the rest of the form.

The interview occurred directly after the participant filled out the evaluation form. The participant was asked to answer the questions in a brief manner. The directors of educational programmes could skip the questions that specifically refer to instructor usage. During the interview an audio-recorder was used. After the interview the researcher thanked the participant for collaborating in this research project.

8.2.4.1 *Data collection*

When participants used the Web version of the background questionnaire, it was returned to the researcher as a text file. The variables in this file were copied to SPSS. When the background questionnaire was filled out on paper, the data were manually typed into SPSS by the researcher. The responses to the evaluation questionnaires were also typed into SPSS. The interviews were transcribed from audio-disc to a Word document and then the answers and remarks were categorised. To categorise the interviews the grounded-theory approach was used (Alsop & Tompsett, 2002), which was also used when analysing actual performance of instructors, and described in Chapter 5 (Section 5.6.2). During this process many categories evolved (Table 71).

Table 71. Categories of interview topics discussed, partly related to the Personal Performance Model.

PPM code	Topic	Sub-topic	Discussed in:
I	PPST tool	layout	Section 8.5.1
		Missing components	
		Resources	
		Integrating Microsoft Project	
A	Academics	Diverse user group	Section 8.5.2
		Novice instructors	
		Expert instructors	
		Use scenarios	
		Flexibility	
C	Colleagues	Collaboration	Section 8.5.3
U	University aspects	Requirements	Section 8.5.4
		Commitment	
		Accountability	
O	Online teaching	Experienced user can also be novice	Section 8.5.5
		Support novice	
J	Job control	Planning	Section 8.5.6
		Efficiency	
		Quality	
-	Overall opinion	Use and usefulness	Section 8.5.7
-	Implementation	Faculty specific approach	Section 8.5.8
		Commitment	
		Implementation team	
		Pilot project	
		PR	
		Access	
		Gradual diffusion	
		Workshops	
		Improvements	
		Support	
-	PPST related to other systems	PPST as a stand-alone system	Section 8.5.9
		PPST integrated in a CMS	
		PPST as part of a portal	

Note. PPM = Personal Performance Model (see Chap. 2); PPST = Personal Performance Support Tool (see Chap. 7); CMS = Course Management System (see Chap. 2).

8.3 Participants' Backgrounds and Initial Opinions

In this section the results of the background questionnaire (see Appendix 10) will be shown and discussed as nine sets of data. First demographics results will be shown, followed by teaching experiences, job context, job control, teaching experience, experience in using TeleTOP for teaching, and experience in performing teaching-related activities, current support for instructors, and finally the willingness to use a support tool and possible constraints to be willing to use the tool will be discussed. In general these findings are similar to earlier interviews conducted in various studies described in Chapter 5, for instance Study C1 and C2.

- **Demographics**

  The first two questions in the background questionnaire are about sex and age categories of participants (Table 72).

  Table 72. Age categories and sex of participants (*N*=18).

		Age categories					Total
		20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	
Sex	Male		5	3	2	3	12
	Female		4			1	5
Total		0	9	3	2	4	18

  As Table 72 shows, no participants fall in the age category from 20 to 29 years. Most participants fall in the category 30 to 39 years. Female participants are from the following faculties: social faculty (4), and business faculty (1). These figures are similar to studies described in Chapter 5 (for instance Studies C1 and C2) in which the majority of participants was above 30-years old and male.

- **Teaching experience**

  Instructors were asked about their number of years of teaching experience and of using TeleTOP in teaching (Table 73).

  Table 73. Teaching experience and TeleTOP experience of instructors (*n*=11).

Years of teaching experience	Level of TeleTOP experience				Total
	None	Novice	Common	Expert	
1-5 years			1	2	3
6-10 years			2		2
11-15 years			2	1	3
> 15 years			2	1	3
Total	0	0	7	4	11

  Table 73 shows that within each category of teaching experience there are more than one instructor. The TeleTOP experience is at least common for all instructors, which could be expected as TeleTOP is common practice at all faculties at the University of Twente. Four instructors indicate that they are expert TeleTOP users. In studies described in Chapter 5 instructors had many years of teaching experience (Studies O2 and C3). In the international survey described in Chapter 6 (see Study C3) the teaching experience of the instructors was similar to the teaching experience of instructors participating in this study (Table 73). The level of TeleTOP (or CMS) experience in this study is similar to UT-instructors who participated in Studies C1 based on interview data, but higher than CAH/STOAS instructors (Study C2).

- **Job context**

  The feelings of instructors about their workload in general, teaching workload, and the contribution to the teaching workload caused by TeleTOP are shown in Table 74.

Table 74. Job context of instructors.

Question	Instructors	Per faculty		
	Total (*N*=11) *M (SD)*	**Business (*n*=3)** *M (SD)*	**Technical (*n*=3)** *M (SD)*	**Social (*n*=5)** *M (SD)*
Which term best describes your feelings about your **workload in general**?	3.64 (.81)	3.67 (.58)	3.67 (1.15)	3.60 (.89)
Which term best describes your feelings about your **teaching workload**?	2.73 (1.10)	3.67 (.58)	3.33 (.58)	1.80 (.84)*
Which term best describes your feelings about TeleTOP-use contributing to your **workload**?	1.73 (.79)	1.67 (.58)	2.00 (1.00)	1.60 (.89)

Note. 1=not a problem; 3=somewhat a problem; 5=very much a problem.
*) significant difference (p<.05) between social, and both business and technical.

Workload in general is somewhat a problem for instructors, in total, but also per faculty. The teaching workload is somewhat a problem for instructors of the business and technical faculties, but just a small problem for instructors of the social faculty. For the technical faculty, this may be caused by the fact that their curriculum is structured in intense periods of teaching called 'blocks'. The TeleTOP contribution to workload of instructors is just a small problem. Feelings of instructors at the social faculty about their teaching workload are significantly different from feelings by instructors of business and technical faculties.

- **Job control**

The way instructors experience the way they can control their work relates to autonomy, specifications by management, and incentives offered by management (Table 75).

Table 75. Job control of instructors.

Question	Instructors	Per faculty		
	Total (*N*=11) *M (SD)*	**Business (*n*=3)** *M (SD)*	**Technical (*n*=3)** *M (SD)*	**Social (*n*=5)** *M (SD)*
In your opinion, what is the level of **autonomy** (set by management) in your teaching tasks?	4.36 (.67)	4.67 (.58)	4.33 (.58)	4.20 (.84)
In your opinion, what is the level of **detail** in which management specifies your teaching tasks?	1.73 (.79)	1.67 (1.15)	2.33 (.58)	1.40 (.55)
In your opinion, what is the level of (extra, non-curricula) **incentives** offered by management you experience related to your teaching and teaching-related activities?	1.73 (1.01)	1.67 (1.15)	2.67 (1.15)	1.20 (.45)*

Note. 1=very low; 3=neutral; 5=very high.
*) Significant difference (p<.05) between social and technical.

The level of autonomy for instructors in teaching tasks is very high. The level of detail in which management specifies teaching is in general low to very low, although instructors at the technical faculty indicate that the level at which management is specifying teaching tasks in a bit more in detail. Extra incentives offered by management for teaching and teaching-related activities are in general

low to very low, although technical instructors have a more neutral opinion about this. The feelings of instructors in the social faculty about incentives is significantly lower than the feelings of instructors in the technical faculty.

- **Teaching**

  The involvement in teaching courses is shown in Table 76.

  Table 76. Number of courses per instructor in total and per faculty.

	Instructors	**Per faculty**		
# courses	**Total (*N*=11)**	**Business (*n*=3)**	**Technical (*n*=3)**	**Social (*n*=5)**
0	1			1
1	1			1
2-4	8	2	3	3
> 4	1	1		
Total	11	3	3	5

  Table 76 shows that most instructors teach two to four courses during one academic year. One instructor currently does not teach a course this academic year.

  As courses can vary in length, the next table shows the amount of EC credit units per instructor, where EC stands for European Credits, and one EC equals 28 hours of study time for students during a course (Table 77).

  Table 77. Total amount of EC points per instructor.

EC units	**Frequency**	**Percent**
0	1	9.1
7	2	18.2
10	4	36.4
15	1	9.1
20	1	9.1
25	2	18.2
Total	11	100.0

  Most instructors (60 %) teach courses with a total amount of up to 10 EC units, but two instructors have a total of 25 EC units per academic year.

  To get insight in the number of courses per instructor in which TeleTOP is used, instructors were asked to categorise their TeleTOP courses (Table 78).

Table 78. Number of TeleTOP courses per instructor, in total and per faculty.

	Instructors	**Per faculty**		
# courses	**Total (*n*=11)**	**Business (*n*=3)**	**Technical (*n*=3)**	**Social (*n*=5)**
0	1			1
1	1			1
2-4	8	2	3	3
> 4	1	1		

Table 78 shows that all instructors use TeleTOP in their courses, including the instructor without courses this year.

- **Skills to use TeleTOP for teaching**

  As TeleTOP is used at the University of Twente to deliver courses, the instructors were asked about their ICT skills in general, and more specifically about their skills to use TeleTOP (Table 79).

Table 79. ICT and TeleTOP skills of instructors.

Question	**Total**	**Per faculty**		
	Instructors (*N*=11) *M (SD)*	**Business (*n*=3)** *M (SD)*	**Technical (*n*=3)** *M (SD)*	**Social (*n*=5)** *M (SD)*
To what extent are you **skilled** in using **ICT**?	4.09 (.83)	3.67 (1.15)	4.00 (1.00)	4.40 (.55)
To what extent are you **skilled** in using **TeleTOP**?	4.00 (.77)	4.33 (.58)	3.33 (.58)	4.20 (.84)
To what extent are you **using TeleTOP** in your courses?	4.27 (.65)	4.33 (.58)	3.67 (.58)	4.60 (.55)
In your opinion, to what extent do you use **the full functionality** offered in TeleTOP?	3.36 (.92)	3.67 (.58)	3.00 (1.00)	3.40 (1.14)

Note. 1=not at all; 3=some; 5=very much.

Table 79 shows that all instructors are highly skilled in using ICT, and they are also highly skilled in using TeleTOP. In their courses TeleTOP is used very much, but they only use to some extent the full functionality of TeleTOP. This may be caused by the fact that they do not need the full functionality, or that they do not know how to use these other features. No significant differences (p>.05) were found between the three faculties for these four variables.

- **Performing teaching-related activities**

  Instructors were also asked about the teaching-related activities (Table 80).

Table 80. Performing teaching-related activities of instructors.

Question	Total	Per faculty		
	Instructors (*N*=11) *M (SD)*	**Business (*n*=3)** *M (SD)*	**Technical (*n*=3)** *M (SD)*	**Social (*n*=5)** *M (SD)*
To what extent do you use **a standard set of procedures** when performing your teaching-related activities?	3.00 (1.18)	3.33 (.58)	2.67 (1.15)	3.00 (1.58)
To what extent are you **planning** your teaching-related activities in detail?	3.64 (1.03)	4.00 (.00)	3.67 (1.53)	3.40 (1.14)
To what extent are you using **reference material** to support your teaching-related activities?	3.55 (1.13)	4.33 (.58)	2.67 (1.53)	3.60 (.89)
To what extent are you informed by educational director about the teaching **requirements**?	2.45 (1.13)	2.00 (.00)	2.00 (1.00)	3.00 (1.41)
To what extent do you use a standard set of procedures when using **TeleTOP**?	3.55 (.93)	4.00 (.00)	2.67 (.58)	3.80 (1.10)
To what extent do you **manage and control** your own performance of teaching-related activities?	4.00 (.63)	3.67 (.58)	4.33 (.58)	4.00 (.71)
To what extent do you have to **inform administration** about your teaching-related activities?	2.18 (.60)	2.00 (1.00)	2.33 (.58)	2.20 (.45)

Note. 1=not at all; 3=some; 5=very much.

Looking at Table 80 as a whole, it appears that according to instructors they perform their teaching-related activities in a highly autonomous way according to the extent to which they are able to manage and control their work (M=4.00, SD=.63). When performing they sometimes use a standard set of work procedures and TeleTOP procedures, and also sometimes use reference material. However, they are not well informed about requirements set by the organisation, and they do not have to inform administration. This suggest that they are still autonomous in the way they perform their teaching-related activities, a situation that is not likely to remain as pressures increase (see Chapters 1 and 3). When comparing the three faculties there are no significant differences (p>.05) for these variables.

- **Current support for instructors**

  Instructors were asked about the level of support that is offered to them for various aspects of their teaching-related activities (Table 81).

Table 81. Support offered to instructors according to all instructors, and per faculty.

Question	Instructors	Per faculty		
	Total (*N*=11) *M (SD)*	**Business (*n*=3)** *M (SD)*	**Technical (*n*=3)** *M (SD)*	**Social (*n*=5)** *M (SD)*
How would you rate the level of support offered to you towards **teaching-related activities**?	2.55 (1.13)	2.00 (.00)	3.67 (1.15)	2.20 (1.10)
How would you rate the level of support offered to you towards (new) **work-related procedures**?	2.36 (.92)	2.00 (.00)	3.33 (.58)	2.00 (1.00)
How would you rate the level of support offered to you towards your own **planning** and job-control?	1.91 (1.04)	1.67 (.58)	2.67 (1.53)	1.60 (.89)
How would you rate the level of support offered to you towards (new) **subject-matter information** (articles, references)?	1.91 (1.14)	1.33 (.58)	3.33 (.58)	1.40 (.89)*
How would you rate the level of support offered to you towards (new) **requirements** you have to apply?	2.36 (.92)	2.00 (.00)	3.33 (.58)	2.00 (1.00)
How would you rate the level of support offered to you towards using **TeleTOP** in your teaching?	2.91 (.94)	3.67 (.58)	3.33 (.58)	2.20 (.84)**
How would you rate the level of support offered to you towards applying **administrative procedures**?	2.55 (.69)	1.67 (.58)	3.00 (.00)	2.80 (.45)**

Note. 1=very low; 3=neutral; 5=very high.
* significant difference (p<.05) between Social and Technical
** significant difference (p<.05) between Social and Business.

Table 81 shows that all support categories score below neutral, with planning and subject-matter information at the extreme (M=1.91). Support teaching and support administration have the highest score (M=2.55), but still below neutral. For all except TeleTOP, instructors at the technical faculty are more positive than business and social-faculty instructors. In general faculties are not offering much support to their instructors.

In Table 82 the opinions about support offered to instructors is shown, categorised by instructors, directors, and support staff.

Table 82. Opinions of instructors, directors, and support staff about support offered to instructors.

Question	**Instructors (*n*=11)**	**Directors (*n*=2)**	**Support staff (*n*=3)**
	M (SD)	*M (SD)*	*M (SD)*
How would you rate the level of support offered to you towards **teaching-related activities**?	2.55 (1.13)	2.50 (2.12)	3.33 (.58)
How would you rate the level of support offered to you towards (new) **work-related procedures**?	2.36 (.92)	3.00 (.00)	3.33 (1.15)
How would you rate the level of support offered to you towards your own **planning** and job-control?	1.91 (1.04)	2.00 (1.41)	2.00 (1.41)
How would you rate the level of support offered to you towards (new) **subject-matter information** (articles, references)?	1.91 (1.14)	3.50 (.71)	2.67 (1.53)
How would you rate the level of support offered to you towards (new) **requirements** you have to apply?	2.36 (.92)	3.50 (.71)	3.00 (1.41)
How would you rate the level of support offered to you towards using **TeleTOP** in your teaching?	2.91 (.94)*	4.50 (.71)	3.67 (.58)
How would you rate the level of support offered to you towards applying **administrative procedures**?	2.55 (.69)	3.50 (.71)	3.00 (1.73)

Note. 1=very low; 3=neutral; 5=very high.
* significant difference (p<.05) between instructors and directors.

Table 82 shows that for all aspects, except support for teaching, instructors are the least satisfied about the support that is offered to them. Support staff are most positive about the support that they and their colleagues offer to instructors. Support for planning is lowest for all three categories of participants. Instructors value the support offered towards TeleTOP significantly lower than the directors. Maybe within each organisation there is a helpdesk but instructors do not consider these to be adequate to support specific TeleTOP use.

The instructors were also asked whether they need additional support in their teaching related activities (Table 83).

Table 83. Need for additional support, according to instructors (in total and per faculty).

Question	**Instructors**	**Per faculty**		
	Total (*N*=11) M (SD)	**Business (*n*=3)** M (SD)	**Technical (*n*=3)** M (SD)	**Social (*n*=5)** M (SD)
How would you rate your need for additional support towards teaching-related activities?	3.09 (.70)	3.00 (1.00)	2.67 (.58)	3.40 (.55)

Note. 1=very low; 3=neutral; 5=very high.

Table 83 shows that on average, instructors rate the need for a support tool as neutral, where technical instructors feel less need for a support tool and social-

faculty instructors value additional support more, although these differences are not significant ($p>.05$).

The need for additional support for instructors is next compared with opinions by directors, and support-staff members (Table 84).

Table 84. Need for additional support for instructors, according to instructors, directors, and support-staff members.

Question	**Instructors (*n*=11)** M (SD)	**Directors (*n*=3)** M (SD)	**Support staff (*n*=4)** M (SD)
How would you rate your need for additional support towards teaching-related activities?	3.09 (.70)	2.33 (1.15)	3.25 (.50)

Table 84 shows that directors rate the need for additional support as rather low, whereas instructors and support staff rate this need as neutral, but the differences are not significant ($p>.05$) between the three actor groups.

- **Willingness to use a support tool**

Before participants carried out the evaluation test, they were also asked about their willingness to try and use new ICT applications and a support tool (Table 85).

Table 85. Willingness of instructors to use ICT and to use a support tool (in total and per faculty).

Question	**Instructors**	**Faculties**		
	Total (*N*=11) *M (SD)*	**Business (*n*=3)** *M (SD)*	**Technical (*n*=3)** *M (SD)*	**Social (*n*=5)** *M (SD)*
How would you rate your willingness in general to try and use **new ICT applications**?	4.18 (.87)	3.67 (1.15)	3.67 (.58)	4.80 (.45)*
How would you rate your willingness to try and use a **support tool** for teaching-related activities?	3.82 (.75)	3.67 (.58)	3.00 (.00)	4.40 (.55)*

Note. 1=very low; 3=neutral; 5=very high.
* significant difference ($p<.05$) between Social and Technical

Table 85 shows that instructors are very willing to try and use new ICT applications. The willingness to try and use a support tool is there, but as some instructors indicated, they first want to know more about the support tool and whether it will be beneficial for them. The willingness for both aspects is highest for the social-faculty instructors. Social-faculty instructors score significantly higher ($p<.05$) than technical-faculty instructors for both aspects. Maybe technical-oriented instructors consider the use of new ICT applications as part of their daily work and do not emphasise their willingness. The willingness of technical-faculty instructors to use a support tool is neutral which indicates that they first want to see and try it before they are willing to use it.

The willingness of instructors to try and use new ICT applications or a support tool is compared between instructors, directors, and support staff in Table 86.

Table 86. Willingness to try and use new ICT applications and a support tool according to instructors, directors, and support staff.

Question	**Instructors (*n*=11)** *M (SD)*	**Directors (*n*=3)** *M (SD)*	**Support staff (*n*=4)** *M (SD)*
How would you rate your willingness in general to try and use **new ICT applications**?	4.18 (.87)*	3.33 (1.53)	2.67 (.58)
How would you rate your willingness to try and use a **support tool** for teaching-related activities?	3.82 (.75)*	2.67 (1.53)	2.67 (.58)

Note. 1=very low; 3=neutral; 5=very high.
* significant difference (p<.05) between Instructors and Support staff.

Table 86 shows that instructors rate their willingness to try and use new ICT applications as high and the use of a support tool as rather high. These scores of instructors on both variables are significantly higher (p<.05) than the scores of support staff who rate their willingness to try and use new ICT applications or a support tool as rather low. Directors are willing to use new ICT applications but their willingness to use a support tool is rather low. The rather high willingness of instructors to use new ICT applications and support tools is a good starting point for the implementation of a Personal Performance Support tool.

The remarks of participants about the conditions to be willing to try and use a support tool are shown in Table 87.

Table 87. Remarks of participants about conditions to be willing to try and use a support tool.

Participants	**Remarks**
bus1	Low level to all instructors; especially administrative support desired (e.g. grading); easy transfer of information to Student Administration (BOZ).
bus3	Ease of use; time efficient; no need to attend a course
tech1	First see the benefits; convince me!
tech2	Available hardware should be optimal: PC, network connection, beamer, screen
tech3	Flexibility
soc1	Easy to use; convincing relevance for work
soc2	It should be directly applicable to my situation; it has to be available all the time; it has to be well-structured; it would be nice if other colleagues are using it to compare experiences.
soc3	Error-free functioning; absolute absence of double work; integrated applying it for collaboration with co-instructors and support staff
soc4	Technical support; opportunity to hear from someone what the tool can do for me
soc5	Should not cost extra time (after initial implementation dip); benefit should be worth the cost put in (energy) to learn the system; the tool's purpose should match with my needs and wishes in terms of functionality - primarily this could be more related to new/innovative teaching approaches or more tied to better organisation of course content.
dir2	Flexible; consistent user interface; reliable; intuitive
sup1	Should never cost extra time/energy, to the contrary, should be beneficial.
sup2	Easy access; searchable
sup3	Single-logon system; always available; support one telephone-call away; "rewards", e.g. a tailor-made TeleTOP site after completion

From Table 87 some specific aspects can be extracted of what participants expect of a support tool. To make the implementation of a PPST a success the following aspects should be taken into account:

- The PPST should be ease of use
- The tool should be useful and applicable
- Technical support should be offered
- Using the tool should decrease time and energy.

Thus the sample indicates that instructors are willing to use a support tool (Table 86). Whether the final prototype of the Personal Performance Support Tool is according to their expectations is discussed in the next section.

8.4 Final Evaluation of the PPST

Participants were asked to first evaluate the various elements and components within the PPST and then to come to an overall opinion about the usefulness of the tool. In Section 8.4.1 the Entry-page and Welcome-page are discussed. In Section 8.4.2 the Task and Sub-Task pages are discussed. In Section 8.4.3 the Activity tables are discussed. In Section 8.4.4 the PPST-support information is discussed. In Section 8.4.5 the overall potential usefulness is discussed. In Section 8.4.6 the anticipated use of a PPST is discussed.

8.4.1 Entry and Welcome page

Participants were asked to give their opinions about the Entry page (Figure 81) and the Welcome page (Figure 82) of the PPST.

The Entry page is the starting point of the PPST tool and participants were asked about the potential attractiveness of this page (Table 88).

Table 88. Potential usefulness of the Entry page.

Question	**Instructors (*n*=11)** *M (SD)*
How would you rate the (potential) attractiveness of the **Entry page**?	3.64 (1.03)

Note. 1=very negative; 3=neutral; 5=very positive.

Table 88 shows that instructors rate the potential attractiveness of the Entry page rather positively. Some instructors also made remarks about the Entry page, and these are shown in Table 89.

Table 89. Remarks about the Entry page.

Participants	Remarks
soc1	Fine
soc2	Nice background picture; 'non disclosure' unclear to me
soc4	++
tech2	pleasing, concise
tech3	just one way to go to; move version info and credits to an 'about' page
dir2	the use of various font sizes looks a bit untidy
sup4	Entry page not very appealing; title does not give me the right clue as to what it will do for me

Table 89 shows that most participants also in their remarks liked the Entry page, but a few remarks suggest some small changes.

Participants were also asked to give their opinion about the potential usefulness of various elements of the Welcome page (Table 90).

Table 90. Potential usefulness of the Welcome page.

Question	Instructors (*n*=11) *M* (*SD*)
How would you rate the (potential) usefulness of the **Welcome page in general**?	3.82 (1.08)
How would you rate the (potential) attractiveness of the **screen layout** with 4 frames?	3.36 (.92)
How would you rate the (potential) usefulness of the **navigation** frame at the left?	4.36 (.50)
How would you rate the (potential) usefulness of the **information** frame at the right?	3.55 (1.29)

Note. 1=very negative; 3=neutral; 5=very positive.

Table 90 shows that various parts of the Welcome page and the frame structure are valued high, especially the navigation frame. This is in line with remarks instructors gave about the Welcome page (Table 91).

Table 91. Remarks about the Welcome page.

Participants	Remarks
soc2	Navigation is clear, but text should be highlighted when selected
soc4	++
soc5	Content seems fine; layout yields misconception: that it is more complicated than it really is; maybe use roll-over info?
bus1	Address frame not useful as it is used now.
bus2	Too much text to be read only once (so, a second visit is burdened by a text sheet)
tech1	Much text; offer a link to this page
tech2	Banner unnecessary?; information frame useless as it is now
tech3	use once as a tutorial, then offer a link to this page
dir1	Here you sense, that you have to do a lot of work you don't feel like doing, probably because this way of working is unfamiliar to you.
dir2	Especially the information frame is too much covered with text
sup4	Address frame not useful; banner useful; information frame has too much text. Overall it makes sense!

A few remarks were made about the text to introduce the tool. Some participants indicated that the information frame is useful, especially the first time, to understand what the tool has to offer, but could then be skipped. Also some felt that the text was a bit too long and suggested to shorten it.

8.4.2 Task and Sub-task pages

The pages that describe the major tasks (Develop and Deliver) (Figure 83) are rated by the participants as shown in Table 92.

Table 92. Potential usefulness of the Task-overview page by instructors.

Question	**Instructors (*n*=11)** *M* (*SD*)
How would you rate the (potential) usefulness of the **task-overview page in general**?	4.09 (.54)
How would you rate the (potential) usefulness of the **task with sub-tasks** in the navigation frame?	4.00 (.89)
How would you rate the (potential) usefulness of the **major-task description**?	3.91 (.83)
How would you rate the (potential) usefulness of the **task-decomposition graphic**?	4.18 (.87)
How would you rate the (potential) usefulness of the **sub-task table**?	4.09 (.83)
How would you rate the (potential) usefulness of a link to sub-task details for each sub-task in the table?	4.09 (1.04)
How would you rate the (potential) usefulness of total **planning time per sub-task**?	3.55 (1.44)

Note. 1=very negative; 3=neutral; 5=very positive.

From Table 92 it can be concluded that instructors rate the task-overview page positively, and also the various elements of this page. In their remarks they gave some suggestions to improve this page further (Table 93).

Table 93. Remarks about the Task-overview page.

Participants	**Remarks**
soc1	Indicate that default values are based on experimental data, when available
soc2	Task-decomposition graphic OK, but it's not intuitively clear that the graphic is clickable; a bit superfluous as links are also available in the navigation bar
soc5	Task-decomposition graphic helps me to learn the process How about a tick to indicate completion of a task?
bus1	It was unclear to me at first, that I could use the graphic to navigate, I used the navigation bar and links on a page.
bus2	The window offers three opportunities to click to the same thing, that is too much.
tech1	Navigation positive, but use other font or indent.
tech2	Some parts are very subdivided (less overview); Time per sub-task a bit arbitrary.
tech3	Use more concrete terms than sub-tasks and activities
sup4	Major tasks typically are long texts; not clear that input can be changed; prevent scrolling; link details (also) to DUIT materials [DUIT is a training program for novice instructors at the University of Twente]

In the PPST there are three ways to navigate: by the navigation bar, by links on a page, and by the task-decomposition graphic, and some remarked that this may be less (Table 93). As the task-decomposition graphic was valued highly as an alternative way to

navigate, it suggests that it should be available and leave it to the user what he or she prefers. For a first-time user, it may be unclear that the graphic is clickable. The suggestion to involve the training program for novice instructors at the University of Twente (called the DUIT program) in the further development of the tool and include its material is very attractive.

Instructors were asked to give their rating of the Sub-task page (Table 94).

Table 94. Potential usefulness of the Sub-task page by instructors.

Question	**Instructors (n=11)** *M* (*SD*)
How would you rate the (potential) usefulness of dividing the development process in **sub-tasks**: propose, prepare, create, test, and finish?	3.91 (1.04)
How would you rate the (potential) usefulness of a **Sub-task page** in general?	4.00 (.77)
How would you rate the (potential) usefulness of a **sub-task description** for each sub-task?	4.00 (.63)
How would you rate the (potential) usefulness of a **task-decomposition graphic** that highlights the sub-task?	4.36 (.67)
How would you rate the (potential) usefulness of the **Activity table** in general?	4.00 (.63)
How would you rate the (potential) usefulness of the **list of activities** in the Activity table?	3.91 (.70)
How would you rate the (potential) usefulness of the **Planning** column, with default times that can be changed?	3.55 (1.57)

Note. 1=very negative; 3=neutral; 5=very positive.

From Table 94 it can be seen that also the Sub-task page was valued highly, not only in general, but also each element. A few remarks were given about the Sub-task page and these are shown in Table 95.

Table 95. Remarks about the Sub-task page.

Participants	**Remarks**
soc2	Task description a bit 'prescriptive', but that's OK; keep it short.
soc3	For me, it's hard to grasp that planning can be used beforehand to reserve time and also while performing tasks.
soc4	++
soc5	maybe able to simplify layout by putting this task description under roll-over
bus1	I would use text (link or click) instead of icons
bus2	Propose and Finish are a bit far-fetched
sup4	tool should be adaptable by instructors; we need directors of educational programmes to set specifications for courses! I don't know where the biggest benefits are!

Table 95 shows that some participants did not understand the full functionality as they used this tool for the first time. A few participants suggested some small changes to the text or presentation. It seems a rather personal matter of taste, whereas the overall rating is very positive (see Table 94). As one participant (sup4) indicated the directors of educational programmes should be involved in implementing the tool.

8.4.3 Activity tables

Instructors were asked about their rating of the overall potential usefulness of the major components of the activity table (Figure 84), which consists of the Reference column with links to background information, the Requirements column with overviews of requirements, the TeleTOP column with procedures how to handle TeleTOP, the Control column with checklists, and the Administration column with forms and templates (Table 96).

Table 96. Rating of potential usefulness of the components of the Activity table by instructors.

Question	**Instructors (*n*=11)** *M* (*SD*)
How would you rate the (potential) usefulness of the **reference** column, with icons that link to articles and websites?	4.00 (1.10)
How would you rate the (potential) usefulness of the **requirements** column, with icons that link to documents?	4.09 (.94)
How would you rate the (potential) usefulness of the **TeleTOP** column (Course Management System, such as TeleTOP), with icons that link to CMS procedures?	3.27 (1.19)
How would you rate the (potential) usefulness of the **control** column with icons that link to checklists and tips?	4.18 (.87)
How would you rate the (potential) usefulness of the **administration** column, with icons that link to administrative documents and forms?	4.45 (.93)
How would you rate the (potential) usefulness of icons in general, to link to recourses, documents, forms, etc?	3.91 (.94)

Note. 1=very negative; 3=neutral; 5=very positive.

Table 96 shows that instructors rate activity components positively, with the Administration column earning the highest response, and the TeleTOP column as just above neutral. This may be caused by the fact that all instructors already use TeleTOP for all their courses and have the impression that the are familiar with TeleTOP use.

Participants could also give their remarks about the activity components of the Activity table (Table 97).

Table 97. Remarks about Activity-table components.

Participants	Remarks
soc2	Attractive to be able to use rows and columns the way I choose
soc4	Add screendumps to TeleTOP guidelines
soc5	References very useful !! Consider a link to a page with a list of requirements, better for control TeleTOP would be more useful to novice than for me Can these icons also be offered in an alternative version of a sitemap?
bus2	Requirements are a bit annoying
bus3	Provide a direct link to TeleTOP
tech1	References about writing course objectives very useful
tech2	I prefer text over icons
dir1	For references and requirements: maybe better to differentiate between an article and options. I miss a direct link to TeleTOP
dir2	Fully integrated with TeleTOP would be nice
sup1	Just a link to Picarta may not be effective for someone who is not very skilled in information retrieval; offer a link to a tutorial about library search.
sup4	Please include & match DUIT materials; consider more explicit instructions for course design by directors of educational programmes; consider more quality-assurance aspects (Deming cycles); take care of security issues; consider more automatic workflows.

Table 97 shows that various components of the activity table and their resources are valued differently by various people, depending on their job or their current needs. A few participants suggested to integrate this PPST in a broader context of university databases, such as TeleTOP and Picarta. One participant (sup4) was very clear in indicating that to implement such a support tool many aspects have to be taken into account, for instance: the DUIT program to train novice instructors right from the start to use this tool; directors of educational programmes to commit themselves and fill the tool with useful instructions and guidelines; quality assurance in procedures and checklists; and automatic workflows at faculty level but also at university level in which the flow of work between employees is supported by ICT facilities.

8.4.4 PPST-support information

Instructors were asked to rate the potential usefulness of the PPST-support information and results are shown in Table 98.

Table 98. Potential usefulness of PPST-support information by instructors.

	Instructors (*n*=11)
	M (*SD*)
How would you rate the (potential) usefulness of the link to **Mail** to send a message to the Help desk?	3.64 (.92)
How would you rate the (potential) usefulness of the **Help** in the banner frame at the top?	3.18 (1.25)
How would you rate the (potential) usefulness of the **Help subentry** at left?	3.82 (.87)
How would you rate the (potential) usefulness of the **Help page** itself? [1]	3.60 (1.07)
How would you rate the (potential) usefulness of the **Sitemap** subentry?	4.36 (.81)
How would you rate the (potential) usefulness of the **Research** subentry? [1]	3.27 (1.27)
How would you rate the (potential) usefulness of the **research** articles (project management, time management)?	3.78 (1.09)
How would you rate the (potential) usefulness of the **contact page** subentry?	3.91 (.83)

Note. 1=very negative; 3=neutral; 5=very positive.
[1]) Help page *n*=10; research *n*=9.

Table 98 shows that tool support is rated between neutral and positive, except the sitemap, which is rated more than positive, and the help at the right top of the main window as just above neutral. The research background information is rated just above neutral, as it is not directly supporting the users.

Participants could give their remarks about the PPST-support information (Table 99).

Table 99. Remarks about PPST-support information.

Participants	**Remarks**
soc1	Very good !
soc2	Presenting Help in a new window is especially handy; Be careful to change contact information before implementing the tool, otherwise people will call you instead of the helpdesk
soc4	Be consistent when indicating a task hierarchy with numbers, or leave out
soc5	Let Help pop-up the first time, until clicked away. Help page a bit short I like sitemaps ☺ Research page explains [research] role in THIS program
bus2	Mail OK, but not on top! Research info unclear
bus3	The system should work without help
tech1	Question about usefulness of help page is a trick question Research articles are for students
tech2	I don't like redundancy One should not need a sitemap
dir1	The system should work without help

Table 99 shows that the participants like to use a tool without the need to use help. Some instructors indicate that the research background information can be left out, but they are aware of the usefulness during this research.

8.4.5 Overall potential usefulness

Instructors were asked about their overall impression of various parts of the PPST (Table 100).

Table 100. Overall potential usefulness of various parts of the PPST by instructors.

Question	**Instructors (*n*=11)** *M* (*SD*)
What is your overall impression of the **look and feel**?	3.91 (.54)
What is your overall impression of the **screen design**?	3.55 (.69)
What is your overall impression of the **navigation**?	3.91 (.70)
What is your overall impression of the (potential) usefulness of the **tasks and activity lists**?	4.36 (.50)
To what extent do you think that the **tasks and sub-tasks** match common practice of instructors?	3.45 (1.21)
What is your overall impression of the **content** of the PPST tool itself (excluding the content of resources, such as articles, documents, forms)?	4.18 (.60)
What is your overall impression of the (potential) usefulness of the **resources**, such as articles, documents, forms, that are linked in the PPST tool?	4.00 (.89)
What is your overall impression of the (potential) usefulness of the **planning** support? [1]	3.90 (1.20)
What is your overall impression of the **overall** (potential) **usefulness** of the support tool for teaching-related activities?	4.00 (.89)

Note. 1=very negative; 3=neutral; 5=very positive.
[1]) *n*=10

Table 100 shows that the overall feeling about the (potential) usefulness of the various elements of the tool are positive, with 'tasks and activity lists' and 'content of the tool' as more than positive, and 'match with common practice' as more than neutral, and screen design also rated as more than neutral. The PPST overall impression by instructors is that the usefulness of the tool is positive.

Participants could also add remarks about the overall usefulness of various parts of the PPST (Table 101).

Table 101. Remarks about overall usefulness of various parts of the PPST.

Participants	**Remarks**
soc1	Very fine!
soc2	Especially Control and Adm.
soc3	This final version is far better than all previous versions
soc5	Look and feel is busy, can be improved Layout is strong; colours and fonts could be simpler; coloured fonts better? Sequence of tasks and sub-tasks does not match my way of working, but tasks do, mostly.
bus2	Sometimes too many details to match common practice
tech1	My common practice is more ad-hoc caused by lack of time I would like as output a time planning: you have to start that date, then do this, etc. Planning depends on time usage; should be better than alternatives
tech3	Nice tool
dir2	PPST is potentially promising, but much will depend on the way the system is introduced to the instructors; maybe as part of the DUIT[1] program
sup1	Planning time is open to discussion

Note. [1]) DUIT is a teaching-support program for novice instructors at the University of Twente.

Table 101 shows that participants valued various parts of the tool but also made some suggestions to improve the PPST. One of the directors noted the importance of an effective implementation process.

Results can also be compared between instructors of the three faculties participating (Table 102).

Table 102. Comparing overall impressions of instructors, in total and by faculty.

Question	**Instructors**	**Per faculty**		
	Total (*n*=11) *M (SD)*	**Business (*n*=3)** *M (SD)*	**Technical (*n*=3)** *M (SD)*	**Social (*n*=5)** *M (SD)*
What is your overall impression of the **look and feel**?	3.91 (.54)	3.67 (.58)	4.00 (.00)	4.00 (.71)
What is your overall impression of the **screen design**?	3.55 (.69)	3.33 (.58)	3.33 (.58)	3.80 (.84)
What is your overall impression of the **navigation**?	3.91 (.70)	4.00 (1.00)	3.67 (.58)	4.00 (.71)
What is your overall impression of the (potential) usefulness of the **tasks and activity lists**?	4.36 (.50)	4.33 (.58)	4.00 (.00)	4.60 (.55)
To what extent do you think that the **tasks and sub-tasks** match common practice of instructors?	3.45 (1.21)	3.67 (1.53)	2.33 (.58)*	4.00 (1.00)
What is your overall impression of the **content** of the PPST tool itself (excluding the content of resources, such as articles, documents, forms)?	4.18 (.60)	4.00 (1.00)	4.00 (.00)	4.40 (.55)
What is your overall impression of the (potential) usefulness of the **resources**, such as articles, documents, forms, that are linked in the PPST tool?	4.00 (.89)	3.67 (.58)	3.33 (1.15)	4.60 (.55)
What is your overall impression of the (potential) usefulness of the **planning** support? [1]	3.90 (1.20)	3.67 (1.53)	3.00 (1.41)	4.40 (.89)
What is your overall impression of the **overall** (potential) **usefulness** of the support tool for teaching-related activities?	4.00 (.89)	3.67 (1.53)	3.67 (.58)	4.40 (.55)

Note. 1=very negative; 3=neutral; 5=very positive.

[1]) Total *N*=10; tech *n*=2.

* Significant difference ($p<.05$) between Technical and Social

Table 102 shows that instructors in the social-science faculty score highest on almost all items, except for look and feel, and navigation where they score equal to another faculty. Of the business and technical-faculty instructors, the technical instructors score higher than average on look and feel, whereas the business instructors score higher than average on navigation and match with common practice. The technical instructors rate the match with common practice as rather negative, and significantly lower ($p<.05$) than the rate of the social-faculty instructors.

These results indicate that the screen design could probably be improved. The usefulness of tasks and activity lists is valued highly, whereas the score for resources is a bit lower, which may indicate that within the same structure, the resources can be improved. The fact that there is a better match of the PPST with common practice in

the social-science faculty can be explained by the fact that the researcher has based his tool on the situation in this faculty. Instructors in the technical faculty who already indicated that their need for additional support was low (see Table 83) and who are used to a different educational format with periods of intense face-to-face teaching ('blokonderwijs') valued the current content of the PPST as different from their teaching situation. As they still rate the tasks and activities parts of the PPST as high, this indicates that when the tool is adapted to their educational format of intense teaching ('blokonderwijs'), their ratings will probably be higher. That may also be the reason why the resources are valued a bit lower by technical instructors than by the business and social-faculty instructors. The rating for the usefulness of the planning is rated high, but neutral by technical instructors. Again, this may be caused by the "blokonderwijs" approach, because during that period there is no time or less need for individual planning, because all instructors are fully engaged in face-to-face teaching. The reason why the value for business instructors is higher can be explained by the fact that they are business oriented by profession, and appreciate the potential usefulness of project management in general, including planning.

The overall potential usefulness is rated very high by social-faculty instructors, which may indicate that they are more aware of the needs of instructors and better foresee the role this PPST can play to support instructors.

Maybe instructors who are younger will have different opinions about the overall usefulness of various parts of the tool than do older categories of instructors? These categories are compared in Table 103.

Table 103. Comparing overall impressions of PPST elements by age categories of instructors.

Question	**Instructors**	
	30 - 39 years (*n*=9) *M* (*SD*)	**>= 40 years (*n*=8)** *M* (*SD*)
What is your overall impression of the **look and feel**?	3.71 (.49)	4.25 (.50)
What is your overall impression of the **screen design**?	3.29 (.49)	4.00 (.82)
What is your overall impression of the **navigation**?	3.86 (.69)	4.00 (.82)
What is your overall impression of the (potential) usefulness of the **tasks and activity lists**?	4.29 (.49)	4.50 (.58)
To what extent do you think that the **tasks and sub-tasks** match common practice of instructors?	3.29 (1.11)	3.75 (1.50)
What is your overall impression of the **content** of the PPST tool itself (excluding the content of resources, such as articles, documents, forms)?	4.00 (.58)	4.50 (.58)
What is your overall impression of the (potential) usefulness of the **resources**, such as articles, documents, forms, that are linked in the PPST tool?	3.71 (.95)	4.50 (.58)
What is your overall impression of the (potential) usefulness of the **planning** support?	4.00 (1.10)	3.75 (1.50)
What is your overall impression of the **overall** (potential) **usefulness** of the support tool for teaching-related activities?	3.71 (.95)	4.50 (.58)

Note. 1=very negative; 3=neutral; 5=very positive.

Table 103 shows that instructor in age category 30-39 years are a bit less positive than are the instructors of 40 years and above, except for the planning support which younger instructors value more, but none of these differences was significant (p>.05).

The impressions about the overall potential usefulness of various parts of the PPST can also be compared by years of experience (Table 104).

Table 104. Comparing overall impressions of PPST elements by years of teaching experience of instructors.

Question	**Teaching experience of instructors**			
	1-5 years (*n*=3) *M (SD)*	**6-10 years (*n*=2)** *M (SD)*	**11-15 years (*n*=3)** *M (SD)*	**> 15 years (*n*=3)** *M (SD)*
What is your overall impression of the **look and feel**?	4.00 (.00)	3.50 (.71)	3.67 (.58)	4.33 (.58)
What is your overall impression of the **screen design**?	3.67 (.58)	3.00 (.00)	3.00 (.00)	4.33 (.58)
What is your overall impression of the **navigation**?	4.00 (1.00)	4.00 (.00)	3.33 (.58)	4.33 (.58)
What is your overall impression of the (potential) usefulness of the **tasks and activity lists**?	4.67 (.58)	4.00 (.00)	4.00 (.00)	4.67 (.58)
To what extent do you think that the **tasks and sub-tasks** match common practice of instructors?	4.00 (1.00)	2.50 (.71)	2.67 (1.15)	4.33 (1.15)
What is your overall impression of the **content** of the PPST tool itself (excluding the content of resources, such as articles, documents, forms)?	4.33 (.58)	4.00 (.00)	3.67 (.58)	4.67 (.58)
What is your overall impression of the (potential) usefulness of the **resources**, such as articles, documents, forms, that are linked in the PPST tool?	3.33 (1.15)	4.50 (.71)	3.67 (.58)	4.67 (.58)
What is your overall impression of the (potential) usefulness of the **planning** support?	4.33 (.58)	4.00 [1]	3.00 (1.73)	4.33 (1.15)
What is your overall impression of the **overall** (potential) **usefulness** of the support tool for teaching-related activities?	4.00 (1.00)	4.00 (.00)	3.33 (1.15)	4.67 (.58)

Note. 1=very negative; 3=neutral; 5=very positive.
[1]) n=1

Table 104 shows that all components of the tool are rated equal or above neutral, except for the match of tasks and sub-tasks with common practice which were rated rather negative by instructors with 6-to-10 and 11-to-15 years of teaching experience. In contrast these tasks and sub-tasks pages were valued highly by instructors with 1-5 years and > 15 years of teaching experience, although the differences were not significant (p>.05).

When comparing the scores for the nine variables by the four categories of teaching experience using the Kruskal-Wallis test no significant differences (p>.05) were found. In general Table 104 shows that the instructors with a few years of teaching experience and those with more than 15 years of teaching experience are more positive about various aspects of the tool than are the other categories. It suggests that less-experienced instructors value the potential usefulness as very promising to support them, and the very-experienced instructors also value the usefulness as very high as they know what it takes to develop and deliver good courses.

Another way to analyse the impressions about the overall usefulness is by TeleTOP experience (Table 105).

Table 105. Comparing overall impressions of PPST elements by level of TeleTOP experience of instructors.

Question	**Levels of TeleTOP experience**	
	Average (*n*=7) *M (SD)*	**Expert (*n*=4)** *M (SD)*
What is your overall impression of the **look and feel**?	3.86 (.69)	4.00 (.00)
What is your overall impression of the **screen design**?	3.57 (.79)	3.50 (.58)
What is your overall impression of the **navigation**?	4.00 (.58)	3.75 (.96)
What is your overall impression of the (potential) usefulness of the **tasks and activity lists**?	4.14 (.38)	4.75 (.50)*
To what extent do you think that the **tasks and sub-tasks** match common practice of instructors?	2.86 (1.07)	4.50 (.58)*
What is your overall impression of the **content** of the PPST tool itself (excluding the content of resources, such as articles, documents, forms)?	4.00 (.58)	4.50 (.58)
What is your overall impression of the (potential) usefulness of the **resources**, such as articles, documents, forms, that are linked in the PPST tool?	3.86 (1.07)	4.25 (.50)
What is your overall impression of the (potential) usefulness of the **planning** support?	3.33 (1.21)	4.75 (.50)
What is your overall impression of the **overall** (potential) **usefulness** of the support tool for teaching-related activities?	3.71 (.95)	4.50 (.58)

Note. 1=very negative; 3=neutral; 5=very positive.
* significantly higher (p<.05)

Table 106 shows that in general, expert TeleTOP users value various parts of the tool more than average users. Maybe the experienced users are more aware of all the aspects of what they are doing, while the others perform in a more-intuitive sense. A significant difference (p<.05) occurs with a match between common practice of average TeleTOP users and experienced TeleTOP users. This suggests that the tool is well-tailored to experienced TeleTOP users. It also suggests that the less-experienced users can benefit from the TeleTOP procedures to become experienced TeleTOP users.

Table 106. Comparing overall impressions of the PPST by instructors and directors.

