D30.3.1 (Final)

Empirical report

Main author : Martin Oliver (IOE)

Nature of the deliverable : Report

Dissemination level : Public

Planned delivery date : November 2005

Prepared for the European Commission, DG INFSO, under contract N°. IST 507838
as a deliverable from WP30
Submitted on 21-12-2005

Summary

Final draft of the empirical work undertaken by the project team to extend the work initiated during the review phase of the project.

History

Filename	Status	Release	Changes	Uploaded
D30-03-01-F.pdf	Final	1		21/12/2005
	Draft	1		01/01/1970

Contributor(s)

Name, First name	Contractor
Boytcheva Svetla	(USOFIA)
Kemp Bob	(ULANCASTER)
Mjelstad Stig	(UBERGEN)
Nikolov Roumen	(USOFIA)
Price Sara	(IOE)
van der meij Hans	(UTWENTE)
Wake Jo	(UBERGEN)

Empirical studies of the impact of technology-enhanced learning on roles and practices in Higher Education

Kaleidoscope Deliverable 30.3.1

1 Empirical studies of the impact of technology-enhanced learning on roles and practices in Higher Education

Martin Oliver[1], Sara Price[1], Svetla Boycheva[4], Jo Dugstad Wake[3], Chris Jones[6], Stig Mjelstad[3], Bob Kemp[2], Roumen Nikolov[4] and Hans van der Meij[5]

[1]*London Knowledge Lab, Institute of Education, London, UK*

[2]*Centre for Studies in Advanced Learning Technology, University of Lancaster*

[3]*InterMedia and Department of Information Science, University of Bergen, Norway*

[4]*Centre of Information Society Technologies, University of Sofia, Bulgaria*

[5]*Department of Instructional Technology University of Twente, The Netherlands*

[6]*Open University, UK*

1.1 Introduction

This report is the second deliverable of the Kaleidoscope Jointly-Executed Integrative Research Project, *The impact of technology-enhanced learning on roles and practices in higher education*. The first deliverable (Price *et al*, 2005) provided a review of research on this topic, looking specifically at Bulgaria, The Netherlands, Norway and the United Kingdom as case studies, as well as drawing in international studies that considered this topic. Based on this review, a series of research questions were identified that reflected gaps in the existing literature. In addition, a way of conceptualising the different approaches to researching 'impact' was developed.

This report describes empirical work undertaken in order to build on the review. It does not seek to provide definitive answers to all of the questions previously raised; that is beyond the scope of the project. Instead, the work described here is intended to show:

- That the questions previously identified are amenable to research;
- That the methods proposed for the study of impact are feasible and revealing; and
- Some preliminary extension of our understanding, relative to the position described in the previous report.

After outlining the background to this work in greater detail, a series of studies will be presented, each of which contributes to the overall aim of the project. These separate studies will then be synthesised, leading to conclusions intended to inform the final phase of this project and also follow-on activity, nationally and internationally.

1.2 Background

Although there is great interest in the use of technology to support teaching in Higher Education, and considerable effort and expenditure goes on promoting such activities,

research into this topic has provided only a partial (and sometimes inconsistent) account of how technology, teaching and learning relate. Our previous review established that the relationship between teaching practice and technology was particularly poorly understood; consequently, this project as a whole has two objectives:

1. To explore the impact of new forms of technology on roles and practices, and
2. To identify the kinds of intervention best suited to supporting staff within the processes of change that surround the introduction of technology-enhanced learning.

The previous review revealed several themes that seem to be shared across national contexts of technology use:

- The policy push, internationally, for increased implementation and use of technology (although the assumptions and rhetoric employed are questionable);
- The tension between the hype associated with technology and the experience of using it;
- The complexity of the relationship between technology and changes in roles and practices;
- That 'early' adoption is common and frequently studied, but mainstream adoption is poorly understood;
- That there are a range of forms of staff development that may be suitable for supporting and changing staff practice, but there is no single 'best' way to approach this;
- That team-based approaches to development are becoming increasingly common, and these have implications for the negotiation of responsibility and professional identity between different staff;
- That teachers' engagement with technology is shaped by the models of learning and teaching that they hold, making it important to understand this perspective if we are to explain why technology is permitted to have a particular impact; and
- That there is no obvious research method to adopt in relation to this problem – instead, different approaches seem well suited to particular aspects of the area, and additionally it may be necessary to develop one or more new approaches.

Specific research questions were developed in relation to these themes (see Appendix A). Although this set of questions represents a step forwards in making sense of this area, it was still too broad to provide a framework for this project, so questions were clustered along methodological lines. Distinctions were drawn between:

- Anticipatory impact (discourses and rhetoric of policy, design or opinion);
- Ongoing impact (processes of integration); and
- Achieved impact (summative studies).

This is summarised in Figure 1.