Question	**Instructors (*n*=11)** *M* (*SD*)	**Directors (*n*=3)** *M* (*SD*)
What is your overall impression of the **look and feel**?	3.91 (.54)	3.33 (1.15)
What is your overall impression of the **screen design**?	3.55 (.69)	3.67 (.58)
What is your overall impression of the **navigation**?	3.91 (.70)	3.67 (.58)
What is your overall impression of the (potential) usefulness of the **tasks and activity lists**?	4.36 (.50)	3.33 (1.15)
To what extent do you think that the **tasks and sub-tasks** match common practice of instructors?	3.45 (1.21)	3.67 (.58)
What is your overall impression of the **content** of the PPST tool itself (excluding the content of resources, such as articles, documents, forms)?	4.18 (.60)	3.67 (.58)
What is your overall impression of the (potential) usefulness of the **resources**, such as articles, documents, forms, that are linked in the PPST tool?	4.00 (.89)	3.00 (1.00)
What is your overall impression of the (potential) usefulness of the **planning** support?	3.90 (1.20)	2.00 (1.00)*
What is your overall impression of the **overall** (potential) **usefulness** of the support tool for teaching-related activities?	4.00 (.89)	2.33 (.58)*

Note. 1=very negative; 3=neutral; 5=very positive.
* Significantly lower ($p<.05$)

Table 106 shows that instructors score higher than directors for all items except for screen design and match with common practice. Directors rate the potential usefulness of the planning support and the overall usefulness as significantly lower ($p<.05$) than instructors, based on a Kruskal-Wallis non-parametric test. The planning may be biased by the fact that directors are not involved in detailed planning of instructors. The support staff were only asked about the usefulness of the resources and they all rated the potential usefulness as high (M=4, SD=.00).

The overall potential usefulness of the PPST is rated low by directors, probably because they would like to see this tool integrated into an overall system with TeleTOP, VIST [a database with course descriptions used at the University of Twente], and other databases, and they dislike the idea of having to introduce yet another tool. As the tool is meant for instructors, their impressions are more important than impressions of directors. As instructors rate the potential usefulness as high, whereas directors rate it rather low, this implies that directors need to be convinced of the benefits of this tool in order to support its implementation.

8.4.6 Anticipated use of this PPST

On the evaluation form, instructors were asked about their willingness to use a full-scale PPST. In Table 107 the overall willingness and per faculty are shown.

Table 107. Comparing willingness of instructors to use a PPST, overall and by faculty.

Question	Instructors	Per faculty		
	Total (*n*=11) *M (SD)*	**Business (*n*=3)** *M (SD)*	**Technical (*n*=3)** *M (SD)*	**Social (*n*=5)** *M (SD)*
To what extent do you think **you will use the tool** when a full-scale version would be made generally available?	4.18 (1.08)	3.67 (1.53)	3.67 (1.15)	4.80 (.45)

Note. 1=very negative; 3=neutral; 5=very positive.

As Table 107 shows, overall instructors are more than positive to use the tool. Instructors at the social-science faculty are more willing to try and use the tool compared to instructors of the other faculties, which may indicate that social-faculty instructors are more aware of the needs of instructors and better foresee the role this PPST can play to support instructors. No significant differences between faculties were found (p>.05) for the Kruskal-Wallis test. To further analyse the willingness to use the PPST, a comparison is made between younger, 30 to 39 years, and older instructors, equal or above 40 years of age.

Table 108. Comparing willingness to use the PPST among young and older instructors.

Question	Age of instructors	
	30 - 39 years (*n*=7) *M (SD)*	**>= 40 years (*n*=4)** *M (SD)*
To what extent do you think **you will use the tool** when a full-scale version would be made generally available?	4.00 (1.15)	4.50 (1.00)

Note. 1=very negative; 3=neutral; 5=very positive.

According to Table 108 the willingness to use the PPST is higher for instructors who are above 40 years old, compared to younger instructors of age 30 to 39 years. No significant differences between these age categories were found (p>.05) for the Kruskal-Wallis test. Therefore, the willingness is also related to the number of years of teaching experience (Table 109).

Table 109. Comparing willingness to use a PPST by years of teaching experience.

Question	Teaching experience of instructors			
	1-5 years (*n*=3) *M (SD)*	**6-10 years (*n*=2)** *M (SD)*	**11-15 years (*n*=3)** *M (SD)*	**> 15 years (*n*=3)** *M (SD)*
To what extent do you think **you will use the tool** when a full-scale version would be made generally available?	4.00 (1.00)	5.00 (.00)	3.00 (1.00)	5.00 (.00)

Note. 1=very negative; 3=neutral; 5=very positive.

Instructors (Table 109) with one-to-five years of teaching experience are positive about using the tool, and instructors with from six to ten years of teaching experience are all

very positive about using the tool. Instructors with from 11-to-15 years of teaching experience are neutral, whereas instructors with more than 15 years of teaching experience are all very positive to use the tool. No significant differences between categories of teaching experience were found (p>.05) for the Kruskal-Wallis test. As TeleTOP was introduced some years ago (1997), the willingness may also relate to the amount of TeleTOP experience instructors have (Table 110).

Table 110. Comparing willingness to use a PPST by TeleTOP experience.

Question	**Level of TeleTOP experience**	
	Average (*n*=7) *M (SD)*	**Expert (*n*=4)** *M (SD)*
To what extent do you think **you will use the tool** when a full scale version would be made generally available?	4.00 (1.29)	4.50 (.58)

Note. 1=very negative; 3=neutral; 5=very positive.

According to Table 110, instructors who indicate that they are expert users of TeleTOP are also very positive about using the PPST. They have experienced the benefits of using a Web-based system and maybe this is why they are more willing to use the PPST. No significant differences between categories of TeleTOP experience were found (p>.05) for the Kruskal-Wallis test.

During the interviews, participants were asked to reflect a bit more in detail about the anticipated use by instructors of the full-scale PPST when it will be generally available (Table 111).

Table 111. Remarks about anticipated use of a PPST.

Participants	**Remarks**
soc2	Someone should draw my attention to it, maybe by a short, positive, attractive introduction
soc5	Time to get familiar will be a major factor link to Microsoft Project is enticing
bus1	I would love to try it out 'in real life'
bus3	Use will increase when colleagues also use it
tech1	"IF" (within blokonderwijs): if you are able to convince me that it is better than the alternative (make a list of deadlines); if it has more of the interface of the tax CD-rom [1]; if you can show me that it saves time or increases quality (cost/quality ratio of the net result); if I am convinced, then I will use it.
tech2	Useful as a 'scenario' tool, not as a strict planning tool.
tech3	Curious about actual use, result remains to be seen.
sup1	Tool should be recommended to novice instructors, and maybe also for instructors in training.
sup2	They will use the resources, and forget about the rest, I'm afraid.
sup3	Active role of chairs and faculty management is required to stimulate instructors to use this tool

Note. [1]) In-come tax submission tool, widely used in The Netherlands.

Table 111 shows that many participants mention one or more implementation-type constraints that may influence the use of the PPST.

From the responses to the questionnaire and the remarks made by the instructors, it can be concluded that in general the PPST was valued positively, with not much differences within various groups, except for opinions about the tasks/sub-tasks components.

8.5 Participants' Reflections on Both the PPST and the PPST Implementation Plan

After evaluating the PPST tool, all participants (instructors, directors of educational programmes, and support-staff members) were interviewed to reflect on the tool and the implementation plan in more detail. The Personal Performance Model as described in Chapter 4 will be used as a basis to discuss interview results. For convenience the model is repeated in here, in which the educational-program directors are part of university management (Figure 90).

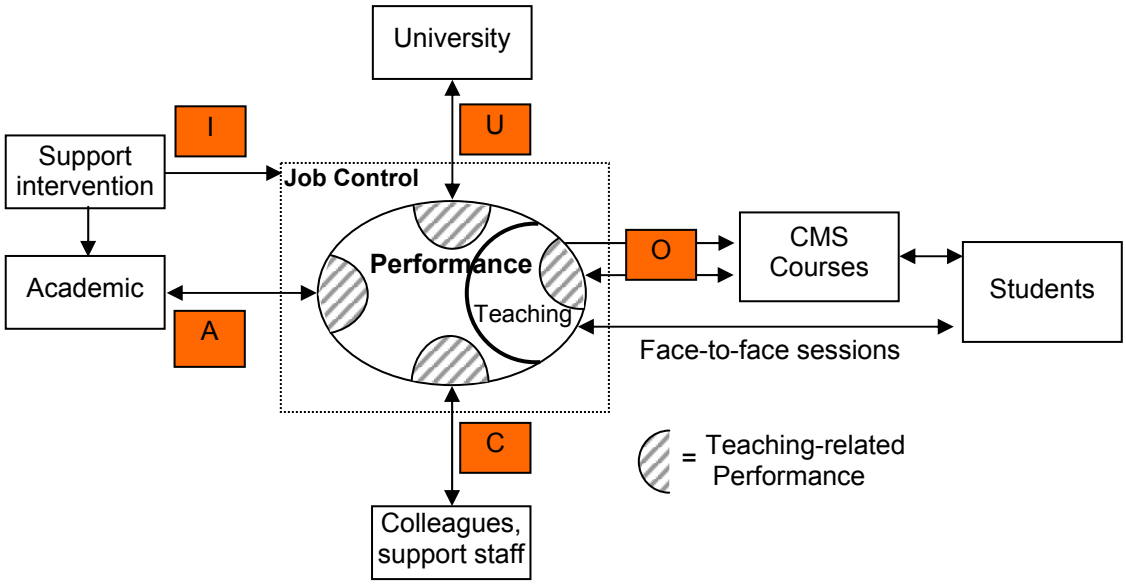


Figure 90. Personal Performance Model (repeated here from Section 4.1.2 for convenience).

The dimensions in the Personal Performance Model (Figure 90) are used to categorise and structure the reflections of the participants, and in which 'university' refers to university management, including directors of educational programmes. New categories were added that relate to the overall use and usefulness of the PPST, the implementation process of a PPST, and possible integration of this PPST with other systems.

The following categories will be discussed:

- The PPST intervention tool itself (I) in Section 8.5.1
- Academics (A) in Section 8.5.2
- Colleagues (C) in Section 8.5.3
- University (U) in Section 8.5.4
- On-line teaching (O) in Section 8.5.5
- Job Control in Section 8.5.6
- Overall use and usefulness in Section 8.5.7
- Implementing a PPST in an organisation in Section 8.5.8
- Integrating a PPST with other organisational databases in Section 8.5.9.

8.5.1 PPST intervention tool

In Section 8.4 the final evaluation of the PPST tool was described where participants carried out a walkthrough and then filled out a questionnaire. Although the questionnaire offered a few open-answer questions, interviews were held because interviews are an effective instrument to elicit feelings and opinions (Kvale, 1996), in this case about the tool and the usability. Also the interviews offered an opportunity to present the PPST Implementation Plan and let participants discuss this plan aloud. The interviews were held following each walkthrough and were recorded on audio disc. Following is a summary of the results.

- Layout
  The layout of the tool was valued as nice, but could still be improved to make it more attractive (dir2). One instructor (soc5) indicated that the current layout can lead to the misconception that the tool is more complicated than it is, which is supported by another instructor who prefers to keep it simple (bus1). One director suggested using a similar layout as TeleTOP (dir2).
- Missing components
  When participants were asked whether they missed important elements in the current version, their general reaction was that they did not miss important parts (for instance, tech2, dir2, soc1,2). Suggestions to add were: additional educational components (tech3), more flexibility to adapt the tool at an individual level (soc2), and an additional component to facilitate database and library searches (sup1). One participant wondered if a Web-based tutorial could be sufficient, just to learn and be trained in how to do things, instead of this PPST. Yet another participant would prefer one big checklist in a paper-based version with all the information stored in the current PPST. Instructors indicate that they still miss a Save button, to be able to save planning data and an in-between status of a planning. When it would become possible to store data, this data could also be used again in the years to come, as a reference to experienced practice and a basis for further fine-tuning to improve own planning.
- Resources
  Many instructors liked the idea that the tool can be used as a 'central' database where all the information can be found that is needed, such as references and forms. One of the instructors (soc1) indicated his ranking of the various activity details according to his feeling of the importance of each: that administrative forms come first, followed by control, TeleTOP, requirements, and references last, in that order.

- Integrating Microsoft Project
  Most instructors liked the incorporation of Microsoft Project into the tool. In the current version a file has to be created manually before planning data can be transferred to Microsoft Project and of course some participants made a remark about this, but realised that this is a temporary drawback that can be overcome in a full-scale version. They support the potential usefulness to be able to specify in more detail all activities and costs within Microsoft Project and be able to see a graphical representation of the planning, but they do not expect that instructors will start to use this aspect of the PPST tool. They indicated that instructors are not yet familiar with Microsoft Project and will only start using it when they feel they can benefit from it.

8.5.2 Academics

Academics are not a homogeneous group, but still the PPST should be able to serve them all. Some participants made remarks about these differences.

- Diverse user group
  One of the participants (soc5) mentioned the fact that the user group of this PPST is very diverse and has a number of different characteristics, which she indicated as "expert teachers, or experienced teachers, also you've got people who are good of with ICT, and people who know TeleTOP very well.".
- Novice instructors
  Most instructors (6) indicated explicitly that this tool can be very beneficial for novice instructors and would recommend offering this PPST during their teacher training, for instance in the DUIT program, a teacher-training program for novice instructors offered at the University of Twente. One novice instructor (soc2) mentioned that she would have liked to have this tool available before she started to develop a new course. Also two directors and two support staff emphasised the importance of offering this PPST to support novice instructors, also to get used to this way of working. Probably, young people will more easily adopt new systems, as one director (dir1) indicated, and also, as two directors indicated, that novices can be the ones to introduce this new way of planning and working within their faculties and departments and gradually initiate a change in the way experienced instructors work.
- Expert instructors
  But as one instructor (dir2) indicated: your tougher candidates are going to be people who have been doing this for fifteen years and already have their own approach, and say "Thank you very much but I don't need it" (soc5). One instructor (dir2) sighed and said that "for those it's not worth the energy to try and convince them".

Each instructor has a personal way to perform teaching-related activities and instructors were asked about the match between current practice and the work procedures in the PPST. Their comments relate to the use of scenarios and flexibility.

- Use scenarios
  One instructor (soc1) was very positive about the PPST, as it offers a detailed, systematic overview of activities people often do in an intuitive way. A technical instructor valued a "roadmap" as very handy, and another instructor (tech2) referred to the activities as "scripts" and valued these as the most important part of the

PPST. In contract, some participants (e.g. bus2 or dir1) had the impression that the system will force them too much to perform in a standardised way. On the other hand, it will help instructors to work in a structured way and that is valued as positive (dir1, soc2): "the more structure you can bring into your performance, the more you are in control, of course" (dir1). Nine participants (bus2, tech2,3, soc3,4, dir2, sup1,2,3) explicitly indicated that the tool will stimulate instructors to work in a more-structured way, although support-staff members were a bit reluctant: "less useful for very experienced users as they have their own work patterns" (sup1), "most useful on a detailed level" (sup2), and "I hope so" (sup3). According to one of the directors (dir1), people who are familiar with project management will probably value this emphasis on working systematically offered by the PPST tool more than those who are not familiar with working in projects.

- Flexibility
  According to one of the instructors (tech3), the tool might limit creativity when taken to the letter, and he emphasised the importance of flexibility to use the tool and be able to still teach in a different way than presented by the tool. As a social-faculty instructor (soc5) mentioned: "You don't want to squash creativity, because sometimes exciting things happen", and she stressed that "using the system should not be taken too far to the extreme." and she appreciated that the tool offers this flexibility.

8.5.3 Colleagues and collaboration

Some instructors (4) and one of the support-staff members indicated that this tool can be useful for collaboration. One instructor (bus3) emphasised that this tool can be used to explicitly show the common understanding about work procedures among colleagues and even within one course team, as it is structured in the tasks and activities within the PPST. Another instructor (soc2) mentioned as a benefit the fact that the PPST can be used by a group to better organise the way of working, which was supported by another instructor who emphasised the benefits of having a shared process and a shared language (soc5).

8.5.4 University aspects

There were no remarks made about the organisational requirements as stored in the PPST. This may be influenced by the fact that there are not many documents related to requirements in the PPST tool, because currently there are not many requirements stated by faculty management that are specifically directed towards instructors. It seems that faculty management is not yet familiar with communicating requirements in a more formal and documented way.

However the participants did stress the importance of management support of the tool. Management at the university or faculty level should stress their commitment to implementing this PPST, not only by offering the financial support for its implementation and deployment, but also to motivate people and stimulate the use of it. This can be done by referring to the tool during daily use in administrative and organisational processes, as one instructor (bus2) envisioned that a director could say to an instructor that "I don't care if you use the tool or not, but I want these forms and the best way to send them is by using the PPST".

Although the tool is meant to support instructors, managers can also use the PPST to identify how instructors could improve their work efficiency, or could help to reduce in time/costs. Also over the years they can use the information strategically during official reviews with faculty members. But this works both ways, as instructors can also document their time and show to management that their workload is too high (bus1, soc4).

8.5.5 Online-teaching aspects

Also one instructor pointed to the fact that also experienced instructors can be novice for unfamiliar teaching components, such as getting an on-line discussion off the ground, because as she indicated: "that's not something people did in the time that they were building up their experience." (soc5). For new instructors this PPST can give them more direction (soc4), and also to prevent them from inventing the wheel anew (tech2).

8.5.6 Job control

Job control deals with the way a person is able to control his or her performance to stay within specific constrains, such as time, budget, or quality constraints set by the organisation. In the following comments planning, efficiency, and quality will be discussed in detail.

- **Planning**
  Some instructors liked the planning part of this PPST and would like to use it to plan their work and maybe further improve it (for instance bus1, bus3, soc2, soc4). According to a social-faculty instructor (soc4), this tool provides a better insight in one's planning, even for experienced instructors. A business-faculty instructor (bus3) valued the systematic insight in time aspects that the tool offers, because "many activities you perform intuitively are now presented explicitly in this tool" and he argued that often instructors do not want to think about time consequences and using this tool "could mean a shock to them, when it shows the total amount of time and all the details" (bus3). Even one of the directors (dir1) expected to be confronted with the realisation that a "lot of days" will be needed to spend on teaching, but does not want to know this so explicitly. One of the technical instructors (tech3) pointed to another dimension of the tool, as it "offers you an opportunity to find out whether a new course component is feasible, and then to decide to invest the time or select an alternative component". It seems that working overtime is not (yet) a big issue for instructors, and as one of the instructors indicated, "it's not a 9-to-5 job" (soc3) or phrased similarly by soc4: "time is an endless commodity". This is in contrast with a corporate context where people have stricter working hours (soc4) or where, as another instructor put it, "you have to build a bridge within half a year" (tech2). In this study 5 out of 11 instructors indicated (or mentioned an example of) problems they faced because of wrong planning. Instructors are sometimes planning in a "slap-happy way" (tech2), or ignorant of the consequences as observed by one support-staff member (sup2): "They start too late, they finish too late; but they are used to it, and they do not care". Probably this can be stressful, and may not improve good quality of work. In contrast to the above, dir3 indicated that according to his observations instructors do

not have a planning problem nor is it a problem that they are unable to handle their time.

As planning is done in advance there can be discrepancies between the time planned and the actual time used for a task. One of the instructors (bus1) would like to use the tool to get better insight in this discrepancy. Offering courses implies a series of deadlines, especially as the start of a course is fixed and thus the development process should be finished by that date (and preferably earlier). As one instructor (bus1) said: "when a deadline is near, you drop everything you were doing, and also use evenings and weekends to catch up". This stress is confirmed by another business-faculty instructor (bus2). A novice instructor (soc2) indicated that she certainly wants to use this tool, especially when it turns out that the actual time expenditure matches the planning output of the PPST.

Using this tool could stimulate instructors to start preparing their courses at an earlier stage (dir2), and this is even more important for instructors involved in "blokonderwijs", which means that instructors will be teaching in an intensive manner for four weeks. There will be no time to do part of the development process during delivery, so everything, such as a TeleTOP site, course material, assignments, has to be prepared and made available before the start of the course. (tech1).

Some instructors indicated that they prefer to use their own agendas for their planning (e.g. bus2). Also one instructor (tech2) argued that the use of this tool may result in an illusive planning that it will not be in accordance with actual performance, as the time per activity will not be exactly the same for each occurrence, for instance preparing a lecture may take two days for one lecture and just half a day for another lecture. He also worried that when an instructor would select 'As late as possible' for the planning of activities, this could result in waiting until the very last day before performing a task, then when something else interferes you may be too late to catch up. Another instructor (soc2) indicated that a drawback might be that instructors perform a lot of other activities that cannot be planned within this PPST. These arguments seem to discuss the general usefulness of planning and the way these instructors want to perform accordingly.

Although the main focus for the planning part within this PPST is for instructors to better plan their time, two instructors (bus3, soc4) argued that this tool might also be used by management to get a better insight in working conditions of the instructors to be able to improve these. But as was mentioned by a director (dir1), it may also be used by management to put pressure on instructors, when for example according to the PPST an instructor will not be that busy with a course and still has time left to do other tasks.

- **Efficiency**

  Efficiency is becoming more important for instructors because of budget reasons. One instructor (soc5) indicated "teaching does not pay very well, and at least in my department, we're encouraged to be as efficient as possible.". The purpose of this PPST to offer efficiency to organise one's own work was positively valued by four instructors. One instructor (tech2) indicated that using this PPST is more efficient than 'inventing the wheel anew' because colleagues can use a task overview as a scenario for their work. Another instructor (tech3) pointed out that developing and delivering courses is comparable with a production process in industry, and this tool helps instructors to do their work in less time and thus they become more efficient.

As the tool offers a number of checklists and guidelines, it decreases the time spent by instructors, and one social-faculty instructor (soc3) expressed that this tool more-or-less automates the process and you just "open the system and use one of the procedures".

To improve efficiency also depends on the motivation of the individual instructor. There are so many things an academic has to do apart from teaching, as one instructor (soc3) indicated and argued that some instructors neglect to plan and prepare until the last minute. Instructors indicated that they find many of the resources very useful. As one instructor said (tech3): "When workload is high and you have to find your way through a jungle of rules and regulations, I would value these resources very positively". Another instructor (soc1) valued the detailed level of the resources, yet another instructor (soc2) ranked the activity-details columns as offering "high surplus value" and that it will save her a lot of time using these resources. An experienced instructor (soc4) expected to especially use the forms and other administrative parts routinely.

One of the instructors (soc4) indicated that as long as faculty administration is not efficient in what it expects, "then it'll be based on the individual's desire for efficiency." and she also pointed out that this PPST could be used in discussions with the department chair about the time expenditure of an instructor. As she indicated, when an instructor is spending a huge amount of time to develop and deliver courses, then that might not be that efficient. They could look together how the instructor could use time more efficiently. As this instructor said: "There are some people who say: I can not possibly publish, because I was too busy teaching. It might be that they are inefficient in their teaching, and that it could be better addressed with systematic use of a tool like this." (soc4).

- **Quality**

  One instructor (bus3) indicated explicitly that according to her opinion the PPST will increase quality when the tool is used in a systematic way and "I know for sure that it will improve my work". She argued that using this tool in a systematic way will not only improve the quality of the organisational procedures, but that it will also improve the quality of the courses because courses will be less "messy" so students can focus better on the content. A director (dir2) and an instructor (tech2) both emphasised that by using this tool courses would be presented to students in a more uniform way, which will increase the average quality of all courses, and also that instructors would come to work "in a similar way, and preferably at a bit higher level" (tech2), which then will also help students (dir2). The same technical instructor (tech2) remarked that using this PPST will decrease the risk of making mistakes and just because of that, he found it is already useful. He even stated it more boldly: "it will become easier to prevent disasters". This was also indicated by another instructor (soc5) who noted: "Structure makes sure that you don't miss important things and drop stitches; you don't want to miss the important things." A social-faculty instructor (soc4) expressed the observation that more requirements and quality constraints will be put on instructors, and another instructor (soc3) emphasised the importance of using this PPST for quality reasons: "It can support instructors to meet the obligations set by the university's quality-management system ('kwaliteitzorgsysteem')". Although that would be very beneficial, one of the directors (dir3) pointed out that in current practice, the quality requirements are solely about educational quality and effectiveness of a program and its courses, for

instance about how to design a high-quality curriculum, or about how to state course objectives, or about examination quality, and certainly not about organisational procedures and teaching-related activities of instructors. Apart from these broader perspectives, participants noted that also simple things, like "which font size and colours should I use in a PowerPoint presentation" (tech2) can improve quality.

8.5.7 Overall use and usefulness

Most instructors (8) indicated that they want to use the tool or at least give it a try (2), whereas one instructor was rather negative and only would want to use some "bits and pieces". Two educational program directors indicated that they would not want to use the tool but in contrast one director indicated a general interest in using new tools. Support-staff participants were very willing to support this tool and submit additional references and guidelines to the tool.

With regard to the control issue of helping academics to remain in control of their time and teaching-related planning a majority of the participants (10) felt that using this tool would result in instructors being more in control of their work. As one instructor (bus3) indicated, "it will offer me peace of mind", and another instructor (tech2) noted that using this tool "may prevent some planning disasters to happen.". One support-staff member (sup2) stressed the ease of use of this tool as a database for all teaching-related documents and other related material. In contrast, one instructor (bus2) and one director (dir3) felt that this tool will not help instructors at all to stay in control, or even that it may take up more of their time, as this tool has to be used in addition to their other work.

However, an initial time investment can pay off in the future, when the tool is in use for many years and instructors can plan a new course by data from previous years and better stay in control. They can use planning data and revise them, or as one instructor (soc4) indicated, the planning data can be "compared from year to year as well too: Do you get faster as time goes on, or do the increased demands for tailoring and individualising in education make it more complicated?" However, some instructors had the impression that over time they will not use the tool that much anymore because "you do not develop a new course every year", or because you "become familiar with the procedures". This suggests that they do not expect to innovate their teaching with new, maybe less-familiar teaching formats.

In summary, four instructors (bus1, soc3,4,5), one director (dir2) and one support-staff member (sup2) rated the tool as useful or very useful. Two participants (dir1, sup2) stressed the use of this tool as a central database. Three participants (bus3, tech2, sup3) emphasised the potential usefulness for management purposes, to get strategic information. However, in contrast, one director (dir3) rated this tool as not useful.

8.5.8 Implementing a PPST

During the interview, participants were asked to make suggestions about how an implementation process could be structured. They were also asked to comment a specific PPST implementation plan (see Section 8.1.3).

The implementation plan was rated as suitable by two instructors (soc1,2), a director (dir2), and one support-staff member (sup3), whereas four instructors indicated that

they are not familiar with such processes and therefore this should be left to others. Some instructors referred to the way TeleTOP was introduced in various faculties some years ago. It started low-level, with a lot of personal support, and as a system that could be effective without a lot of content to start with. Some major steps in the implementation plan were suggested or commented by participants and these are discussed next.

- **Faculty-specific approach**
  According to one of the directors (dir2), faculties are all different from each other, and that will influence the way the implementation process will be carried out. One instructor (soc3) indicated that as faculties and even educational programs differ from each other, it is a matter of logic that their organisation and work procedures will also be different from each other. Especially the task scenarios and the documents will have to be specific for each faculty (bus1, sup2). As other universities have implemented various CMSs, the "TeleTOP" column would have to be adapted, but as one instructor (soc2) indicated even then many steps will remain the same, as these steps have to be performed, apart from the specific CMS at hand. Also some participants stressed that the content could be tailor-made to reflect specific research topics. Also the references can be made more topic-specific (sup2), and maybe some topic-specific databases and articles should be added (sup1).
- **Commitment**
  According to one director (dir1), the most important step would be to convince management of the importance to implement the tool.
- **Implementation team**
  One instructor (bus3) indicated that the preparation phase, before the system is presented to the users, is not relevant for instructors. That may be true, but part of the implementation process is to adapt the task scenarios to common practice within a faculty, and another instructor (bus1) found this an important part. The suggestion in the implementation plan to set up a team of instructors was supported by some participants (soc2, dir1) but one instructor indicated that without incentives he will not join this team. Another suggestion was to appoint one co-ordinator to handle all individual recommendations and changes to the system (bus1).
- **Pilot project**
  After the system is adapted to a specific faculty, two participants (dir2, sup2) suggested to do a step in between, namely to start a pilot project. During this pilot errors or bugs in the system can be repaired, and it can also initiate a gradual introduction in the faculty when the pilot is shown to other faculty members and convince them when they see it "in action".
- **PR**
  Before the deployment phase, three instructors in the social-science faculty and one support-staff participant emphasised that the benefits of the tool should be communicated in a very good way, like a marketing or PR process. This should motivate and convince instructors to start using the system. Special attention given to the tool in a newsletter, or by showing some examples, or by an article in the weekly magazine of the University of Twente will make instructors aware of the tool and initiate their acceptance. It was expected that motivating instructors to use this tool will be hard and that they will need to be convinced that using this tool will

save time. It will be hard because: a) instructors do not have time (tech3), b) they have other priorities (dir1), c) they are stubborn (tech1) and are not willing to change their attitudes (soc3). To force them to use the tool is hopeless according to one director (dir2), and this can only be overcome when there is a net return for them (tech1, soc3).

- **Access**
  Some participants explicitly mentioned some obvious criteria for the implementation of the tool, such as easy access for instructors to use the tool is a prerequisite (soc5), accessible from every computer at any time (soc2), and the tool should be error-free (mentioned for instance by bus1, bus3, tech1, soc2, sup2).
- **Gradual diffusion**
  Instructors and support staff suggested using a very gradual way of diffusion of the system within the faculty. Start with some "nerds" (soc5), some "evangelists" (soc5), some pioneers (soc2) or enthusiasts (dir1, 2) are some of the suggestions to begin a long period of gradual implementation. According to one instructor (bus3), it will depend on the type of instructors, a sociologist will react differently than an engineer. The three directors were very sceptical about possible acceptance by instructors. Management can stimulate the use of this tool by referring to it as a handy tool, by integrating this tool in administrative procedures, to exchange forms (soc4). One instructor suggested emphasising the benefit of using Microsoft Project as it "might give you a little bit of a leg up on usability or on selling usability of the system, because a project approach is more widely applicable." (soc5).
- **Workshops**
  A majority of participants were in favour of organising workshops to introduce the system to the instructors. Two participants (dir1, soc5) emphasised that these meetings should be short and maybe only occurring once. One instructor (tech3) suggested organising two workshops, one for existing courses and one for new educational approaches. In contrast, a business instructor (bus3) was a bit reluctant and one instructor (tech1) was very negative about organising workshops.
- **Improvements**
  When the PPST is deployed, suggestions for changes will be more than welcome (tech1, sup3) and also the system needs updates (dir1) because forms will change, or there will be a need for new course components to be added, or task procedures will evolve.
- **Support**
  During regular use, some instructors would like to have someone or a helpdesk they can turn to when they need support or help (bus3, tech1, soc5, sup1,2,3).

8.5.9 Combining a PPST with other systems

Currently the PPST tool is developed as a stand-alone tool. Two instructors (soc2, bus3) and two directors (dir2, 3) specifically would like to combine this PPST with TeleTOP so that planning and performing activities using the PPST and using TeleTOP can be done within one system. In contrast, one instructor (soc2) felt that an integration of a PPST with TeleTOP would confuse her, as these systems serve different objectives: PPST is for planning, including all kinds of activities where TeleTOP is not a part; and TeleTOP is for presenting on-line courses. She also stressed, that is should be possible to use the PPST with another CMS, such as Blackboard. Some instructors (5) want to see a combination or integration of the PPST with university administrative

systems, such as the VIST database (a university database with course descriptions), to prevent instructors having to do extra work: first fill out a VIST-form in one system, then again in the VIST-database. Even a combination of the PPST, TeleTOP, and VIST could be beneficial according to one instructor (bus3) and two directors (dir2 and dir3), because information stored in VIST has also to be submitted to TeleTOP.

As a compromise, some participants noted that combining or integrating one or more of these systems may not be needed, as long as there are links in each system pointing to the other ones, for instance from PPST to TeleTOP (bus3), or from TeleTOP to PPST (tech2). A more-elaborated link to Picarta (online library services) was suggested by one support-staff member (sup2), who also said to add as many links as possibly useful, as long as the interface allows you to easily access these links and click them away when not needed anymore. One instructor (soc3) also suggested a close relationship with planning of educational programs and curricula at the faculty level. And when a teacher portal at the University of Twente is installed then this portal should also link to the PPST (soc2).

8.6 Discussion of the Evaluation Findings

In the following sections, the findings of the final evaluation, both of the PPST tool and the PPST implementation plan, are discussed. In the following list of conclusions the PPST tool itself is discussed, the PPST implementation plan is discussed leading to a revised version, and an enhanced version of the Personal Performance Plan is presented, with additional support aspects, standardised work procedures, and a possible combination of the PPST with other systems at university level.

- **The PPST tool**
  PPST is potentially useful, although it needs some additional educational components, a save button and a 'normal' way of transferring data to Microsoft Project. The general impression of the usefulness is high, but most participants are reluctant about actual use. They emphasise that the deployment should be done very carefully and gradually, with a PR campaign and some short workshops. They also indicate that personal support is required, with also a procedure to suggest amendments. Most instructors are very willing to give it a serious try and indicate that using this tool will offer them more control for their teaching-related activities.
- **The PPST implementation plan**

  During the evaluation of the PPST participants could write their suggestions on the test questionnaire. Also during the interviews participants commented the proposed PPST implementation plan and reflected on possible improvements of the plan.

  Based on these findings collected during the final evaluation, an enhanced PPST Implementation Plan was designed (Table 112).

Table 112. Enhanced PPST Implementation Plan with major changes indicated.

Key steps	New	PPST aspects	Description
Analysis		Is there a need?	Analyse the need for a PPST and specific discrepancies between PPST and faculty culture / procedures
Plan	✓	Business plan	Write a business plan
Commitment		Get commitment	Let management state their commitment and offer budget to implement a PPST
Prepare		Tasks and activities	Form a team of experienced on-line instructors at university or faculty level to adapt tasks and activities to common practice
		Planning	Adapt default-time estimates per activity to common practice.
		Activity details:	
		- References	Adapt references to research articles and reports to reflect institution's own educational practice
		- Requirements	Adapt requirements to reflect organisational constraints and desired performance
		- TeleTOP	Adapt TeleTOP procedures to reflect best practice
		- Control	Adapt checklists to improve efficiency, effectiveness, and quality within the specific organisation
		- Administration	Adapt administrative procedures and forms to reflect common practice
	✓	Prototype testing	Implement and use the PPST in a small, closed setting
Deploy	✓	Propagate	PR push
		Access	Offer access to all instructors and novice instructors
		Instruct	Instruct users and novices who register during a workshop about this PPST and stimulate day-to-day use
	✓	Commitment	Let management stimulate effective day-to-day use
	✓	Enhance	Gradually enhance daily use, and then make it common practice
		Suggestions	Stimulate instructors and support staff to suggest new activities and add material to enhance and improve the PPST
Combine	✓	Combine with university systems and portals	Tune to other systems, such as TeleTOP and VIST, to prevent overlap and to improve overall efficiency.

Table 112 shows the enhanced PPST Implementation Plan with major changes indicated in the second column New. One of the major changes suggested during the evaluation process was to write a business plan right at the beginning to foresee all budget and personnel aspects and based on this plan get commitment from university or faculty management. Whether a team of instructors should be part of the adaptation process or one co-ordinator who is appointed to organise the preparation phase could not be concluded based on this study. Then after the tool is adapted to a specific organisation a pilot test is included. At the beginning of the deployment phase participants suggested to add a PR campaign to propagate the benefits of the tool. At the same time also to get commitment from management to stimulate daily use and to offer facilities to enhance its use. When the system is in daily use it could be profitable to also combine this PPST with other systems at

university or faculty level, such as the TeleTOP system or VIST, a database of course descriptions, but also administrative databases for instance to register time expenditures. Although directors are reluctant about success, the fact that the TeleTOP Method to implement TeleTOP was a success may be a indication that when using the same approach for this PPST, it may work out fine.

The enhanced PSPT Implementation Plan can also be shown as a flowchart with major changes highlighted (Figure 91).

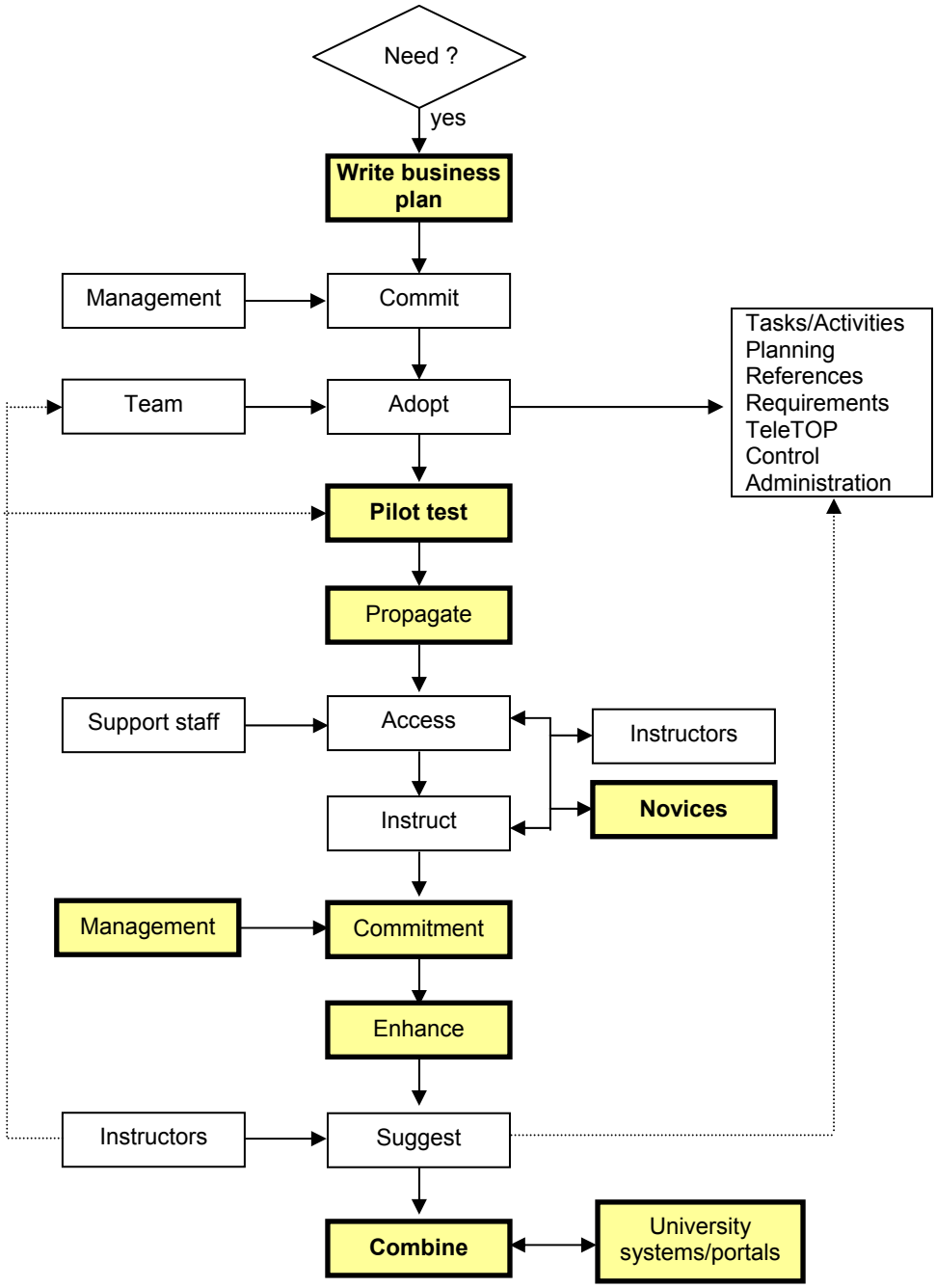


Figure 91. Enhanced PPST Implementation Plan with major changes highlighted.

- **Personal Performance Plan**
  Some of findings from the analysis of current practice (Chapters 5 and 6) and from the evaluations of various prototypes also influence the Personal Performance Model as previously defined in Chapter 3. Based on these findings an enhanced Personal Performance Model was developed (Figure 92).

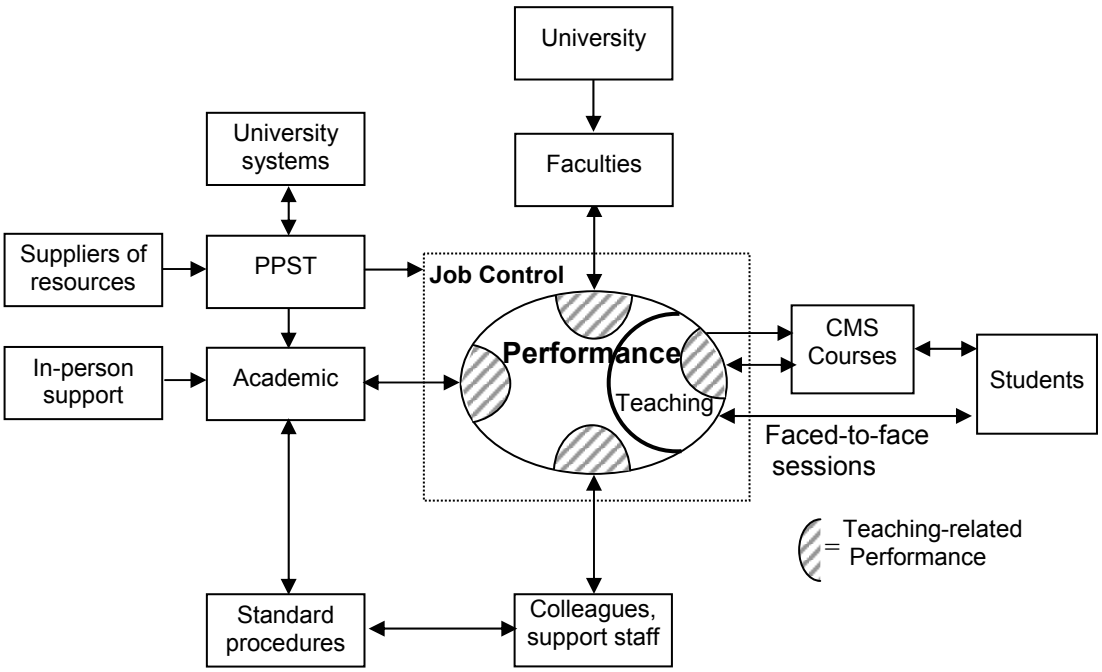


Figure 92. Personal Performance Model, enhanced.

Figure 92 shows that within a university, various faculties are organised in different ways, and therefore work procedures and requirements will be different. As instructors perform their work within a faculty-specific environment the PPST should be adapted to meet the daily practice of the faculty involved. This means that the PPST should be filled with faculty-specific information, procedures, and documents and these "suppliers" of recourses, such as librarians, TeleTOP specialists, quality managers, and administrators are also added to the model. It was found that academics also value in-person support when it is available to offer a few workshops and to be 'at hand' when needed, although others just want to start using the tool and find out themselves. This in-person support can also help to update the PPST when instructors feel the need, or organisational procedures change. Standard procedures are added to the Personal Performance Model to indicate the scenarios that can improve collaboration of academics with colleagues and support staff. Some participants also suggested that directors of educational programmes should be involved to set up procedures. After the tool is accepted and used in daily practice then participants suggested to combine the tool with other systems at a university or faculty level, such as TeleTOP. As the tool has its specific functionalities it was suggested not to integrate it in another system, but to combine the PPST with other systems in a portal to offer easy access and also to offer facilities to link information in various systems so that users do not have to submit information twice.

8.7 Conclusions

A key conclusion from this final evaluation is that the PPST is potentially useful, especially when integrated with other systems at the university level, such as TeleTOP and VIST. Before this PPST can be implemented in a university or faculty, some layout and navigation aspects should be improved. Also the work procedures and resources need to be adjusted to a specific faculty or university. Depending on the educational-program structure and components, the PPST may need additional components to meet these educational needs.

According to this final evaluation, the implementation process can best be similar to the approach used with the introduction of TeleTOP at the University of Twente (Collis & De Boer, 1999), that is, gradually introducing and stimulating the use, and after a while pushing a bit harder until it can be considered a standard part of working. The implementation plan with the amendments as discussed in this chapter is likely to improve the eventual use of the PPST by instructors.

9 Conclusions and Recommendations

In previous chapters the desired and actual teaching-related performance of instructors were analysed and gaps between these revealed. After analysing what caused these gaps a specific intervention (a Personal Performance Support Tool, PPST) was designed, developed and evaluated as a means to support instructors for their teaching-related activities. To analyse how such a tool could be implemented in a university context a PPST implementation plan was also designed and evaluated. These steps were performed in accordance with the HPT model and in Figure 93 the model is shown with numbers to indicate in which chapter each step is addressed.

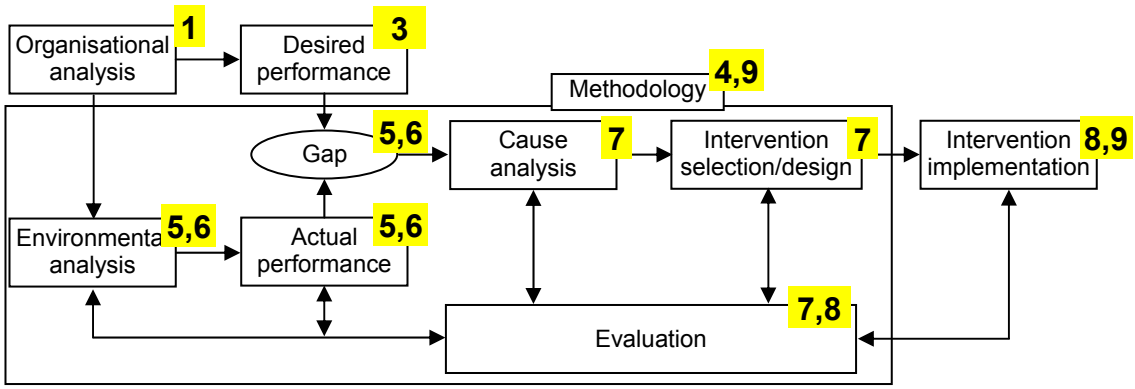


Figure 93. Schematic HPT model with numbers to indicate in which chapter the topic was addressed.

In this final chapter the main conclusions of this research will be described. The last research question (RQ7) will be addressed by offering recommendations about how to support instructors to stay in control for their teaching-related activities.

In Section 9.1 a summary of main findings will be described, organised around the research questions as defined in Chapter 2. In Section 9.2 an interpretation of this research in its context is given. In Section 9.3 reflections are offered on the research methodologies applied to analyse and improve instructor's performance. Then in Section 9.4 implications for the use of the Personal Performance Model, the PPST, and the PPST implementation plan are presented. In Section 9.5 recommendations are offered and this chapter will conclude with discussions about a future outlook and suggestions about further research in Section 9.6.

9.1 Summary of Main Findings

The focus of this research was to analyse academics' performance and particularly their teaching-related activities and to find ways to offer support to instructors to stay in control of their personal performance. The general problem statement investigated in this research was presented in Chapter 1:

- *What are key aspects of academics' teaching-related performance that are coming under increased pressure in the changing university context?*
- *How can an individual academic stay in control of these pressures?*

In Chapter 1 it was argued that academics' work circumstances are changing because of many changes within their universities, such as changes in educational structures and programmes, changes in organisational and administrative procedures, and changes in the way individual academics are held accountable for their work. This led to the conclusion that academics are or soon will be under increased pressure. In Chapter 2 the HPT methodology was selected to research the general problem statement in more detail and the general problem statement was expressed in terms of the following set of research questions:

- RQ1: *What are key aspects of personal performance of academics?*
- RQ2: *What is the desired personal performance for the current and future teaching-related activities of academics in the changing university context?*
- RQ3: *What is the current level of personal performance in the teaching-related activities of academics in changing university environments?*
- RQ4: *What gap is developing between these current and desired levels, and which interventions can be selected to support the reduction of this emerging gap between the actual and desired personal performance in teaching-related activities of academics in changing university environments?*
- RQ5: *What are criteria for such interventions to be effective and efficient?*
- RQ6: *What are the results when a particular intervention is designed and evaluated?*
- RQ7: *What recommendations based on this study can be given to support academics to stay in control when performing teaching-related activities?*

In the next paragraphs responses to research questions RQ1 to RQ6 will be discussed. The last research question (RQ7) will be addressed in Section 9.5.

- **RQ1: What are key aspects of personal performance of academics?**
  In Chapter 3 the academics' job was analysed and decomposed in three major tasks: teaching, research, and service. It was noted that to perform these tasks academics are involved in various processes. The teaching-related (non-pedagogical) processes were analysed in more detail and four categories were found to be of major importance. These processes relate to the organisation (the university), the collaboration with colleagues, the use of a CMS in courses, and the personal ways and preferences of working. Job control was added as a distinct part of academic's work to emphasise that for an individual instructor the organisation and management of his or her own performance is important to perform in an effective and efficient way. Within academics' performance the teaching part was further decomposed into direct interactions with students, such as face-to-face sessions, and teaching-related activities which are often performed in the instructor's office and involve the use of a CMS. These observations led to the development of a Personal Performance Model which depicts the key aspects of personal performance of academics, with a focus on teaching-related aspects rather than aspects associated with being in the lecture hall or in face-to-face meetings with students (Figure 94).

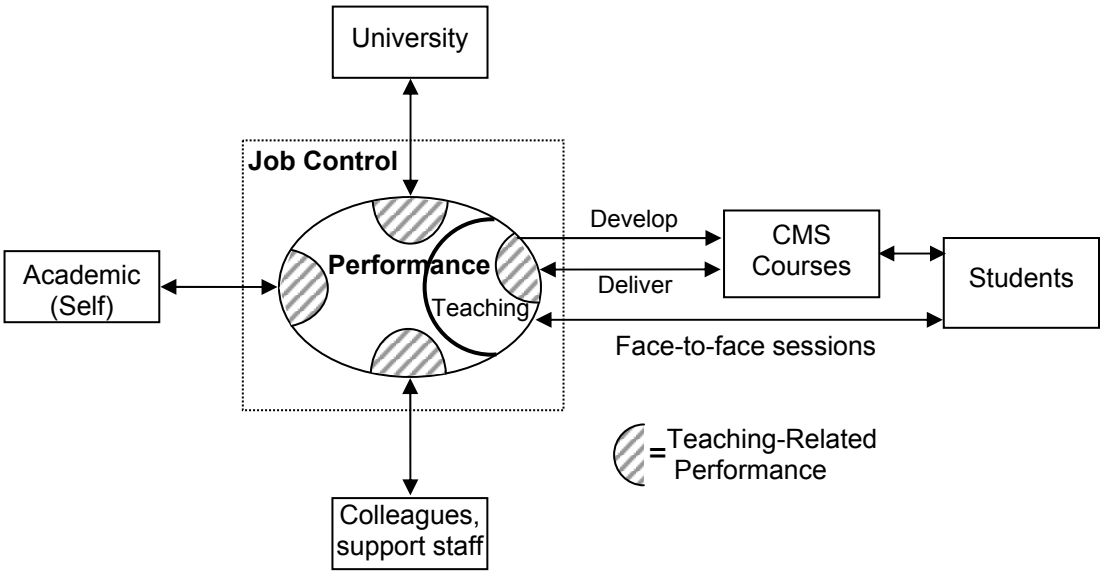


Figure 94. Academic's Personal Performance Model (see Section 3.4.2).

During the design and development of the Personal Performance Support Tool (see Chapter 7 and 8) the teaching-related performance was further decomposed in specific tasks and activities to be able to offer task-based support. One major task was Develop which was decomposed in: Propose, Prepare, Create, Test, and Finish. A second major task was Deliver which was decomposed in: Accept, Prepare, Offer, Evaluate, and Finish. As examples of many educational formats three course components were developed both for the development and delivery phase: Lectures, Assignments, and Discussions. Although many instructors were not accustomed to focus on their teaching-related activities, findings from the final evaluation indicate that this was accepted as a useful way to structure the support tool.

- **RQ2: What is the desired personal performance for the current and future teaching-related activities of academics in the changing university context?**
  This question was analysed in Chapter 3 based on literature. It was found that instructors will be held more responsible and accountable for their performance than is currently the case and that effectiveness and efficiently will be increasingly emphasised as important aspects in future performance. It was found that there are almost no concrete requirements or guidelines about the turn-key related performance of instructors, except in very general terms, such as "to offer good courses". It seems that instructors are not adequately informed about desired performance and that there will be increased pressures relating to students becoming more and more diverse and requiring correspondingly more differentiated treatment. Also the use of CMSs to develop and deliver courses will become a prominent part in future instructors' performance and thus instructors should be informed about desired performance when using a CMS in their courses. When the university context is changing in new directions, it is to be expected that instructors will feel a need to be informed in an adequate way about consequences of these changes on their jobs and desired performance.

- **RQ3. What is the current level of personal performance in the teaching-related activities of academics in changing university environments?**
  This question was analysed in Chapters 5 and 6 using various data-collecting methods as described in Chapter 4. One of the main findings in the studies about current performance was that instructors often do not perform their teaching-related activities in a systematic way. It was also found that instructors only plan a small subset of their activities, in particular the face-to-face sessions, but that the teaching-related activities that they also do often are not planned. From both the international survey and the interviews held at the University of Twente and the CAH/STOAS Hogescholen it turned out that there are almost no incentives offered to instructors to use a CMS in their courses and to improve their level of job control. As pressure on academics increases (even more) then instructors will need to plan in more detail in order to stay in control. Management should be aware of this and offer effective support to instructors.
- **RQ4. What gap is developing between these current and desired levels, and which interventions can be selected to support the reduction of this emerging gap between the actual and desired personal performance in teaching-related activities of academics in changing university environments?**
  The gaps between desired and actual performance became visible in Chapters 5 and 6 and were consolidated at the start of Chapter 7. It was found that instructors do not have a clear idea about the teaching-related activities they have to perform and in what order to be most effective and efficient. Also lack of information, for example about references, requirements and guidelines relating to the educational program in which an instructor is working, procedures for efficient use of a CMS, and administrative procedures were found to be some of the reasons of less than desired performance or high workload. It was also found that there is almost no specific support offered to instructors for their teaching-related activities. The use of a computer-based intervention was suggested because it can offer resources in a systematic way closely related to daily practice of instructors, it can be used and adapted at an individual level, it is not embarrassing to ask for support, and it is accessible 24 hours a day which can be beneficial for those instructors who work during the evening or weekend. This led to the selection of three promising categories of interventions: Job Aids, Expert Systems, and Electronic Performance Support Systems (EPSSs). Of these three, an EPSS was selected as the most adequate intervention category to support instructors in their teaching-related activities. During the various evaluations of the prototypes of the specific EPSS developed for this intervention (the Personal Performance Support Tool) it was found by the evaluators (instructors, directors of educational programmes, and members of the support staff) that such an intervention can reduce part of the emerging gap between actual and desired performance.
- **RQ5. What are criteria for such interventions to be effective and efficient?**
  In Chapter 7 it was noted that specific information is not readily available about the criteria for a support system to support teaching-related activities of instructors. It was necessary to design and develop such an intervention and to gradually get a better insight in the criteria by evaluating prototype versions in four cycles of prototype development and evaluation. A project-management approach was used to structure instructors' teaching-related performance in a systematic way by defining major tasks (such as Develop and Deliver) and for each task and subtask

specifying the teaching-related activities in a logical order. The five phases of project management (Define, Plan, Organise, control, and close) were amended to relate to daily practice of instructors and called: Propose, Prepare, Create, Test, Finish for the Development phase, and: Accept, Prepare, Offer, Evaluate, and Finish for the Delivery phase. This structure was then used to design the prototypes. Such a structure is also flexible enough to adapt the tasks, activities, and resources offered in the PPST to specific local settings and to new educational formats and teaching-related activities. In the Personal Performance Support Tool the current actual performance is taken as starting point but new activities and resources can be added as part of a quality-improvement cycle to support instructors to meet desired performance as requested by organisational management and students in the future. It will be important for instructors to be aware of the benefits of using a PPST and to use it in their daily work. The PPST Implementation Plan emphasises the role of management at university and faculty level to stimulate the daily use of a PPST.

- **RQ6. What are the results when a particular intervention is designed and evaluated?**
  After four cycles of prototyping (Chapter 7), the final version of the Personal Performance Support Tool and the corresponding PPST Implementation Plan were evaluated as described in Chapter 8. From the final evaluation it can be concluded that an EPSS can offer support for instructors at various phases in the development and delivery of courses. The instructors indicated that they are willing to use such a tool if it is tuned to their work environment. The final version can well serve as the basis for implementing such a tool at a university or faculty context. A PPST Implementation Plan was developed and evaluated to get insight in the barriers and opportunities to implement a Personal Performance Support Tool in a university or faculty context. The further deployment of the PPST depends on the willingness of instructors to use such a tool in their daily practice (see also De Boer, 2004) within their local workgroups (departments, divisions). The deployment of the PPST among instructors and workgroups will gain momentum when pressure on instructors increases and the PPST can support them to lessen their burden.

9.2 Interpreting the Research in its Context

This research focused on the personal performance of instructors and how this can be supported using a Performance Support Tool as a useful intervention. It was carried out in a particular context and many decisions were made as the research evolved based on steadily growing insights from the Action-Research process, but the same context also brought limitations that bounded the work. The following list offers theoretical and methodological considerations reflecting this context.

- **Teaching-related activities**
  In Chapter 3 it was noted that instructors perform various tasks within their job, such as face-to-face teaching activities, teaching-related activities, and research activities. The decision was made to investigate teaching-related activities in this research with an emphasis on the use of a CMS (TeleTOP), because these activities are becoming more-common practice for instructors and are not yet investigated in detail. It was also expected that teaching-related activities of instructors within various faculties will share common aspects such as curricula with a yearly cycle of

events, the division of curricula in courses, and a limited set of educational formats applied in combination with the use of CMS. Therefore the research was focussed on teaching-related activities but in future the PPST can be enhanced to also support other types of instructor's activities, such as research activities. Even when focussing on teaching-related activities there are various educational formats that are not yet supported by the tool, such as "blokonderwijs" [four weeks of intense teaching], but as the tool can be adapted to meet local needs, these adaptations for teaching-related activities can be added. According to the final evaluation the usefulness of the support offered by the PPST for some commonly used formats (planning and managing lectures, assignments, and online discussions) was rated high by instructors.

- **Instructors**
  The main target group in this research was on instructors within higher education. This group was selected as they have more freedom in the way they work and plan their time than instructors of secondary or primary schools and also because they will be expected to adapt to a wider range of students with more differentiated backgrounds and requirements. The more freedom professionals have in the way they work and plan their time, the more they might loose control over their work and thus the more they might benefit from the use of a PPST. Although teaching is focussed on students, they were not part of this research as they are not directly involved in teaching-related activities. Students may for instance complain about the performance of instructors; this is interpreted in this study as an additional pressure (see Chapter 1) that will influence instructor's performance in an indirect way, for instance requiring him or her to plan more precisely and offer more extensive feedback. Although other stakeholders besides instructors, particularly educational management and colleagues, were included in this research to get better insights in instructors' performance, the focus to analyse and support teaching-related performance remains with the instructors.
- **Dimensions in the Personal Performance Model**
  The dimensions in the Personal Performance Model can be considered as the primary processes related to performing teaching-related activities. Although the University of Twente is not atypical for Dutch universities, there might be differences in the way teaching is organised at other universities. To balance this information was also gathered via an international survey. If the model differs from the situation (currently or desired in the future) at a specific university, then the model should be revised and additional activities and resources added to the PPST to also support these differences.
- **Planning**
  From the findings in Chapter 5 it can be concluded that most instructors are not planning their teaching-related activities in a systematic way. The planning of these teaching-related activities is supported by the PPST, but other activities related to face-to-face teaching and research are not supported. Thus the planning output of the PPST does not cover all instructor's activities as it is limited to teaching-related activities. This was not considered a drawback during the development of the PPST as the output can be copied to a personal agenda, such as Microsoft Outlook or a paper-based agenda and there be combined with other kinds of planning data. This also offers the opportunity to fine-tune the personal planning based on many, very-

specific personal considerations before the teaching-related activities are fixed in an individual's agenda.

- **TeleTOP**
  This research was focused on the use of TeleTOP as course-management system. During the analysis phase of the actual performance of instructors (see Chapter 5), some of the participants working at the CAH/STOAS Hogescholen used Blackboard or Learning Space as their CMS, but the different CMSs did not seem to influence the outcomes. Based on this it can be expected that teaching-related performance will only be affected in a limited way when instead of TeleTOP a different CMS is used. Using a different CMS will imply that some procedures have to be adapted in the PPST, especially in the TeleTOP column of the activity tables, but this does not affect the generalisability of the tool because the PPST can be adapted to the CMS in the local context.
- **Non-integration of the PPST in TeleTOP**
  For this research the support tool was developed as a stand-alone tool and not integrated in a CMS such as TeleTOP. This was done to make the tool generally applicable, also for instructors using Blackboard or some other CMS, which would not be possible if the PPST was integrated in TeleTOP. The lack of integration might have been a limitation to some instructors, but the PPST not only supports the use of a CMS, but it also serves a broader goal, namely to support teaching-related activities in general, of which the use of a CMS is only one aspect. As there are many applications at a university that all serve different goals, it might be more appropriate to set up a portal to offer easy access to these applications, including this PPST and TeleTOP as two separate but related applications.
- **Evaluations**
  The various prototypes were evaluated by a limited number of participants working at the University of Twente. This was caused by the fact that instructors are very busy and not willing to participate in activities that cost extra time, even when asked by a colleague. To involve other universities in the evaluation process would probably cause additional resistance, but it would also require the adaptation of the prototype to other local settings. It was decided to focus on the University of Twente as even within the university there are differences in organisational and work procedures between faculties and departments. During the evaluation of the final prototype (see Chapter 8) the PPST was adapted to each faculty setting, thus on a small scale experiences were acquired about adaptation to a local context. In the future the tool should also be evaluated at other faculties and universities to make the findings more generalisable.
- **Implementation**
  In this research the PPST implementation plan was designed and then evaluated by asking instructors, directors of educational programmes, and support-staff members about their opinions. Based on these findings the implementation plan was improved, but it has not yet been applied in a real setting at a university. However, as the plan is similar to the implementation plan to implement TeleTOP at the Faculty of Educational Science and Technology of the University of Twente (Collis & Moonen, 2001) the PPST implementation plan can be considered an adequate blueprint.

Given these limitations the research is still valuable, because the Personal Performance Model is considered to be generally applicable, the Personal Performance Support Tool can be used to offer support to instructors and then can be further improved over the years based on instructors' experiences, and the PPST implementation plan can be considered a suitable blueprint that can be adapted to fit a specific local situation.

9.3 Reflections on the Research Methodologies Applied to Analyse and Improve Instructors' Performance

In this research the performance of instructors was analysed focussing on teaching-related activities, and then an intervention was selected, developed, and evaluated to potentially improve their performance by offering support. Various methodologies and methods were used and in the next points these will be reflected on. The list ends with an overall reflection about combining these methods.

- **Human Performance Technology**
  The HPT methodology was introduced in Chapter 2 and it was used as the major methodology for this research. Each chapter in this dissertation highlights specific steps in the HPT model. The HPT model offers a very systematic and structured way to analyse actual and desired performance and to develop appropriate interventions to improve performance. This methodology was experienced as a good and practical model to research instructors' teaching-related performance and to support them.
- **Design Research**
  As described in Chapter 4 Design Research focuses on complex problems. Although in this research only teaching-related activities were studied in detail, it was found (Chapters 3 and 5) that this part of instructor's performance is already very complex. Also a second aspect of design research, the integration of previously established design principles with new guidelines emerging from the research was carried out, as this research started with analysing desired and actual performance of instructors in a traditional way, and then using prototypes to further analyse the less-known aspects of instructor's performance. This also links to a third aspect of research design, that innovative environments should be iteratively tested and refined, as was the case in this research when in four cycles of prototyping each prototype was tested, leading to refinements in the next version. Some other aspects of design research are more-related to long-term investigations, such as continual refinement of protocols and research questions, intense collaboration among researchers and practitioners, and commitment to theory construction, but these were not part of this research. Design research in combination with the HPT methodology was found to be a very fruitful combination.
- **Mixed-methods approach**
  In this research a mixed-methods approach was used to analyse the research questions listed in Chapter 2. The various studies carried out in this research are listed in Chapter 4 with an indication of the methods that were used in each study. One category of studies zoomed in on local settings at two specific institutions. Another category focused on the international setting using a survey to gather data. To further analyse instructors' needs prototypes were developed and evaluated to

gather additional and more-detailed data on instructors' needs and practices. Applying more than one method is considered a good approach to prevent a too-small vision on the complex problem of performing teaching and teaching-related activities (Johnson & Onwuegbuzie, 2004). By applying this mixed-methods approach various perspectives were used to investigate the Personal Performance Model. The positive findings in the evaluation of the final prototype indicate that the mixed-method approach strengthened the insights obtained through the studies.

- **Action Research**
  As was indicated in Chapter 4 action-research methodology was ongoing through the overall research as the researcher was participating in teaching during this research, thus also performing teaching-related activities at the same time as studying them more generally outside of his own work. From the start of the project the researcher could observe and reflect on all the aspects of his own performance and that of his colleagues. This constant mix of being a researcher and at the same time being the object of study offered valuable insights into many teaching-related problems and opportunities of instructors when performing their work. But it was also a burden because it was hard to limit the research to specific topics, when at the same time as an instructor you are confronted with a myriad of other teaching-related problems you would like to solve.
- **Methods more common in business enterprises**
  Although common in business enterprises as a method to organise, manage, and control production units and organisations, project management tools and strategies are rarely used to organise and manage individual performance in higher education. In this research a project-management methodology was applied to structure the teaching-related activities and tasks of instructors. Then these tasks and activities were implemented in the Personal Performance Support Tool also using a project-management approach, to structure the PPST in the way the navigation entries are presented and the ways the instructor's task- and activity-related information and resources are presented. By using the PPST an individual instructor is offered an individual way to organise and manage his or her own work. One of the first steps in project management is to make a planning and this was incorporated in the PPST to show time estimates per activity and task which are adaptable to meet personal needs. The PPST also offers a feature to transfer planning data from the PPST to Microsoft Project and then instructors can add more planning details and budget control. Overall it was found that a project-management approach offers a very useful way to support the individual performance of instructors for instance to systematically present the tasks and activities to perform in an appropriate order, associated resources to be used, and checklists to control one's own performance.
  Within the project-management approach aspects of time management were also taken into account. By offering clear insight into activities and time estimates the effectiveness and efficiency of instructor's performance can be improved.
- **Overall reflection**
  The combination of various methodologies and methods in the studies also has its drawbacks. As it could not be foreseen in advance which data-collecting methods would be appropriate as the overall structure of the research could not be specified in all detail and evolved over time. This made the planning of this research more difficult. By applying action research and participating in own research findings and

results will be closer to reality than could have been reached by controlled experiments in laboratory settings.

In this section the various methodologies that were applied in this research have been reflected upon, and it was concluded that this mix of methodologies and methods proved to feasible and useful, leading to results that are close to the experience of practitioners.

9.4 Implications for the Use of the Personal Performance Support Tool and its Implementation Plan

The process of implementing a PPST starts with the PPST Implementation Plan with the possible need to amend the plan to fit specific local situations. Part of the plan itself is to adapt the tool to work procedures within specific work units, such as a faculty. These work procedures should be based on a common work practice among the members. If there are too many differences between work procedures of individuals then first the work procedures should be discussed internally and one approach chosen as the basis to perform.

Additional tasks and educational formats can be added using the currently available tasks and formats as starting point. The resources will also vary from university to university but here again the set of resources already offered in the tool can be used as a starting point and as a guide to the sort of resources that are needed by an instructor when performing a specific task.

The PPST has been developed to be adaptable in a flexible way, for instance for adding additional resources or removing resources that have become obsolete. The planning component will be the most important part to improve over the years when more and more information is available about the time an instructor needs to perform a specific task. It will be important for an instructor to be able to save a current time setting and use it again for the next course or to compare a planning with a colleague. When colleagues within faculties and workgroups are willing to submit their resources, work procedures, and planning data the PPST can become a shared resource of knowledge.

To make the implementation a success, management should commit itself to facilitate the implementation process, but also from the start stress the importance to carry out the activities as listed in the tool, using the resources that are offered in the tool. In this way not only the performance of an individual instructor will improve but also of a work unit or a course team.

9.5 Recommendations

In both design and development research an important endpoint is to formulate recommendations related to the context of the research (Van den Akker, 1999; Reeves, 2000). The last research question defined in Chapter 2 was also about giving recommendations based on this research. Thus in this section the last Research Question (RQ7) will be addressed:

RQ7. *What recommendations based on this study can be given to support academics to stay in control when performing teaching-related activities?*

The following list offers recommendations on how to support instructors for three distinct levels within a university: the organisational-management level, work-group management level, and the individual instructor level. This list is enhanced with recommendations for researchers of human performance and for designers of support systems for instructors.

- **Organisational-management level**
  Organisational management should pay more attention to the working conditions of instructors and commit themselves to offer substantial support to the performance of instructors. The following recommendations are offered to organisational management.

  In Chapter 1 it was argued that instructors are under increased pressure, but as shown in Chapters 5 and 6 desired performance is not specified in a way that is communicated well to the instructors in a format that is applicable in practice. These observations lead to Recommendation 1.

Recommendation 1 Management should specify teaching-related expectations, requirements, guidelines, and constraints in a more-explicit way to guide instructors to perform as desired by the organisation.

  When CMSs were introduced in education and gradually become commonplace the teaching-related activities within courses become more-and-more important because face-to-face sessions were (partly) replaced by for instance the online exchange of information and giving feedback on submitted assignments. This causes a change in the way instructors should perform their daily work. In Chapter 7 and 8 it was found that a PPST can offer support to instructors to organise their work, but it also showed that management has to stimulate its use. This leads to Recommendation 2.

Recommendation 2 Management should recommend and stimulate the use of the Personal Performance Support Tool to support instructors to organise and manage their own work and stay in control, as teaching-related activities are becoming more manifest because of the intense use of course-management systems.

  Key parts of the PPST to support instructors are related to resources that can be helpful when performing activities. From the evaluations of prototypes as described in Chapter 7 and 8 it was concluded that a PPST should be adapted to a local setting. The following three recommendations will focus on three aspects that commonly are the responsibility of the organisational-management level: the consistent use of a CMS such as TeleTOP, the supply of checklists related to program- and course-management requirements, and the consistent use of administrative procedures. In the PPST these three aspects are represented by three columns in the Activity table that offer these kinds of support: the columns in the prototype PPST labelled as TeleTOP, Control, and Administration.

Based on the study in which the TeleTOP database was analysed (see Chapter 5, Study O3) it was found that the way a CMS system is used to offer courses varies from course to course and from instructor to instructor. The need for a consistent way to offer courses to students will imply the use of common templates, also to make it easier for instructors to find their way to the appropriate information. As students often are participating in courses offered by various faculties it is recommended that organisational management will offer these templates and guide the development of new ones. This leads to Recommendation 3.

Recommendation 3
Management should provide instructors with templates and guidelines on how to fill and use a course-management system such as TeleTOP for consistent and effective use in practice.

During the prototype development of a support system (Chapter 7) the use of checklists was considered to be an appropriate way to help instructors to not forget essential steps in their work related to preparing and delivering courses. Many of these steps will be common across faculties and therefore the organisational management can take a lead to supply these checklists. These checklists can then also guard quality-related aspects of performance and courses. This leads to Recommendation 4.

Recommendation 4
Management should provide instructors with procedural checklists to stimulate the development and delivery of high-quality courses in an effective and efficient way.

In this research it was found that at the University of Twente, each faculty has its own set of administrative procedures and forms that an instructor should use. It can be expected that this will also be the case at other universities. It was found during the interviews (Chapter 5) and when developing a support system (Chapter 7 and 8) that sometimes procedures are not known or that forms can not be easily retrieved. As these administrative procedures are often set up at the organisational-management level it is recommended that management supplies clear procedures, guidelines, and templates to help instructors to perform their administrative duties in a proper way. This leads to Recommendation 5.

Recommendation 5
Management should provide instructors with clearly stated administrative procedures, guidelines, and templates of reports and forms to streamline workflow and administrative procedures within faculties and workgroups.

Finally, organisation management should take the lead in a top-down approach (from management towards instructors) to offer a tool such as the PPST as a common facility to instructors and stimulate its use. From interviews with instructors (Chapter 5) it was seen that information is often not available to the instructor or even not defined. This leaves the instructor to work on his or her own, "on an island" . This should be prevented. Based on the research findings as described in Chapter 8 a PPST Implementation Plan was considered by the participants to be an adequate way to implement a PPST for instructors. This plan includes the adaptation of a support tool as the PPST to local settings and

suggestions to deploy the tool and stimulate improvements. This leads to Recommendation 6.

Recommendation 6
Management should make some form of a Personal Performance Support Tool commonly available to instructors at the university or faculty level and should use an approach such as the PPST Implementation Plan a blueprint to localise the PPST and deploy and stimulate its use.

Educational programs or curricula are made up of courses offered by various instructors who often collaborate in work groups. These colleagues are the ones an instructor is interacting with on a daily or on-going basis. Because of various influences within a work group, such as personal characteristics of the members or the tasks that have to be performed by the group the individual instructor's performance will be affected. The management of the work group should also be enclosed in streamlining teaching-related processes.

- **Work group-management level**
  In general instructors are appointed within a faculty and often work collaboratively with colleagues within workgroups or course teams. At the workgroup-management level group members should be facilitated in their teaching-related activities. The PPST can offer this support to streamline work procedures, group planning, and the use of common resources. The following three recommendations all embed the use of the PPST in a team / collegial approach and are aimed at stimulating the further deployment of planning and work procedures within workgroups as a bottom-up process to complement the top-down support offered by the organisational management.

  When a PPST is implemented at a university or faculty and adapted to the organisational characteristics, it can be expected that within workgroups there will be a need to fine-tune the PPST to the groups' way of working, for instance to develop and deliver courses as a course team. The PPST should be streamlined to reach optimal results. This leads to Recommendation 7.

Recommendation 7
Workgroup management and peers should stimulate the common use of a PPST to streamline common work procedures within a workgroup.

The PPST offers the facility to store and retrieve reference material linked to specific teaching-related tasks and activities. By adapting the tool to commonly used articles and documents the tool can gradually be considered as a common source of reference for the workgroup. This leads to Recommendation 8.

Recommendation 8
Workgroup management and peers should stimulate that relevant articles and background information specifically targeted at each workgroup are submitted to the PPST to create a common source of reference for teaching-related activities.

During or after performing specific teaching-related tasks and activities the use of checklists can prevent work groups to forget to perform specific activities or not to monitor quality constraints.

Recommendation 9
Workgroup management and peers should stimulate the use of checklists based on specific work-group practices to monitor workflow and high quality output.

Although instructors can work collaboratively within work groups, still they have to perform their own work. The individual-instructor level will be the next focus point for recommendations.

- **Individual-instructor level**
  Instructors should be aware of their own responsibility and accountability towards their own performance as described in Chapter 2. They should organise and manage their work in a systematic way and seek support when needed. The following three recommendations reflect this.

  From literature (for instance Kerzner, 2003) it was shown in Chapter 2 that a project-management approach can be useful to organise and manage one's own work in a systematic way This was supported by instructors and directors of educational programmes during the evaluation of the final version of the PPST (Chapter 8). This leads to Recommendation 10.

  Recommendation 10
  Instructors should work in a systematic way, using a project-management work approach and define own personal-work procedures in order to control effective and efficient course preparation and delivery, taking into account their work-group and university constraints.

  From the interviews described in Chapter 5 and the international survey described in Chapter 6 it was found that instructors do not plan their teaching-related time in full detail, and often only plan face-to-face sessions. As the use of a CMS changes the daily way of working of instructors this should be reflected in the way they plan their time, also focussing on teaching-related activities. This leads to Recommendation 11.

  Recommendation 11
  Instructors should plan their time in a systematic way not only for face-to-face sessions but more-and-more for teaching-related activities, for instance planning for time to submit feedback to assignments or time to participate in online discussions.

  The PPST developed and designed in four rounds of prototyping (Chapter 7 and 8) was found in its final version to be an adequate way to support instructors for their teaching-related activities. The university should implement this PPST and make it available to instructors. Then the individual instructor should use this PPST whenever possible to support his or her teaching-related activities. This leads to Recommendation 12.

Recommendation 12
The individual instructor should optimise the organisation and management of his or her own work by using a tool such as the Personal Performance Support Tool for support.

The following two focus points relate to researchers and designers as stakeholders in the process of researching academics' needs and promising interventions and then designing and developing these interventions.

- **Researchers in performance support**
  In this research a mix of research methods described in Chapter 4 was used to analyse desired and actual performance of instructors and to select and design an appropriate intervention in the form of a Personal Performance Support Tool. This leads to Recommendation 13.

Recommendation 13
Researchers involved in performance support should consider the use of a Human Performance Technology approach combined with a design/development research methodology to design and develop interventions.

During the whole period that this research was carried out, the researcher was also active as an instructor within the Faculty of Behavioural Sciences. Thus the researcher was also actively involved as a participant within the educational programme. This combination of being a researcher and a practitioner via Action Research underlies this research and was found to be beneficial to better understand the instructor's problems and opportunities. This leads to Recommendation 14.

Recommendation 14
Researchers in performance support should consider an Action Research approach with the personal participation of the researcher in the research, in order to better understand instructors' problems and opportunities.

- **Designers of support systems**

The major guideline for designers has been stated many times in the literature: involve the user as much as possible (Van den Akker, 1999; Moonen, 2002). The actual practice of the user should be mirrored in the system and should guide the way the system is designed and offered. This leads to the following set of recommendations directed to the designers of support systems.

One of the research findings was that desired performance of instructors was ill-defined and that instructors are not well aware of future changes (Chapter 2). It was also found that actual performance can be improved (Chapter 5) which leads to Recommendation 15.

Recommendation 15
Designers of support systems to improve instructor's performance should start by accommodating instructor's current performance and use this as the basis to lead and support instructors towards desired performance.

During the development of the final PPST version, the system was tailored to each faculty where a specific participant was assigned. This tailoring focussed on storing specific forms of that faculty in the PPST. Within the University of Twente the forms and procedures differ among faculties, so it can be expected that this will be even more the case when one university is compared to other universities in The Netherlands or elsewhere, which leads to Recommendation 16.

Recommendation 16
Designers of support systems for instructors should build in the possibility to easily tailor the system to a specific local context, such as a university, faculty, or work group.

The first prototype developed in this research (see Chapter 7) was partly based on an expert-systems approach but this was not valued highly by the participants. In the following cycles of prototyping it was found that a more-flexible approach was appreciated much more, when the activities of a task were presented as a table that can be used as a sequential list but also can be used to select a specific element within the table. This leads to Recommendation 17.

Recommendation 17
Designers of support systems for instructors should offer maximum flexibility to the instructors to select a specific element they need when consulting the system, such as a time estimate, a work procedure, or an activity resource.

The research suggests that these recommendations when followed through will create a working context for instructors in which they can more efficiently perform their teaching-related activities and that a PPST-type tool will be available to support them to optimise their organisation and management of their own work. More general remarks about the future outlook for the research and recommendations for further research will be given in the next section.

9.6 Future Outlook and Further Research

As universities go through a rapid change process, especially related to changing educational structures and organisational procedures, instructors will come under increased pressure, as was discussed in Chapter 1. Also more-formal work relations will evolve in which academics become more responsible and accountable for their performance. In this research the implementation of a Personal Performance Support tool was found to be a promising way to support instructors for responding to these pressures. To implement this specific tool in real life it has to be further improved to accommodate the specific requirements of various universities and to make it more generally useful. Also the current set of teaching-related tasks and activities offered in the tool focussing on educational formats should be a added with more formats currently common at universities, such as project work and practice, but also more innovative formats, such as preparing for and managing the time and tasks involving groupwork or lecturing virtual reality, or the collaborative work of students in an international setting, can be added to support not only less-experienced instructors, but also experienced instructors who may not be familiar with these new formats. The

Personal Performance Support tool has to be kept up-to-date to serve instructors in the future.

The activities of instructors in this research were based on a limited number of participants in the various studies described in Chapter 4, 5, and 6. Further research is needed about how academics perform their work at a personal level, measuring and questioning a variety of instructors at various faculties and within various organisations.

It was found that in general academics are not yet aware of new and increasing pressures that will influence their performance in the near future, especially pressures caused by the greater personal responsibility and accountability that is being put on individual academics. This situation will cause problems when workload increases and stress will rise. To prevent this, instructors should be prepared for these changes and be stimulated to change some of their working habits. Management can support this by implementing a PPST and offer specific training for managing time and tasks.

Within universities there are a number of Internet or intranet-based systems offered to their employees and this number is growing rapidly. Also instructors have to deal with a substantial number of systems, not only a CMS to develop and deliver their courses, but also, for instance at the University of Twente, a database with descriptions of all courses, a project-management database to record the hours spent on research activities, a library catalogue of the University of Twente and one of all the Dutch universities, and via the Bureau of Educational Affairs with student databases, grade files, and more. A portal for instructors that offers easy access to these and other systems often used by instructors would increase efficiency.

This research focussed on the higher-education context, but these findings may also be relevant for other sorts of educational institutes, such as secondary schools, primary schools, corporate training institutes, and other institutes related to the professional development of individuals. This too is an area for further research.

Finally, this research emphasises the importance of offering support to individuals who have to perform in an ever-changing environment. As instructors become more-and-more self-responsible for their work and have to perform in increasingly efficient and effective ways and are being held accountable for good quality courses and results, they will need to be able to get support to stay in control.

References

Aalst, W. van der, & Hee, K. van. (2002). *Workflow management: Models, methods, and systems*. Cambridge, MA: MIT Press.

Aartsen, M., & Bouwmeester, M. (2001, June). De mogelijkheden van log-file analyse voor het bepalen van de tijdsbesteding van docenten aan onderwijs-ondersteunende activiteiten in TeleTOP [Using log-file analysis to investigate time expenditure of teaching-related activities of instructors when using TeleTOP]. *Proceedings van het symposium in het kader van het vak Onderzoeksopdracht (196037)* (pp. 1-22). Enschede: University of Twente, Faculty of Educational Science and Technology.

Akker, J. van den. (1999). Principles and methods of development research. In J. van den Akker, R.M. Branch, K. Gustafson, N. Nieveen, & Tj. Plomp (Eds.), *Design approaches and tools in education and training* (pp. 1-14). Dordrecht: Kluwer Academic.

Alexander, F.K. (2000). The changing face of accountability. *The Journal of Higher Education, 71*(4), 411-431.

Alsop, G., & Tompsett, C. (2002). Grounded Theory as an approach to studying students' uses of learning management systems. *Association of Learning Technology Journal, 10*(2), 63-76.

American Association of University Professors. (2002). *What do faculty do?* Retrieved July 24, 2002, from http://www.aaup.org/Issues/workplace/facdo.htm

Arentsen, M., & Wieland, A. (2001, June). Tijdsbesteding van docenten in het wetenschappelijk onderwijs [Time expenditure of instructors in university education]. *Proceedings van het symposium in het kader van het vak Onderzoeksopdracht (196037)* (pp. 35-50). Enschede: University of Twente, Faculty of Educational Science and Technology.

Bang, S. (1996). *Hét complete Internet handboek* [The complete Internet reference book] (2nd ed.). Schoonhoven: Academic Service Informatica.

Bannan-Ritland, B. (2003). The role of design in research: The integrative learning design framework. *Educational Researcher, 32*(1), 21-24.

Berg, J.J. van den, Bergen, H. van, & Schouten, R. (2001). *Bezinning op de MUB: een tussenstand* [Reflections on the MUB: an interim overview]. Retrieved October 30, 2003, from http://www.minocw.nl/download/doc/eindrapport-mub.doc

Boer, H.F. de. (2003). *Institutionele verandering en professionele autonomie* [Institutional change and professional autonomy]. Doctoral dissertation, CHEPS, University of Twente. Enschede: University of Twente, CHEPS.

Boer, W. de. (2002). ICT in teaching and learning: Part of a blend. In B. Collis and M. van der Wende (Eds.), *Models of technology and change in higher education: An international comparative survey on the current and future use of ICT in higher education* (pp. 31-36). Enschede: University of Twente, CHEPS and Toegepaste Onderwijskunde.

Boer, W. de. (2004). *Flexibility support for a changing university.* Doctoral dissertation, Faculty of Educational Science and Technology, University of Twente.

Burbules, N.C., & Callister, T.A. (2000). Universities in transition: The promise and the challenge of new technologies. *Teachers College Record, 102*(2), 271-293.

Bureau of Labor Statistics (2002). *Occupational outlook handbook*. Retrieved May 5, 2002, from http://www.bls.gov/oco/pdf/ocos066.pdf

Chevaillier, T. (2000). *The changing conditions of higher education teaching personnel*. Geneva: International Labour Office.

Coaldrake, P., & Stedman, L. (1999). *Academic work in the Twenty-First Century: Changing roles and policies*. Canberra, Australia: Department of Education, Training and Youth Affairs, Higher Education Division.

Collis, B. (1997). Pedagogical re-engineering: A new approach to course enrichment and redesign with the WWW. *Educational Technology Review, 8*, 11-15.

Collis, B. (1998). New didactics in university instruction: Why and how. *Computers & Education, 31*(4), 373-395.

Collis, B. (1999). Teleware: Instrumentation for tele-learning. *Education and Information Technologies, 4*(1), 9-32.

Collis, B. (2002). An overview of information technologies for education and training. In H. Adelsberger, B. Collis, & J. Pawlowski (Eds.), *Handbook on information technologies for education and training* (pp. 1-21). Berlin: Springer Verlag.

Collis, B., & Boer, W. de. (1999). Scaling up for the pioneers: The TeleTOP Method at the University of Twente. *Interactive Learning Environments, 7*(2-3), 93-112.

Collis, B, & Gervedink Nijhuis, G. (2000). The Instructor as manager: Time and task. *The Internet and Higher Education, 3*(1-2), 75-97.

Collis, B., & Messing, J. (2001). Usage, attitudes and workload implications for a Web-based learning environment. *Association of Learning Technology Journal, 9*(1), 17-25.

Collis, B., & Moonen, J. (2001). *Flexible learning in a digital world: Experiences and expectations*. London: Kogan Page.

Collis, B., & Wende, M. van der (Eds.). (1999). *The use of information and communication technology in higher education: An international orientation on trends and issues*. Enschede: University of Twente, CHEPS.

Collis, B., & Wende, M. van der (Eds.). (2002). *Models of technology and change in higher education: An international comparative survey on the current and future use of ICT in higher education.* Enschede: University of Twente, CHEPS.

Corbalan Perez, G. (2002). *Analysis and development of a prototype support system for instructors*. Doctoral thesis, Faculty of Educational Science and Technology, University of Twente.

Davis, L.E., & Wacker, G.J. (1988). Job design. In S. Gael (Ed.), *The job analysis handbook for business, industry, and government* (pp. 157-172). New York: John Wiley.

Deterline, W.A. (1993). Looking for things to fix. *Performance and Instruction, 32*(4), 1-6.

Dormant, D. (1999). Implementing human performance technology in organisations. In H.D. Stolovitch & E.J. Keeps (Eds.), *Handbook of human performance technology: Improving individual and organizational performance worldwide* (2nd ed.) (pp. 237-259). San Francisco: Jossey-Bass/Pfeiffer.

Erasmus Universiteit Rotterdam (2001). *Strategisch Plan: Een strategiedocument voor de ontwikkeling van de Erasmus Universiteit Rotterdam 1999-2005* [Strategic plan: A strategy-defining document for the development of the Erasmus University Rotterdam 1999-2005]. Retrieved February 17, 2002, from http://www2.eur.nl/eur/media/sp99_inhoud.html

Estes, F. (1999). Expert systems. In D. Langdon, K. Whiteside, & M. McKenna (Eds.), *Intervention resource guide: 50 performance improvement tools* (pp. 158-165). San Francisco: Jossey-Bass/Pfeiffer.

European Foundation for the Improvement of Living and Working Conditions [Eurofound] (2001a). *Ten years of working conditions in the European Union*. Retrieved on April 5, 2004 from http://www.eurofound.ie/publications/files/EF00128EN.pdf

European Foundation for the Improvement of Living and Working Conditions [Eurofound] (2001b). *Third European survey on working conditions 2000*. Luxembourg: Office for Official Publications of the European Communities. Retrieved on December 31, 2003 from http://www.eurofound.ie/publications/files/EF00121EN.pdf

Fisser, P. (2001). *Using information and communication technology: A process of change in higher education*. Doctoral dissertation, University of Twente. Enschede: Twente University Press.

Gervedink Nijhuis, G. (2001a). *Analysis of instructors' contributions to TO courses in TeleTOP: Academic year 2000-2001*. [Internal report]. Enschede: University of Twente, Faculty of Educational Science and Technology.

Gervedink Nijhuis, G. (2001b). *Instructors' time using TeleTOP for TO courses: Academic year 2000-2001*. [Internal report]. Enschede: Faculty of Educational Science and Technology.

Gervedink Nijhuis, G.J. (2002). Instructors: Gradually doing more, but with no reward. In B. Collis and M. van der Wende (Eds.), *Models of technology and change in higher education: An international comparative survey on the current and future use of ICT in higher education* (pp. 37-40). Enschede: University of Twente, CHEPS and Toegepaste Onderwijskunde.

Gervedink Nijhuis, G., & Collis, B. (2003). Using a Web-based course-management system: An evaluation of management tasks and time implications for the instructor. *Evaluation and Program Planning, 26*(2), 193-201.

Gery, G. (1991). *Electronic performance support systems: How and why to remake the workplace through the strategic application of technology*. Boston, Ma: Weingarten Publications.

Gery, G. & Jezsik, L. (1999). Electronic performance support system (EPSS). In D. Langdon, K. Whiteside, & M. McKenna (Eds.), *Intervention resource guide: 50 performance improvement tools* (pp. 142-148). San Francisco: Jossey-Bass/Pfeiffer.

Goodman, D. (1998). *JavaScript bible* (3rd ed.). Foster City, Ca: IDG Books Worldwide.

Gustafson, K.L. (2000). Designing technology-based performance support. *Educational Technology, 40*(1), 38-44.

Harley, B. (1999). *The myth of empowerment: Work organisation, hierarchy and employee autonomy in contemporary Australian workplaces*. Retrieved on December 31, 2003 from http://www.management.unimelb.edu.au/Research/ papers/wpd4.pdf

Hellriegel, D., Slocum, J.W., & Woodman, R.W. (1995). *Organizational behavior* (7th ed.). St. Paul, MN: West.

Hom, J. (2004). *The usability methods toolbox*. Retrieved on May 15, 2005 from http://www.wsiie.olsztyn.pl/~mirek/The Usability Methods Toolbox-druk.doc

Honan, J.P., & Teferra, D. (2001). The US academic profession: Key policy challenges. *Higher Education, 41*(1-2), 183-203.

Hornby, A.S. (2005). *Oxford advanced learner's dictionary of current English* (7th Ed.). Oxford, England: Oxford University Press.

International Society for Performance Improvement [ISPI]. (2003). *What is Human Performance Technology?* Retrieved January 24, 2003, from http://www.ispi.org/services/whatshptmodel.htm

Jansen, K.A., & Jacobs, T.M. (1996). *Ontwerpen van informatiesystemen met SDW* [Designing information systems using SDW]. Schoonhoven: Academic Service Informatica.

Johnson, R.B., & Onwuegbuzie, A.J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26.

Judge, T.A., Thoreson, C.J., Bono, J.E., & Patton, G.K. (2001). The job satisfaction-job performance relationship: A qualitative and quantitative review. *Psychological Bulletin, 127*(3), 376-407.

Kerzner, H. (2003). *Project management: A systems approach to planning, scheduling and controlling* (8th ed.). Hoboken, NJ: John Wiley & Sons.

Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing*. Thousand Oaks, CA: Sage.

Langdon, D. (1999a). Job Aids. In D. Langdon, K. Whiteside, and M. McKenna (Eds.), *Intervention resource guide: 50 performance improvement tools* (pp. 191-196). San Francisco: Jossey-Bass/Pfeiffer.

Langdon, D. (1999b). Selecting interventions. In D. Langdon, K. Whiteside, & M. McKenna (Eds.), *Intervention resource guide: 50 performance improvement tools* (pp. 15-25). San Francisco: Jossey-Bass/Pfeiffer.

Langdon, D. (1999c). The language of work. In H.D. Stolovitch & E.J. Keeps (Eds.), *Handbook of Human performance technology: Improving individual and organizational performance worldwide* (2nd ed.) (pp. 260-280). San Francisco: Jossey-Bass/Pfeiffer.

Langdon, D. (2000). Putting the "P" in PT. *Performance Improvement, 39*(2), 5-7.

Langdon, D., Whiteside, K., & McKenna, M. (Eds.). (1999). *Intervention resource guide: 50 performance improvement tools.* San Francisco: Jossey-Bass/Pfeiffer.

Lineberry, C. & Bullock, D. (1980). *Job aids*. In D. Langdon (The instructional design library Vol. 25). Engelwood Cliffs, NJ: Educational Technology Publications.

Littlejohn, A. (2003). Supporting sustainable e-learning. *Association for Learning Technology Journal*, *11*(3), 88-102.

Loucks, S.F., & Hall, G.E. (1977). Assessing and facilitating the implementation of innovations: A new approach. *Educational Technology, 17*(2), 18-21.

Marmel, E. (2000). *Microsoft Project 2000: Het complete handboek* [Microsoft Project 2000: Exhaustive reference book]. Schoonhoven: Academic Service.

McInnis, C. (1999). *The work roles of academics in Australian universities*. Department of Education, Training, and Youth Affairs. Retrieved April 19, 2001, from http://www.dest.gov.au/archive/hihered/eippubs/eip00_5/fullcopy.pdf

McKenzie, B., Kirby, E., Newbill, S., & Davidson, T. (1998). What are the most important teaching behaviors for distance instructors? Perceptions of facilitators, instructors and coordinators. *Technology and Teacher Education annual, 1998*, 121-123.

McNay, I. (1995). From the collegial academy to corporate enterprise: The changing cultures of universities. In T. Schuller (Ed.), *The changing university?* (pp. 105-115). Buckingham, UK: Society for Research into Higher Education & Open University Press.

Meyer, K.A. (1998). *Faculty workload studies: Perspectives, needs, and future directions* (ASHE-ERIC Higher Education Report Vol. 26, No. 1). Washington, DC : George Washington University, Graduate School of Education and Human Development.

Mioduser, D. & Nachmias, R. (2002). WWW in Education: An overview. In H. Adelsberger, B. Collis, & J. Pawlowski (Eds.), *Handbook on Information Technology in Education and Training* (pp. 23-44). Berlin: Springer Verlag.

Moonen, J. (1996). Prototyping as a design method. In Tj. Plomp & D. Ely (Eds.), *International encyclopedia of educational technology* (2nd Ed., pp. 186-190). Oxford: Pergamon.

Moonen, J. (2002). Design methodology. In H. Adelsberger, B. Collis, & J. Pawlowski (Eds.), *Handbook on information technologies for education and training* (pp. 153-180). Berlin: Springer Verlag.

Nielsen, J. (1993). *Usability engineering*. Boston: Academic Press.

OC&W (2000). *Naar een open hoger onderwijs. Invoering van een bachelor-masterstructuur in het Nederlandse hoger onderwijs* [Towards an open Higher Education: Implementation of a Bachelor-Master structure in Dutch Higher Education]. Den Haag: Ministerie van Onderwijs, Cultuur en Wetenschappen.

Paulson, K. (2002). Reconfiguring faculty roles for virtual settings. *The Journal of Higher Education, 73*(1), 123-140.

Reding, K.F., Ratiiff, R.L., & Fullmer, R.R. (1998). Flowcharting business processes: A new approach. *Managerial Auditing Journal, 13*(7), 397-402.

Reeves, T.C. (1993). Evaluating interactive multimedia. In D.M. Gayeski (Ed.), *Multimedia for learning: Development, application, evaluation* (pp. 97-112). Englewood Cliffs, NJ: Educational Technology.

Reeves, T.C. (2000, April). *Enhancing the worth of instructional technology research through "design experiments" and other development research strategies*. Paper presented at the International perspectives on instructional technology research for the 21st century of the American Educational Research Association, New Orleans, LA, USA. Retrieved May 15, 2003, from http://it.coe.uga.edu/~reeves/AERA2000Reeves.pdf

Reeves, T.C. (2002). Distance education and the professorate: The issue of productivity. In C. Vrasidas and C. V Glass (Eds.), *Current perspectives on applied information technologies. distance education and distributed learning* (pp. 135-156). Greenwich, CT: Information Age.

Reeves, T.C., Herrington, J., & Oliver, R. (2003). *A development research agenda for online collaborative learning*. Retrieved November 13, 2004, from http://it.coe.uga.edu/~reeves/edit6900/devresearchaect.pdf

Reeves, T.C., Herrington, J., & Oliver, R. (2005). Design research: A socially responsible approach to instructional technology research in higher education. *Journal of Computing in Higher Education, 16*(2), 97-116.

Rhoades, G. (2000). The changing role of faculty. In J. Losco & B.L. Fife (Eds.), *Higher education in transition: The challenges of the new millennium* (pp. 29-51). Westport, CT: Bergin & Garvey.

Rogers, E.M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.

Rubin, J. (1994). *The handbook of usability testing: How to plan, design, and conduct effective tests*. New York: John Wiley & Sons.

Rummler, G.A. (1999). Transforming organizations through human performance technology. In H.D. Stolovitch & E.J. Keeps (Eds.), *Handbook of human performance technology: Improving individual and organizational performance worldwide* (2nd ed.) (pp. 47-66). San Francisco: Jossey-Bass/Pfeiffer.

Ryder, M., & Wilson, B. (1997, March). *From center to periphery: Shifting agency in complex technical learning environments*. Paper presented at the meeting of the American Educational Research Association, Chicago. Retrieved May 27, 2005, from http://carbon.cudenver.edu/~mryder/coss.html

Sánchez, C.M. (2000). Performance improvement in international environments: Designing individual performance interventions to fit national cultures. *Performance Improvement Quarterly, 13*(2), 56-70.

Schaffer, S.P. (2000). A review of organizational and human performance frameworks. *Performance Improvement Quarterly, 13*(3), 220-243.

Schuller, T. (1995). *The changing university?* Buckingham, UK: The Society for Research into Higher Education.

Smith, M.F. (1991). Software *prototyping: Adoption, practice and management*. London: McGraw-Hill.

Sommerville, I. (2004). *Software engineering*. Boston: Pearson/Addison-Wesley.

Stolovitch, H.D., & Keeps, E.J. (1999). What is human performance technology? In H.D. Stolovitch & E.J. Keeps (Eds.), *Handbook of human performance technology: Improving individual and organizational performance worldwide* (2nd ed.) (pp. 3-23). San Francisco: Jossey-Bass/Pfeiffer.

Strauss, A. & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, Ca: Sage Publications.

Tessmer, M. (1998). Meeting with the SME to design multimedia exploration systems. *Educational Technology Research and Development, 46*(2), 79-95.

Thach, E., & Murphy, K. (1995). Competencies for distance education professionals. *Educational Technology Research and Development, 43*(1), 57-72.

Universiteit Twente (2000). *Instellingsplan 2000 - 2005* [Institutional plan 2000-2005]. Enschede: Universiteit Twente. Retrieved April 19, 2001, from http://www.utwente.nl/intra/informatie/meerjarenplannen/instellingsplan/instellingsplan.pdf

Van Cott, H.P. & Paramore, B. (1988).Task analysis. In S. Gael (Ed.), *The job analysis handbook for business, industry, and government* (pp. 651-671). New York: John Wiley.

Veen, J. van der. (2001). *Telematic support for group-based learning*. Doctoral dissertation, Faculty of Educational Science and Technology, University of Twente. Enschede: Twente University Press.

Veen, J. van der, Boer, W. de, & Collis, B. (2000). *Didactics for Web learning environments: Active learning*. Report for the SURF-TeleTOP Alpha-Beta Project. Enschede: University of Twente, DINKEL Institute.

Veen, J. van der, Collis, B. A., Diepen, J. van, & Andernach, T. (1997, August 13). *Implementing project-based tele-learning.* Presentation at ICTE '97, Oslo, Norway.

Veen, J. van der, Jones, V., & Collis, B. (2000). Using workflow for projects in higher education. *Journal of Computer Science Education, 10*(2), 17-26.

Weiss, J., & Wysocki, R. (1992). *5-Phase project management: A practical planning and implementation guide*. Reading, MA: Perseus Books.

Werkdruk te hoog [Pressure to perform too high]. (2001, December 20). UT-Nieuws, p. 3.

Wester, F.P.J. (1984). *De gefundeerde theorie-benadering: Een strategie voor kwalitatief onderzoek* [The grounded theory: A strategy for qualitative research]. Boxmeer: Heijnen.

Williams, R.S. (1998). *Performance management: Perspectives on employee performance*. London: International Thomson Business Press.

Wilmoth, F.S., Prigmore, C., & Bray, M. (2002). HPT models: An overview of the major models in the field. *Performance Improvement, 41*(8), 14-22.

Winefield, A.H., Gillespie, N., Stough, C., Dua, J., & Hapuararchchi, J. (2002). *Occupational stress in Australian universities: A national survey 2002*. Melbourne, Australia: National Tertiary Education Union. Retrieved on 2002, December 6, from http://www.nteu.org.au/freestyler/gui/files/file3d23b3832b491.pdf

Winnips, K. (2000). *Scaffolding-by-design: A model for WWW-based learner support*. Doctoral dissertation, Faculty of Educational Science and Technology, University of Twente.

Yin, R.K. (1994). *Case study research, design and methods* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Summary

Introduction

Students in higher education are more and more demanding flexibility to select courses within various curricula that fit their personal goals, and also flexibility in ways to participate in these courses. In addition, students have increasingly different types and levels of prior knowledge and want to attain different goals as a result of a programme or a course. This situation is re-enforced by part-time students who want to participate at a different pace than regular students. Instructors have to adapt to these new constraints and change their teaching accordingly.

The introduction of the Bachelor /Master structure in The Netherlands two years ago also initiated a process of major changes and renewal of current curricula. Study programmes and courses are being transformed to online versions and instructors have to adapt their work behaviour to offer their courses online and interact with students in an asynchronous way. The use of Course Management Systems (CMSs) such as *Blackboard* and *TeleTOP*, can greatly facilitate distance education and blended learning (Collis & Moonen, 2001), but instructors have to learn how best to offer their courses using such a system and become efficient at managing their time and teaching-related activities involving the system. In addition, tight budget constraints lead to increased accountability for faculty (Fisser, 2001). Chevaillier (2000) observes that "all the changes that have affected higher education systems in the last three decades around the world have inevitably had an impact on the working and living conditions of academics" (p. 28). In general, academics usually do not welcome such substantial changes with their accompanying risks and uncertainty (De Boer, 2003). Academics indicate that they feel stressed caused by increasing workloads and therefore sometimes leave the profession (Meyer, 1998) or do not want to invest time in developing new forms of education (Collis & Messing, 2001).

These observations lead to the initial problem statement for this research:

- *What are key aspects of academics' teaching-related performance that are coming under increased pressure in the changing university context?*
- *How can the individual academic stay in control of these pressures?*

Methodology and Conceptual Model

A multi-method research project has been running since the year 2000 to investigate how instructors can be supported when performing teaching-related activities in this climate of changing expectations. Key aspects of this study are described next.

General methodology

The methodology used in this research is based on the Human Performance Technology (HPT) methodology (Stolovitch & Keeps, 1999). Their HPT approach consists of a process to improve actual performance, with key phases as shown in Figure 1.

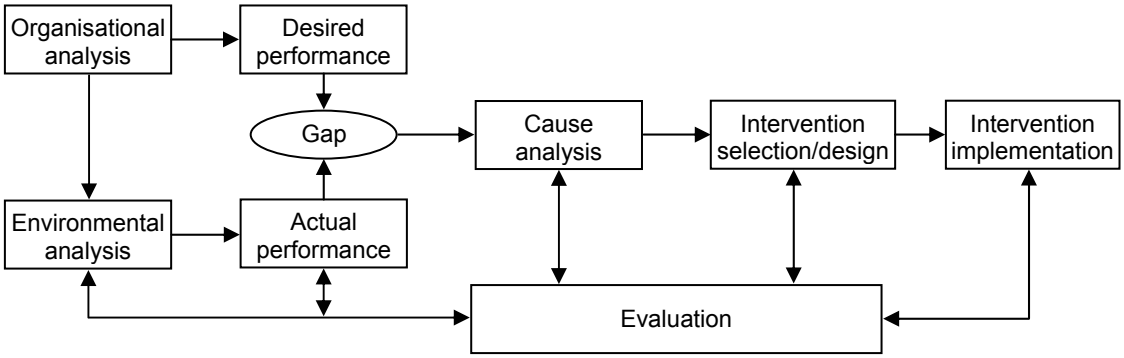


Figure 1. Simplified HPT model based on Stolovitch and Keeps (1999)

The HPT model (Figure 1) shows the order and interrelationships between the various key phases. It starts with an analysis of organisational aspects that influence expected desired performance, followed by an environmental analysis of factors that influence actual performance. Gaps between desired and actual performance and their causes will lead to the design and development of one or more interventions to be implemented in the organisation to improve individual performance. Evaluations guide this process and will continue after the implementation to further improve performance.

Within the HPT methodology the intervention-design step involves the application of another methodology, that of design research (Reeves, 2000). Design research involves iterative processes of design and development, with on-going input from members of the target group of the intervention, testing the intervention or a prototype of the intervention to some extent in practice and using the insights gained to improve the following iteration of the process. Like the HPT approach, design research starts with the analysis of a practical problem; however, the conclusion of a design-research process involves the production of "overall design principles that can inform other practitioners and researchers, and future development projects" (Reeves, Herrington, & Oliver, 2005) as well as the reduction of a particular local problem.

A final aspect of the methodology of this investigation is action research, particularly action research with the researchers as reflective practitioners (Ryder & Wilson, 1997). Action research emphasises an emergent process of on-going reflection, with the researcher deeply involved in striving for change in a situation at the same time as he or she studies the situation. In this investigation the researcher was himself involved in his own teaching-related activities throughout the research, and continually applied what was being observed from specific studies to his own practical situations, integrating the further insights that emerged.

Analysis of desired performance

The starting point for this research involved the formulation of a conceptual model for academics' performance. This evolved over a period of time via literature reviews, peer interactions, and conceptual modelling. For a full elaboration see this dissertation. Within the teaching task of academics, two major categories of activities can be distinguished for the conceptual model: teaching activities that are directly linked to student learning, such as delivery of face-to-face sessions; and teaching-related activities to manage and control the academic's personal performance, such as planning

and administration. Using a CMS makes these teaching-related activities a substantial part of instructors' work. A Personal Performance Model was developed to further analyse academic's performance and was the conclusion of the first steps of the HPT process (Figure 2).

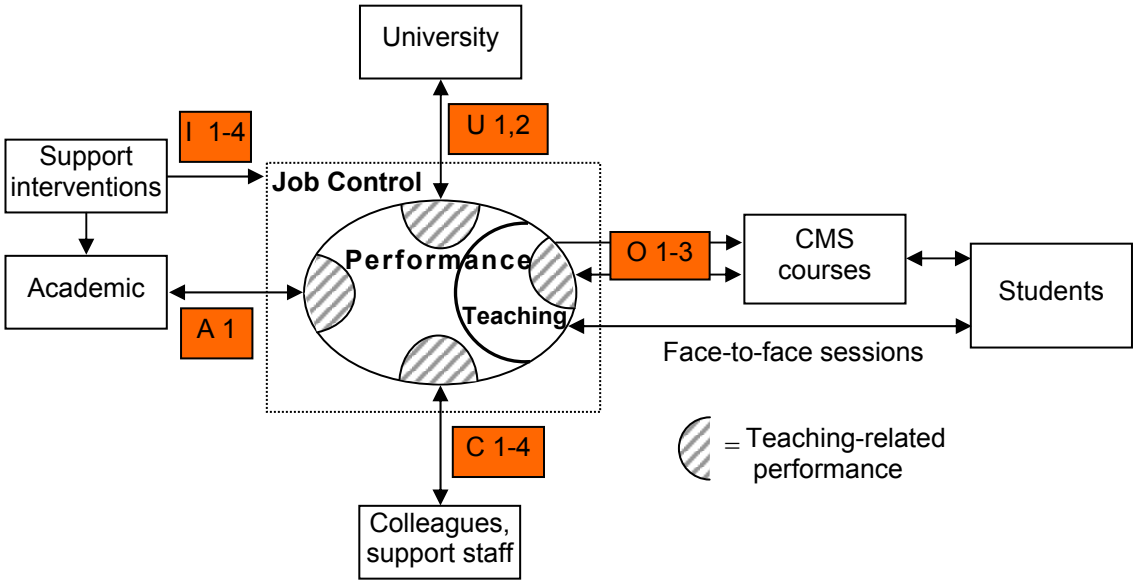


Figure 2. Personal Performance Model

Figure 2 shows the teaching-related performance of an individual academic in the context of his or her job, with work relations in four 'directions'. The first direction is a direct link between the personal characteristics of the individual academic and job performance. A second direction indicates academic's performance within a specific university context. A third direction indicates collaboration with colleagues and support staff, and a fourth direction indicates direct teaching, such as face-to-face sessions, combined with the teaching and management of online and blended courses within a CMS such as *Blackboard*. Being able to manage and control their own work within the dynamics of this model is an important way that academics can improve the efficiency and effectiveness of their personal performance.

Analysis of actual performance

As the next phase of this research, the HPT approach was used to analyse academics' actual teaching-related performance according to the four directions in the Personal Performance model. While the conceptual analysis identified desired performance, a series of studies was carried out to map actual performance, and identify gaps and their causes (Table 1).

Table 1. Overview of studies to analyse actual performance. (The codes used refer to the directions indicated in Figure 2)

Direction	Code	Study
Academic (A)	A1	Personal experiences of two instructors
Online courses (O)	O1	Pilot study to analyse instructors' activities when using *TeleTOP*
	O2	Pilot study to analyse log files of recorded *TeleTOP* use
	O3	Study to analyse *TeleTOP* courses and estimate instructor's time expenditures
Colleagues (C)	C1	Study to elicit instructors' opinions about teaching-related performance at the University of Twente
	C2	Study to elicit instructors' opinions about teaching-related performance at the CAH and STOAS (two other institutions of higher vocational education in The Netherlands)
	C3	International survey 'Models of technology and change': Instructors' questionnaire
	C4	International survey 'Models of technology and change': Support-staff questionnaire
University (U)	U1	Study of opinions of management about the demands of teaching-related activities at the University of Twente
	U2	International survey 'Models of technology and change': Decision makers' questionnaire

The results of these studies gave a basis for comparing the desired and actual personal performance of academics in terms of their teaching-related activities and identified potentially serious gaps in terms of maintaining control over time and task management. In the next sections, some of the studies shown in Table 1 will be discussed. Although only the study A1 indicates a specific self-investigation, the action-research approach underlying the project meant that all of the individual studies were critically related to the researcher's own on-going experiences in an on-going manner, to integrate the overall picture of actual performance that emerged.

Personal experiences (Study A1)

Study A1 involved a reflective analysis of the researcher and a colleague of their own experiences with changing expectations relating to teaching. Selected aspects of this analysis (Collis & Gervedink Nijhuis, 2000) are summarised here. In the year 1998, the Faculty of Educational Sciences developed a course-management system, called *TeleTOP*, that has since been used by almost all instructors at the University of Twente since then. The researcher and one colleague were the first users and they studied their own experiences carefully in order to help their colleagues and themselves. It turned out to be difficult to plan enough time to keep up with students sending in their assignments at irregular intervals, and to manage all the study material that became available for the students. It showed clearly the potential burden that management tasks place on the instructor to participate in new forms of education and make use of new technologies. Student assistants were available to help instructors, but only during office hours. Because of budget reasons this support soon disappeared. This put a large burden on instructors needing to manage all their teaching and teaching-related activities particularly those involved with responding individually to students via a CMS.

TeleTOP use analysis (Study O3)

Instructors use *TeleTOP* to develop a course by storing all relevant learning material and instructions in the *TeleTOP* database. During the delivery of their course, instructors add additional information to the course and interact with students, for instance by sending feedback on submitted assignments or by participating in online discussions. To get better insight in what time and tasks were involved, all the information contributed to the TeleTOP environments of courses in the Faculty of Educational Science and Technology by instructors over an entire academic year were analysed, and estimates were made about the time it took instructors to create these contributions (Gervedink Nijhuis, 2001; Gervedink Nijhuis & Collis, 2003). Among the results of these analyses are the following observations.

The average instructor's contributions to *TeleTOP* courses (*n*=51) show that almost two-thirds of the instructor's input per course occurs in the News, Course Info, and Roster elements. An "element" is an entry to a template that is saved and uploaded into *TeleTOP*. The Roster is a table-like template that supports an integrated way to offer a course schedule, and associated with each cell of the table, links to all course materials, assignment instructions, upload tools for assignments, and feedback and administration tools. Attachments can be added to these elements. Average numbers of contributions per element made by the instructors and time estimates for these contributions were calculated (Table 2).

Table 2. Average number of course elements contributed by instructors in TeleTOP and instructors' time involved

Course elements	**Average number per course**	**Mean hours per course**
Menu entries	7.9	1
Items /sub-items	72.6	3.6
Attachments	20.3	1.7
Text (total length in characters)	36,621	7.6
Total time for an 'average' course		13.9 hours

It should be emphasised that these time estimates (Table 2) relate exclusively to the use of the *TeleTOP* course environment itself, and not to the aspects of activities such as preparing study material, reading and grading students' submissions, or managing face-to-face sessions that take place outside of the CMS. This study showed that instructors used *TeleTOP* mainly for one-way communication (News, Course Info, and Roster) and that conversational interactions with students (Discussions, FAQs) were rare. With this approach, the use of *TeleTOP* was not very time consuming (13.9 hours per average course). This could imply that instructors may need extra support to become aware of *TeleTOP* facilities, especially for interactive use. However, a parallel study (Collis & Messing, 2001) indicated that instructors felt they were under too much time pressure to do more than a minimal level of course organization and (one-way) communication within *TeleTOP*.

International Survey (Studies C3, C4, and U2)

To study the actual time and task-management practices of instructors, samples of instructors both within the University of Twente and outside were used. For insights

outside the University of Twente an international survey was carried out in six European countries and Australia to investigate the current educational situation and changes that are occurring or will occur in the near future (Collis & Van der Wende, 2002). Decision makers, instructors, and support staff of over 300 universities were asked to fill out a questionnaire. Selected results in the portion of the study focussed on pressures on academics (Gervedink Nijhuis, 2002) are reported here. One of the questions was about the future situation of objectives of policy related to ICT (information and communication technology) and its impact on work and teaching (Table 3).

Table 3. Main objectives of ICT policies, international survey

ICT objective	**Instructors (*n*=347)**	**Decision makers (*n*=189)**	**Support staff (*n*=154)**	**Total (*N*=690)**
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Enhancing the quality of teaching and learning	4.14 (.87)	4.49 (.63)	4.17 (.84)	4.24 (.82)
Increasing efficiency	4.02 (.87)	4.03 (.85)	4.10 (.80)	4.04 (.85)
Enhancing flexibility	3.99 (.85)	4.31 (.80)	4.22 (.79)	4.13 (.84)
Enhancing cost-effectiveness	3.72 (1.04)	3.75 (1.03)	3.80 (1.05)	3.74 (1.04)
Creating more opportunities for lifelong learning	3.57 (1.00)	3.93 (.91)	3.69 (.99)	3.69 (.98)
Creating more opportunities for international students	3.56 (1.04)	3.55 (1.07)	3.59 (1.01)	3.56 (1.04)
Widening access to the traditional (18-24 year old) student base	3.48 (1.00)	3.86 (.94)	3.86 (.88)	3.67 (.98)

Note. Scale: 1=Low, 3=Moderate, 5=High.

Table 3 shows that all objectives for ICT use were valued higher than the rating of “moderate". Instructors indicated that in the future, increasing efficiency will be somewhat more important than enhancing flexibility. For most aspects the scores for the future situation were higher than for the current situation, which indicates that ICT use is expected to be even more important in the future than today, both for work and teaching.

When instructors know that using ICT use for teaching counts towards promotion and tenure or that using ICT is an integral part of regular staff assessment then these will be strong incentives to professionalize their use of ICT. In Table 4 an overview is given of the responses of instructors and decision makers about the presence of policy incentives related to ICT use.

Table 4. The role of ICT in staffing policy according to instructors and decision makers, international survey

Policy objective	**Instructors (*n*=347)**	**Decision makers (*n*=189)**
	M (*SD*)	*M* (*SD*)
ICT competencies are systematic criteria for selection and recruitment of new staff	2.50 (1.15)	2.85 (1.10)
ICT use in education is part of regular external quality assurance exercises	2.17 (1.11)	2.32 (1.11)
ICT use in education is an integral part of regular staff assessments	2.02 (1.13)	2.06 (1.04)
Professionalisation of staff in ICT competencies is mandatory	1.86 (1.09)	2.02 (1.10)
ICT use in education counts towards promotion and tenure	1.84 (1.03)	2.00 (1.05)
ICT use in education is mandatory	1.77 (1.13)	1.95 (1.22)
Financial incentives to individual staff are provided for development of ICT use in education	1.73 (1.04)	2.14 (1.18)

Note. Score: 1 = Not at all, 2 = a little, 3= some, 4= much, 5= very much**.**

As Table 4 shows, instructors indicated that they are more negative than decision-makers in their perceptions about policy incentives for ICT use in teaching. Especially the last four objectives, where the organisation can establish an active policy towards current staff, score very low (M<2.0). These results show that using ICT in education, for example through efficient and effective management of a course environment that is part of a CMS, does not yet receive attention in staffing policies and that the necessary incentives and rewards for staff to make the effort to handle a CMS in a well-managed way are lacking (Gervedink Nijhuis, 2002).

Instructors were also asked about their performance with regard to planning aspects (Table 5).

Table 5. Planning aspects of instructors, international survey

Planning aspect	**Instructors (*n*=347) *M* (*SD*)**
Desire to be well organised	4.26 (0.77)
Desire to be able to plan my time in advance	4.05 (0.90)
Planning tools, such as network-accessible agendas influence general teaching practice	2.05 (1.13)

Note. Score: 1 = Not at all, 2 = a little, 3= some, 4= much, 5= very much

As Table 5 shows, instructors want to be well organised and want to plan their time in advance. However, planning tools do not have much influence on teaching. This could imply that instructors can benefit from a planning tool that supports them to plan their time in advance.

Design of an Intervention

In accordance with the HPT approach interventions can be designed and implemented to eliminate gaps between desired and actual performance. After the desired and actual

personal performance of academics in their teaching-related tasks had been studied, a gap analysis was carried out and based on this, an intervention was designed, using design-research methodology (Reeves, 2000). In this research the intervention took the form of a series of prototypes of a Web-based support tool. These prototypes were designed, developed, and evaluated to lead to a final, elaborated prototype of a Personal Performance Support tool to support academics in their teaching-related activities. The last version of the prototype was accompanied by an implementation plan, indicating the institutional practices needed before such a tool could be of maximal value for instructors. An overview of the studies carried out relating to the intervention design and implementation is shown in Table 6.

Table 6. Overview of studies about intervention design and implementation

HPT phase	Code	Study
Intervention design	I1	Rudimentary version (Prototype 1): design, development, and evaluation
	I2	Basic version (Prototype 2): design, development, and evaluation
	I3	Enhanced version (Prototype 3): design, development, and evaluation
Intervention design and implementation plan	I4	Final version of a Personal Performance Support tool: design, development, and evaluation; PPST Implementation plan: design and evaluation

Prototypes of a personal performance support tool (Studies I 1-4)

As the workplace becomes increasingly complex, quick and accurate information processing becomes a competitive necessity. According to Winslow and Bramer (1994), as the rate of change accelerates, even experts may have to struggle to maintain their level of performance. To support and improve individual performance an Electronic Performance Support System (EPSS) can be used as a powerful intervention (Gery, 1991; Gery & Jezsik, 1999). Prototypes of an EPSS to support instructors were developed and evaluated to define the content and user-interface. At the same time, an 'analysis by synthesis' approach (Tessmer, 1998) was used to further analyse the potential usefulness of the tool within the organisation. The choice of features in the EPSSs and the organization of the interfaces were directly related to the results of the investigations of current practice (see Chapter 7 and 8 for a full description of the design processes used).

The first prototype offered a graphical overview of activities to perform to prepare and deliver teaching, and an advisory module to present the instructor with detailed planning information and time estimates (Figure 3).

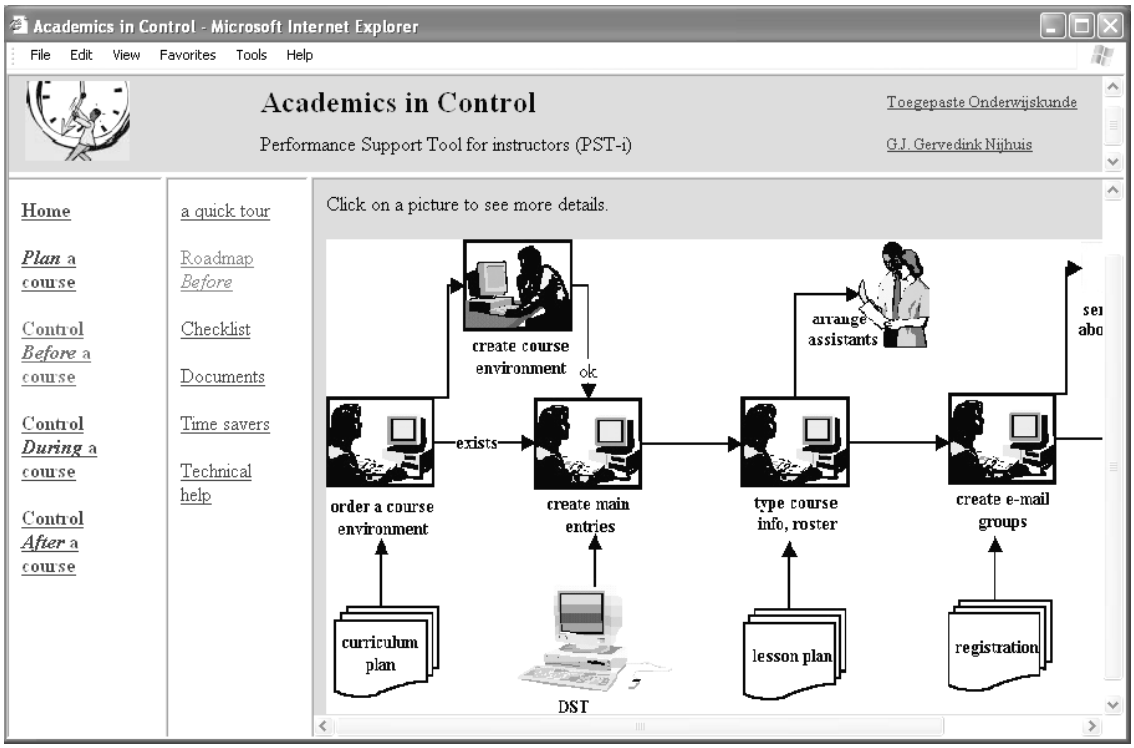


Figure 3. Screendump from the first prototype

Evaluations and interviews with instructors using this prototype were positive but showed that the respondents wanted a system that was not only for time planning but also for other task aspects, especially when using a CMS.

Based on this and other evaluation results a new series of prototypes was designed where instructors could use the system whenever they needed support not only for planning needs, but also for detailed support information, such as research articles, or a list of requirements per teaching-related activity. These prototyping cycles led to the final prototype of the research. One of the windows in this final version of the Personal Performance Support Tool (PPST) is shown in Figure 4.

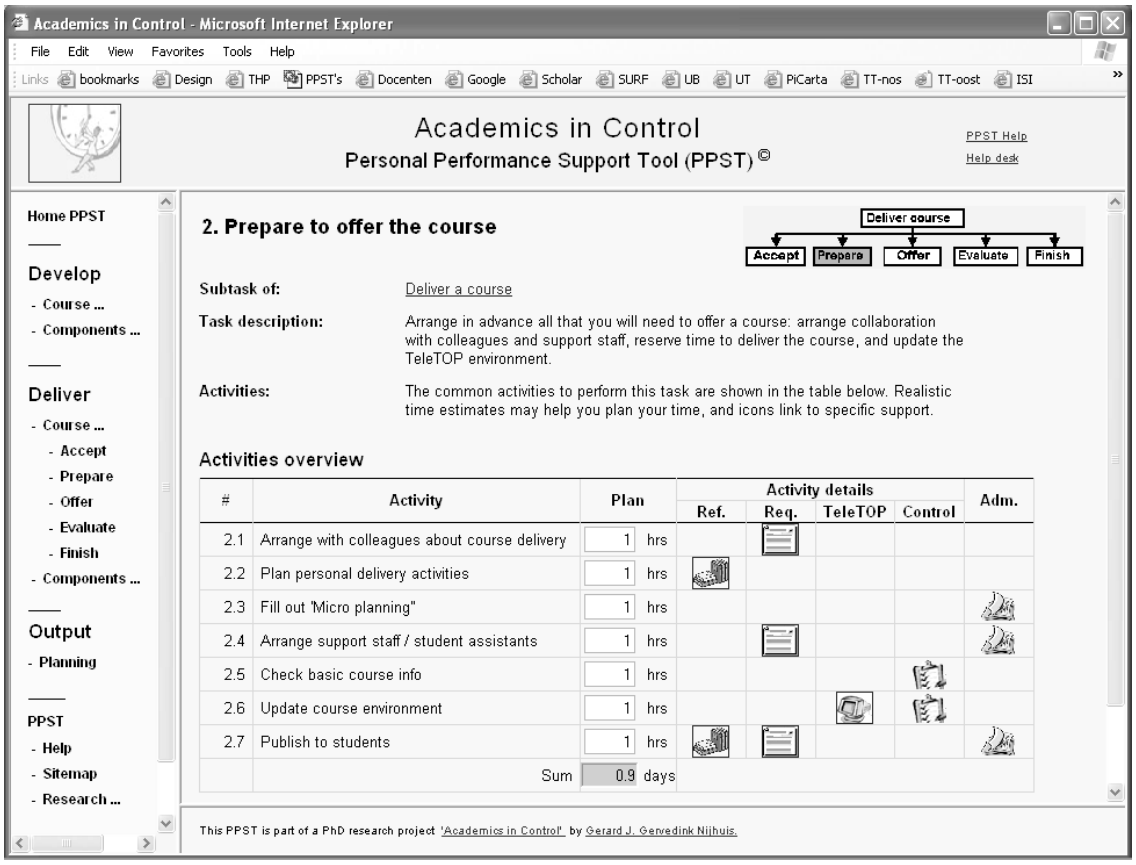


Figure 4. Screendump from the final prototype of the Personal Performance Support Tool.

The general appearance (Figure 4) of the interface of the final prototype consists of two main areas: a navigation bar at the left, where instructors can select major teaching-related tasks, and a large information window to present relevant task information. Each task starts with a short description and an introduction of the associated activity table. The activity table lists all activities involved in the task, in the most-appropriate order, showing per activity an estimate of the time needed to perform the activity, followed by activity details, and administrative support. Instructors can personalise the time estimates to reflect their personal work practice, and they can click icons to receive detailed activity information in a pop-up window. Activity details can be available per activity to show a) references ("Ref." in Figure 4) with links to research articles, b) lists of requirements (Req.), c) procedures for how to efficiently use *TeleTOP* for the activity, d) checklists for performance and quality control, and e) forms required by the faculty administrative related to the activity. As these activities and their details are shown in a table format, instructors can directly choose whatever information they need, but they can also more systematically go through these steps in sequence.

Implementation plan (Study I4)

This final version of the prototype was also used as an instrument to elicit information from instructors about the way such a system could be implemented at universities. Based on a synthesis of all of the individual studies, a model implementation plan was developed to prompt the instructors' reflections (Table 7).

Table 7. Key steps in a PPST Implementation Plan

Key steps	PPST aspects	Description
Analysis		Analyse the need to implement a PPST
Commitment		Management state their commitment and offer budget to implement this PPST, and also to effectuate day-to-day use
Prepare	Tasks and activities	Form a team of experienced online instructors at university or faculty level to adapt tasks and activities to common practice
	Plan	Adapt default-time estimates per activity to common practice.
	Ref.	Adapt references to research articles and reports to reflect the institution's own educational practice
	Req.	Adapt requirements to reflect organisational constraints and desired performance
	CMS	Adapt CMS procedures to reflect best practice
	Control	Adapt checklists to improve efficiency, effectiveness, and quality within the specific organisation
	Adm.	Adapt administrative procedures and forms to reflect common practice
Deploy	Access	Offer access to all users, such as instructors, support staff, and administrative personnel
	Instruct	Instruct all users during a workshop about this PPST and stimulate day-to-day use.
	Suggestions	Stimulate users to suggest new activities and add support material to improve the PPST

As shown in Table 7, the first step in the implementation process is to analyse and show the need for a Personal Performance Support tool for academics, followed by a clear commitment by university or faculty management to provide budget and stimulate effective day-to-day use. Then a team of experienced online instructors can be formed to guide the adaptation process of the tool to meet desired or actual educational and specific work procedures within their university. When the framework of major tasks, sub-tasks, and activities has been defined, activity details, specific to the particular university, can then be added or amended. When the system becomes operational, the users should be informed about how to access the PPST and during a workshop learn how to use the tool in their daily work. During regular use of the system, instructors can suggest amendments and additions to the system to improvement the usefulness of the tool.

An implementation plan was evaluated during interviews by 11 instructors, 3 directors of educational programmes, and 4 support-staff members. The results of evaluating this implementation plan suggest that this approach is very promising and will result in better support for instructors in many ways, both novice and experts. However, the implementation plan is a necessary but not sufficient condition. It represents the organisational-level support important to fill the PPST with documents and other materials relevant to the particular organisational setting. However, once such a tool is available the Deployment steps of the plan need further attention at the level of the instructor's own department or working group, the level at which instructors interact with each other in relation to their daily teaching-related duties. Here, the motivation that comes from bottom-up interactions with one's own colleagues takes place and the

opportunity to see the tool in action by one's officemate or personal colleague is critical to building a critical mass of use in practice.

During the evaluation of the final prototype of the PPST and the evaluation of the PPST Implementation Plan as shown in Table 7 evaluators made various suggestions to further improve the tool and the plan. Based on these findings an enhanced PPST Implementation Plan was developed (Table 8).

Table 8. Enhanced PPST Implementation Plan with new steps added to the original plan indicated.

Key steps	**New**	**PPST aspects**	**Description**
Analysis		Is there a need?	Analyse the need for a PPST and specific discrepancies between PPST and faculty culture / procedures
Plan	✓	Business plan	Write a business plan
Commitment		Get commitment	Let management state their commitment and offer budget to implement a PPST
Prepare		Tasks and activities	Form a team of experienced on-line instructors at university or faculty level to adapt tasks and activities to common practice
		Planning	Adapt default-time estimates per activity to common practice.
		Activity details:	
		- References	Adapt references to research articles and reports to reflect institution's own educational practice
		- Requirements	Adapt requirements to reflect organisational constraints and desired performance
		- TeleTOP	Adapt TeleTOP procedures to reflect best practice
		- Control	Adapt checklists to improve efficiency, effectiveness, and quality within the specific organisation
		- Administration	Adapt administrative procedures and forms to reflect common practice
	✓	Prototype testing	Implement and use the PPST in a small, closed setting
Deploy	✓	Propagate	PR push
		Access	Offer access to all instructors and novice instructors
		Instruct	Instruct users and novices who register during a workshop about this PPST and stimulate day-to-day use
	✓	Commitment	Let management stimulate effective day-to-day use
	✓	Enhance	Gradually enhance daily use, and then make it common practice
		Suggestions	Stimulate instructors and support staff to suggest new activities and add material to enhance and improve the PPST
Combine	✓	Combine with university systems and portals	Tune to other systems, such as TeleTOP and VIST, to prevent overlap and to improve overall efficiency.

The phases in the PPST Implementation plan can also be presented as a flowchart to show the interrelation between the various steps and the stakeholders involved (Figure 5).

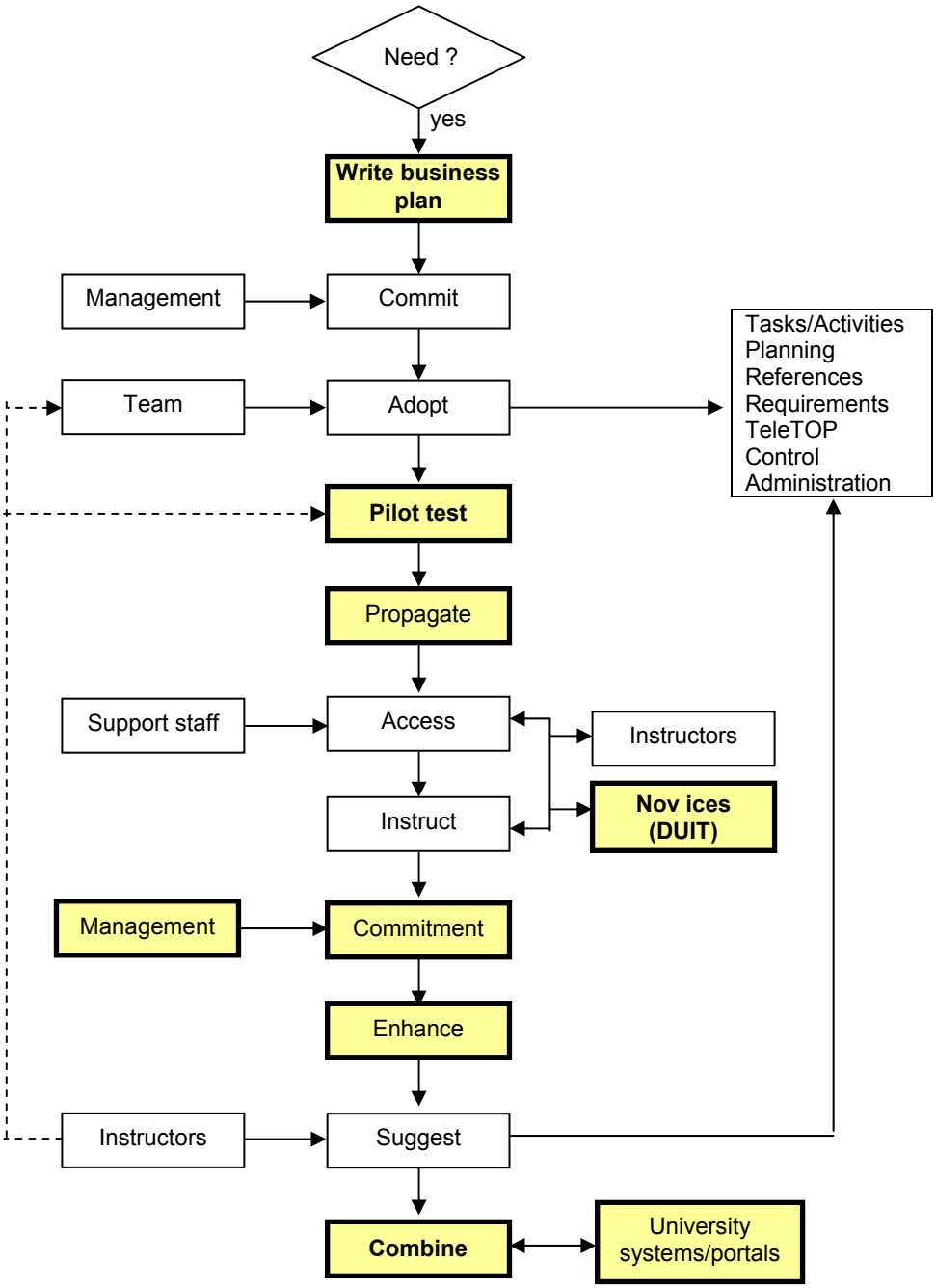


Figure 5. Enhanced PPST Implementation plan with major changes highlighted.

In both Table 8 and Figure 5 it can be seen that after a first analysis if the need to implement a support tool, a business plan should be written to offer clear insights in the financial and personnel consequences. Then after commitment by management and the adaptation of the tool to meet local practice the tool should be tested in a pilot to check its proper functioning in practice. Deployment in this enhanced plan starts with a PR push to propagate the benefits and convince instructors to try and use the PPST.

Compared to the previous version (Table 7) it was suggested by the evaluators to also involve novice instructors from the start so they can become familiar with the tool and then convince the laggards. Management should commit itself to stimulate daily use by instructors and also facilitate the enhancement of use with the organisation. When the PPST has become routine then the PPST should also be combined with other systems at university level for instance through a university or faculty-level portal. The information in various systems should be linked so instructors do not have to submit information twice and have easy access to all teaching-related information.

Based on final evaluation the Personal Performance Model of instructors was also amended to include additional aspects (Figure 6).

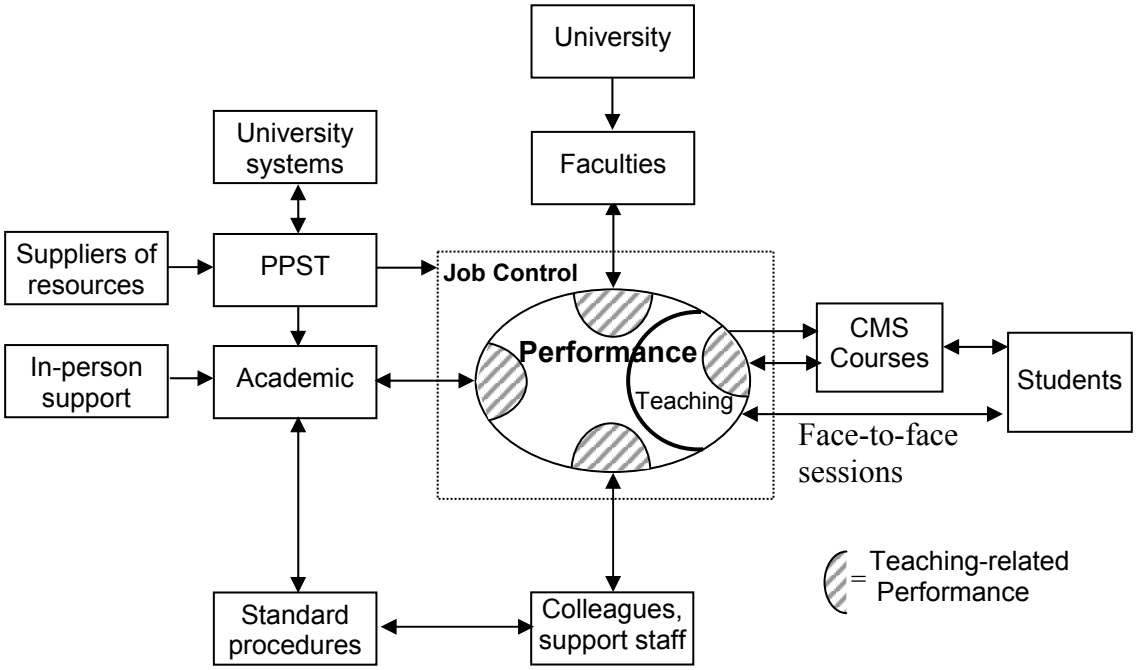


Figure 6. Enhanced Personal Performance Model for instructors.

In Figure 6 between university and performance the faculties are now added to indicate that within a university daily practice within various faculties will vary. A PPST should take this into account and be adapted to meet faculty-specific needs. To fill the PPST with useful resources various 'suppliers', such as directors of educational programmes, managers, a librarian, support staff, and others can supply documents, procedures, templates and more. Although the PPST can support academics all day, some instructors also appreciate in-person support when it is available. Between the individual academic and colleagues and support staff standard procedures are added to indicate that within workgroups procedures can facilitate easy workflow. Above the PPST the university systems are depicted to indicate that combining the PPST with other systems at university level, such as TeleTOP, can be promising to offer easy access and prevent double work.

Conclusion and Recommendations

Academics are under pressure because of entrepreneurial constraints, such as budgets and cost-oriented objectives, and educational demands, such as for more flexibility and for offering courses online or with online components. Based on the results of a series of studies of desired and actual performance, and evaluations of responses to a set of prototypes of a Personal Performance Support Tool, a final prototype version of the tool was developed to research the effects the tool can have on the performance and job satisfaction of academics, especially for their teaching-related activities. Results indicate that instructors are very positive in their evaluation of the system, but that a careful implementation process is essential to make this kind of support tool part of daily routine for instructors. A university can develop incentives for the use of this tool to increase the individual's personal control over teaching-related work processes and to improve the execution of administrative processes. Instructors will demand such a tool when pressure on them gets higher and educational demands lead to an overload of expectations. As both of these forces are building on the individual academic, this will increase the need for such a tool. Universities should start now to consider the implementation of such a personal performance support tool. In this way instructors can stay in control of their teaching-related performance. In line with design-research methodology, the research concludes with a series of guidelines and recommendations that can help this process of staying in control to occur.

The following list offers recommendations on how to support instructors for three distinct levels within a university: the organisational-management level, work-group management level, and the individual instructor level. This list is enhanced with recommendations for researchers of human performance and for designers of support systems for instructors.

Organisational-management level

Organisational management should pay more attention to the working conditions of instructors and commit themselves to offer substantial support to the performance of instructors. The following recommendations are offered to organisational management.

Recommendation 1
Management should specify teaching-related expectations, requirements, guidelines, and constraints in a more-explicit way to guide instructors to perform as desired by the organisation.

Recommendation 2
Management should recommend and stimulate the use of the Personal Performance Support Tool to support instructors to organise and manage their own work and stay in control, as teaching-related activities are becoming more manifest because of the intense use of course-management systems.

Recommendation 3
Management should provide instructors with templates and guidelines on how to fill and use a course-management system such as TeleTOP for consistent and effective use in practice.

Recommendation 4
Management should provide instructors with procedural checklists to stimulate the development and delivery of high-quality courses in an effective and efficient way.

Recommendation 5
Management should provide instructors with clearly stated administrative procedures, guidelines, and templates of reports and forms to streamline workflow and administrative procedures within faculties and workgroups.

Recommendation 6
Management should make some form of a Personal Performance Support Tool commonly available to instructors at the university or faculty level and should use an approach such as the PPST Implementation Plan a blueprint to localise the PPST and deploy and stimulate its use.

Work group-management level

In general instructors are appointed within a faculty and often work collaboratively with colleagues within workgroups or course teams. At the workgroup-management level group members should be facilitated in their teaching-related activities. The PPST can offer this support to streamline work procedures, group planning, and the use of common resources. The following three recommendations all embed the use of the PPST in a team / collegial approach and are aimed at stimulating the further deployment of planning and work procedures within workgroups as a bottom-up process to complement the top-down support offered by the organisational management.

Recommendation 7
Workgroup management and peers should stimulate the common use of a PPST to streamline common work procedures within a workgroup.

Recommendation 8
Workgroup management and peers should stimulate that relevant articles and background information specifically targeted at each workgroup are submitted to the PPST to create a common source of reference for teaching-related activities.

Recommendation 9
Workgroup management and peers should stimulate the use of checklists based on specific work-group practices to monitor workflow and high quality output.

Individual-instructor level

Instructors should be aware of their own responsibility and accountability towards their own performance as described in Chapter 2. They should organise and manage their work in a systematic way and seek support when needed. The following three recommendations reflect this.

Recommendation 10
Instructors should work in a systematic way, using a project-management work approach and define own personal-work procedures in order to control effective and efficient course preparation and delivery, taking into account their work-group and university constraints.

Recommendation 11
Instructors should plan their time in a systematic way not only for face-to-face sessions but more-and-more for teaching-related activities, for instance planning for time to submit feedback to assignments or time to participate in online discussions.

Recommendation 12
The individual instructor should optimise the organisation and management of his or her own work by using a tool such as the Personal Performance Support Tool for support.

Researchers in performance support

In this research a mix of research methods was used to analyse desired and actual performance of instructors and to select and design an appropriate intervention in the form of a Personal Performance Support Tool. This leads to Recommendations 13 and 14.

Recommendation 13
Researchers involved in performance support should consider the use of a Human Performance Technology approach combined with a design/development research methodology to design and develop interventions.

Recommendation 14
Researchers in performance support should consider an Action Research approach with the personal participation of the researcher in the research, in order to better understand instructors' problems and opportunities.

Designers of support systems

The major guideline for designers has been stated many times in the literature: involve the user as much as possible (Van den Akker, 1999; Moonen, 2002). The actual practice of the user should be mirrored in the system and should guide the way the system is designed and offered. This leads to the following set of recommendations directed to the designers of support systems.

Recommendation 15
Designers of support systems to improve instructor's performance should start by accommodating instructor's current performance and use this as the basis to lead and support instructors towards desired performance.

Recommendation 16
Designers of support systems for instructors should build in the possibility to easily tailor the system to a specific local context, such as a university, faculty, or work group.

Recommendation 17
Designers of support systems for instructors should offer maximum flexibility to the instructors to select a specific element they need when consulting the system, such as a time estimate, a work procedure, or an activity resource.

The research suggests that these recommendations when followed through will create a working context for instructors in which they can more efficiently perform their teaching-related activities and that a PPST-type tool will be available to support them to optimise their organisation and management of their own work and stay in control.

Samenvatting

Introductie

Studenten in het hoger onderwijs vragen steeds meer om flexibiliteit binnen curricula om vakken te kunnen kiezen die voldoen aan hun persoonlijke doelen en ook om flexibiliteit in de manier waarop ze kunnen participeren in deze vakken. Ook verschillen studenten onderling steeds meer wat betreft hun vooropleiding en voorkennis en willen ze met een onderwijsprogramma of een vak verschillende doelen bereiken. Deze situatie wordt versterkt door parttime studenten die in een ander tempo willen participeren dan de reguliere studenten. Docenten moeten daarom hun onderwijs aanpassen aan deze nieuwe randvoorwaarden.

De introductie twee jaar geleden van de Bachelor/Master structuur in Nederland initieerde een proces van belangrijke veranderingen en vernieuwingen in bestaande curricula. Onderwijsprogramma's en vakken worden geleidelijk omgezet naar online versies en om hun vakken online te kunnen aanbieden moeten de docenten hun manier van werken aanpassen en leren communiceren met studenten op een asynchrone manier. Het gebruik van Elektronische Leeromgevingen (ELO's) zoals Blackboard en TeleTOP kunnen afstandsonderwijs en "blended" leren (bijvoorbeeld een combinatie van klassikaal en online leren) in hoge mate faciliteren (Collis & Moonen, 2001), maar ook dan moeten docenten leren hoe ze hun vakken het beste kunnen aanbieden via een ELO en hoe ze hun tijd efficiënt kunnen managen met inbegrip van de onderwijs-gerelateerde activiteiten t.a.v. de inzet van een ELO. Bovendien leiden krappe budgetten ertoe dat docenten zich steeds meer moeten verantwoorden (Fisser, 2001). Chevaillier (2000) concludeert dan ook dat "alle veranderingen die het hoger onderwijs in de wereld de laatste tientallen jaren hebben beïnvloed onvermijdelijk hun invloed hebben gehad op de werk- en leefomstandigheden van academici" (p. 28). In het algemeen staan academici niet te wachten op dergelijke substantiële wijzigingen met de bijbehorende risico's en onzekerheden (De Boer, 2003). Academici geven aan dat ze zich gestresst voelen door de toenemende werkdruk en daardoor soms een andere baan zoeken (Meyer, 1998), of ze willen geen tijd investeren in het ontwikkelen van nieuwe onderwijs-vormen (Collis & Messing, 2001).

Uitgaande van deze overwegingen werd een initiële probleemstelling voor dit onderzoek geformuleerd:

- *Wat zijn de belangrijkste aspecten van de onderwijs-gerelatateerd performance*[1] *van academici die onder toenemende druk komen te staan door veranderende werkomstandigheden binnen de universiteit?*
- *Hoe kan een individuele docent ondanks deze druk zijn werk goed managen?*

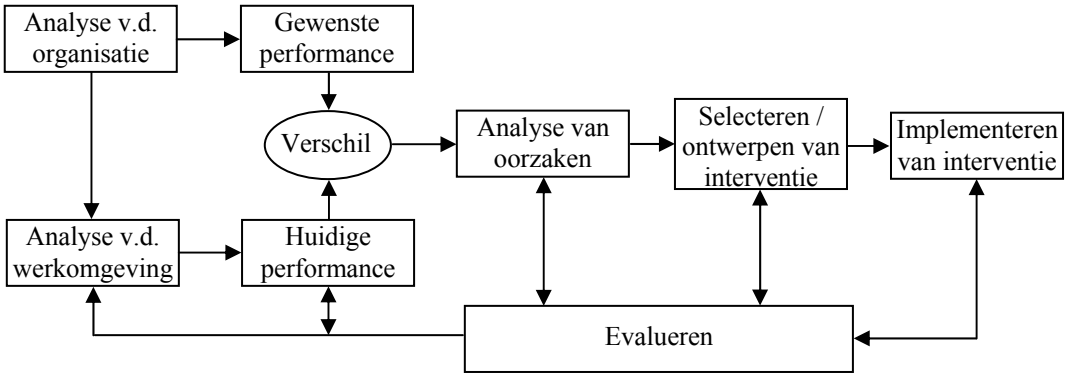
Methodologie en conceptueel model

Vanaf 2000 is een onderzoeksproject uitgevoerd waarbij meerdere methoden zijn gebruikt om te onderzoeken hoe docenten ondersteund kunnen worden bij het uitvoeren van onderwijs-gerelateerde activiteiten, gegeven een veranderend werkklimaat met hogere eisen en verwachtingen. De belangrijkste aspecten van dit onderzoek worden hierna samengevat.

[1] Met 'performance' wordt hier bedoeld: presteren; verrichten van werk.

Algemene methodologie

In dit onderzoek is gebruik gemaakt van de Human Performance Technology (HPT) methodologie (Stolovitch & Keeps, 1999). De HPT benadering om de performance van mensen of een organisatie te verbeteren, bestaat uit een proces waarvan de belangrijkste stappen worden weergegeven in Figuur 1.



Figuur 1. Vereenvoudigd HPT model gebaseerd op Stolovitch en Keeps (1999).

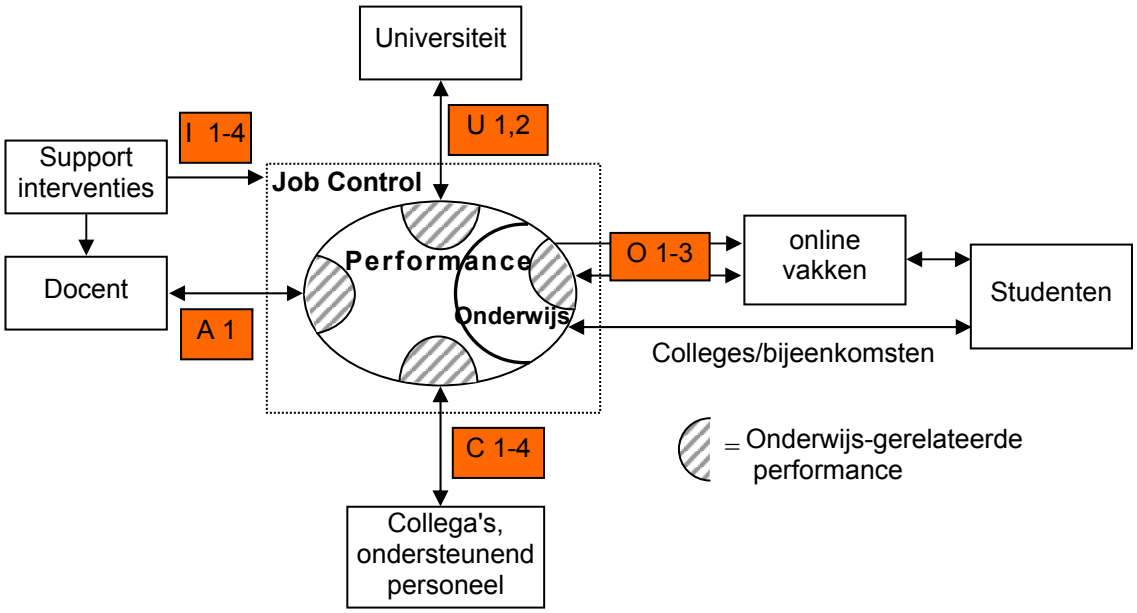
Het HPT model (Figuur 1) toont de volgorde en de onderlinge relaties tussen de belangrijkste stappen in het HPT proces. Het proces begint met een analyse van de organisatorische aspecten die invloed hebben op de gewenste performance en daarna een analyse van factoren die invloed hebben op de actuele performance. Verschillen tussen de gewenste en de huidige performance en de oorzaken daarvan vormen de basis voor het ontwerpen en ontwikkelen van één of meer interventies die geïmplementeerd kunnen worden in een organisatie om daarmee de individuele performance te verbeteren. Evaluaties worden uitgevoerd om dit proces te sturen en deze zullen ook na de implementatie doorgaan om de performance verder te verbeteren.

Bij het ontwerpen van de interventie is binnen de HPT benadering een aanvullende methodologie toegepast namelijk de 'design research' methodologie (Reeves, 2000). Design research bestaat o.a. uit een iteratief proces van ontwerpen en ontwikkelen, met voortdurend bijdragen vanuit de doelgroep die de interventie zal gaan gebruiken, daarna het testen in de praktijk (tot op zekere hoogte) van de interventie of een prototype ervan en vervolgens de verkregen inzichten weer gebruiken voor het ontwikkelen van een volgende, verbeterde versie. Net als bij de HPT benadering start design research met het analyseren van een praktisch probleem, maar de conclusie van een design research proces bestaat uit het produceren van "algemeen geldende principes die andere ontwerpers en onderzoekers kunnen gebruiken bij toekomstige ontwikkelprojecten" (Reeves, Herrington, & Oliver, 2005), naast het reduceren van een specifiek lokaal probleem.

Een laatste onderdeel van de in dit onderzoek gebruikte methodologie is 'action research' en meer in het bijzonder action research waarbij de onderzoeker actief deelneemt aan het te bestuderen proces (Ryder & Wilson, 1997). Action research benadrukt een proces van terugkerende reflectie, waarbij de onderzoeker direct betrokken is bij het streven naar een verandering van een situatie en daarbij tegelijkertijd de situatie bestudeert. In dit onderzoek voerde de onderzoeker zijn eigen onderwijs-gerelateerde activiteiten uit en integreerde daarbij steeds de bevindingen uit de uitgevoerde studies in zijn werk.

Analyse van de gewenste performance

Een eerste stap in dit onderzoek was het formuleren van een conceptueel model van de performance van academici. Dit model ontstond geleidelijk vanuit het bestuderen van de literatuur, de samenwerking met collega's en het modelleren van het concept. Binnen de onderwijstaak van docenten kunnen voor het conceptueel model twee belangrijke categorieën van activiteiten onderscheiden worden: onderwijsactiviteiten die direct gekoppeld zijn aan het leren door studenten, zoals het geven van colleges en het houden van bijeenkomsten, en onderwijsgerelateerde activiteiten om de eigen performance te managen en te controleren, zoals het plannen van tijd en het bijhouden van de administratie. Door de invoering van een ELO in het onderwijs worden deze onderwijs-gerelateerde activiteiten een wezenlijk onderdeel van het werk van docenten. Om de performance van academici verder te analyseren werd een Persoonlijk Performance Model (PPM) ontwikkeld en dat vormde de afronding van de eerste stappen in het HPT proces (Figuur 2).



Figuur 2. Persoonlijk Performance Model.

Figuur 2 toont de onderwijs-gerelateerde performance van een individuele docent in de context van zijn of haar taak, met werkrelaties in vier richtingen. De eerste richting is een directe koppeling tussen de persoonlijke eigenschappen van de individuele docent en de eigen performance. Een tweede richting is de performance van de docent binnen een specifieke universitaire context. Een derde richting is de samenwerking met collega's en ondersteund personeel en een vierde richting is het directe lesgeven, zoals colleges geven en bijeenkomsten houden, gecombineerd met het geven en managen van onderwijs via een ELO zoals bijvoorbeeld Blackboard of TeleTOP. Als docenten in staat zijn hun werk te managen en te controleren binnen de dynamiek van dit model is dat een belangrijke manier waarop academici de efficiëntie en effectiviteit van hun persoonlijke performance kunnen verbeteren.

Analyseren van de huidige performance

Bij de volgende stap in dit onderzoek werd de HPT benadering gebruikt om de huidige onderwijs-gerelateerde performance van docenten te analyseren volgens de vier richtingen in het Persoonlijk Performance Model. Een reeks studies werd uitgevoerd om de huidige performance te kunnen vergelijken met de gewenste situatie en om daarmee verschillen en mogelijke oorzaken te kunnen aantonen (Tabel 1).

Tabel 1: Overzicht van studies om de huidige performance te analyseren. (De codes verwijzen naar de richtingen in Figuur 2)

Richting	Code	Studie
Docent / Academicus (A)	A1	Persoonlijke ervaringen van twee docenten
Online vakken (O)	O1	Pilot-studie om docent activiteiten te analyseren bij gebruik van TeleTOP
	O2	Pilot-studie om log files van TeleTOP gebruik te analyseren
	O3	Studie om TeleTOP vakken te analyseren en om de bestede tijd van docenten in te schatten
Collega's (C)	C1	Studie om meningen van docenten te achterhalen over onderwijs-gerelateerde performance aan de Universiteit Twente
	C2	Studie om meningen van docenten te achterhalen over onderwijs-gerelateerde performance bij CAH and STOAS (twee instellingen voor agrarisch hoger onderwijs)
	C3	Internationale survey 'Models of technology and change': Vragenlijst voor docenten
	C4	Internationale survey 'Models of technology and change': Vragenlijst voor ondersteunend personeel
Universiteit (U)	U1	Studie naar meningen van managers over de eisen t.a.v. onderwijs-gerelateerde performance aan de Universiteit Twente
	U2	Internationale survey 'Models of technology and change': Vragenlijst voor beleidsbepalers

De resultaten van deze studies vormden de basis om de gewenste en huidige performance van docenten te kunnen vergelijken wat betreft hun onderwijs-gerelateerde activiteiten en daaruit kwamen een aantal serieuze verschillen naar voren wat betreft het managen van hun tijdsbesteding en hun taken. In de volgende secties worden enkele studies beschreven. Hoewel de onderzoeker alleen bij Studie A1 direct als onderwerp van studie fungeerde, was de 'action research' benadering de basis voor alle studies en werden de resultaten constant gerelateerd aan de eigen onderwijservaringen van de onderzoeker om daardoor beter in staat te zijn om de huidige performance van docenten te kunnen begrijpen.

Persoonlijke ervaringen (Studie A1)

Studie A1 was een reflectieve analyse van de onderzoeker en een collega van hun ervaringen met veranderende eisen en verwachtingen t.a.v. het uitvoeren van onderwijs. Bepaalde aspecten uit deze studie worden hier samengevat (Collis & Gervedink Nijhuis, 2000). In 1998 ontwikkelde de Faculteit Toegepaste Onderwijskunde (nu onderdeel van de Faculteit Gedragswetenschappen) een elektronische leeromgeving genaamd TeleTOP, dat sindsdien door bijna alle docenten van de Universiteit Twente gebruikt wordt. De onderzoeker en een collega waren de eerste gebruikers van het systeem en ze bestudeerden hun eigen ervaringen zorgvuldig om hun collega's en zichzelf te kunnen helpen. Het bleek dat het moeilijk was om genoeg tijd te plannen om

bij te blijven met de studenten die op onregelmatige tijden opdrachten instuurden en om al het studiemateriaal dat ze beschikbaar stelden aan de studenten te managen. Het werd duidelijk dat de managementtaken een potentiële last vormen voor de docent om te participeren in nieuwe onderwijsvormen en om gebruik te maken van nieuwe technologieën. Er waren wel student assistenten beschikbaar om docenten te helpen, maar alleen gedurende de normale werktijd. Vanwege budgettaire redenen werd deze ondersteuning al snel afgeschaft. Het is een zware belasting voor docenten om al hun onderwijs en onderwijs-gerelateerde activiteiten te managen, vooral voor docenten die op individuele basis via een ELO willen communiceren met studenten.

Analyse van het TeleTOP gebruik (Studie O3)

Docenten gebruiken TeleTOP om een vak te ontwikkelen en slaan al het noodzakelijk lesmateriaal en alle instructies op in de TeleTOP database. Gedurende het geven van het vak voegen docenten informatie toe aan het vak en interacteren ze met studenten, bijvoorbeeld door feedback te sturen over ingeleverde opdrachten of door deel te nemen aan online discussies. Om een beter inzicht te krijgen in de tijdsbesteding en de taken die uitgevoerd werden door de docenten werd alle informatie in TeleTOP van alle vakken van de Faculteit Toegepaste Onderwijskunde gedurende een geheel jaar geanalyseerd en op basis van deze tellingen werden schattingen gemaakt van de tijd die de docenten nodig hadden om deze bijdragen in TeleTOP te plaatsen (Gervedink Nijhuis, 2001a, 2001b; Gervedink Nijhuis & Collis, 2003). Enkele resultaten van deze analyses volgen hierna.

De gemiddelde bijdrage van docenten aan TeleTOP vakken (*n*=51) laat zien dat bijna tweederde van de invoer van een docent voor een vak gaat naar de onderdelen Nieuws, Info, en Rooster. Het Rooster heeft de vorm van een tabel die op een geïntegreerde manier een tijdschema van een vak laat zien en elke cel in de tabel kan weer verwijzen naar cursusmateriaal, opdracht-instructies, mogelijkheden om opdrachten in te leveren en feedback op opdrachten met eventueel een cijfer. Extra bijlagen (attachments) kunnen aan deze elementen toegevoegd worden. De gemiddelde bijdragen door de docenten per element werden berekend en daar werden tijdschattingen uit afgeleid (Tabel 2).

Tabel 2: Gemiddelde aantal cursus elementen toegevoegd door docenten in TeleTOP met de benodigde docent-tijd.

TeleTOP elementen	**Gemiddeld aantal per vak**	**Gemiddeld aantal docent-uren per vak**
Menu ingangen	7.9	1
Items /sub-ingangen	72.6	3.6
Bijlagen	20.3	1.7
Tekst (totale lengte in karkaters)	36,621	7.6
Totale tijd voor een ‘gemiddeld’ vak		13.9 uur

Deze tijdschattingen (Tabel 2) hebben alleen betrekking op het gebruik van de TeleTOP omgeving zelf en niet op activiteiten die plaatsvinden zonder gebruik te maken van TeleTOP, zoals het voorbereiden van studiemateriaal, het lezen en beoordelen van werk van studenten of het houden van colleges en bijeenkomsten. Uit deze studie blijkt dat docenten TeleTOP vooral gebruiken voor communicatie in één

richting (zoals Nieuws, Vak-informatie en Rooster) en dat interactie met studenten (zoals Discussies en Vraag/Antwoord) zelden wordt toegepast. Daardoor is het gebruik van TeleTOP niet erg tijdrovend (13.9 uur per gemiddeld vak). Hieruit zou kunnen worden afgeleid dat docenten meer ondersteuning nodig hebben om de mogelijkheden van TeleTOP te leren kennen, vooral ten aanzien van interactieve communicatie. Uit een andere studie (Collis & Messing, 2001) bleek dat docenten het gevoel hadden dat ze onder te grote tijdsdruk moesten werken om meer te doen dan een minimaal niveau van vakinvulling in TeleTOP en (eenzijdige) communicatie.

Internationale survey (Studies C3-4 en U2)

Om de werkelijke tijdsbesteding en de managementactiviteiten van docenten te bestuderen, werden zowel docenten van de Universiteit Twente als van elders benaderd (zie Hoofdstuk 5). Om inzicht te krijgen in de situatie buiten de Universiteit Twente werd een internationale survey gehouden in zes Europese landen en Australië om de huidige onderwijssituatie en de veranderingen die gaande zijn of in de naaste toekomst zullen plaatsvinden te onderzoeken (Collis & Van der Wende, 2002). Aan beleidsbepalers, docenten en ondersteunend personeel van meer dan 300 universiteiten werd gevraagd om een vragenlijst in te vullen. Enkele resultaten uit het deel van de studie dat gericht was op de druk die uitgeoefend wordt op docenten (Gervedink Nijhuis, 2002) worden hier weergegeven. Eén van de vragen ging over de toekomstige situatie van beleidsdoelstellingen gerelateerd aan ICT gebruik en de invloed ervan op het werk en het onderwijs (Tabel 3).

Tabel 3. Belangrijkste doelstellingen van ICT beleid, internationale survey

ICT doestelling	**Docenten (*n*=347)**	**Beleids-bepalers (*n*=189)**	**Onder-steunend personeel (*n*=154)**	**Totaal (*N*=690)**
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Kwaliteitsverhoging van doceren en leren	4.14 (.87)	4.49 (.63)	4.17 (.84)	4.24 (.82)
Vergroten van de efficiëntie	4.02 (.87)	4.03 (.85)	4.10 (.80)	4.04 (.85)
Vergroten van de flexibiliteit	3.99 (.85)	4.31 (.80)	4.22 (.79)	4.13 (.84)
Verbeteren van de verhouding kosten-baten	3.72 (1.04)	3.75 (1.03)	3.80 (1.05)	3.74 (1.04)
Meer mogelijkheden bieden voor leven-lang leren	3.57 (1.00)	3.93 (.91)	3.69 (.99)	3.69 (.98)
Meer mogelijkheden bieden voor internationale studenten	3.56 (1.04)	3.55 (1.07)	3.59 (1.01)	3.56 (1.04)
Verbreden van de toelating tot de traditionele studentenpopulatie (18-24 jarigen)	3.48 (1.00)	3.86 (.94)	3.86 (.88)	3.67 (.98)

Noot. Schaal: 1=Laag, 3=Gemiddeld, 5=Hoog.

Tabel 3 laat zien dat alle doelstellingen over ICT gebruik hoger dan "gemiddeld" werden gewaardeerd. Docenten gaven aan dat in de toekomst het vergroten van de efficiëntie nog iets belangrijker zal zijn dan het vergroten van de flexibiliteit. Bij de meeste aspecten waren de uitkomsten hoger voor de toekomstige situatie dan voor de huidige situatie waaruit afgeleid zou kunnen worden dat docenten verwachten dat ICT gebruik nog belangrijker zal worden dan het nu al is, zowel voor het werk in het algemeen als bij het verzorgen van onderwijs.

Als docenten weten dat als ze ICT gebruiken bij het uitvoeren van hun onderwijs dit meetelt voor bevordering of een vaste aanstelling, of dat het inzetten van ICT een

belangrijk onderdeel vormt bij hun beoordeling, dan zijn dit voor hen sterke drijfveren om hun ICT-gebruik te professionaliseren. Tabel 4 toont een overzicht van de antwoorden door docenten en beleidsbepalers over het huidige beleid om het ICT gebruik te stimuleren.

Tabel 4. De rol van ICT in het personeelsbeleid volgens docenten en beleidsbepalers, internationale survey

Doelstelling van beleid	**Docenten (*n*=347) *M* (*SD*)**	**Beleidsbepalers (*n*=189) *M* (*SD*)**
ICT competenties vormen essentiële criteria voor het selecteren en aanstellen van nieuw personeel	2.50 (1.15)	2.85 (1.10)
ICT-gebruik in het onderwijs is een aandachtspunt bij gebruikelijke externe kwaliteitscontroles	2.17 (1.11)	2.32 (1.11)
ICT-gebruik bij onderwijs is een integraal deel van de gebruikelijke functiebeoordelingen	2.02 (1.13)	2.06 (1.04)
Professionalisering in ICT-competenties is verplicht voor het personeel	1.86 (1.09)	2.02 (1.10)
ICT-gebruik bij onderwijs telt mee voor bevordering en vaste aanstelling	1.84 (1.03)	2.00 (1.05)
ICT-gebruik bij onderwijs is verplicht	1.77 (1.13)	1.95 (1.22)
Individuele medewerkers krijgen financiële prikkels om het ontwikkelen van ICT-gebruik bij onderwijs te stimuleren	1.73 (1.04)	2.14 (1.18)

Noot. Schaal: 1 = Helemaal niet, 2 = een beetje, 3= redelijk, 4= veel, 5= heel veel**.**

Zoals Tabel 4 laat zien geven docenten aan dat ze negatiever zijn in hun oordeel over de beleidsprikkels voor ICT-gebruik in het onderwijs dan beleidsbepalers. In het bijzonder de laatste vier doelstellingen waar de organisatie een actief beleid kan voeren gericht op het aanwezige personeel scoren erg laag (M<2.0). Deze resultaten tonen aan dat het gebruik van ICT in het onderwijs, bijvoorbeeld door het efficiënt en effectief managen van het gebruik van een vakomgeving (als onderdeel van een ELO), niet voldoende aandacht krijgt in het personeelsbeleid en dat de noodzakelijke prikkels en waarderingen voor docenten ontbreken om moeite te doen om een ELO op een goed georganiseerde manier te gebruiken (Gervedink Nijhuis, 2002).

Docenten werd ook gevraagd naar hun performance ten aanzien van planningaspecten (Tabel 5).

Tabel 5. Planningaspecten van docenten, internationale survey

Planning aspect	**Docenten (*n*=347) *M* (*SD*)**
Wens om alles op orde te hebben	4.26 (0.77)
Wens om eigen tijd van tevoren te kunnen plannen	4.05 (0.90)
Planning hulpmiddelen, zoals agenda's toegankelijk via een netwerk hebben invloed op de algemene onderwijspraktijk	2.05 (1.13)

Noot. Schaal: 1 = Helemaal niet, 2 = een beetje, 3= redelijk, 4= veel, 5= heel veel

Zoals Tabel 5 aangeeft willen docenten graag alles goed op orde hebben en willen ze graag hun eigen tijd vooraf kunnen plannen. Planninghulpmiddelen hebben echter weinig invloed op het verzorgen van onderwijs. Hieruit zou kunnen worden afgeleid dat docenten voordeel kunnen halen uit het gebruik van een planningsprogramma dat hen ondersteunt bij het plannen van hun tijd.

Ontwerpen van een interventie

Zoals aangegeven in de HPT benadering kunnen interventies worden ontworpen en geïmplementeerd om verschillen tussen gewenste en huidige performance te verkleinen. Nadat de gewenste en huidige persoonlijke performance van docenten ten aanzien van hun onderwijs-gerelateerde taken waren bestudeerd, werden de verschillen geanalyseerd en werd een interventie ontworpen gebaseerd op deze analyse, waarbij gebruik werd gemaakt van de 'design research' methodologie (Reeves, 2000). De interventie is in dit onderzoek uitgewerkt in een reeks prototypes in de vorm van een web-gebaseerd docent-ondersteunend programma. Deze prototypes werden ontworpen, gemaakt en geëvalueerd en dat leidde tot een uitgebreide eindversie van een Personal Performance Support tool (Persoonlijk Performance-Ondersteunend programma) om docenten te ondersteunen bij hun onderwijs-gerelateerde activiteiten. Bij de PPST werd ook een PPST implementatieplan ontwikkeld, waarin wordt aangegeven wat de organisatie moet doen, voordat een dergelijk systeem door de docenten optimaal benut kan worden. In Tabel 6 wordt een overzicht gegeven van de studies die werden uitgevoerd om een interventie en een implementatieplan te ontwikkelen.

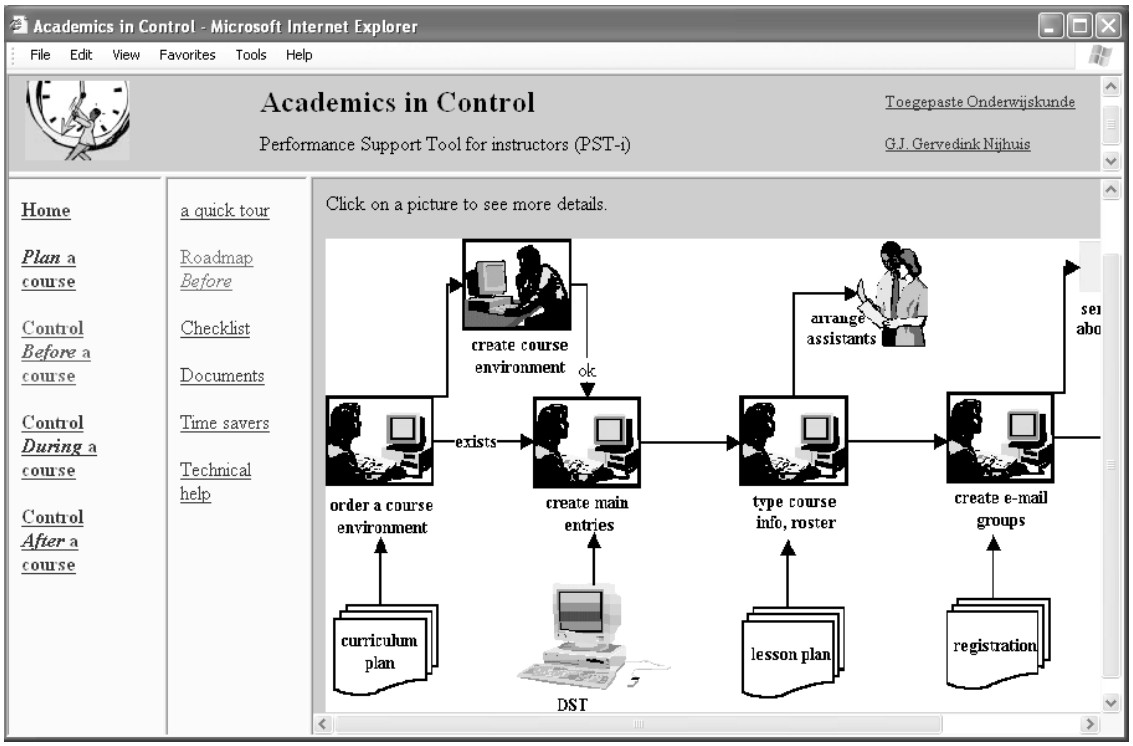
Tabel 6. Overzicht van studies om een interventie te ontwerpen en te implementeren

HPT fase	Code	Studie
Ontwikkelen van een interventie	I1	Rudimentair systeem (Prototype 1): ontwikkelen en evalueren
	I2	Basis systeem (Prototype 2): ontwikkelen en evalueren
	I3	Uitgebreidere versie (Prototype 3): ontwikkelen en evalueren
Ontwikkelen van eindversie en implementatieplan	I4	Eindversie van de Personal Performance Support Tool: ontwikkelen en evalueren; PPST Implementatieplan: ontwikkelen en evalueren

Prototypes van een Personal Performance Support Tool (Studies I 1-4)

Doordat de werkzaamheden van docenten steeds complexer worden, wordt de noodzaak tot snelle en accurate informatieverwerking van cruciaal belang en bij de steeds snellere veranderingen zullen zelfs experts moeite hebben om hun performance-niveau te handhaven. Om de individuele performance te ondersteunen en te verbeteren kan een Elektronisch Performance-Ondersteunend systeem (EPSS) gebruikt worden als een krachtige interventie (Gery, 1991; Gery & Jezsik, 1999). Prototypes van een EPSS om docenten te ondersteunen werden ontwikkeld en geëvalueerd om de inhoud en de gebruikersinterface te definiëren. Tegelijkertijd werd een 'analyse door synthese'-benadering gebruikt (Tessmer, 1998) om de verdere bruikbaarheid van de tool binnen de organisatie te analyseren. De keuzemogelijkheden in de EPSS prototypes en de structuur van de gebruikersinterface waren direct gerelateerd aan de uitkomsten van de studies naar de huidige praktijk (voor een volledige beschrijving zie Hoofdstukken 7 en 8 in dit proefschrift).

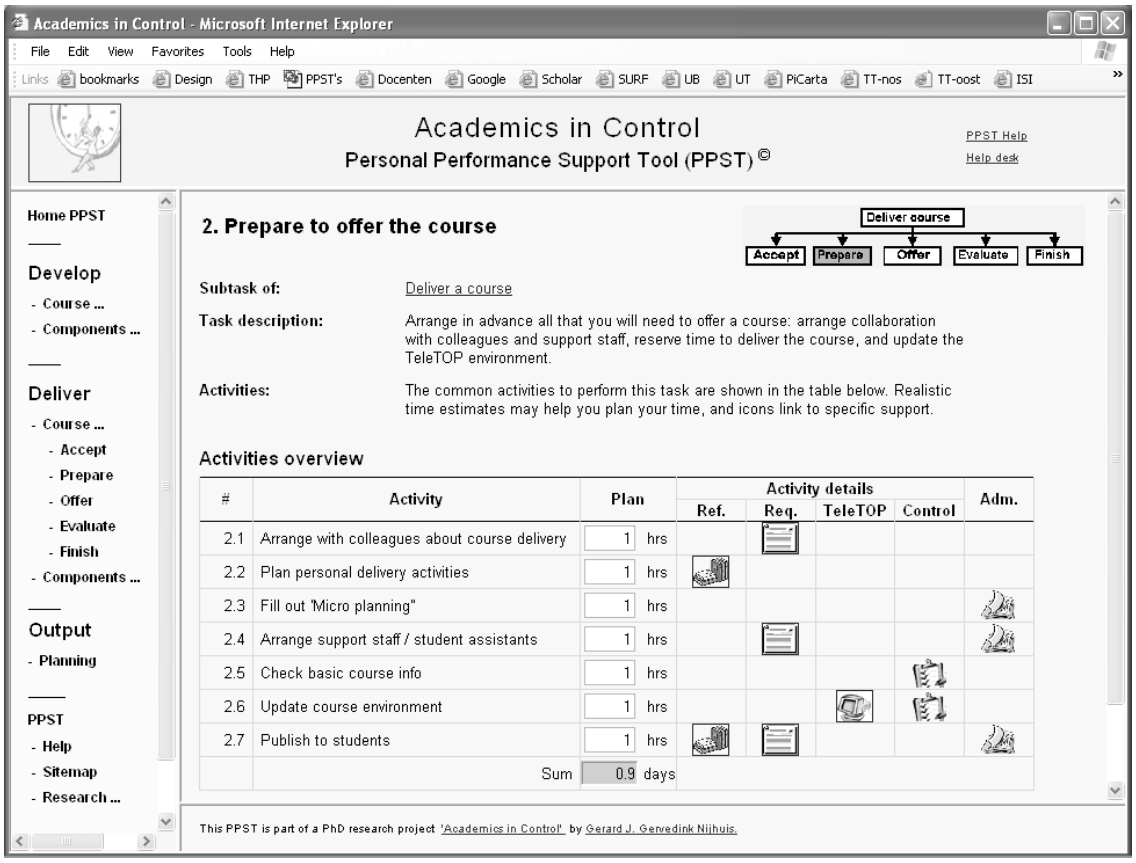
In het eerste prototype werd schematisch een overzicht gegeven van de activiteiten die de docent moet uitvoeren om het onderwijs voor te bereiden en uit te voeren, met een adviesmodule om de docent gedetailleerde planningsinformatie en tijdschattingen te kunnen geven (Figuur 3).



Figuur 3. Screendump van het eerste prototype.

Evaluaties en interviews met docenten waren positief maar ze toonden wel aan dat de gebruikers een systeem wilden dat niet alleen planningsinformatie zou geven maar ook andere taakonderdelen zou ondersteunen, bijvoorbeeld activiteiten speciaal gericht op het gebruik van een ELO.

Vanwege deze bevindingen en andere evaluatieresultaten werd een nieuwe reeks prototypes ontworpen met als uitgangspunt dat docenten het systeem zouden kunnen gebruiken steeds als ze ondersteuning nodig hebben, dus niet alleen voor planning maar ook voor gedetailleerde docent-ondersteunende informatie per onderwijs-gerelateerde activiteit, zoals wetenschappelijke artikelen, of een lijst van eisen en richtlijnen. Uiteindelijk leidde deze cyclus van het ontwikkelen van prototypes tot een eindversie. Eén van de schermen in de eindversie van de Personal Performance Support Tool (PPST) wordt weergegeven in Figuur 4.



Figuur 4. Screendump van de eindversie van de Personal Performance Support Tool voor docenten.

De algemene opmaak (Figuur 4) van de gebruikersinterface in het definitieve prototype bestaat uit twee hoofdvlakken: een navigatiebalk aan de linker kant waar docenten de belangrijkste onderwijs-gerelateerde taken kunnen kiezen en een informatief deel waar relevante taakinformatie wordt gepresenteerd. Elke taak begint met een korte beschrijving en een introductie van de bijbehorende activiteitentabel. De activiteitentabel geeft een overzicht van alle activiteiten binnen de taak in een volgorde die voor de uitvoering van de taak het meest voor de hand ligt, en vervolgens wordt per activiteit een tijdschatting gegeven met daarna detailinformatie behorende bij die activiteit. Docenten kunnen de tijdschattingen aanpassen aan hun eigen werkomstandigheden en ze kunnen klikken op iconen om detailinformatie in een extra venster te bekijken. Detailinformatie bij een activiteit kan bestaan uit a) verwijzingen naar artikelen ('Ref' in Figuur 4), b) richtlijnen ('Req'), c) procedures hoe TeleTOP het meest efficiënt gebruikt kan worden, d) checklists om de performance en de kwaliteit te controleren en e) administratieve formulieren. Doordat de activiteiten en de bijbehorende detailinformatie worden weergegeven in een tabel kunnen docenten direct selecteren welke informatie ze nodig hebben maar ze kunnen de stappen ook systematisch in de gewenste volgorde doorlopen.

Implementatieplan (Studie I4)

De eindversie van het prototype werd ook gebruikt als een onderzoeksinstrument om van docenten nadere informatie te verkrijgen hoe een dergelijk docent-ondersteunend systeem in universiteiten zou kunnen worden geïmplementeerd. Op basis van een

synthese van alle afzonderlijke studies werd een model van een implementatieplan ontwikkeld om voor te leggen aan docenten (Tabel 7).

Tabel 7. Belangrijke stappen in een PPST Implementatieplan

	Belangrijke stappen	**PPST aspecten**	**Omschrijving**
1	Analyse		Analyseren of het implementeren van een PPST zinvol is
2	Verplichting aangaan		Laat het management een duidelijke toezegging doen en een budget beschikbaar stellen om een PPST te implementeren en het dagelijks gebruik ervan te faciliteren
3	Voorbereiden	Taken en activiteiten	Samenstellen van een team van ervaren docenten w.b. ELO gebruik op universitair of facultair niveau om de taken en activiteiten (in de PPST) aan te passen aan de dagelijkse praktijk
		Planning	Aanpassen van tijdschattingen per activiteit aan de dagelijkse praktijk.
		Activiteiten details:	
		- Referenties	Aanpassen van verwijzingen naar artikelen en rapporten aan de onderwijspraktijk binnen het instituut
		- Eisen	Aanpassen van richtlijnen aan de organisatorische eisen en de gewenste performance
		- TeleTOP	Aanpassen van TeleTOP-procedures aan eigen ervaringen
		- Controle	Aanpassen van checklists om de efficiëntie, effectiviteit en kwaliteit van de eigen performance en van de organisatie te bevorderen
		- Administratie	Aanpassen van de administratieve procedures en formulieren aan de dagelijkse praktijk
4	Inzetten	Openstellen	Alle gebruikers toegang geven tot het systeem, zoals docenten, ondersteunend personeel en de administratie
		Instrueren	Instrueren van alle gebruikers tijdens een workshop over de PPST en stimuleren om het systeem dagelijks te gebruiken
		Suggesties	Stimuleren van gebruikers om voorstellen te doen voor nieuwe activiteiten en om ondersteunend materiaal aan de PPST toe te voegen

Zoals aangegeven in Tabel 7 is de eerste stap in het implementatieproces om te analyseren of er behoefte is aan een Personal Performance Support Tool voor docenten, waarna er een duidelijke toezegging moet zijn van het management van de universiteit of de faculteit om budgetten beschikbaar te stellen en om vervolgens het dagelijks gebruik te stimuleren. Daarna kan een team van ervaren online docenten gevormd worden om het aanpassingsproces te begeleiden om de tool aan te passen aan het huidige of gewenste onderwijsvormen en de specifieke werkprocedures binnen de eigen universiteit. Als het raamwerk van hoofdtaken, subtaken en activiteiten is vastgesteld kan alle detailinformatie bij de activiteiten worden toegevoegd of aangepast, toegespitst op de eigen universiteit of faculteit. Als het systeem operationeel wordt, moeten de docenten worden geïnformeerd over het toegang krijgen tot de PPST en in een workshop kunnen ze dan leren hoe ze de tool kunnen gebruiken bij hun dagelijks werk. Tijdens het routinematig gebruiken van de tool kunnen docenten suggesties doen voor aanpassingen en toevoegingen aan het systeem om daarmee de bruikbaarheid van de tool verder te verbeteren.

Tijdens interviews met 11 docenten, 3 opleidingsdirecteuren en 4 medewerkers ondersteunend personeel werd het PPST implementatieplan geëvalueerd. De resultaten

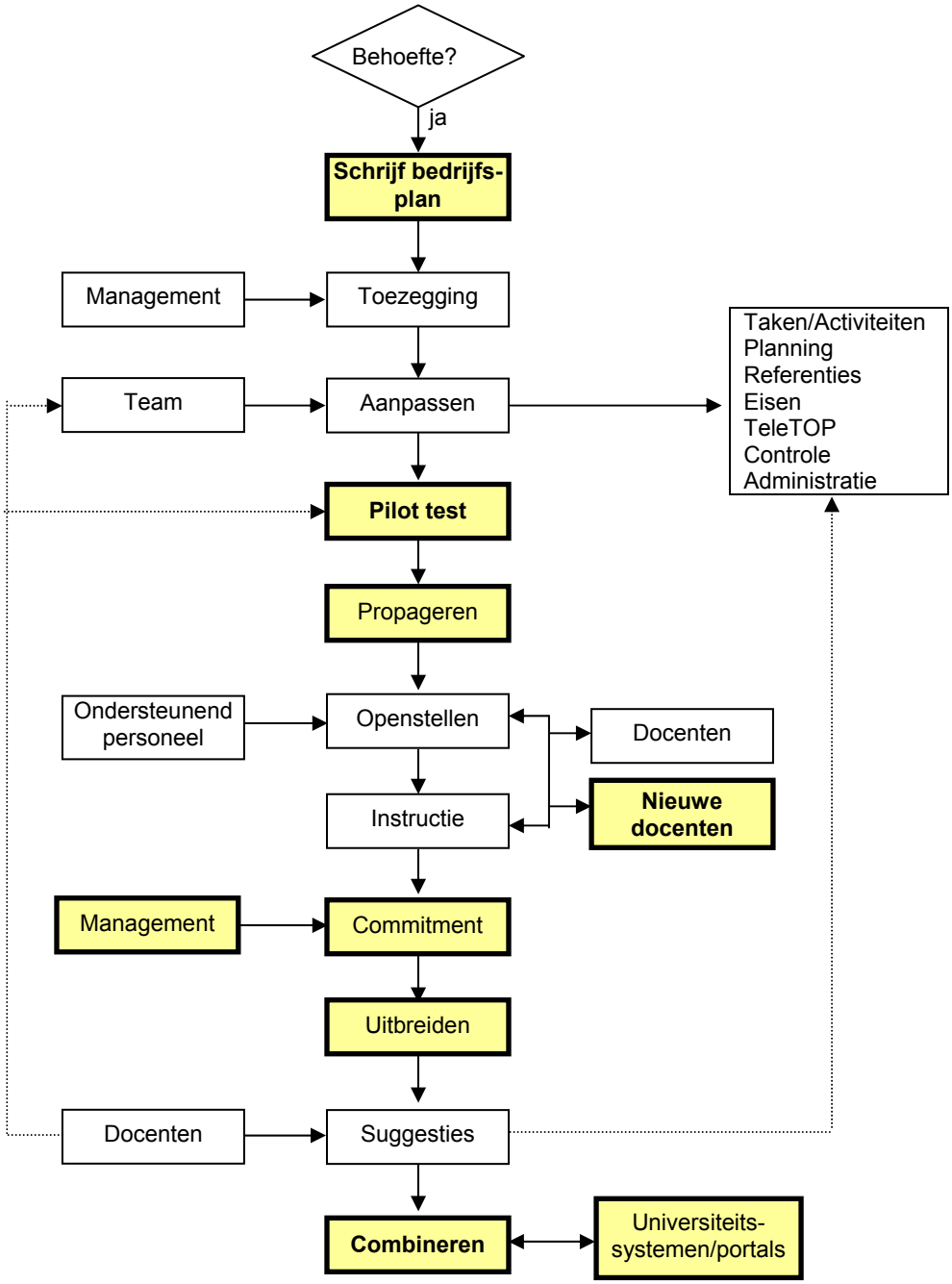
van deze evaluatie geven aan dat deze opzet veelbelovend is en dat het zal resulteren in betere ondersteuning van de docenten, zowel voor nieuwkomers als voor ervaren docenten. Maar het implementatieplan is een noodzakelijke maar niet voldoende voorwaarde. Het plan geeft de organisatorische kant van de ondersteuning aan, waarbij de PPST gevuld wordt met documenten en ander materiaal dat belangrijk is binnen de specifieke organisatorische context. Echter, zodra de tool in gebruik is genomen verdient de Úitrol'-fase extra aandacht op het niveau van de eigen afdeling of werkgroep van de docent, want dat is het niveau waarop docenten met elkaar samenwerken bij het uitvoeren van hun dagelijkse onderwijsactiviteiten. Uit de samenwerking met collega's die het systeem gebruiken, ontstaat er 'van onderaf' in de organisatie de motivatie om het systeem te gebruiken en kan er een kritische massa van gebruikers ontstaan.

Tijdens de evaluatie van de eindversie van de PPST en de evaluatie van het PPST implementatieplan (Tabel 7) gaven de deelnemers diverse suggesties om de tool en het plan verder te verbeteren. Op basis van deze bevindingen werd een uitgebreider PPST implementatieplan ontwikkeld (Tabel 8; zie volgende pagina).

Tabel 8. Uitgebreider PPST Implementatieplan waarbij de aanvullingen t.o.v. het eerdere plan worden aangeduid.

	Belangrijke stappen		**PPST aspecten**	**Omschrijving**
1	Analyse			Analyseren of het implementeren van een PPST zinvol is
2	Plan	✓	Bedrijfsplan	Schrijven van een bedrijfsplan
3	Verplichting aangaan			Laat het management een duidelijke toezegging doen en een budget beschikbaar stellen om een PPST te implementeren en het dagelijks gebruik ervan te faciliteren
4	Voorbereiden		Taken en activiteiten	Samenstellen van een team van ervaren docenten w.b. ELO gebruik op universitair of facultair niveau om de taken en activiteiten (in de PPST) aan te passen aan de dagelijkse praktijk
			Planning	Aanpassen van tijdschattingen per activiteit aan de dagelijkse praktijk.
			Activiteiten details:	
			-Referenties	Aanpassen van verwijzingen naar artikelen en rapporten aan de onderwijspraktijk binnen het instituut
			-Eisen	Aanpassen van richtlijnen aan de organisatorische eisen en de gewenste performance
			-TeleTOP	Aanpassen van TeleTOP-procedures aan eigen ervaringen
			-Controle	Aanpassen van checklists om de efficiëntie, effectiviteit en kwaliteit van de eigen performance en van de organisatie te bevorderen
			-Administratie	Aanpassen van de administratieve procedures en formulieren aan de dagelijkse praktijk
		✓	Testen	Implementeren en gebruiken van de PPST in een kleine, afgebakende omgeving
5	Inzetten	✓	Propageren	De mogelijkheden van de PPST intensief onder de aandacht brengen
			Openstellen	Alle gebruikers toegang geven tot het systeem, zoals docenten, ondersteunend personeel en de administratie
			Instrueren	Instrueren van alle gebruikers tijdens een workshop over de PPST en stimuleren om het systeem dagelijks te gebruiken
		✓	Verlichting aangaan	Zorgen dat het management het effectieve gebruik bij het dagelijks werk stimuleert
		✓	Uitbreiden	Geleidelijk het dagelijks gebruik uitbreiden en vervolgens als standaard invoeren
			Suggesties	Stimuleren van gebruikers om voorstellen te doen voor nieuwe activiteiten en om ondersteunend materiaal aan de PPST toe te voegen
6	Combineren	✓	Combineren met andere systemen en portals	Afstemmen met andere systemen binnen de universiteit zoals TeleTOP en VIST (database) om overlap te voorkomen en om de algehele efficiëntie te verbeteren

De fasen in het PPST implementatieplan kunnen ook schematisch als een structuurschema worden weergegeven waardoor de onderlinge relaties tussen de verschillende stappen en de direct betrokkenen zichtbaar worden (Figuur 5).

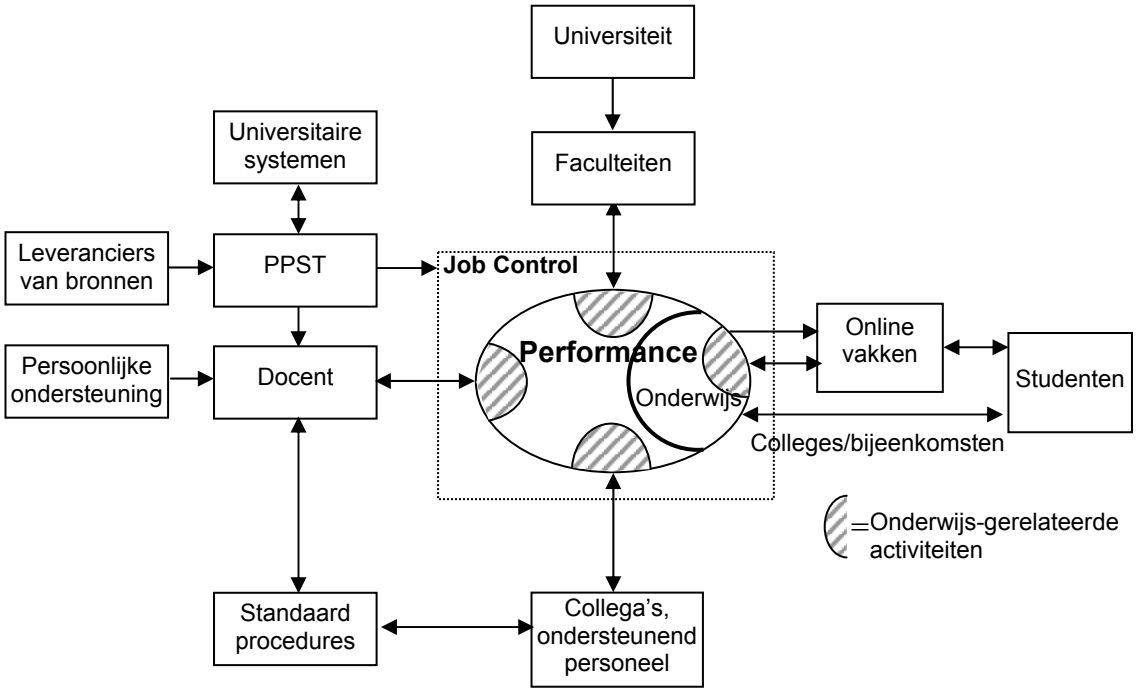


Figuur 5. Aangepast PPST implementatieplan waarbij de belangrijkste veranderingen zijn aangegeven.

Zowel in Tabel 8 als in Figuur 5 wordt aangegeven dat na het analyseren van de behoefte aan een ondersteunend systeem er een bedrijfsplan geschreven moet worden om duidelijk inzicht te krijgen in de financiële en personele consequenties. Na de toezegging van het management en het aanpassen van de tool aan de specifieke lokale werksituatie, moet de tool eerst uitgetest worden om te controleren of het systeem in de praktijk goed functioneert. Inzetten van het systeem begint in het aangepaste plan met een PR campagne om de voordelen te propageren en om de docenten te stimuleren om de PPST uit te proberen en bij hun werk te gebruiken. Als aanvulling op de vorige versie (Tabel 7) werd door de deelnemers de suggestie gedaan om vanaf het begin de

beginnende docenten erbij te betrekken zodat ze vertrouwd kunnen raken met het systeem en de andere docenten daarna over de streep kunnen trekken. Het management moet een duidelijke verplichting uitspreken om het dagelijks gebruik door docenten te stimuleren en ze de gelegenheid geven om het systeem uit te breiden. Als het gebruik van de PPST is ingeburgerd kan het ook gecombineerd worden met andere systemen in de organisatie, bijvoorbeeld door het op te nemen in een portal op universitair of facultair niveau. De informatie in de diverse systemen zou gekoppeld moeten worden opdat docenten niet tweemaal dezelfde informatie hoeven in te voeren en ze eenvoudig en snel toegang hebben tot alle onderwijs-gerelateerde informatie.

Op basis van de eindevaluatie werd het Persoonlijke Performance model voor docenten ook aangepast om er aanvullende aspecten in onder te brengen (Figuur 6).



Figuur 6. Uitgebreider Persoonlijk Performance model voor docenten.

In Figuur 6 zijn tussen de universiteit en de docent-performance de faculteiten toegevoegd om aan te geven dat binnen een universiteit de dagelijkse praktijk binnen de diverse faculteiten kan verschillen. Een PPST moet hier rekening mee houden en daarom afgestemd worden op specifieke behoeften per faculteit. Om de PPST te vullen met nuttige informatie kunnen "informatieleveranciers", zoals opleidingsdirecteuren, managers, en bibliotheek- en ander ondersteunend personeel documenten, procedures, voorbeelden en dergelijke aanleveren. Hoewel een PPST docenten kan ondersteunen, waarderen diverse docenten ook de persoonlijke ondersteuning als die aanwezig is. In het schema zijn tussen de individuele docent en de collega's en het ondersteunende personeel standaard procedures toegevoegd om aan te geven dat procedures de werkprocessen makkelijker kunnen maken. Boven de PPST zijn de universitaire systemen getekend om aan te geven dat het combineren van de PPST met andere universitaire systemen zoals TeleTOP nuttig kan zijn om de toegankelijkheid te bevorderen en dubbel werk te voorkomen.

Conclusies en aanbevelingen

Docenten staan onder druk vanwege toenemende financiële randvoorwaarden zoals strakke budgetten en kosten/baten analyses, en daarnaast toenemende eisen ten aanzien van hun onderwijs, zoals het bieden van meer flexibiliteit en het online aanbieden van vakken. Gebaseerd op de resultaten van een reeks studies naar de gewenste en huidige performance en na evaluaties van de reacties op een serie prototypes van een Personal Performance Support Tool, werd een eindversie van een prototype ontwikkeld om te onderzoeken welke effecten een dergelijk systeem kan hebben op de performance en de tevredenheid van docenten, in het bijzonder ten aanzien van hun onderwijs-gerelateerde activiteiten. Uit de resultaten van de evaluatie van het systeem blijkt dat de docenten zeer positief zijn, maar dat een goed voorbereid implementatieproces essentieel is om te zorgen dat docenten er dagelijks mee gaan werken. Universiteiten kunnen het gebruik van het systeem aanmoedigen om te bevorderen dat individuele docenten meer grip krijgen op hun onderwijs-gerelateerde activiteiten en dat administratieve processen beter verlopen. Als de druk op de docenten steeds groter wordt en de onderwijseisen leiden tot overdreven verwachtingen zullen ook docenten een dergelijk docent-ondersteunend systeem eisen. Doordat beide ontwikkelingen te maken hebben met de individuele docent zal de behoefte aan een ondersteunend systeem toenemen. Universiteiten zouden nu moeten beginnen met na te denken over de implementatie van een Personal Performance Support Tool. Op die manier kunnen docenten grip houden op hun onderwijs-gerelateerde performance. In overeenstemming met de ‘design research’ methodologie wordt dit onderzoek afgesloten met een aantal richtlijnen en aanbevelingen die ertoe kunnen bijdragen dat docenten grip houden op hun werk.

De volgende lijst geeft aanbevelingen voor het ondersteunen van docenten op drie organisatorische niveaus binnen een universiteit: het management van de organisatie, het management van een werkgroep en de individuele docent. Deze lijst wordt aangevuld met aanbevelingen voor onderzoekers van performance ondersteuning en voor ontwerpers van ondersteunende systemen.

Het management van de organisatie

Het management van een organisatie (universiteit of faculteit) zou meer aandacht moeten besteden aan de werkomstandigheden van docenten en zich verplichten om substantiële ondersteuning te bieden aan de performance van docenten. De volgende aanbevelingen zijn gericht op het management van een organisatie.

Aanbeveling 1
Het management zou de verwachtingen, eisen, richtlijnen en randvoorwaarden ten aanzien van onderwijs-gerelateerde activiteiten duidelijker kenbaar moeten maken om docenten te helpen om hun werk te kunnen uitvoeren zoals gewenst door de organisatie.

Aanbeveling 2
Het management zou het gebruik van de Personal Performance Support Tool moeten aanbevelen en stimuleren om docenten te ondersteunen bij het organiseren en managen van hun eigen werk en te zorgen dat docenten er grip op houden, vooral nu onderwijs-gerelateerde activiteiten steeds belangrijker worden vanwege het intensieve gebruik van Elektronische Leeromgevingen.

Aanbeveling 3
Het management zou docenten moeten voorzien van voorbeelden en richtlijnen wat betreft het vullen en gebruiken van een Elektronische Leeromgeving, zoals TeleTOP, om te zorgen voor een consistent en effectief gebruik ervan in het onderwijs.

Aanbeveling 4
Het management zou docenten moeten voorzien van procedurele checklists om ze te stimuleren om op een effectieve en efficiënte manier vakken van hoge kwaliteit te ontwikkelen en te verzorgen.

Aanbeveling 5
Het management zou docenten moeten voorzien van duidelijke administratieve procedures, richtlijnen, en voorbeelden van rapporten en formulieren om zodoende de workflow en administratieve procedures binnen de faculteiten en werkgroepen te stroomlijnen.

Aanbeveling 6
Het management zou op universitair of facultair niveau een Personal Performance Support Tool algemeen beschikbaar moeten stellen aan docenten en zou daarbij het PPST Implementatieplan kunnen gebruiken als een blauwdruk voor het aanpassen van het systeem aan de lokale omstandigheden en voor het inzetten en stimuleren van het gebruik.

Het management van een werkgroep

In het algemeen zijn docenten aangesteld bij een faculteit en daarbinnen werken ze vaak samen met collega's in werkgroepen of in docententeams voor bepaalde vakken. Vanuit het management van een werkgroep moeten docenten gefaciliteerd worden bij het uitvoeren van hun onderwijs-gerelateerde activiteiten. De PPST kan deze ondersteuning bieden om werkprocedures, groepsplanningen en het gebruik van gezamenlijke documenten te stroomlijnen. De volgende drie aanbevelingen hebben betrekking op het gebruik van een PPST in een werkgroep of andere collegiale samenwerking. Ze zijn gericht op de verdere inbedding van plannings- en werkprocedures binnen werkgroepen, als een proces dat ‘van onderaf’ de ondersteuning verzorgt en complementair is aan het ‘van bovenaf’ ondersteunen door het management van de organisatie.

Aanbeveling 7
Het werkgroepmanagement zou het dagelijks gebruik van een PPST moeten stimuleren om daarmee de algemene werkprocedures binnen een werkgroep te stroomlijnen.

Aanbeveling 8
Het werkgroepmanagement zou moeten stimuleren dat relevante artikelen en achtergrond informatie, specifiek gericht op de groep, toegevoegd worden aan de PPST om zodoende een algemene bron van informatie te creëren wat betreft onderwijs-gerelateerde activiteiten.

Aanbeveling 9
Het werkgroepmanagement zou het gebruik van checklists, gebaseerd op de specifieke werkcultuur binnen de groep, moeten stimuleren om de workflow en de hoge kwaliteit van de output te bewaken.

De individuele docent

Docenten moeten zich bewust zijn van hun eigen verantwoordelijkheid en het afleggen van verantwoordelijkheid over hun eigen performance, zoals beschreven in Hoofdstuk 2. Ze moeten hun werk op een systematische manier organiseren en managen en indien nodig ondersteuning zoeken. De volgende drie aanbevelingen hebben hierop betrekking.

Aanbeveling 10
Docenten dienen hun werk op een systematische manier uit te voeren met behulp van project-management en het definiëren van eigen individuele werkprocedures, om zodoende het voorbereiden en verzorgen van vakken efficiënt en effectief in de hand te houden, binnen de randvoorwaarden van de werkgroep en de organisatie.

Aanbeveling 11
Docenten dienen hun tijd op een systematische manier te plannen, met naast de colleges en bijeenkomsten met studenten ook steeds meer de onderwijs-gerelateerde activiteiten, zoals het reserveren van tijd voor het geven van feedback op ingeleverde opdrachten of voor het deelnemen aan online discussies.

Aanbeveling 12
Een individuele docent zou het organiseren en managen van zijn eigen werk kunnen optimaliseren door gebruik te maken van een Personal Performance Support Tool voor extra ondersteuning.

Onderzoekers van performance ondersteuning

In dit onderzoek zijn diverse onderzoeksmethoden gebruikt om de gewenste en huidige performance van docenten te analyseren en om een geschikte interventie te selecteren en te ontwikkelen in de vorm van een Personal Performance Support Tool. Hieruit zijn aanbevelingen 13 en 14 voortgekomen.

Aanbeveling 13
Onderzoekers van performance ondersteuning zouden het gebruik van een ‘Human Performance Technology’(HPT)-benadering moeten overwegen, gecombineerd met een ‘design/development research’-methodologie voor het ontwerpen en ontwikkelen van interventies.

Aanbeveling 14
Onderzoekers van performance ondersteuning zouden een 'Action research'-benadering moeten overwegen waarbij de onderzoeker persoonlijk deelneemt aan het onderzoek, om zodoende de problemen en mogelijkheden van docenten beter te begrijpen.

Ontwerpers van ondersteunende systemen

De belangrijkste aanbeveling voor ontwerpers is al vele malen aangegeven in de wetenschappelijke literatuur: Betrek zo veel mogelijk de gebruikers erbij (Van den Akker, 1999; Moonen, 2002). De dagelijkse praktijk van de gebruiker zou weerspiegeld moeten worden in het systeem en zou als richtlijn moeten gelden bij het ontwerpen en het beschikbaar stellen van een systeem aan de gebruiker. De volgende aanbevelingen zijn gericht op de ontwerpers van ondersteunende systemen.

Aanbeveling 15
Ontwerpers van ondersteunende systemen voor het verbeteren van de docent-performance zouden moeten beginnen met het faciliteren van de huidige performance en dit gebruiken als basis voor het toewerken naar en ondersteunen van de gewenste performance.

Aanbeveling 16
Ontwerpers van ondersteunende systemen voor docenten zouden moeten zorgen dat het systeem de mogelijkheid biedt om het systeem gemakkelijk aan te passen aan de specifieke lokale omstandigheden, zoals een universitaire, facultaire, of werkgroep context.

Aanbeveling 17
Ontwerpers van ondersteunende systemen voor docenten zouden maximale flexibiliteit moeten bieden om specifieke onderdelen te kunnen selecteren die een docent op dat moment nodig heeft, zoals een tijdschatting, een werkprocedure of een document.

Dit onderzoek laat zien dat als deze aanbevelingen worden opgevolgd er voor docenten een werksituatie kan ontstaan waarin ze efficiënter hun onderwijs-gerelateerde activiteiten kunnen uitvoeren met een Personal Performance Support Tool om hen te ondersteunen om het organiseren en managen van hun werk te optimaliseren en er zo grip op te houden.

Curriculum Vitae

Gerard Gervedink Nijhuis was born and raised in Bathmen. After finishing secondary education (ULO) in Holten and in Deventer (HBS), he started his ICT career. From 1968 till 1969 he worked as a programmer at the Smit Electrotechnische Fabrieken (transformer manufacturer) in Nijmegen. In 1969 he continued his career as a programmer in the University library at the University of Twente. The administrative processes were computerised, but his main target was to digitalise the card-based book catalogue. In the beginning the output was printed on cards and added to the card catalogue, but later the whole catalogue was computerised and produced on microfiche. In 1980 he started at the Faculty of Educational Science and Technology (now part of the Faculty of Behavioural Sciences) as an ICT expert within the TOlab (media laboratory) and gradually also as a part-time manager. He then became manager of the 'Computer Section' and was more and more involved in using computers and the Internet for teaching and learning. In 1993 he graduated as Master of Science in knowledge engineering at the University of Middlesex, UK.
In 1996 he started to work in the Department of Educational Instrumentation at the Faculty of Educational Science and Technology as assistant instructor, and gradually became an instructor. In his research he focuses on models of performance improvement in higher education, performance support systems, and the implementation of technology in higher education. His PhD research started at the end of 2000 and after a period of grief because of the death of his father in law, he worked enthusiastically to find ways to support instructors. Striving for the efficiency improvement of instructors, especially from the viewpoint of the instructors themselves, has since then dominated his life. For a more-detailed overview of his work and background see http://users.gw.utwente.nl/gervedink.

Appendices

Appendix 1: Questionnaire (Study O1)

Versie: 04/10/2001 16:26:32

Enquête Toegepaste Onderwijskunde

Voor het D2 vak *Onderzoeksopdracht* (faculteit Toegepaste Onderwijskunde) wordt een onderzoek uitgevoerd naar de tijdsbesteding en werkdruk van docenten die verbonden zijn aan een universiteit. De aandacht gaat daarbij vooral uit naar onderwijsactiviteiten. Doel van het onderzoek is het in kaart brengen van eventuele problemen en ergernissen die docenten ervaren bij het uitvoeren van hun onderwijsactiviteiten. Daarnaast wordt er geïnventariseerd welke ondersteuningsbehoeften er bestaan bij docenten.

Dit onderzoek is tevens een pilot voor het promotieonderzoek van de heer G.J. Gervedink Nijhuis (faculteit Toegepaste Onderwijskunde, afdeling Instrumentatietechnologie) naar "Time and workload problems of academics when using ICT, in particular WWW-based course management systems". Tijdens het promotieonderzoek zullen de resultaten van dit onderzoek gebruikt worden om te onderzoeken op welke manier aan docenten ondersteuning kan worden geboden opdat het werk van docenten efficiënter kan worden uitgevoerd en de arbeidssatisfactie mogelijk verbetert.

Deze enquête is opgesplitst in deel A, B en C. Het doorlopen van deze enquête duurt ongeveer 15 tot 20 minuten. De gegevens die u in deze enquête invult zullen niet aan uw naam gekoppeld worden. Sommige begrippen in de enquête worden toegelicht. Deze begrippen zijn te herkennen aan het vraagteken-icoon. Wanneer u de cursor op dit icoon houdt, verschijnt de toelichting op het scherm. Deze enquête kunt u retourneren door op de *Verstuur* knop onderaan de enquête te klikken. Hiervoor dient een werkend e-mailaccount op uw computer geïnstalleerd te zijn.

Deel A - Onderwijscontext

Dit deel is bedoeld om feitelijke informatie en inzicht te krijgen in de onderwijsactiviteiten van docenten. Neemt u bij het beantwoorden van de onderstaande vragen uw laatst gegeven vak in gedachten. Waren dat er meer dan één, neemt u dan het meest omvangrijke vak in gedachten.

1. Wat is de naam van het vak dat u bij de volgende vragen in gedachten neemt?

2. Voor welk studiejaar werd het vak gegeven?

selecteer

3. Uit hoeveel studiepunten (SP) bestond het vak?

selecteer SP

4. Hoe vaak hebt u het vak gegeven?

selecteer keer

5. Werd het vak in een elektronische leeromgeving aangeboden?
Zo ja, hoe vaak is het vak gegeven in deze omgeving?

- Ja, selecteer keer in totaal gegeven in een elektronische leeromgeving
- Nee

6. Wat was de aard van het vak?

Theoretisch		Even theoretisch als praktisch		Praktisch

7. Hoeveel opdrachten hebt u aan de studenten gegeven?

Selecteer kleine opdrachten

Selecteer grote opdrachten

8. Welk soort tentaminering hebt u gehanteerd?

- Combinatie open en meerkeuze (% open % meerkeuze)
- Enkel open vragen
- Enkel meerkeuzevragen
- Andere beoordeling dan tentaminering, nl.

9. Hoeveel studenten namen deel aan het vak?

selecteer

10. Welke groepen studenten vormden de meerderheid bij het vak?

- Voltijd studenten van eigen faculteit
- Deeltijd studenten van eigen faculteit
- Studenten van andere Nederlandse faculteiten
- Erasmus studenten
- Master studenten
- Overige studenten, nl.

11. Tijdsbesteding en middelen per onderwijsactiviteit

Bij het invullen van onderstaande vragen gaat u steeds uit van het vak waarvan u zojuist een aantal kenmerken hebt genoemd.

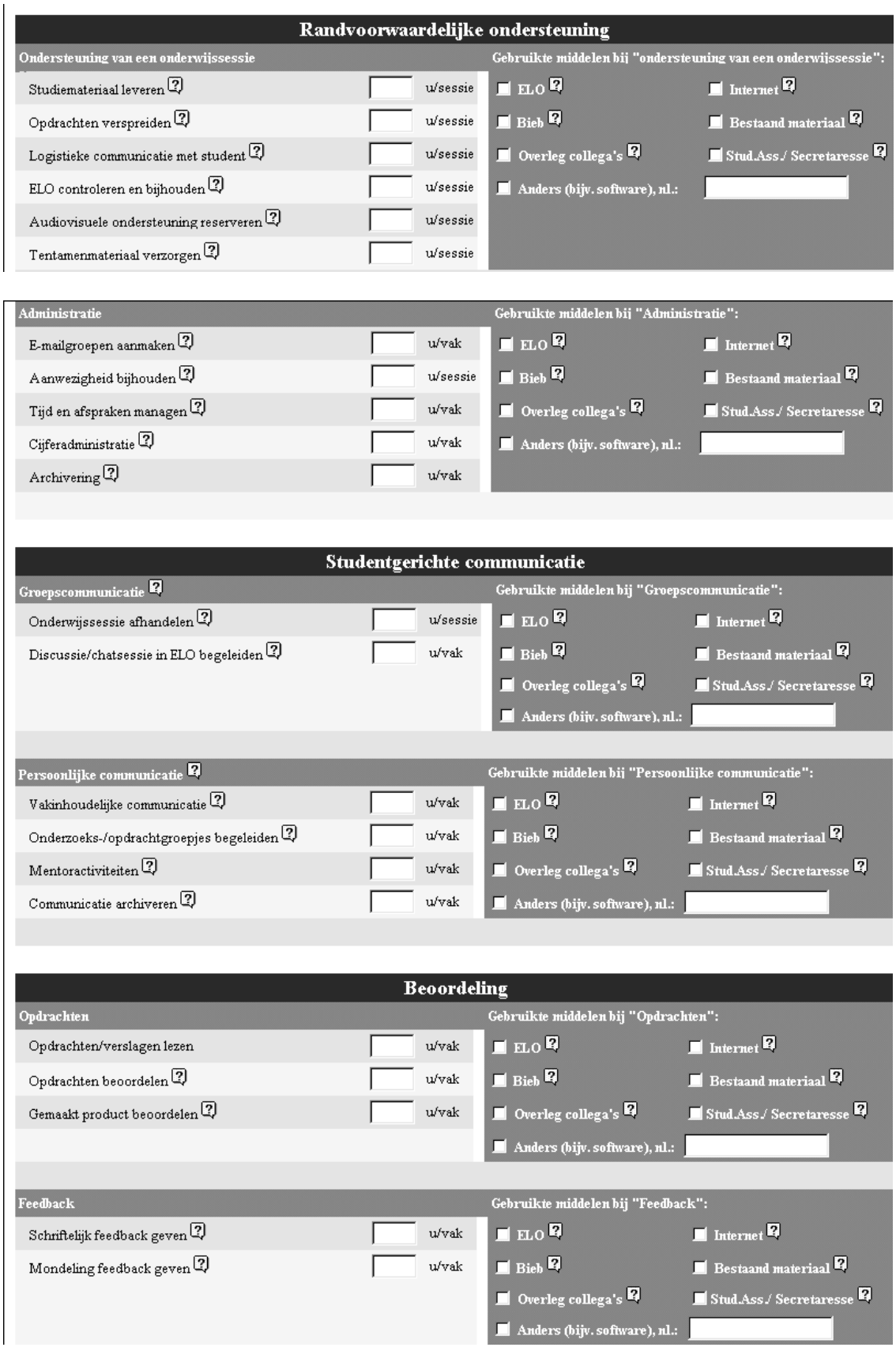
a) Vul achter elke onderwijsactiviteit (het linkerblok) het aantal uren in dat u in totaal daaraan besteed hebt. Sommige activiteiten zijn misschien eenmalig, vult u bij deze activiteiten het aantal uren per vak in. Andere activiteiten worden misschien wekelijks uitgevoerd, vult u bij deze activiteiten het aantal uren per sessie in. Met "sessie" wordt een onderwijssessie, zoals een hoorcollege, werkcollege, practicum of een andere werkvorm bedoeld. Bij activiteiten die voor u helemaal niet relevant zijn, vult u als aantal uren "0" in.

b) Kruis per hoofdactiviteit aan welke middelen u gebruikt hebt bij de uitvoering van die activiteit (het rechterblok). Niet elk middel is voor elke hoofdactiviteit relevant. U kunt meerdere middelen per activiteit tegelijk aankruisen. Houd de aanwijzer van uw muis boven het -icoon voor een toelichting op de activiteiten. Met het middel *ELO* wordt het gebruik van een *Elektronische leeromgeving* zoals TeleTop bedoeld. Met het middel *Internet* wordt het zoeken of publiceren van informatie buiten een elektronische leeromgeving om bedoeld.

Onderwijsleerproces

Voorbereiding van vak			Gebruikte middelen bij "Voorbereiding van vak":	
Studiemateriaal zoeken	u/vak		ELO	Internet
Studiemateriaal maken	u/vak		Bieb	Bestaand materiaal
Opdrachten construeren	u/vak		Overleg met collega's	Stud.Ass./ Secretaresse
Elektronische leeromgeving (ELO) vullen	u/vak		Anders (bijv. software), nl.:	

Onderwijssessie			Gebruikte middelen bij "Onderwijssessie":	
Inhoud onderwijssessie voorbereiden	u/sessie		ELO	Internet
Werkvormen bedenken en voorbereiden	u/sessie		Bieb	Bestaand materiaal
Sheets maken	u/sessie		Overleg collega's	Stud.Ass./ Secretaresse
Onderwijssessie geven	u/sessie		Anders (bijv. software), nl.:	



Randvoorwaardelijke ondersteuning

Ondersteuning van een onderwijssessie		Gebruikte middelen bij "ondersteuning van een onderwijssessie":
Studiemateriaal leveren	u/sessie	☐ ELO ☐ Internet
Opdrachten verspreiden	u/sessie	☐ Bieb ☐ Bestaand materiaal
Logistieke communicatie met student	u/sessie	☐ Overleg collega's ☐ Stud.Ass./ Secretaresse
ELO controleren en bijhouden	u/sessie	☐ Anders (bijv. software), nl.:
Audiovisuele ondersteuning reserveren	u/sessie	
Tentamenmateriaal verzorgen	u/sessie	

Administratie		Gebruikte middelen bij "Administratie":
E-mailgroepen aanmaken	u/vak	☐ ELO ☐ Internet
Aanwezigheid bijhouden	u/sessie	☐ Bieb ☐ Bestaand materiaal
Tijd en afspraken managen	u/vak	☐ Overleg collega's ☐ Stud.Ass./ Secretaresse
Cijferadministratie	u/vak	☐ Anders (bijv. software), nl.:
Archivering	u/vak	

Studentgerichte communicatie

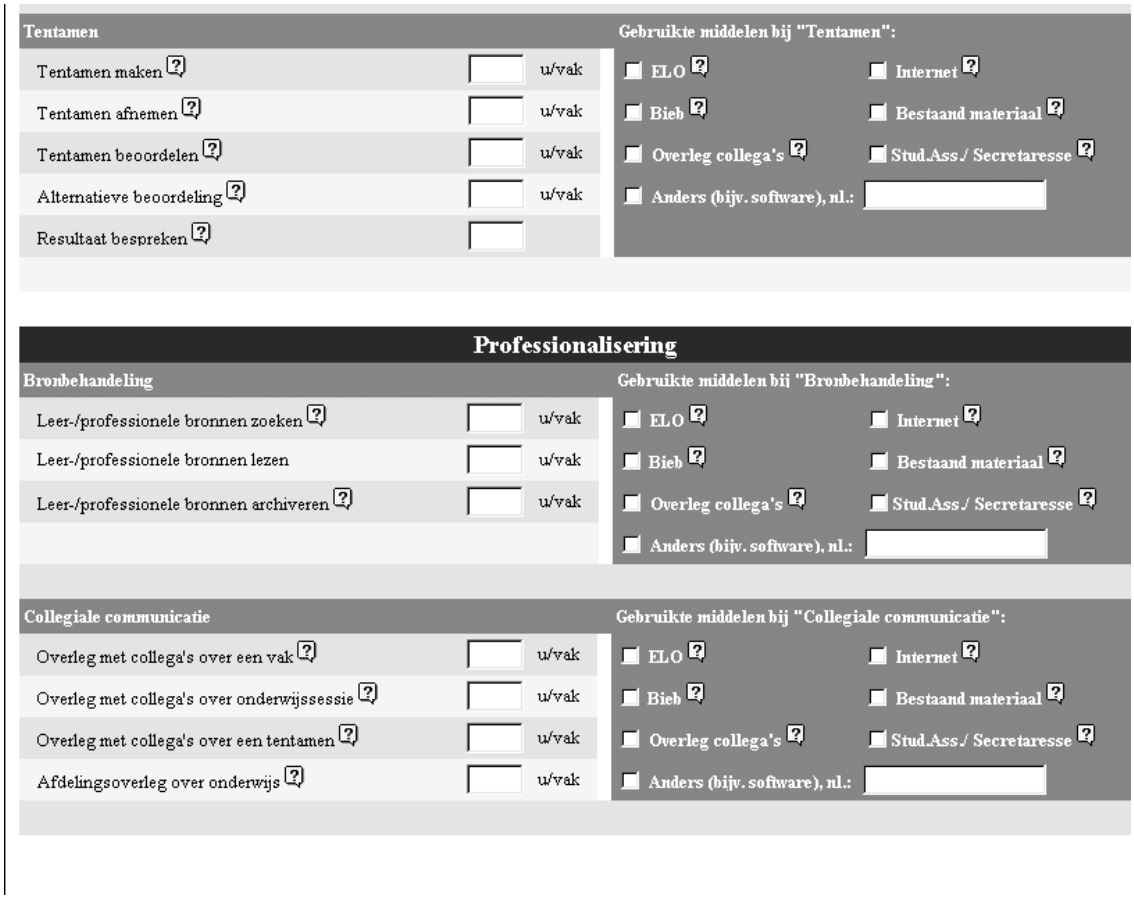
Groepscommunicatie		Gebruikte middelen bij "Groepscommunicatie":
Onderwijssessie afhandelen	u/sessie	☐ ELO ☐ Internet
Discussie/chatsessie in ELO begeleiden	u/vak	☐ Bieb ☐ Bestaand materiaal
		☐ Overleg collega's ☐ Stud.Ass./ Secretaresse
		☐ Anders (bijv. software), nl.:

Persoonlijke communicatie		Gebruikte middelen bij "Persoonlijke communicatie":
Vakinhoudelijke communicatie	u/vak	☐ ELO ☐ Internet
Onderzoeks-/opdrachtgroepjes begeleiden	u/vak	☐ Bieb ☐ Bestaand materiaal
Mentoractiviteiten	u/vak	☐ Overleg collega's ☐ Stud.Ass./ Secretaresse
Communicatie archiveren	u/vak	☐ Anders (bijv. software), nl.:

Beoordeling

Opdrachten		Gebruikte middelen bij "Opdrachten":
Opdrachten/verslagen lezen	u/vak	☐ ELO ☐ Internet
Opdrachten beoordelen	u/vak	☐ Bieb ☐ Bestaand materiaal
Gemaakt product beoordelen	u/vak	☐ Overleg collega's ☐ Stud.Ass./ Secretaresse
		☐ Anders (bijv. software), nl.:

Feedback		Gebruikte middelen bij "Feedback":
Schriftelijk feedback geven	u/vak	☐ ELO ☐ Internet
Mondeling feedback geven	u/vak	☐ Bieb ☐ Bestaand materiaal
		☐ Overleg collega's ☐ Stud.Ass./ Secretaresse
		☐ Anders (bijv. software), nl.:



Tentamen			Gebruikte middelen bij "Tentamen":	
Tentamen maken		u/vak	ELO	Internet
Tentamen afnemen		u/vak	Bieb	Bestaand materiaal
Tentamen beoordelen		u/vak	Overleg collega's	Stud.Ass./ Secretaresse
Alternatieve beoordeling		u/vak	Anders (bijv. software), nl.:	
Resultaat bespreken				

Professionalisering

Bronbehandeling			Gebruikte middelen bij "Bronbehandeling":	
Leer-/professionele bronnen zoeken		u/vak	ELO	Internet
Leer-/professionele bronnen lezen		u/vak	Bieb	Bestaand materiaal
Leer-/professionele bronnen archiveren		u/vak	Overleg collega's	Stud.Ass./ Secretaresse
			Anders (bijv. software), nl.:	

Collegiale communicatie			Gebruikte middelen bij "Collegiale communicatie":	
Overleg met collega's over een vak		u/vak	ELO	Internet
Overleg met collega's over onderwijssessie		u/vak	Bieb	Bestaand materiaal
Overleg met collega's over een tentamen		u/vak	Overleg collega's	Stud.Ass./ Secretaresse
Afdelingsoverleg over onderwijs		u/vak	Anders (bijv. software), nl.:	

Deel B - Inventarisatie van problemen en behoeften

Dit deel is bedoeld om inzicht te krijgen in de arbeidssatisfactie van docenten.

1. Welke ontevredenheden of ergernissen ervaart u bij het uitvoeren van uw onderwijsactiviteiten?
Geef uw grootste ergernis bij 1. aan, de volgende bij 2. enzovoort.

1.
2.
3.
4.
5.

Deel B - Inventarisatie van problemen en behoeften

Dit deel is bedoeld om inzicht te krijgen in de arbeidssatisfactie van docenten.

1. Welke ontevredenheden of ergernissen ervaart u bij het uitvoeren van uw onderwijsactiviteiten? Geef uw grootste ergernis bij 1. aan, de volgende bij 2. enzovoort.

1.
2.
3.
4.
5.

2. Welke onderwijsactiviteiten kosten hinderlijk veel tijd? Wat is hier de reden voor?

Selecteer onder "Activiteit" een onderwijsactiviteit die u hinderlijk veel tijd kost. Geef onder "Rangnummer" de activiteit waar de tijdsbesteding het meest hinderlijk is nummer "1". Geef de activiteit die iets minder hinderlijk is qua tijdsbesteding nummer "2", enzovoort. Geef tevens aan wat de reden is dat die activiteit u hinderlijk veel tijd kost. U kunt meerdere redenen aangeven per activiteit.

Onderwijsactiviteit	Rangnummer:	Reden:
Selecteer	Selecteer	
Selecteer	Selecteer	
Selecteer	Selecteer	
Selecteer	Selecteer	
Selecteer	Selecteer	
Selecteer	Selecteer	
Selecteer	Selecteer	
Selecteer	Selecteer	
Selecteer	Selecteer	
Selecteer	Selecteer	

3. Op welke wijze zouden deze ontevredenheden gedeeltelijk of geheel weggenomen kunnen worden?

Oplossing 1:

Oplossing 2:

Oplossing 3:

4. Hebt u behoefte aan ondersteuning? Zo ja, op welke gebieden en waarom?

Richtlijnen/suggesties op de volgende gebieden:

- ☐ Technisch
- ☐ Inhoudelijk
- ☐ Organisatorisch
- ☐ Administratief
- ☐ Anders, nl.

Toelichting:

Procedures/handleidingen op de volgende gebieden:

- ☐ Technisch
- ☐ Inhoudelijk
- ☐ Organisatorisch
- ☐ Administratief
- ☐ Anders, nl.

Toelichting:

Personele ondersteuning op de volgende gebieden:

- ☐ Technisch
- ☐ Inhoudelijk
- ☐ Organisatorisch
- ☐ Administratief
- ☐ Anders, nl.

Toelichting:

☐ Andere ondersteuning, nl:

Toelichting:

☐ Ik heb geen behoefte aan ondersteuning.

Toelichting:

Deel C - Overige informatie

Tot slot willen we u nog enkele persoonlijke vragen stellen. Deze gegevens worden niet gekoppeld aan uw naam. Ze dienen enkel om de resultaten van alle respondenten beter met elkaar te kunnen vergelijken.

1. Wat is uw geslacht?

- ○ Man
- ○ Vrouw

2. Hoeveel werkervaring hebt u als docent verbonden aan een universiteit?

selecteer jaar

3. Bij welke faculteit bent u werkzaam?

- ○ Faculteit Elektrotechniek
- ○ Faculteit Toegepaste Onderwijskunde

4. Hoeveel contracturen (het aantal uren waarvoor u bent aangesteld op de UT) hebt u op dit moment?

contracturen

5. Hoeveel ervaring hebt u met computers?

Nauwelijks	Weinig	Enigszins	Redelijk	Veel
○	○	○	○	○

6. Hoe ervaart u het gebruik van een elektronische leeromgeving zoals bijvoorbeeld TeleTop?

Onplezierig		Neutraal		Plezierig
○	○	○	○	○

Opsturen Enquête

Als u alle vragen hebt ingevuld, klikt u op "Verstuur" om de gegevens te versturen.
Als uw browser vraagt om een bevestiging voor het opsturen via e-mail, klikt u op "Ok".
Hartelijk dank voor uw medewerking.

Verstuur

Appendix 2: Example of a log-file analysis (Study O2)

Example of a log-file analysis of one instructor (Appendix 2-Table 1).

Appendix 2-Table 1. Summary of log-file analysis of one instructor using TeleTOP during one week.

		Instructor B				
Categories	**Sub-categories**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Total**
Log in	To TeleTOP	1:17	0:03	0:38	0:15	2:14
	To a course	2:04	0:08	0:09	0:13	2:34
News	Viewing	5:50	0:03	1:31	0:30	7:55
	Typing/ Editing	22:50			3:24	26:14
Course Info	Viewing	2:44		0:10	0:09	3:02
	Typing/ Editing	12:47			1:57	14:44
Roster	Viewing	4:06		1:16		5:22
	Typing/ Editing	0:45				0:45
E-mail	Viewing	56:25	0:19	2:27	0:35	59:46
	Typing/ Editing	1:23	19:35			21:15
Participants	Viewing list	0:15				
Discussion	Viewing				0:04	0:04
	Typing/ Editing					
Chat	Participating		0:53		0:15	1:09
Workspace	Viewing		0:39	10:38	1:02	12:19
	Typing/ Editing			8:08	0:53	9:00
Weblinks	Viewing	0:06				0:06
	Typing/ Editing	15:30				15:30
Search		0:14				0:14
Feedback	Viewing	0:10				0:10
	Typing/ Editing					
Request support	Of helpdesk	2:28		3:40		6:08
Total	**hrs:min:secs**	2:08:56	21:59	28:37	9:18	3:08:50

Note. Time in minutes and seconds; total time in hours, minutes, and seconds.

Appendix 2-Table 1 shows a summary of logfile analysis of one instructor showing activities that were performed and the time they took. This time was calculated by subtracting the clock-time in mili-seconds of the previous activity, from the clock-time of the next activity.

In Appendix 2-Table 2 an example of a time-sheet is shown of how much time a specific instructor has spend in one specific week on using TeleTOP to deliver a course.

Appendix 2-Table 2. Example of a timesheet of one of the instructors (the same instructor as in Appendix 2-Table 1).

Day	Time	TeleTOP Activity	Category of interruption
Day 1	11:53	Start	Telephone call
	12:17	News	Visitor
		Roster (check lecture room)	Check with Administration
	12:38	Move TeleTOP to background	
	15:32	Back in TeleTOP	
		Specify due date of assignment	
		Sending e-mail	Send fails
			Ask for support: failed
			Visitor
			Read mail
	16:54	Add a document to a course	
	17:04	Switch to another application	
Day 2	16:50	Login: create student groups	
	17:06	Open workplace	Look for an e-mail message
			Not able to copy groups, therefore quit
		Open Chat session	
	17:12	Logoff TeleTOP	
Day 3	10:05	Send mail to student groups	Look for paper-based overview of division into groups
		Reply to e-mails	
			Visitor
		E-mail	
	10:57	Stop	
Day 4	9:44	Remove wrong name from group workplace	
			Doing something else
	10:04	Log off	

Appendix 3: Interview results of UT instructors (*n*=3) (Study O2)

Appendix 3-Table 1. Performance.

	Instructor		
Categories	**A**	**B**	**C**
Tasks	teaching; research; managerial	teaching at own faculty, also another faculty and external; research; managerial	teaching; research; managerial; professional life
Teaching	coaching students lecturing marking assignments	organising assignments, teaching, giving feedback less lectures "for external teaching much time to arrange various things"	coaching students, lecturing; coaching PhD students
Autonomy and job control	high (within job boundaries) to structure courses and to select research projects	high. Free to choose how to perform tasks. Teaching is fixed	varies per main task
Resources	pen and paper, computer, books, Internet, TeleTOP	computer, lecture rooms, overhead sheets, beamer, video, writing. e-mail, TeleTOP	some hours a day using e-mail, beamer, likes TeleTOP, Outlook useful
Dependencies	bureaucratic facilities and colleagues	BOZ for planning, lecture-rooms	
Colleagues		consolidation with colleagues	teaching in teams
Time		almost no time for teaching although needed	1/4 of the time busy with managerial activities
Home	a workplace at home	a workplace at home with a scanner; also the train as workplace	a workplace at home with printer
Problems		more information about teaching facilities, i.e. what are the facilities in a lecture-room.	

Appendix 3-Table 2. Job Control.

Aspect	**A**	**B**	**C**
Way of working	often in a rather structured way	not very structured	structured way, many activities in parallel
	activities are planned in advance	general planning	strict
	overall planning for a day		overall planning for a day
	long time planning	counting backwards from deadlines	
	short time planning		
	agenda and Outlook	agenda	stickers, Outlook
	can't meet planning	can't meet planning	can't meet planning
	plans > than 60% a day		

Appendix 3-Table 3. CMS-oriented performance.

TeleTOP use	A	B	C
General use	not much	to communicate and disseminate documents	uses TeleTOP as a tool. Main functions: archive, communication, and submitting assignments and feedback
Items	news, course info, e-mail group, workplace, archive, roster, discussion, weblinks	news, roster, course info, e-mail groups. chat not useful	all that's needed
Planning to use TeleTOP	TeleTOP use only planned at beginning of a course	as late as possible, not 6 weeks beforehand. No need to plan TeleTOP use during a course because only short activities; TeleTOP activities not planned in a structured way	no structured way of using TeleTOP
Time	20 min / week	not much because TeleTOP not much used flexible	some hours a day
	feels longer (10 min instead of actual 3 min.)	depends on what students submit	
		teaching means communication must be in time	
Where used	used TeleTOP in lecture-room once		
	at university and at home	at university	at university and at home
Support	technical expert	technical expert; not always available right away	no need
Problems	finds discussion and weblinks hard to use	when there is a problem I let others solve it	

Appendix 3-Table 4. Interrupts when using TeleTOP.

Interrupt	A	B	C
Frequency	regular interrupts; varies per day; in teaching: the more students the more interrupts	regular interrupts, depends on culture in faculty	regular interrupts
Who	colleagues, students, own thoughts	colleagues, students	
Why	to make an appointment, information, to cancel a meeting, for advice	knocking at my door for something; because of the next appointment;	because of the next appointment;
Other causes	also receiving many e-mail messages	meetings at short notice, email, mail; problems with TeleTOP	
Consequences		Interrupts are annoying and you have to postpone a deadline	

Appendix 4: Interview results of UT instructors (*n*=6) (Study C1)

Appendix 4-Table 1. Personal skills, workload, and attitudes.

Interview topic	instructor code	Remarks
TeleTOP skills	A	Good, but not beyond current use
	B	Good, at least for current use; trial and error
	C	Very good
	D	Very good, at least for current use; "I just try it and I 'll get the feeling"
	E	Very good; trial and error; "Give me a site and I handle it"
	F	Very good
Organisation context	A	A bit negative about bureaucratic, administrative procedures and forms
	B	Frequent curriculum-changes very frustrating
	C	Organisation became too big
	D	No remarks
	E	Accept consequences of being a teacher
	F	University is a professional bureaucracy thus it's "hard to control academics"
Colleagues and collaboration related	A	No remarks
	B	No remarks
	C	No remarks
	D	No remarks
	E	Very useful
	F	No remarks
Workload	A	Increasing; more teaching than planned, thus research under pressure
	B	Too much teaching, thus research too limited; working 60 hours a week is no exception
	C	Takes too much time using TeleTOP
	D	Frustrating: too much tasks and too much teaching, thus not 50% research
	E	Workload far too high and will even increase; " working 55 hours in a week feels quiet"; research too limited; "I have to prepare Master courses, but current courses still go on"
	F	Too much teaching
Job control related	A	Not a planner; often last minute, 'there is always something you forget"; uses free time for marking and preparing lectures
	B	Plan pretty much; "good planning decreases stress"; don't like many emails; much free time
	C	Not a planner; it varies: sometimes all details, sometimes not at all; not much free time
	D	Plan pretty much; almost no free-time use
	E	Not a planner, uses much free time; "When you are already overloaded an extra planning activity makes it even worse"
	F	Uses free time; uses timesheets to prove that assigned time is too limited

Appendix 4-Table 1 continues …

Appendix 4-Table 1 continued

Interview topic	instructor code	Remarks
Teaching, TeleTOP related	A	No specific drive to use TeleTOP; fairly positive
	B	Enthusiast about teaching; content with TeleTOP
	C	Enthusiast user of TeleTOP; tries new facilities
	D	Likes to use TeleTOP
	E	Teaching is like a hobby; content with TeleTOP
	F	Criticises TeleTOP about technical aspects
Support related	A	Annoyed when support is not available right away
	B	No remarks
	C	Prefers in-person support
	D	No remarks
	E	Content with available support
	F	No remarks
Support system	A	I would try it
	B	Useful, especially for novice instructors
	C	Would be fairly handy
	D	No need for extra support
	E	I'll give it a try
	F	I'll give it a try

Appendix 4-Table 2. Organisation.

Interview topic	instructor code	Remarks
Current mission	A	To implement TeleTOP; to implement a Bachelor/Master structure; to attract international students; to appoint no extra personnel
	B	To implement a Bachelor/Master structure; transition from trimester to semester structure
	C	To implement TeleTOP
	D	To implement TeleTOP, but details unknown; Bachelor/Masters; more students
	E	To implement a Bachelor/Master structure; no faculty mission to attract distance students; currently understaffed
	F	To implement TeleTOP, but management failed to communicate why
Budget	A	Based on student/study-point model, but model unknown; assigned hours unknown;
	B	Based on student/study-point model but far too limited
	C	Based on student/study-point model, but model unknown to instructors; "I will minimise teaching when forced to."
	D	Based on student/study-point model
	E	We surpass the assigned limits
	F	Student/study-point model, but that's not enough
Curriculum	A	Each year rearranging of courses
	B	Try to have one trimester without teaching; ECTS model;
	C	No planning of time using student/study-point model yet; currently a "You ask, we serve" approach
	D	50% teaching
	E	Some courses are delivered three times a year
	F	In future courses in one-third of current assigned time

Appendix 4-Table 2 continues …

Appendix 4-Table 2 continued

Interview topic	instructor code	Remarks
Requirements	A	To deliver courses; to use TeleTOP; no specific TeleTOP requirements;
	B	Teaching less intensive; no requirements for personal time management; no specific TeleTOP requirements;
	C	No specific TeleTOP requirements; just "There should be a site."
	D	Maybe less intense project-based teaching; no specific TeleTOP requirements;
	E	No specific TeleTOP requirements; restrictions by management will kill all initiatives
	F	No specific TeleTOP requirements; letter by management, "but instructors will not be able to retrieve it"
Administration, accountability	A	Bureaucratic; publishing articles most important; a form is used to request a course environment in TeleTOP
	B	No specific incentives to use TeleTOP; publications most important; a form is used to request a course environment in TeleTOP
	C	No control of time-usage yet
	D	No specific incentives to use TeleTOP; only teaching in general is evaluated
	E	No incentives to use TeleTOP
	F	Own timesheets to show management that assigned time is insufficient
Support offered	A	Internal within our faculty; support decreases; support to set-up a course environment available
	B	Internal within our faculty, but only available for two or three days a week; CIV (computer department) arranges access to TeleTOP but uses a very annoying procedure; support available to set-up a course environment
	C	Internal help desk available; it is very good, "but we have been lucky", service strongly depends on the type of person
	D	By Dinkel institute (a support institute at the university); workshops were held
	E	By Dinkel institute (a support institute at the university); positive feeling about support
	F	Two student-assistants available; a workshop was held, but I feel negative about the effectiveness

Appendix 4-Table 3. Colleagues.

Interview topic	instructor code	Remarks
Collaboration	A	Collaborates with a colleague in most courses; others use student-assistants
	B	collaborates with an external colleague; uses a student-assistant; it was discussed whether a secretary could assist
	C	Collaborates with colleagues and an external colleague
	D	Collaborates with a new colleague; also with external colleagues; uses student-assistants
	E	For each course there is a "back-up" instructor; we use external guest instructors; collaborates with colleagues; uses student-assistant
	F	Collaborates with colleagues and external colleagues

Appendix 4-Table 3 continues …

Appendix 4-Table 3 continued

Interview topic	instructor code	Remarks
Plan	A	Meetings are planned also sessions and order of sessions within a course; this need not be strictly 50%-50% between colleagues; in one course a colleague presents the lectures and I do managerial activities, including TeleTOP use.
	B	Each has his own part of the course; I do all TeleTOP activities
	C	In one course I handle half, and two other colleagues handle the rest; I use the Roster in TeleTOP to manage team-planning; Planning was discussed in advance
	D	I base my planning on previous year
	E	No remarks
	F	No remarks
Control	A	I rearranged the sequence of sessions within a course; lack of information
	B	A student-assistant handles assignments; I mark final test
	C	No remarks
	D	I share responsibility for a course with one colleague
	E	Available as "back-up" instructor; I share responsibility with one colleague to co-ordinate a course
	F	I wonder who will monitor FAQ's?

Appendix 4-Table 4. Job control.

Interview topic	instructor code	Remarks
Way of working	A	TeleTOP forces you to change your way of working; a transition to TeleTOP is "just uploading"; TeleTOP offers more flexibility; free in my way of working and time usage; in one course I do the managerial activities, including TeleTOP use
	B	Created own forms; "You have to manage your work yourself"; I take full responsibility about my way of working and time usage
	C	"I would like to teach much more, but without all the extra fuss: administration, arranging things. I wish I had an assistant for that and say: I do the teaching and you do the rest". This fuss is very tiring; free in using my time; "blokonderwijs" (intense teaching during a four-week period) forces you to work systematically; TeleTOP forces you to better plan your time
	D	Free in my way of working and time usage; creating project groups is another category of activities than teaching; "Preparing a course in a different way than TeleTOP prescribes takes a lot of extra time"
	E	At the end of a course there are extra activities to perform
	F	Free how I use my time; TeleTOP can be filled and used in many different ways
Own planning	A	Plans to prepare a course, sessions, preparing a lecture; plans a diversity of activities; plans backwards from a deadline; no plan to mark tests; "A detailed planning is in my head"
	B	Plans to prepare lectures, sessions, appointments; also plans "to check TeleTOP"; As a project-management expert I know that "teaching is the ultimate example of planning under uncertainty"; "It's almost impossible to plan teaching" because the "planning-problem is different for each day of the week"; to use a planning offers grip, but to plan demands discipline

Appendix 4-Table 4 continues …

Appendix 4-Table 4 continued

Interview topic	instructor code	Remarks
	C	"To plan teaching is different from planning my own teaching-related activities"; I should plan more, but it's coming; "My teaching activities just occur when needed, thus I don't get round to the tasks that are less important"; I prepare a course as late as possible
	D	Plans on a weekly basis; planning relates to deadlines; plans to read student essays; plans to prepare test questions
	E	I have no strict planning and "I don't want to know"; my planning will change anyway; I only plan to read student essays
	F	I encountered a complete mismatch between scheduled time and actual used time
Own control	A	I use a to-do list of highest-priority tasks; often last-minute; not reserving time for feedback results in too-late responses and many complaints by students; I do not use own quality requirements to course sites;
	B	I use a to-do list and reminders in Outlook to not forget performing these activities; I communicate my schedule to students; I check TeleTOP once every day or two; interrupts by students at my door is very frustrating, it would be better to schedule these
	C	I use a to-do list; to control exceptions caused by students is hard, because "I could list 1000 examples"; I check web links to see if they are still up-to-date
	D	I use a to-do list; there are many interrupts, "but some could have been foreseen if I had thought about it beforehand"
	E	I have a lack of discipline to check if students have submitted assignments or asked a question in FAQ; when students complain I will prepare better next time
	F	I use time sheets; "To find that letter about requirements will take me an hour."; offering a on-line discussion in a course implies you have to check each day
Time estimates	A	To upload files: almost no time; to set-up a site: a couple of hours; to prepare a lecture: a couple of hours
	B	To prepare lectures: about 4 hours; to prepare a test: 3 hours; to estimate time to prepare a lecture is very hard to do; to set-up a roster takes about one-and-a-half hour
	C	Teaching is fragmented over a long period of time, therefore unknown; to start-up a course: half a day; to offer an on-line discussion takes a lot of time; to search for websites and background information takes a lot of time; to fill general courseinfo does not take much time; to set-up a roster a bit more; maybe to set-up a site could be done in half-a-day, but I need more.
	D	To handle new project groups takes extra time; to use TeleTOP in three courses takes a couple of hours a week; an on-line discussion takes a lot of time
	E	To create a project group may take five minutes or one hour a day during three days.
	F	To mark a small essay: nine minutes and for a large essay: 15 min; "It's best to estimate time based on previous experiences"

Appendix 4-Table 4 continues …

Appendix 4-Table 4 continued

Interview topic	instructor code	Remarks
Planning tools	A	Outlook
	B	I'm a fanatical user of Outlook; I use the agenda in Outlook as a to-do list; I use Outlook's special folders; I dislike a paper-based agenda
	C	Outlook
	D	Outlook; handy to rearrange appointments when something urgent comes up; it prevents chaos
	E	Outlook (all day)
	F	Not indicated
Support asked for	A	To create a new site; in-person support not always available
	B	no remarks
	C	To create a new site; reading a manual takes too much time therefore I prefer in-person support
	D	I ask a colleague; "some colleagues just shift a problem on to someone else"; TeleTOP problems
	E	I often have small questions, not important enough to ask someone else
	F	no remarks

Appendix 4-Table 5. Support tool

Interview topic	instructor code	Remarks
General remarks about a support tool	A	I have some doubts; it could well be complementary to a CMS; courses are very diverse, thus hard to differentiate support; we have a need for a tool to estimate time and which compares alternatives; also to become aware if a course is loss-making (based on time usage) ; will be hard to develop
	B	I prefer an integral system (CMS + support system); tool will be useful for planning
	C	A planning tool would be handy, but very hard to develop, taking into account so many variables; courses are very diverse; it will take extra time to use such a system; it could be useful at department level
	D	a good description of such a program useful
	E	no remarks
	F	no remarks
Requirements for a support tool	A	To implement such a tool should be "first time right", more important than fancy advantages; should not interfere regular work; my advice: keep it very simple and easy accessible; Tool should be based on student/study-point model
	B	It should support me to perform a new task; it should offer help to plan my time
	C	It should calculate the time required for a course; it should offer alternatives; "I can handle simple calculations using my own brains"; it should calculate time based on credit units model
	D	I suggest to reserve time for interrupts, although "the actual interrupt need not be at the reserved time, as long as the total time-usage in a week does not exceed 40 hours."
	E	no remarks
	F	For me it needs to be "first time right"; a well designed user interface is important

Appendix 4-Table 5 continues …

Appendix 4-Table 5 continued

Interview topic	instructor code	Remarks
Content	A	To calculate time based on structure of the course, manpower, formats, and other time-related variables; program should indicate whether it can be done within time constraints or not; I like to get notifications; I like to see best practices; I find a checklist useful and efficient
	B	Checklist would be useful especially for novice instructors; also for courses with various instructional formats, such as on-line discussions; should offer extra help; when it makes you aware of special TeleTOP functionalities it already saves time; I suggest to offer hints
	C	I do not want manuals; transferring a planning to Outlook could be felt as "pedantic"; it should offer help
	D	I would like a step-by-step plan; I dislike video
	E	It should offer help; offer a step-by-step plan that can be used right away when needed; not useful for guided TeleTOP use (for instructors and students); in my course students use Microsoft Project to show consequences in time usage and for reporting; I think hints are useful, especially hints to prevent me to proceed in a roundabout way
	F	Checklists will be useful; checklist may vary based on type of course and number of students; hints will be useful about TeleTOP features; a TeleTOP template is handy and hints about time savers although these can only be qualitative

Appendix 5: Interview results of CAH/STOAS instructors (*n*=7) (Study C2)

Appendix 5-Table 1. Results of interviews

Topic	Instructor code	Remarks
Teaching in general	A	contactmomenten worden steeds minder
	A	Blackboard en Livelink komen op me af en ik moet er mee leren werken
	A	CMS gebruik staat nog echt in de kinderschoenen
	A	Nieuw vak samen met collega van CAH
	B	Je ziet dat het die kant op gaat [gebruik van CMS's]
	B	studenten op afstand tijdens stage
	C	geen studenten op afstand maar zal wel komen; wel deeltijd studenten
	D	geen studenten op afstand
	E	studenten op afstand tijdens praktijkweken, niet structureel; wel deeltijdstudenten
	F	studenten op afstand tijdens praktijkweken
	G	geen studenten op afstand behalve tijdens stage
Personal attitude towards ICT and CMS use	A	Ik was wel enthousiast om met Blackboard te gaan werken
	B	zelf begonnen met Blackboard, ik ben in voor nieuwe ontwikkelingen
	C	eigen initiatief om met Blackboard te beginnen; hartstikke mooi
	C	ik ben zelf behoorlijk visueel ingesteld
	C	ik heb liever een goed overzicht dan dat je een stuk tekst door moet lezen
	D	enthousiast ICT gebruiker
	E	ik hou van pionieren
	G	ik wilde zelf Blackboard gaan gebruiken; ik vind het leuk om te doen
	G	je moet goed kunnen plannen; je moet je goed aan je planning kunnen houden; maar je moet ook kunnen zeggen: Nu is het genoeg
organisation	A	het is hier een hectische omgeving
colleagues	D	een aantal collega's hebben 'koud water vrees', zowel computer onhandigheid en beschikbare tijd; die moet je op het goede spoor zetten
	E	we werken op afstand met collega's via Blackboard
Introduction to CMS	A	twee jaar geleden is Blackboard geintroduceerd
	B	enkele bijeenkomsten
	C	we hebben een introductie gehad
	D	een kleine cursus gehad
	E	een korte introductie van twee of drie uur; en een boekje
	F	er zijn workshops gehouden
	G	hele korte introductie, maar eigenlijk niet nodig
Implementation	D	Als er een paar niet enthousiast zijn moet je veel extra moeite doen
	D	Als je een aantal enthousiastelingen hebt dan loopt het wel, dan zijn de randvoorwaarden goed
	D	ik oefen wel wat druk uit om Blackboard te gaan gebruiken

Appendix 5-Table 1 continues …

Appendix 5-Table 1 continued

Topic	Instructor code	Remarks
	E	organisatie bepaalde dat we Blackboard gingen gebruiken
	E	je zou eerst goede voorbeelden moeten zien
Experience with using a CMS	A	ik werk niet heel veel met Blackboard, nog niet veel materiaal erop gezet
	B	Geen actief gebruik van Blackboard, wel ervaring met Learning Space
	C	Net begonnen met Blackboard
	D	gebruik Blackboard al een aantal jaren; meeste dingen in Blackboard gebruik ik wel
	E	ik gebruik Blackboard bij een module
	F	ik gebruik Blackboard ca twee jaar
	G	ik gebruik Blackboard nu 1 jaar
CMS use	A	docenten kunnen al het materiaal kwijt op Blackboard
	A	ik vind gebruik van Blackboard lastig
	A	gebruik Blackboard kost veel tijd
	B	Blackboard lastig vinden komt doordat je in bepaalde fase van gebruik zit
	B	Rooster en al dat soort organisatorische zaken staat op Intranet
	B	probleem met CMS: wat zet je waar? Kost soms onnodig veel zoektijd. Ik vraag me af hoe je dat goed kunt regelen. Een stramien zou handig zijn.
	B	aanbieden en inleveren van opdrachten in Blackboard
	C	te bestuderen studiemateriaal vooraf beschikbaar
	C	beperkt aantal bronnen in literatuur en op internet
	C	behoefte aan inzicht in waar ik iets moet doen in Blackboard
	C	gebruik van Blackboard kost veel tijd
	C	ik gebruik PowerPoint
	D	Handig om er externe links aan toe te voegen
	D	opdrachten via Blackboard
	E	gebruik opdrachten, studiewijzer, studiemateriaal en toetsen
	E	modules ontwikkelen in Blackboard kost nogal wat tijd
	F	Zou meer FAQ's moeten gebruiken
	G	handig om eenduidige structuur aan te houden wat waar staat
Panning own time	A	ik heb 30 uur toegewezen gekregen voor het voorbereiden van een vak
	A	voor Blackboard echt tijd vrij maken, bv. vast moment in de week, 2 tot 3 uur, misschien wel hele middag.
	A	ieder plant op z'n eigen manier, sommige gestructureerd ander niet
	A	plannen noodzakelijk, anders wordt je helemaal gek
	A	ik plan de afspraken en vergaderingen, anders studenten die aankloppen
	A	automatisch toetsen voor mij tijdbesparend
	A	e-mail afhandelen niet apart gepland maar kost wel 1 uur per dag.
	A	E-mail lezen 3 keer per dag: bij begin, lunch, eind
	B	ik plan alles
	B	opdrachten nakijken is volgende dag afgerond: beste manier om kwaliteit te leveren.
	B	nakijken van opdrachten "dat plan ik in mijn hoofd in"
	B	door verschuiving naar geven van begeleiding moet je veel meer plannen

Appendix 5-Table 1 continues …

Appendix 5-Table 1 continued

Topic	Instructor code	Remarks
	B	tijdonafhankelijkheid bv bij discussie is lastig
	B	onvoorspelbaar wanneer studenten iets inleveren
	B	Je moet daar een bepaalde discipline in aanleggen. Oppassen dat CMS en mailbox niet voor jou de agenda bepalen.
	B	Ik kijk regelmatig in Blackboard en e-mail, alleen begin en eind van de dag
	B	gestructureerd werken is beter voor je gezondheid en je wordt er niet zo gauw overspannen van.
	B	ik gebruik absoluut niet mijn vrije tijd
	C	Algemeen: de eerste keer ieder stapje uitvinden duurt gewoon lang.
	C	studenten kunnen bepaalde periode vóór het contactmoment antwoorden inleveren en daarna zijn de vragen weer verdwenen.
	C	ik plan veel, ook voorbereidingstijd van een les
	C	hoeveel tijd het me kost als het vak gaat lopen weet ik nog niet, dat zie ik dan wel
	C	ik plan beantwoorden van e-mail niet apart
	D	ik plan contactmomenten en ik ruim tijd in voor nakijken opdrachten
	D	ik weet vaak niet hoeveel tijd ik moet reserveren, laat staan een nieuwe docent
	D	ik hou m'n tijd niet genoeg bij
	E	ik ben een planner
	E	nakijken van opdrachten plan ik op vaste tijden
	E	ik plan ook ontwikkelactiviteiten
	E	Als je minder tijd hebt ga je het vanzelf strakker regelen
	E	in begin veel te veel opdrachten, daar werd je gek van
	E	je bent geneigd te vergeten om in Blackboard te kijken of er opdrachten ingeleverd zijn
	E	bij onregelmatig inleveren: strak vastleggen in agenda
	F	ik plan mijn lessen en afspraken
	F	ik plan het nakijken van opdrachten niet en dat wordt wel eens een sluitpost
	G	Net als met gewone lessen, je probeert de studenten steeds twee lessen voor te blijven
	G	Ontwikkelen van nieuw vak ruim van tevoren plannen, in september daar geen tijd voor
	G	Blackboard kost meer tijd
	G	altijd meer tijd nodig dan je inplant
	G	nakijken van opdrachten kritisch; allemaal korte termijn deadlines
	G	je moet zoveel mogelijk van tevoren voorbereiden
Workload	A	Ik kom vaak tijd te kort; vooral laatste weken van het jaar, met veel toetsen en vergaderen, dan kom ik niet toe aan Blackboard.
	B	er gaat gigantisch veel tijd zitten in het opzetten van een concept voor een vak en het ontwikkelen van het onderwijsmateriaal
	B	ik heb geen achterstand in feedback geven
	B	organisatie stelt tijd beschikbaar voor nieuwe dingen, maar nooit genoeg
	C	ik kom lang niet uit
	C	veel tijd kwijt aan "neuzel"dingen: layout, cijfers invoeren e.d.

Appendix 5-Table 1 continues …

Appendix 5-Table 1 continued

Topic	Instructor code	Remarks
	D	er wordt een bepaalde tijd toegewezen voor het geven van een module of het ontwikkelen van een nieuw product.
	D	ik stop er wel meer tijd in
	E	voor het voorbereiden en uitvoeren van een module kreeg ik vijf jaar geleden twee keer zoveel tijd toegewezen. Dat gaat ergens mis.
	E	een nieuwe docent komt zeker tijd te kort
	E	norm is minimaal; je komt niet aan vernieuwing toe
	E	nu veel stress vanwege aantal mailtjes of niet goed organiseren van nakijken opdrachten
	F	ik gebruik ook vrije tijd
	F	we zijn hier vreselijk laagdrempelig, studenten lopen constant binnen
	G	in principe geen vrije tijd
	G	werklast van 50, 60 uur is tamelijk normaal
Planning tools	A	papieren agenda, geen Outlook
	B	ik gebruik een papieren agenda
	C	ik gebruik papieren agenda
	D	ik gebruik een papieren agenda
	F	ik gebruik een papieren agenda
Personal way of working	A	We hebben een stappenplan gemaakt voor het opzetten van een vak
	D	ik denk dat je veel te veel op eigen houtje naar eigen goeddunken dingen doet
	E	Nu is iedereen zelf het wiel aan het uitvinden
	E	een strak format/raamwerk gebruiken zodat het niet teveel tijd kost
	F	je hebt hier grote autonomie
	G	jezelf dwingen om gestructureerd tijd te besteden aan Blackboard en niet direct als iets binnen komt
	G	ieder heeft z'n eigen manier van werken; daar zijn we ook eigenwijs genoeg voor
Requirements	A	Site moet onderwijskundig verantwoord zijn
	D	onderwijskundige stelde wat eisen
	F	geen normen aan tijdsbesteding
	G	we krijgen uren toegemeten
Checklists	A	ik werk heel veel met checklists
	B	vooral in het begin nuttig
	C	Checklist zal zeker helpen, anders moet je trial and error doen
	C	aanwijzingen over tijdsbesteding zullen zeker helpen
	D	checklists lijken me heel nuttig; een lijstje met tips van kijk daar en daar eens is heel nuttig
	E	ik hou erg van checklists.
	G	gebruik ik al; een stappenplan als ik een hoorcollege met Blackboard wil ondersteunen
To-do list	A	ik gebruik een 'boodschappenlijst' [to-do list] op papier anders blijft de helft liggen
Communication	A	suggestie om communicatie binnen docententeam via Blackboard te doen
	A	geen standaard communicatiekanaal: zowel email, Blackboard en Livelink

Appendix 5-Table 1 continues …

Appendix 5-Table 1 continued

Online discussion	B	vooraf goede procedure afspreken met studenten
	B	bij slechte voorbereiding kost het zoveel tijd dat je ermee stopt
	C	te lastig voor ons
	D	discussie heel lastig voor elkaar te krijgen
	D	tijdsbesteding valt mee als iedereen goed geïnstrueerd is
	F	voorlopig geen behoefte aan
	G	wel uitgeprobeerd; kost véél meer tijd dan een klassengesprek
Archive	B	Ik bewaar altijd de opmerkingen die ik maak. Vanmorgen bleek dat student zelfde ingeleverd had als vorige keer, dat maakt me kwaad.
Support	A	veel support van onderwijskundige; bij nieuw vak wekelijks overleg van 2 a 3 uur
	A	handleiding wel gebruiken
	A	ik kan terugvallen op een ervaren collega
	A	onderwijskundige moet voldoende tijd toegewezen krijgen
	A	Veel collega's kunnen wel wat hulp gebruiken
	B	overleg met onderwijskundige
	B	ik probeer het wel eerste zelf, maar teveel zelf 'rommelen' zonde van de tijd
	B	ik vind het wel eens vervelend om hulp te vragen
	C	ik probeer het eerst zelf; gewoon overal op drukken en kijken wat er gebeurt
	C	er is hulp beschikbaar van twee mensen
	C	ik maak zeker gebruik van beschikbare hulp
	C	geen behoefte aan handleidingen, wel een soort Help systeem
	C	Samen met een ervaren iemand iets doen dan leer je sneller en het scheelt veel tijd; zou ook via de computer kunnen
	C	video niet aantrekkelijk vanwege vaste afspeelsnelheid.
	C	ik wil door kunnen klikken naar alleen die pagina die ik nodig ben, de rest hoef ik dan even niet
	D	ik probeer het eerst zelf
	D	je hebt soms een ervaren iemand nodig
	D	er zou meer beleid moeten zijn om ervaringen uit te wisselen
	D	Prima als het via de computer wordt aangeboden. Op internet moet je het toevallig op het spoor komen.
	E	veel hulp van onderwijskundige gehad
	E	we doen heel weinig om ervaringen uit te wisselen
	E	aanspreekpunt prima, maar misschien heb je meer structurele hulp nodig
	F	Samen met onderwijskundige opzet gemaakt
	F	Ik zou advies vragen
	F	hulp bij plannen van activiteiten niet zinvol: als het 4 uur kost dan is dat maar zo
	G	ik probeer het zelf of ik verzin een ‘work-around’
	G	geen behoefte aan handleidingen
Administration	A	Je moet per dag invullen hoeveel uur je aan wel project besteedt.
	A	projectoverzichten handig omdat je precies kunt zien hoeveel tijd je aan een onderdeel hebt besteedt.
	A	Alles is hier in projectvorm gegoten, dus ook de dagopleiding is een project.
	B	ook bij stage wordt projectmatig gewerkt

Appendix 6: Interview results of UT managers (*n*=6) (Study U1)

Appendix 6-Table 1. Results of interviews with educational-program directors and co-ordinators

Topic	Manager code	Remarks
Mission (teaching)	A	We decided to implement TeleTOP
	A	No plans to offer courses to distance students;
	B	We initiated the use of TeleTOP; no specific plan to implement TeleTOP
	B	No plans to offer courses to distance students, maybe small parts
	C	No plans to attract distance students
	E	We initiated the use of TeleTOP
	F	No plans to attract distance students; to make TeleTOP a success there should be a concrete plan / policy
Workload of instructors	A	Workload is high; no extra time needed to use TeleTOP; will increase because budgets too low; when instructor spends too much time teaching it's his burden;
	B	Workload very high; Instructors work 50 to 55 hours a week (norm is 40 hours a week); teaching-related activities are performed during the evening and the weekend; makes teaching vulnerable, for instance when an instructor gets ill; budget too low, thus not enough time, so work late; TeleTOP not very time demanding
	C	Faculty community seems overstrained; pressure on instructors is far too high; a recent study showed that everybody worked far too much; as a consequence no time for innovative teaching; instructors work 50 to 60 hours a week, although that is not allowed according to rules; no specific burden using TeleTOP; teaching-related activities are performed during the evening and the weekend;
	C	As far as I know, there is no detailed data about actual time expenditure of instructors; I would like to have more insight to see if actual time expenditure is more or less than instructors indicate
	D	TeleTOP takes a lot of time; work more than 40 hours a week; most instructors work during the evening and weekend to prepare sessions; pressure on instructors increases because of for instance major changes in curricula, low budgets, less assigned teaching-time, and a strong demand to perform at an ever higher level. Some would like to innovate but decide not to, because lack of budget and time
	E	Workload is high, for some even 'immense', and increasing; workload various greatly among instructors;
	F	Instructors very busy; they consider TeleTOP use as an extra burden: "I have enough on my plate"

Appendix 6-Table 1 continues …

Appendix 6-Table 1 continued

Topic	Manager code	Remarks
Requirements: teaching	A	Offer courses according to curriculum
	D	Instructors should apply the right procedures and for instance not change a roster in TeleTOP without notifying BOZ [Bureau Educational Affairs].
	E	no specific instructions by management; they often happen by accident; not much guidance to instructors; in general three courses of three studypoints assigned per instructor; only form to submit is an overview of marks
	F	instructors should act according to the right administrative procedures, for instance when there is a change in the roster. Many overlapping procedures.
	F	Number of students who enrol in a course not known before course starts
requirements: TeleTOP	A	Instructors free to structure a TeleTOP course the way they like
	B	no standards or requirements; instructor in charge; students will force instructors to innovate
	C	Instructors are free to use TeleTOP the way they like; students complain when TeleTOP is used ineffectively
	D	no standards or requirements; not much interactivity in their courses yet; students will force quality;
	E	no standards or requirements; each course should be in TeleTOP; instructor's responsibility; students demand good quality; we plan to check TeleTOP courses in the near future
	F	no specific requirements, no policy; there are sites without content; to offer study material through TeleTOP may cause copyright problems when instructors are not aware
requirements (budget and time)	A	no standards; may change when chairs become 'business units' and have to manage their own budgets, and that dictates time expenditure; as a consequence instructors will limit time-consuming assignments Budget model based on student/studypoints which can be converted to hours per course
	B	no standards; Budget model based on student/studypoints which sets the amount of hours, applying a weight factor, e.g. for lectures and projects;
	C	Budget is the standard no further requirements; Budget model based on student/studypoints; one student/studypoints equals about 2.1 hours; budget fixes teaching time instead of requested teaching time that fixes; chairs autonomous to manage budget and time as long as they produce as agreed, similar to business units
	E	no standards; we only calculate the teaching load per department, although I doubt whether it reflects reality; budget is decisive, not efficiency;
incentives / penalties	A	no penalties; I'm not checking sites
	B	No systematic checking of TeleTOP use
	C	TeleTOP not a topic
	D	teaching not profitable; TeleTOP use not a topic during performance interview
	E	no checking of TeleTOP use

Appendix 6-Table 1 continues …

Appendix 6-Table 1 continued

Topic	Manager code	Remarks
collaboration	ABCDEF	curriculum consultations about distribution of courses and the structure of these courses; semester or trimester consultations to discuss actual problems and experiences
	B	Instructors collaborate with guest instructors, also with German instructors
	D	good interaction between instructors and students; I leave the division of work to the instructor teams; in one of our courses many instructors form a team
	E	collaboration will imply more co-ordination and thus related planning problems; also problems when instructors have to offer their courses to more than one educational programme
implementation	A	expected instructors to be sceptical; a few workshops; support paid by the faculty not each chair; appointed an extra employee; that was luxury; now they have to manage on their own
	B	gradual implementation per course; no workshops; instructors did not need specific training; educational support by Dinkel institute; very in-person "you just call"; concerned about some instructors who had to give up their current way of working;
	C	instructors were sceptical; also 'not invented here' syndrome; you have to convince them of the benefits; we refunded two hours per instructor to stimulate them and four hours in-person support per course by Dinkel institute; if you force them to use TeleTOP, they will refuse;
	C	specific training not needed
	D	gradual implementation; we assigned an instructor with a special commission to introduce ICT and TeleTOP; was carried out very informal
	E	Gradual; We carried out a similar process as the Faculty of Educational Science and Technology did; no workshops, some presentations; make it as easy as possible for instructors; very high level of in-person support; a small support team, instructor centred support.
	E	We appointed an extra employee to implement TeleTOP; after a while no renewal of contract; we limited the support
	F	Benefits of using TeleTOP not communicated well to instructors; we appointed an extra employee; instructors at two educational programs were left on their own
	F	also a workshop was held to show best practices, but almost no interest of instructors
Academics personal characteristics	A	Instructors are very skilled to use TeleTOP
	C	instructors satisfied with their work
	C	Instructor demand direct results otherwise they will not invest their time
	C	Some instructors are more innovative, others more conservative ('it's fine, done this over 20 years')
	E	most instructors are skilled to use TeleTOP although some still struggle with TeleTOP; they use basic features of TeleTOP; fairly skilled in using ICT

Appendix 6-Table 1 continues …

Appendix 6-Table 1 continued

Topic	Manager code	Remarks
	F	Often instructors are stubborn and do it their way;
	F	They don't want to admit that they have a problem which they can not solve themselves; that is a fundamental attitude of academics
	F	All instructors highly skilled in a technical sense to use TeleTOP
TeleTOP use by instructors	A	All courses are in TeleTOP; TeleTOP simple, "there is nothing to it"; instructors are satisfied with TeleTOP
	B	All instructors use TeleTOP; TeleTOP very easy to use and similar to Blackboard; TeleTOP became commonplace; course content varies per type of course and per instructor; online discussion seldom used; common use of PowerPoint files
	B	suggests to integrate TeleTOP and VIST (course information database)
	C	TeleTOP offers very easy interaction among instructors and students
	C	commonplace; In TeleTOP instructors fill out a roster; they offer lectures; online discussions not used; they write study material once to be used for many years; they prepare and mark assignments and exams.
	D	Instructors value TeleTOP positively
	D	TeleTOP should be used much more in a uniform manner (to know where to store what sort of information)
	E	Great variety in the way TeleTOP is used among instructors
	F	Great variety in the way instructors fill in TeleTOP; some course environments are almost empty; a few instructors offer assignments
	F	TeleTOP use not mandatory for students or to have TeleTOP access
Job Control (quality, results)	A	planning will be based on budget
	B	Often people do not perform in the most effective way
	B	Instructors do not prepare their lectures weeks ahead when they are similar to last year
	B	Often instructors just let it happen: 'we'll see'; often they prepare a session the night before; flexible planning will decrease stress; instructors very 'accessible' for students
	C	There is a strong sense of quality improvement at a personal level, but it is not discussed in a systematic way because of lack of time
	C	the use of Outlook is commonplace
	C	Part of their work depends on the number of students and another part not.
	C	Often instructors surprised by teaching-related activities and as a result lock themselves up for three days; Instructors allergic to time keeping
	D	Instructors free to decide to use TeleTOP or not and for how much time; support by student-assistants is an option; no information about the number of students that will show up in a course

Appendix 6-Table 1 continues …

Appendix 6-Table 1 continued

Topic	Manager code	Remarks
	D	Most time is spend to arrange one's thoughts, not to create a PowerPoint file; too few time is reserved to mark exams
	E	Planning left to instructors; Instructors hate time keeping
	E	planning not easy when enrolment in courses not known in advance
Support	A	No budget anymore for student assistants or a technician; maybe cheaper than instructors to do part of the teaching-related activities; novice instructors get no specific support and 'are thrown in at the deep end', they will ask a colleague;
	B	no plans for additional support of instructors; emphasises support of novice instructors; instructors support each other;
	B	Offering insight in one's practice motivates others
	C	Most instructors solve their own problems
	D	Support by ICT instructor; instructors tend to solve their own problems; they ask a colleague
	E	Sometimes they ask someone for help out of pure laziness
	E	Instructors are unaware of best practices of their colleagues; almost no exchange of tips and tricks
	E	Instructors have to solve their own problems
	E	No budget for student-assistants, but maybe cheaper than instructors to do part of the teaching-related activities; instructors who are reluctant are offered extra support
	F	Some manuals available how to use TeleTOP but instructors do not need these
	F	Collegial support
Support system	B	tips and guidelines might help to support instructors to perform more effectively and efficiently
	C	Tool should be designed to meet their specific needs; when it presents information instructors don't need it will be rejected
	D	I question the usefulness because of limited use; to stimulate innovative TeleTOP use not needed as long as everything works well
	F	they will give it a try
	F	integrating administrative databases, such as VIST and TeleTOP would be beneficial

Appendix 7: International survey, questionnaire for instructors (Studies C3,C4, and U2).

Back | How to use

Survey for instructors

This questionnaire is intended for anyone involved in teaching in a higher education institution. The questionnaire consists of 53 questions, organised into nine sections. It takes on an average about 30 minutes to fill in the questionnaire. When you are finished with the questionnaire and push "Submit" you will see your answers as submitted in our database.

Server "time outs"

Many computers have a function that automatically breaks the internet connection when you stay on one web page for a longer time. If this happens when you are filling out the questionnaire, your answers will not be received, and you will not get an error message. In order to avoid this happening, we suggest that you may want to work "offline":

1. go to the menu "file" and click on "Work Offline"
2. fill in the questionnaire
3. at the end of the questionnaire (but before clicking the "submit" button), go to the menu "file" and click a second time on "Work Offline"
4. click on the "submit" button.

Personal data

Please fill in the name of your institution:

Indicate the city and country of your institution:

Please fill in the name of the faculty or unit in which you are working:

[Next section]

Mission and general ICT aspects

1: Indicate in your view how important the following aspects are in the mission (statement) of your institution	Importance				
	low		moderate		high
Teaching 18-24 year-old students	○	○	○	○	○
Providing continuing education (or "lifelong learning") to persons in the workforce	○	○	○	○	○
Teaching international students	○	○	○	○	○
Innovation in teaching and learning	○	○	○	○	○
Internally funded research	○	○	○	○	○
Externally funded research	○	○	○	○	○
Interaction with business and industry	○	○	○	○	○

2: In your view, to what extent do the following aspects contribute to good education in your institution?	Good education				
	very little		some		very much
Face to face contact	○	○	○	○	○
Appropriate use of ICT for teaching and learning support	○	○	○	○	○
Individualisation for different student characteristics	○	○	○	○	○
Time and place independent learning	○	○	○	○	○
Communication among students	○	○	○	○	○
Pedagogy related to groupwork	○	○	○	○	○
Contact with the instructor when needed by the students	○	○	○	○	○

3: In your opinion, what is the current balance in your institution between "face-to-face" and "via the Internet" with respect to administrative procedures for students?	only face to face		balanced, both in use		only via the Internet
	○	○	○	○	○

[Next section]

Policy and leadership processes

4: Which of the following best describes the formally stated policy with respect to ICT in your institution?

- ○ There is none
- ○ Perhaps there is policy but I am not aware of it
- ○ Bottom-up: faculty or department-level policies with no link to institutional-level decision-making
- ○ Combined: institutional-wide policy serving as a framework for faculty-specific plans
- ○ Top-down: institutional-wide policy to be implemented in all faculties

5: To what extent is each of the following an objective of ICT-related policy in your institution?

	none or low		moderate		high
Increasing efficiency	○	○	○	○	○
Enhancing the quality of teaching and learning	○	○	○	○	○
Enhancing flexibility	○	○	○	○	○
Enhancing cost-effectiveness	○	○	○	○	○
Generating institutional income	○	○	○	○	○
Creating more opportunities for continuing education (or "lifelong learning") learners	○	○	○	○	○
Creating more opportunities for international students	○	○	○	○	○
Widening access to the traditional (18-24 year-old) student base	○	○	○	○	○
Enhancing competitiveness	○	○	○	○	○
Enhancing the status and reputation of the institution	○	○	○	○	○

6: In your view, how much leadership do the following groups of actors show in the process of developing and implementing ICT-related policy in your institution?

	Leadership				
	weak		moderate		strong
Rector / president / executive board	○	○	○	○	○
Deans of faculties	○	○	○	○	○
Heads of school / institutes / departments	○	○	○	○	○
Support centre for ICT	○	○	○	○	○
Individual professors or instructors	○	○	○	○	○

[Next section]

Student aspects

7: With regard to undergraduate (or initial degree) programmes in your institution, which of the following best describes the current amount of choice available to students?

- ○ Programmes are fully planned, little or no individual choices for students once they choose a programme
- ○ Programmes are fully planned, but some individual choices for students once they choose a programme
- ○ Programmes are fully planned, but many choices for students once they choose a programme
- ○ Programmes are flexible, students can choose from a range of combinations
- ○ Programmes are highly flexible, students can more or less choose their own combinations

8: In your opinion, to what extent is your institution's current ICT-related policy affected by student demands in the following areas?

	ICT -related policy				
	very little		some		very much
Demand for more/wider access to traditional campus-based education	○	○	○	○	○
Demand for continuing education (lifelong learning)	○	○	○	○	○
Demand from international students	○	○	○	○	○
Demand for more flexibility in locations of learning	○	○	○	○	○
Demand for more flexibility in times of learning events	○	○	○	○	○
Demand for more flexibility in pace of learning	○	○	○	○	○

9: In your view, to what extent is each of the following a typical learning setting in your institution?

	Learning setting				
	little or none		some		very much the case
On-campus settings for course activities	○	○	○	○	○
Many variations in where and how students participate in courses, but campus-based settings remain the basis	○	○	○	○	○
Many students are attending at a distance	○	○	○	○	○
Students use the home institution as a "base" but pick and choose their courses from many locations	○	○	○	○	○

10: In your opinion, the level of support for students with respect to the use of ICT for learning in your institution is:	very low		average		very high
	○	○	○	○	○

11: To what extent do you offer options relating to each of the following to students in your own courses?

	no flexibility		some		extensive flexibility
Times for starting and finishing a course	○	○	○	○	○
Times for submitting assignments and interacting within the course	○	○	○	○	○
Topics of the course	○	○	○	○	○
Orientation of the course (theoretical, practical)	○	○	○	○	○
Assessment standards and completion requirements	○	○	○	○	○
Ways in which the course is experienced (face-to-face; group, individual, combinations)	○	○	○	○	○
Language to be used during the course	○	○	○	○	○
Learning resources	○	○	○	○	○
Assignments required for the course	○	○	○	○	○

12: To what extent do you predict you will offer options in the following to students in your own courses in the year 2005?

Options in 2005

	no flexibility		some		extensive flexibility
Times for starting and finishing a course	○	○	○	○	○
Times for submitting assignments and interacting within the course	○	○	○	○	○
Topics of the course	○	○	○	○	○
Orientation of the course (theoretical, practical)	○	○	○	○	○
Assessment standards and completion requirements	○	○	○	○	○
Ways in which the course is experienced (face-to-face; group, individual, combinations)	○	○	○	○	○
Language to be used during the course	○	○	○	○	○
Learning resources	○	○	○	○	○
Assignments required for the course	○	○	○	○	○

Staff aspects

13: How many years of teaching experience in higher education do you have?	Less than 1 year	1-5 years	6-10 years	11- 15 years	more than 15 years
	○	○	○	○	○

14: Which of the following BEST describes the balance between research and teaching in your work?	mostly research		equal balance		all teaching
	○	○	○	○	○

15: In general, how would you rate the experience of instructors in your institution with respect to the use of ICT?	very low		moderate		very strong
	○	○	○	○	○

16: How much experience do you have with using ICT in your teaching?	little or none		occasional		extensive
	○	○	○	○	○

17: To what extent have you changed your teaching via the use of ICT?	Not at all		Somewhat		Very much
	○	○	○	○	○

18: To what extent is each of the following like you?

	not at all		somewhat		very much
Interest in technology in general	○	○	○	○	○
Tolerance for problems related to using technology	○	○	○	○	○
Desire to be well organised	○	○	○	○	○
Desire to be able to plan my time in advance	○	○	○	○	○
Self-confidence with regard to technology use in general	○	○	○	○	○
Make use of teaching-related ideas and suggestions found on the Web	○	○	○	○	○

19: For each of the following, which term best describes your feelings about your current situation?

	serious problem	problem	neutral	satisfied	very satisfied
Your workload in general	○	○	○	○	○
Your workload with respect to teaching	○	○	○	○	○
Impact on your time and patience when using technology in general	○	○	○	○	○
Support available to you for technology use	○	○	○	○	○

20: Assuming you are still at your institution in the year 2005, which term best describes your PREDICTION of your feelings about your working situation in the year 2005?	serious problem	problem	neutral	satisfied	very satisfied
Your workload in general	○	○	○	○	○
Your workload with respect to teaching	○	○	○	○	○
Impact on your time and patience with respect to using technology in general	○	○	○	○	○
Support available to you for technology use	○	○	○	○	○

21: How would you describe the climate for change among instructors in your institution when it comes to the use of ICT in teaching?	very negative		neutral		very positive
	○	○	○	○	○

22: In your opinion, the level of support for instructors with respect to the use of ICT for teaching purposes in your institution is?	very low		average		very high
	○	○	○	○	○

23: To what extent does ICT play a role in the following aspects of your institution's personnel policy?	Personnel policy				
	not at all		some		very much
ICT use in education counts towards promotion and tenure	○	○	○	○	○
ICT use in education is an integral part of regular staff assessments	○	○	○	○	○
ICT use in education is part of regular external quality assurance exercises	○	○	○	○	○
ICT competencies are systematic criteria for selection and recruitment of new staff	○	○	○	○	○
Professionalisation of staff in ICT competencies is mandatory	○	○	○	○	○
Financial incentives to individual staff are provided for development of ICT use in education	○	○	○	○	○
ICT use in education is mandatory	○	○	○	○	○

24: To what extent are each of the following types of support available for instructors in your institution with respect to using ICT in their teaching?	not at all		some		major feature
A pedagogical-support unit	○	○	○	○	○
An ICT technical unit or helpdesk	○	○	○	○	○
Short courses or workshops	○	○	○	○	○
Handbooks for self-study, or other printed reference material supplied by the institution	○	○	○	○	○
Material made available via the Web	○	○	○	○	○

25: To what extent do you use ICT to support the following instructional orientations in your typical courses?	rarely		some		extensively
Motivating on-going participation	○	○	○	○	○
Connecting to prerequisite knowledge	○	○	○	○	○
Students planning their own learning processes	○	○	○	○	○
Developing positive attitudes towards the discipline	○	○	○	○	○
Knowledge transfer	○	○	○	○	○
Skill development	○	○	○	○	○
Students producing/creating reports and products using ICT tools	○	○	○	○	○
Giving guidance / Informally monitoring progress and effort	○	○	○	○	○
Providing feedback on assignments	○	○	○	○	○
Testing and other formal assessments	○	○	○	○	○
Giving feedback after formal assessments	○	○	○	○	○

26: What is the average number of students in your typical course?	Less than 10	up to 25	up to 50	up to 100	More than 100
	○	○	○	○	○

27: For each of the following select a point on the continuum between the two endpoints listed that best represents the CURRENT balance in the typical course you teach:

How does the student communicate within the course?	Only via face to face		Both		Only via the computer
How does the student participate in the course?	Only indivi dually		Both		Only as part of a group
How much interaction with the instructor occurs in the course?	Very little		Some		Very much
How much interaction among the students occurs in the course?	Very little		Some		Very much
How are the learning materials used in the course acquired?	All by the instructor		By instructor and students		All by the students
How are the learning materials used in the course acquired?	All by the instructor		By instructor and students		All by the students
How much of the course is Web-based?	None		Some		Entire course is Web-based
Does the course include the re-use of materials made by someone else or found elsewhere?	Not at all		Some		Very much
With what type of knowledge does the course deal?	Stable know ledge		Both		Newly emerging know ledge

Technology aspects

28: To what extent do the following technologies influence general teaching practice in your institution?	Effect on general teaching practice				
	very little		some		very much
E-mail systems					
Web resources					
Wireless solutions					
Web-based course management systems					
Planning tools, such as network-accessible agendas					
Externally available courses or modules, accessible via the Web					
Conferencing tools (video, audio, chat)					

29: Indicate in your view the extent to which the following aspects involve the use of ICT in your institution?	Use of ICT				
	low		moderate		high
Teaching 18-24 year- old students					
Providing continuing education (or "lifelong learning") to persons in the workforce					
Teaching international students					
Innovation in teaching and learning					
Internally funded research					
Externally funded research					
Interaction with business and industry					

30: The general level of technology infrastructure in my institution is:	very low		average		very high

31: In your opinion, to what extent is ICT being used in your institution...	Use of ICT				
	rarely		some		extensively
For course preparation or organisational purposes?	○	○	○	○	○
In classroom activities?	○	○	○	○	○
Via a Web environment used outside of classroom activities?	○	○	○	○	○
For communication with and among students and instructors?	○	○	○	○	○
To support group activities and project work?	○	○	○	○	○

32: In your opinion, to what extent are the following teaching practices common in your institution?	How common?				
	very uncommon		somewhat common		very common
Lectures	○	○	○	○	○
Practice activities (labs, field work, practical exercises)	○	○	○	○	○
Studying via (non-Web) computer software	○	○	○	○	○
Studying via Web-based environments	○	○	○	○	○
Participation in project work, group work	○	○	○	○	○

External environment

33: In your opinion, to what extent has competition from each of the following actors changed compared to five years ago?	Competition				
	strongly decreased		stable		strongly increased
National higher education institutions	○	○	○	○	○
Foreign higher education institutions	○	○	○	○	○
National commercial providers	○	○	○	○	○
Foreign commercial providers	○	○	○	○	○

34: In your opinion, how much does competition from each of the following actors currently influence the ICT policy in your institution?	Influence				
	not at all		some		very much
National higher education institutions	○	○	○	○	○
Foreign higher education institutions	○	○	○	○	○
National commercial providers	○	○	○	○	○
Foreign commercial providers	○	○	○	○	○

35: In your opinion, how much is the internal ICT-related policy of your institution influenced by (policies of) the following external actors?	Level of influence				
	very little		some		very much
Supra-national body (e.g. EU, UNESCO)	○	○	○	○	○
National / federal government	○	○	○	○	○
National ministry of education	○	○	○	○	○
Sub-national (regional or state-level) government	○	○	○	○	○

36: In your opinion, to what extent does your institution cooperate with the following external partners with respect to ICT-related activities?	Cooperation				
	not at all		somewhat		intensively
Other national higher education institutions	○	○	○	○	○
Foreign higher education institutions	○	○	○	○	○
National business and industry or other for-profit organisations	○	○	○	○	○
Foreign business and industry or other for-profit organisations	○	○	○	○	○

Perceived impact of technology use

37: In your view, to what extent is the use of ICT important for the quality of education programmes and services in your institution?	very unimportant		neutral		very important
	○	○	○	○	○

38: In your view, the impact of ICT on the efficiency of teaching activities in your institution is...?	very negative		neutral		very positive
	○	○	○	○	○

39: To what extent would you say you have become more efficient in the following tasks through your use of ICT?	Efficiency				
	Much less efficient		Neutral		Much more efficient
Finding resources to use in my courses	○	○	○	○	○
Giving feedback	○	○	○	○	○
Doing routine tasks relating to my teaching	○	○	○	○	○
Doing tasks relating to planning and managing my agenda in general	○	○	○	○	○
Managing administrative data about my students	○	○	○	○	○

40: In your view, the level of satisfaction among personnel in your institution with respect to their working conditions related to the use of ICT is...	very low		neutral		very high
	○	○	○	○	○

41: The following are typical duties of an instructor. Indicate your feelings about the amount of time these activities take for you.	Time demands				
	I am very annoyed by the time needed		Neutral (or not applicable)		I am very satisfied about the time needed
Using a course-management system	○	○	○	○	○
Dealing with e-mail	○	○	○	○	○
Learning to use new technology	○	○	○	○	○
Solving technical problems	○	○	○	○	○
Marking and grading and giving feedback	○	○	○	○	○
Attending meetings related to your courses (curriculum planning, programme-related discussions, etc)	○	○	○	○	○
Making changes in your courses because of institutional changes	○	○	○	○	○
Responding to unexpected interruptions	○	○	○	○	○
Managing exceptions for individual students (in assignment, tests, meeting times, etc)	○	○	○	○	○
Answering questions from students	○	○	○	○	○
Managing course facilities (setting up the classroom, seeing that computer facilities are available, etc)	○	○	○	○	○

42: PREDICT your feelings about the amount of time these activities will take for you in the year 2005.	Time demands in the future				
	Much more time than I will want to spend		Neutral		Just the amount of time that I want to spend
Using a course-management system	○	○	○	○	○
Dealing with e-mail	○	○	○	○	○
Learning to use new technology	○	○	○	○	○
Solving technical problems	○	○	○	○	○
Marking and grading and giving feedback	○	○	○	○	○
Managing exceptions for individual students (in assignment, tests, meeting times, etc)	○	○	○	○	○

43: In your view, the impact of ICT on learning effectiveness in your institution is...?	very negative		neutral		very positive
	○	○	○	○	○

44: To what extent is each of the following the case for you?	Definitely not		Neutral		Definitely yes
I am satisfied with the ease of use of ICT in my teaching	○	○	○	○	○
I am satisfied with the results of using ICT in my courses	○	○	○	○	○
My students are satisfied with the ease of use of ICT in my courses	○	○	○	○	○
My students are satisfied with the results of using ICT in my courses	○	○	○	○	○
Using ICT is facilitating new forms of learning in my courses	○	○	○	○	○
The use of ICT is becoming a normal part of the way I do my teaching-related work	○	○	○	○	○
I feel I can make my own choices with respect to when and how I use ICT in my teaching-related work	○	○	○	○	○
I feel confident about my ability to use ICT for teaching-related work	○	○	○	○	○

45: In your view, the impact of ICT on general working practices in your institution over the last two years has been...?	very negative		neutral		very positive
	○	○	○	○	○

[Next section]

Predictions for the year 2005

46: In your view, to what extent will the following aspects involve the use of ICT in your institution in the year 2005?

	Use of ICT in 2005				
	low		moderate		high
Teaching 18-24 year-old students	○	○	○	○	○
Providing continuing education (or "lifelong learning") to persons in the workforce	○	○	○	○	○
Teaching international students	○	○	○	○	○
Innovation in teaching and learning	○	○	○	○	○
Internally funded research	○	○	○	○	○
Externally funded research	○	○	○	○	○
Interaction with business and industry	○	○	○	○	○

47: With regard to undergraduate (or initial degree) programmes in your institution, which of the following do you predict will best describe the amount of choice available to students in the year 2005?

- ○ Programmes are fully planned, little or no individual choices for students once they choose a programme
- ○ Programmes are fully planned, but some individual choices for students once they choose a programme
- ○ Programmes are fully planned, but many choices for students once they choose a programme
- ○ Programmes are flexible, students can choose from a range of combinations
- ○ Programmes are highly flexible, students can more or less choose their own combinations

48: What do you predict will be the balance between " face-to-face" and " via the Internet" with respect to administrative procedures for students in your institution in the year 2005?	only face to face		balanced, both in use		only via the Internet
	○	○	○	○	○

49: In your view, to what extent will your institution's ICT-related policy be affected by the following types of student demands in the year 2005?

	ICT-related policy in 2005				
	very little		some		very much
Demand for more/wider access to traditional campus-based education	○	○	○	○	○
Demand for continuing education (lifelong learning)	○	○	○	○	○
Demand from international students	○	○	○	○	○
Demand for more flexibility in locations of learning	○	○	○	○	○
Demand for more flexibility in times of learning events	○	○	○	○	○
Demand for more flexibility in pace of learning	○	○	○	○	○

50: In your view, to what extent will each of the following be a typical learning setting in your institution in the year 2005?

	Learning setting in 2005				
	very unlikely		some		very likely
On-campus settings for course activities	○	○	○	○	○
Many variations in where and how students participate in courses, but campus-based settings remain the basis	○	○	○	○	○
Many students are attending at a distance	○	○	○	○	○
Students use the home institution as a "base" but pick and choose their courses from many locations	○	○	○	○	○

51: In your opinion, to what extent will each of the following actors influence the ICT-related policy in your institution in the year 2005?

	Influence in 2005				
	not at all		some		very much
National higher education institutions	○	○	○	○	○
Foreign higher education institutions	○	○	○	○	○
National commercial providers	○	○	○	○	○
Foreign commercial providers	○	○	○	○	○

52: In your opinion, to what extent will each of the following be a major objective in ICT-related policy in your institution in the year 2005?

	Policy objectives in 2005				
	none or low		moderate		high
Increasing efficiency	○	○	○	○	○
Enhancing quality of teaching and learning	○	○	○	○	○
Enhancing flexibility	○	○	○	○	○
Enhancing cost-effectiveness	○	○	○	○	○
Generating institutional income	○	○	○	○	○
Creating more opportunities for continuing education (lifelong learners)	○	○	○	○	○
Creating more opportunities for international students	○	○	○	○	○
Widening access to the traditional target group	○	○	○	○	○
Enhancing competitiveness	○	○	○	○	○
Enhancing the status and reputation of the institution	○	○	○	○	○

53: In your opinion, to what extent will the following forms of external cooperation influence the success of your institution in the area of ICT in the year 2005?

	Influence in 2005				
	not at all		somewhat		very much
National higher education institutions	○	○	○	○	○
International higher education institutions	○	○	○	○	○
Business and industry in the country	○	○	○	○	○
International business and industry	○	○	○	○	○

Would you like to have a password for access to the project reports and further analyses available in early 2002? Please type yes or no:

Please enter your e-mail address in order to receive the password:

Thank you for your cooperation. When you are finished with the questionnaire and push "Submit" you will see your answers as submitted in our database.

Submit Reset

Appendix 8: Summary of Prototype 2 evaluation (Study I2)

The remarks made by the evaluators are not combined, because the two versions of the tool were not fully compatible (see Section 7.5).

Analysis Expert 1, date 15-9-03

- **General remarks**
  - It would be handy to accompany the initial use of the tool with a printed job aid, that shows the different interfaces of the tables, and colour the different frames.
  - a big difference from the last version. I admire it very much

- **Content**
  - You might indicate that this is a research tool as well as a tool intended for instructors.
  - I miss in this main window an overview of what's coming in the tool.
  - I'm wondering where I get the overall sitemap of what's in this site.
  - It seems to me that this table [with an overview of menus and icons] is an important organiser for the site, and it should be easy to find it.
  - Difficult to understand the breakdown of activities and subactivities ". So three different relationships between this table and these second levels."
  - References: I like that very much [references under book icon]. I think that's good. Here [under book icon] you have two different choices, that's really handy.
- **Graphics**
  - I really like the entry page, it pleases me. I think the image is a nice background, not only attractive, but also giving me a sense of what the purpose is.
  - I like the colour combination because it matches the colours in the picture. That's good. I also like the colours because they are calm and peaceful colours. They are not harsh and flashy and that's important.
  - To me the functionality of a flowchart is not clear.

- **Navigation and layout**
  - I'm not sure where to click next. It might be a little more clear if it says "to begin, click here"
  - I like the way you are using the interface of those matrices, with the icons that "communicate", I think that's really nice. So that's excellent.
  - As I look at the navigation frame I don't see which one matches the welcome page.
  - The links in the top frame link to the same page or to a new window.
  - About the top frame: "To me it's not clear what the function is as a navigation aid, compared to this [navigation bar] as a structure."
  - I also see a frame down here and I don't know what this frame is.
  - Give me a way to click and not having to scroll, I never like to scroll in terms of efficiency, I just want to get there.

- The use of various links, pointing to the same page, is not logical.
- The first-level headings in the menu are not links.
- The fact that some pages are almost identical in their layout is confusing at first "I feel it as redundancy and it always leads to confusion if this is the same thing as that."
- In extra windows: "Somehow I lost my scrollbar here."
- Sequential navigation from Develop to Deliver to Export should be skipped, its confusing, better use the menu bar. "My feeling is, go as deep as you want but come up here again where you came from to do the next thing. Don't use Next."
- You might consider colour coding in the electronic version as well to differentiate between different layers.

- **Text**
  - Many small remarks about the text, the spelling, and grammar.
  - Offer clarification as much as possible. "It's really important that people know."
  - Offer direct mapping between menu items and the heading of the linked page, and between text-links and the heading on the linked page.
  - Add a little bit of explanation here of what the columns relate to.
  - Be consistent: use the same word throughout the tool "Here it says Store and here it says OK."
- **Summary**

  - one function is to help instructors to think more systematically about all the steps
  - second function is to give instructors archival readings or forms that help you relate to a certain step
  - third function is to tailor the bottom output to your own situation relative to that step.

I like the **general approach**. I like that the user can tailor under project column the variables or choices that affect his own planning and those will be reflected in something that I can print out and use as well as steering different resources. That's very powerful and that's a big change in what you had before and I like it very much.
I like the **navigation** that you have in the first section that you really worked on. So as we where talking about it, I keep that as the navigation, so that you don't wander in different ways in the site, because you have so much, that the risk is, that people just don't remember where they are. So only let them go with the back button or using the navigation frame consistently.
I like the way you are using the interface of those **matrices**, with the icons that "communicate", I think that's really nice. So that's excellent.
It would be handy to accompany the initial use of the tool with a **printed job aid**, that in fact show the different interfaces of the tables, and colour the different frames. That you can have it as a sort of reference if you want to quickly know where to go for a particular form or adjustment and you don't want to be clicking and remember. You can also make notes on that paper version and circle the parts that are most useful to you.
You might consider **colour coding** in the electronic version as well to differentiate between different layers. Because in some comments I was not sure how deep I was

going. So if the top level is always like beige, and the second level is always like green and the third level always like pink then that also helps you to know how deep you are.
The information **how to use this site** should all be in one place at the very top and more expressive than it now is. Because it's not enough to tell me all the things that were coming. The activities matrix on the very first page had 12 steps and I can't tell you now if I know where the 12 steps are and all the things that I have been looking at. So the mapping with all the things that I have seen is not clear to me how that mapping occurs.
You could have small **thumbnails**: go here for this, go here for these. Because at the moment I can't see how these map on each other. If you change the navigation here so that you only have the core part then probably it will be more sequential and can better map on that first table.
So think hard about the very opening section about to **explain** more to the person on how this tool works.
Another thing is not clear to me even now, is can I quit at any time like a help system where you just do what you chose to do or is the **continual generation** that comes from the choices you make in what you call the project column is that going to have somehow not enough input if I quit early?
So do you have **default values** for everything and it's only if I choose the difference. You should make that clear. If you don't choose to make a personalized input under Project choices, then you will get the default value as the basis for what shown on the screen and any calculations that are made. So in that sense, if I can live with the default value. I'm wondering what I get, if I just choose the default values and not customize anything. I guess I get the three things at the bottom.
So maybe that should be made clear: if you just use the system a little you mainly get default values in the output forms which are there to guide you. However the more you fine-tune your choices under Project the more the three forms at the bottom will be specific to you.

Think about a change of the first section which will be an overview of how to use the PST-I tool.

You made your tables very visual and attractive. If they want more you got a little icon there of a resource and they can click on it and up pops a Word file, a portal site or a video or whatever. But they can choose that and click if they want it.

So think about the section you call "how to use the site" and put it in a matrix and the table you have now can be underneath it, like you have multiple level of tables. That's consistent then.

Very nice. I admire it very much.

Expert 2, date 7-10-2003

Two general observations:
- There was a misunderstanding about the activities shown in the table to indicate what activities have to be performed, and the actual performance of these activities
- the content should be kept up-to-date

- **Navigation**
  - Specify what the user can or should do / select.
  - Indicate where the user is within the tool, highlight the links, but when used more often it will become clear.
  - Be consistent in top-frame: one is a link to the same page, the flowchart is a new page
  - Indicate what will be shown when the user clicks on a link
  - The icon is not clear that it can be clicked as a link: there is no 'hand'
  - Indicate how to go back.
  - In additional windows there should be a scroll bar
  - Use no more than two levels of links.
- **Content:**
  - Background info is very interesting and very useful. How did you find them? I should read them.
  - The level of detail is a dilemma, because some activities are so common that they can be grouped under a broader, more general activity.
  - Take into account the teaching style: the way instructors organise their teaching and interact with students
  - Leave details about student assistants out of the planning
  - Activity lists about how to put info in TeleTOP are useful
  - Proposing a new course and filling a micro-planning is far before developing.
  - Take note of a new quality control process that will be introduced in the faculty.
- **Media**
  - Forms / templates are useful.
  - Add forms for micro planning, Course description (Vist),
  - Indicate in output for instance what is related to quality management
- **Text**
  - Add a bit more explanation with each topic and activity so users understand what is meant
  - State the information in a clear, determined, and short way. They know that 'developing a course is not a single action' as is stated in the tool. Just indicate the steps to take. Maybe during the experiment it can be useful to inform the participant.
- **Graphics**
  - Keep graphics consistent with text
  - Use some graphics to show the user-interface to help users recognise the parts, the tasks.
  - Use attractive, easy to recognise icons (monitor is not clear)

- **Overall impression**
  - This prototype is much more focused towards the instructor than a previous one.
  - Take a closer look at the activities from the perspective of the instructor to describe each aspect in a short format.
  - The resources are attractive and very useful.
  - The tool can be a personal management tool that can also be linked to a management information system on education, program planning, accreditation, and quality management.
  - Important aspect is that it should be very easy for instructors to find and fill in the forms that are required by management (micro-planning, Course description, etc.).
  - It could be very useful for an instructor to use this tool to quickly find some articles or guides about for instance 'What is a good lecture'. Also to quickly find a form and you do not need to think where to look for that form.
  - It is attractive that the instructor can use the system in various ways (not only in a strict sequential way).
  - The map of teaching-related activities says it all, it is a perfect view on the many dimensions in which instructors do their work. It also indicates that instructors face new activities for which they are probably not skilled (new target groups, foreign students). Management may also initiate and support instructors to use the tool for such new situations. This refers to professional development. This scheme indicates, that there is no unique direction for instructors, because there are so many aspects, but this tool (in a final version) offers an integrated way to manage and control all these aspects.

Appendix 9: Summary of Prototype 3 evaluation (Study I3)

Evaluation of Prototype 3 by 2 experts, June 2004.

- **Entry page**

exp1	I think the background image is very attractive and it's also schematically meaningful.
exp1	I don't see the words very well.

- **Welcome page and overall frame structure**

exp1	When I first look at this is, I wonder how I'm going to get back to this [entry page].
exp1	What I see here is a frame-based environment.
exp1	I see the title at the top. And as could be predicted, I see a help and an author reference. So that's all very logical.
exp1	I'm confused about the function of: Show current output at the bottom. [it is obsolete]

- **navigation frame**

exp1	I see a navigation frame at the left which shows me the structure of the program. So that's all very logical.
exp1	'PPST home' might be better than just 'PPST'
exp1	Is this navigation bar changing all the time? [showing and hiding pop-up subentries]
exp1	Call Info 'background information' so people will know that it is conceptual info.
exp2	Add background information to PPST help.

- **Information frame**

exp2	Text is good, but it needs to be shown only once, then users know it.
exp1	You might do one of these screen-cam movies.
exp1	The introduction gives me nine clear points about this tool and the teaching-related activities, so that's ok.
exp1	What is the mapping between these nine topics and the navigation entries?
exp1	Start with PPST here so that I make the connection.
exp2	Text could read: You may use the system as follows: you select a menu entry in the navigation bar and then you will see this, that will turn out to be very intuitive, just try it.

- **Major-task pages (Develop, Deliver)**

exp1	There is a logical tendency of people to go in order, so I go in order too. So I click develop and I see a new page called develop. That's good, I'm not surprised.
exp1	So this Develop page is like a menu page for the develop pages that follow.
exp2	specifying that a Develop is part of teaching is surplus
exp2	Develop page is an in-between step to Develop new course or component. Indicate on this page the development process and what new course and new components stand for.
exp1	Why not take instruction away as it is the same as Help.
exp2	To show operating instructions on a task page is confusing. Can be skipped, as there is also help available.
exp1	I like that very much. [that the tool is task-oriented]

- **Task pages (develop new course, Deliver a course)**

exp1	This is a one page sort of job aid, and that is good, but I'm a bit surprised about this page: What do I have here? I did not have a sort of mental preparation for this.
exp1	In Develop an new course you have the different subtasks. It's a great wealth of stuff here under subtasks and activities. I agree you kept a common structure here.
exp2	I think that the user should be able to see the difference between input fields that can be changed by the user and those that can not be changed.
exp1	May I click on Reset? [for now it resets the values but then presents the welcome page instead of the current page]
exp1	So both [at the Develop new course page and at the Define page] take me to the same information which is underneath the table. [was not clear]

- **Subtask pages**

exp1	The subtasks all have a similar structure.
exp2	Some of these activities are performed right away without planning, such as determine a Dutch coursename, or to what study program the course will be part of.
exp2	With Determine course structure, I expect to see questions about course objectives, whether it will be a lecture-based course or a practice-based course.
exp2	Maybe the activity table for Propose a new course could be structured like a table of contents for the proposal. Then also information that is needed to fill out a microplan form is needed. To write a proposal the estimated time to develop and deliver a course can be based on time

	defaults and calculations in this tool.
exp1	Think of the colour coding [of various levels] if it does not mess the whole layout, because you have a nice colour combination now.
exp1	What I'm missing is a sense of a structure of this page.
exp1	The title of the page is Define a new course, the table heading is Perform and then again define new course: activity details. It's not clear.
exp1	But it says "Define a new course: activity details" So I wonder how I get to this.
exp1	Maybe separate the major parts by a horizontal line and a heading: Materials linked to the above table
exp1	In summary: Put a heavy line here
exp1	Internal links are confusing when nothing changes [because text is already visible]

- **(Links to) Resources**

exp1	So these resources all link to things on the same page? That's unclear.
exp2	Navigation by internal links and icons is not clear.
exp1	Define a new course. Here I have to scroll, it does help to have internal navigation at the top. [The internal navigation is meant to go by the icons]
exp1	In summary: have a consistent way to navigate.
exp1	I think it would be helpful if these resources were popup windows, so when I click on this a pop-up window comes up that just shows this. People don't have to click when they don't want to, but if they want clarification that's all that shows up.
exp1	Better have these resources pop up separately because I did not expect them at the top, my eyes just stayed here.
exp2	For sub-activities show additional information or explanation in a pop-up menu
exp2	It would be nice to use pop-up windows instead of internal links.
exp2	When I click on icon under Req. then the internal link shows not only the information I selected, but a lot more that is on that page.
exp1	Break up your tables and make them level ones and twos.
exp1	I see a lot of resources.
exp2	That's a real strength of your page. [to show a form that can be filled out]
exp2	Clarify why and how a form should be filled out.
exp1	Give some explanation that there are two ways to use a page: by clicking a link in this table you'll go to the support material or it offers a one page overview that can be printed.

- **Components**

exp1	There are two ways to go to develop a new lecture, but I don't see where I came from.

- **Plan**

exp1	I like the Plan column as it gives a suggestion of the amount of time. That's good.
exp1	I can change these values under Plan? I see, I get automatically an updated calculation, that is really handy.
exp2	When specifying the number of lectures and the time per lecture, indicate why it is important. Also indicate the difference between Develop and Deliver. With assignment and discussion it is not clear whether total time is per assignment or overall.
exp2	ECTS norm not clear what is meant and although I did not specify it, the system uses the ECTS point in a calculation.
exp2	Difficult to see the difference between reserve time to plan a course and planning time to perform the course activities.
exp2	To prepare a proposal, the only thing I want to know is, how much time it will take me, not all the details.
exp2	I wonder who pays for the time to prepare a proposal.
exp2	I have a feeling that Plan should not be part of activity details. Activity details are related to actually developing a course itself. The table and activity details should focus on the teaching aspects to develop a course.

- **Project**

exp1	Separate the project management approach from the rest.
exp1	It would be a good idea to show the value of using msProject. Tell them why to use msProject. I'm not an msProject user.
exp2	Is the assumption that instructors are already using msProject? Or am I forced to start using msProject?
exp2	Indicate that using msProject is an option

- **PPST support**

exp1	I would be inclined only have it in one place
exp1	Call Help 'PPST help'.
exp1	So you might consider to offer people for the first time a button "How to use the site".
exp1	It might be better to just have the link to PPST-home and the subentries [Help, Info, Contact] down here in the navigation bar.
exp2	Help should be a guide how to use the tool, not like an order: "Click this"

- **Sitemap**

exp1	It might be helpful to have is a sitemap because you got a complicated tree-type structure here.
exp1	An overall sitemap will help you as we are quite low in the structure now.
exp2	A sitemap has to be added.
exp1	Explore can be left out because there is enough stuff here.

Appendix 10: Background questionnaire for evaluators of final PPST (Study I4)

Background questionnaire

Name:
Date:

This questionnaire is part of a PhD research project called 'Academics in Control'.
Please answer the following questions in order to help us to better understand your job and support needs.
Questions about **teaching-related activities** refer to all your organisational, development, and delivery activities that you perform outside an instructional setting (e.g. outside a lecture, practice, or meeting).

1. Demographics	
What is your **sex**?	○ Male ○ Female
What is your **age**?	○ Less than 20 years ○ 20-29 years ○ 30-39 years ○ 40-49 years ○ 50-59 years ○ More than 59 years
How many years of **teaching experience** in higher education do you have?	○ Less than 1 year ○ 1 - 5 years ○ 6 - 10 years ○ 11 - 15 years ○ more than 15 years
How much experience do you have with **using TeleTOP** in your teaching?	○ none ○ novice ○ common ○ expert

2. Job context	**Not a problem**	**Little**	**Somewhat**	**Much**	**Very much a problem**
Which term best describes your feelings about your **workload in general**?	○	○	○	○	○
Which term best describes your feelings about your **teaching workload**?	○	○	○	○	○
Which term best describes your feelings about **TeleTOP**-use contributing to your **workload**?	○	○	○	○	○

3. Job control	Very low		Neutral		Very high
In your opinion, what is the level of **autonomy** (set by management) in your teaching tasks?	○	○	○	○	○
In your opinion, what is the level of **detail** in which management specifies your teaching tasks?	○	○	○	○	○
In your opinion, what is the level of (extra, non-curricula) **incentives** offered by management you experience related to your teaching and teaching-related activities?	○	○	○	○	○

4. Teaching	
How many courses do you (co-)teach during one academic year?	○ No courses ○ 1 course ○ 2 - 4 courses ○ More than 4 courses
What is the total amount of **EC**- or **SP**-points of your courses that you (co-)teach during one academic year?	☐ EC points; or ☐ SP's [studypoints]
How many courses do you (co-)teach during one academic year in which you use **TeleTOP**?	○ No courses ○ 1 course ○ 2 - 4 courses ○ More than 4 courses

5. Using TeleTOP for teaching	Not at all		Some		Very much
To what extent are you **skilled** in using **ICT**?	○	○	○	○	○
To what extent are you **skilled** in using **TeleTOP**?	○	○	○	○	○
To what extent are you using TeleTOP in your courses?	○	○	○	○	○
In your opinion, to what extent do you use the full functionality offered in TeleTOP?	○	○	○	○	○

6. Performing teaching-related activities	Not at all		Some		Very much
To what extent do you use **a standard set of procedures** when performing your teaching-related activities?	○	○	○	○	○
To what extent are you **planning** your teaching-related activities in detail?	○	○	○	○	○
To what extent are you using **reference material** to support your teaching-related activities?	○	○	○	○	○
To what extent are you informed by educational director about the teaching **requirements**?	○	○	○	○	○
To what extent do you use a standard set of procedures when using **TeleTOP**?	○	○	○	○	○
To what extent do you **manage and control** your own performance of teaching-related activities?	○	○	○	○	○
To what extent do you have to **inform administration** about your teaching-related activities?	○	○	○	○	○

7. Current support for instructors	very low	low	neutral	high	very high
How would you rate the level of support offered to you towards **teaching-related activities**?	○	○	○	○	○
How would you rate the level of support offered to you towards (new) **work-related procedures**?	○	○	○	○	○
How would you rate the level of support offered to you towards your own **planning** and job-control?	○	○	○	○	○
How would you rate the level of support offered to you towards (new) **subject-matter information** (articles, references)?	○	○	○	○	○
How would you rate the level of support offered to you towards (new) **requirements** you have to apply?	○	○	○	○	○
How would you rate the level of support offered to you towards using **TeleTOP** in your teaching?	○	○	○	○	○
How would you rate the level of support offered to you towards applying **administrative procedures**?	○	○	○	○	○

8. Support tool	very low	low	neutral	high	very high
How would you rate your willingness in general to try and use **new ICT applications**?	○	○	○	○	○
How would you rate your willingness to try and use a **support tool** for teaching-related activities?	○	○	○	○	○
How would you rate your **need for additional support** towards teaching-related activities?	○	○	○	○	○

If a computer-based tool would be generaly available to support you with your teaching-related activities, then please specify the **conditions** that should be met to be willing to try and use such a tool?	Specify conditions:

Please click Submit to submit this form, or click Reset and start anew.

Submit Reset

Thanks for your cooperation.

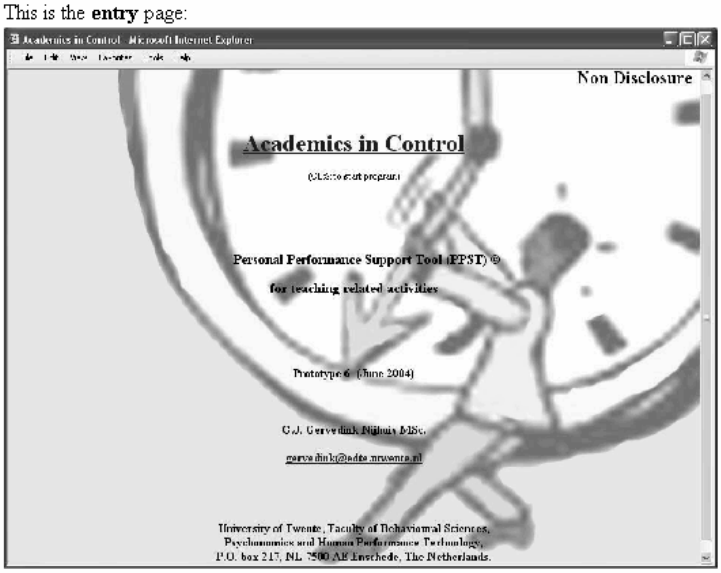
Appendix 11: Questionnaire to evaluate the final PPST (Study I4)

Test questionnaire

Name:……..
Date: ……...

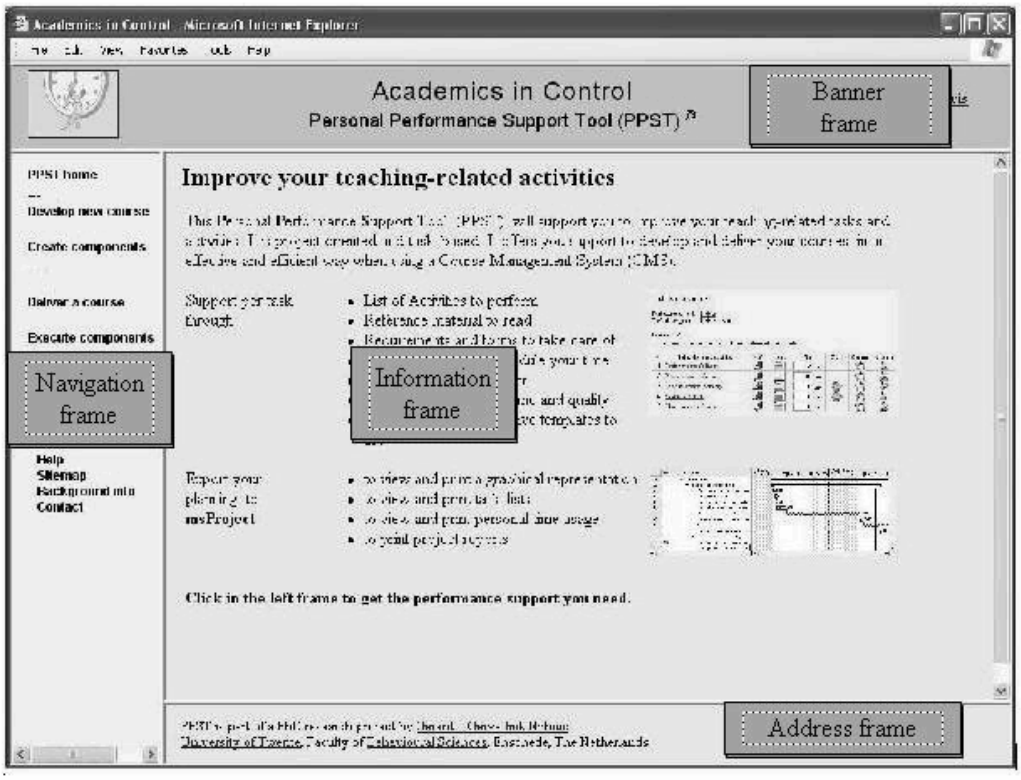
This questionnaire is part of a PhD research project called 'Academics in Control'. Please answer the following questions. Questions about teaching-related activities refer to all your organisational, development, and delivery activities that are performed outside an instructional setting. Potential usefulness ('bruikbaarheid') refers to a future situation when the tool might be generally available in a full-scale version within your organisation.

This is the **entry** page:



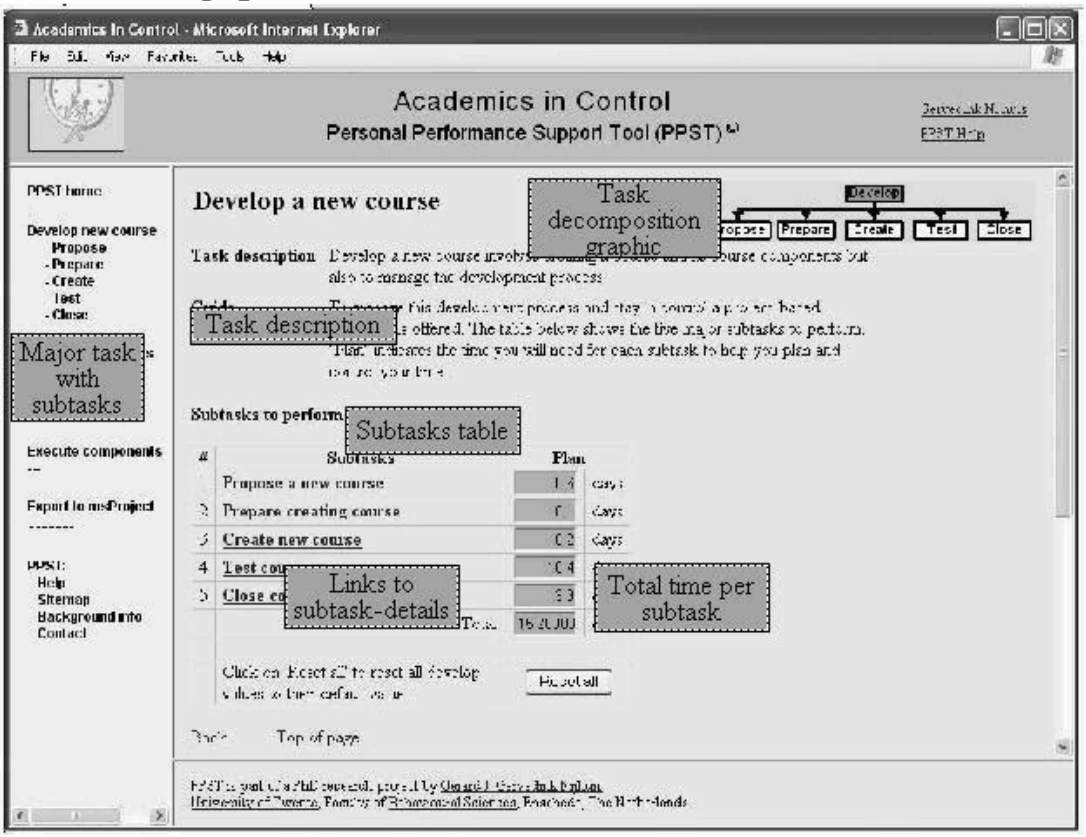
1. Entry	very negative	negative	neutral	positive	very positive
How would you rate the (potential) attractiveness of the **entry page**?	○	○	○	○	○
Please write your comments to the right, if you have any.	Comments:				

Welcome page:



2. Welcome page and layout	very negative	negative	neutral	positive	very positive
How would you rate the (potential) usefulness of the **welcome page in general**?	○	○	○	○	○
How would you rate the (potential) attractiveness of the **screen layout** with 4 frames?	○	○	○	○	○
How would you rate the (potential) usefulness of the **navigation** frame at the left?	○	○	○	○	○
How would you rate the (potential) usefulness of the **information** frame at the right?	○	○	○	○	○
Please write your comments about the start to the right, if you have any.	Comments:				

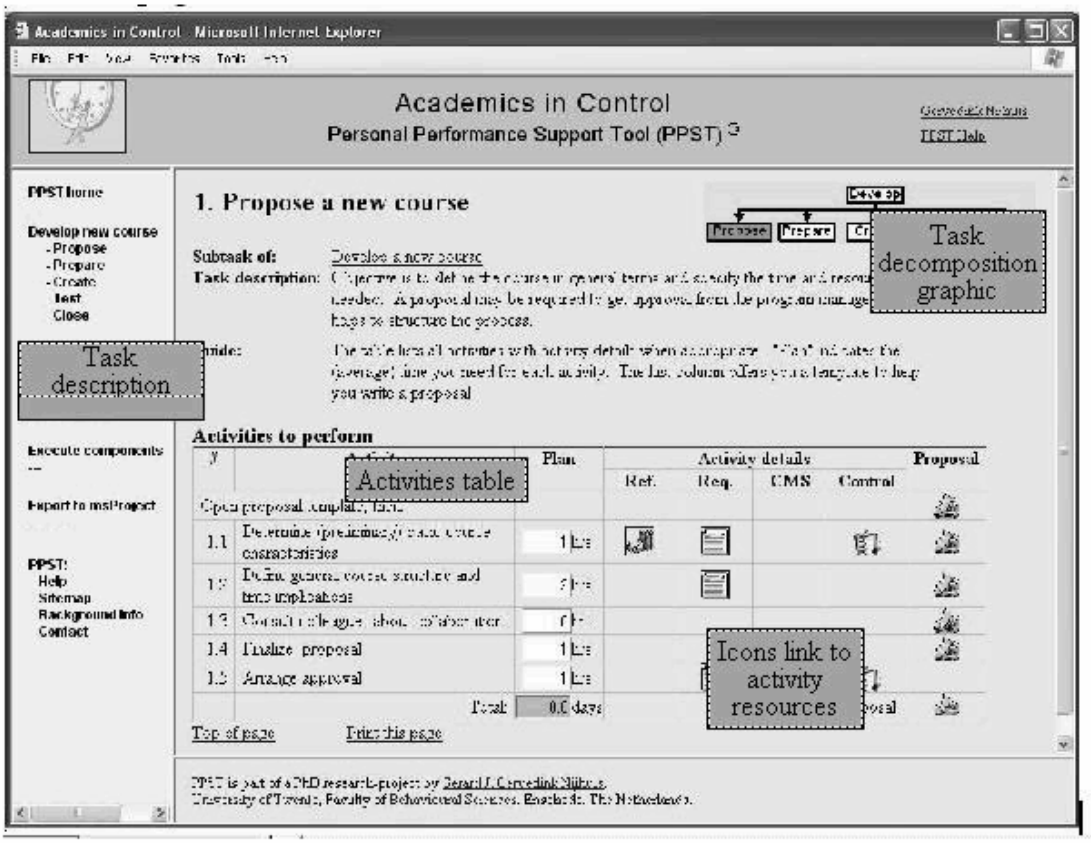
Task-overview page



Example-page of Develop a new course

3. Task overview	very negative	negative	neutral	positive	very positive
How would you rate the (potential) usefulness of the **task-overview page in general**?	○	○	○	○	○
How would you rate the (potential) usefulness of the **task with sub-tasks** in the navigation frame?	○	○	○	○	○
How would you rate the (potential) usefulness of the **major-task description**?	○	○	○	○	○
How would you rate the (potential) usefulness of the **task-decomposition graphic**?	○	○	○	○	○
How would you rate the (potential) usefulness of the **subtask table**?	○	○	○	○	○
How would you rate the (potential) usefulness of a link to subtask-details for each subtask in the table?	○	○	○	○	○
How would you rate the (potential) usefulness of total **planning time per subtask**?	○	○	○	○	○
Please write your comments on task-overview page to the right, if you have any.	Comments:				

Sub-task page:



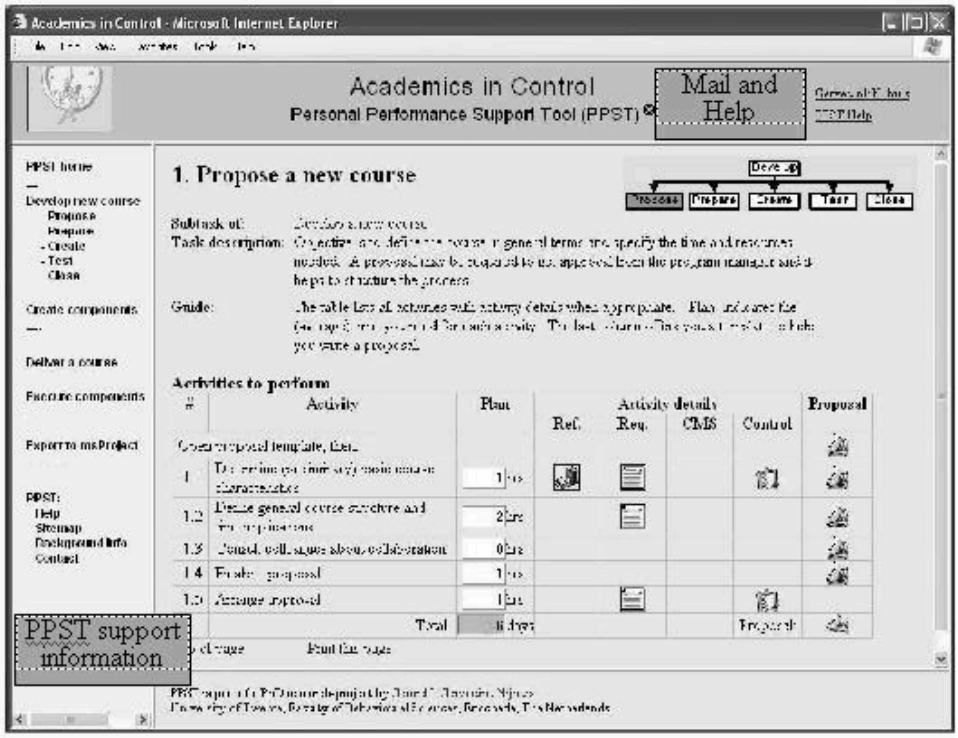
3. SubTask and activities	very negative	negative	neutral	positive	very positive
How would you rate the (potential) usefulness of dividing the development process in **subtasks**: propose, prepare, create, test, and finish?	○	○	○	○	○
How would you rate the (potential) usefulness of a **sub-task page** in general?	○	○	○	○	○
How would you rate the (potential) usefulness of a **sub-task description** for each subtask?	○	○	○	○	○
How would you rate the (potential) usefulness of a **task-decomposition graphic** that highlights the subtask?	○	○	○	○	○
How would you rate the (potential) usefulness of the **activity table** in general?	○	○	○	○	○
How would you rate the (potential) usefulness of the **list of activities** in the activity table?	○	○	○	○	○
How would you rate the (potential) usefulness of the **Planning** column, with default times that can be changed?	○	○	○	○	○

Activity-details columns

How would you rate the (potential) usefulness of the **Reference** column, with icons that link to articles and web sites?	○	○	○	○	○
How would you rate the (potential) usefulness of the **Requirements** column, with icons that link to documents?	○	○	○	○	○
How would you rate the (potential) usefulness of the **TeleTOP** column (Course Management System, such as TeleTOP), with icons that link to CMS procedures?	○	○	○	○	○
How would you rate the (potential) usefulness of the **Control** column with icons that link to checklists and tips?	○	○	○	○	○
How would you rate the (potential) usefulness of the **Administration** column, with icons that link to administrative documents and forms?	○	○	○	○	○
How would you rate the (potential) usefulness of icons in general, to link to recourses, documents, forms, etc?	○	○	○	○	○
Please write your comments on sub tasks and activities to the right, if you have any.	Comments:				

Questions about PPST support information are shown on the next page.

PPST support information



4. PPST support information	very negative	negative	neutral	positive	very positive
How would you rate the (potential) usefulness of the link to **Mail** to send a message to the Help desk?	○	○	○	○	○
How would you rate the (potential) usefulness of the **Help** in the banner frame at the top?	○	○	○	○	○
How would you rate the (potential) usefulness of the **Help sub-entry** at left?	○	○	○	○	○
How would you rate the (potential) usefulness of the **Help page** itself?	○	○	○	○	○
How would you rate the (potential) usefulness of the **Sitemap** sub-entry?	○	○	○	○	○
How would you rate the (potential) usefulness of the **Research** sub-entry?	○	○	○	○	○
How would you rate the (potential) usefulness of the **research** articles (project management, time management)?	○	○	○	○	○
How would you rate the (potential) usefulness of the **contact page** sub-entry?	○	○	○	○	○
Please write your comments about tool-support to the right, if you have any.	Comments:				

Overall Potential usefulness

5. Overall impression	very negative	negative	neutral	positive	very positive
What is your overall impression of the **look and feel**?	○	○	○	○	○
What is your overall impression of the **screen design**?	○	○	○	○	○
What is your overall impression of the **navigation**?	○	○	○	○	○
What is your overall impression of the (potential) usefulness of the **tasks and activity lists**?	○	○	○	○	○
To what extent do you think that the **tasks and subtasks** match common practice of instructors?	○	○	○	○	○
What is your overall impression of the **content** of the PPST tool itself (excluding the content of resources, such as articles, documents, forms)?	○	○	○	○	○
What is your overall impression of the (potential) usefulness of the **resources**, such as articles, documents, forms, that are linked in the PPST tool?	○	○	○	○	○
What is your overall impression of the (potential) usefulness of the **planning** support?	○	○	○	○	○
What is your overall impression of the **overall** (potential) **usefulness** of the support tool for teaching-related activities?	○	○	○	○	○
To what extent do you think **you will use the tool** when a full scale version would be made generally available?	○	○	○	○	○
Please write your comments about the overall impression of the tool to the right, if you have any.	Comments:				

Appendix 12: Post-test questions (Study I4)

Name:……..

Date: ……...

These post-test questions are part of a PhD research project 'Academics in Control'. Please give short answers to the following questions. Questions about teaching-related activities refer to all your organisational, development, and delivery activities that are performed outside an instructional setting. Potential usefulness refers to the final situation when the tool is generally available in a full-scale version.

9.7 Questions:

- What is your general impression of the (potential) usefulness of the PPST to support instructors at higher education for their teaching-related activities?
- If this tool would be generally available as a completely filled system, would you or your colleagues use it for your teaching-related activities? Why, or why not?
- To your opinion, what should be added to the tool to make it (more) useful for instructors to perform their teaching-related activities?
- How would a successful procedure to implement such a tool as a complete system look like? What steps in which order?
- I have here a draft of an implementation plan. Please comment on this plan (i.e. is it well structured? Is it adequate? Will it lead to success?).
- Will the use of this PPST stimulate you and your colleagues to standardize your work procedures according to the content of this PPST?
- Will instructors be better equipped to stay in control for their teaching-related activities?

Thanks very much for your kind co-operation.

Appendix 13: Example of Microsoft Project Gantt chart using PPST output (Study I4)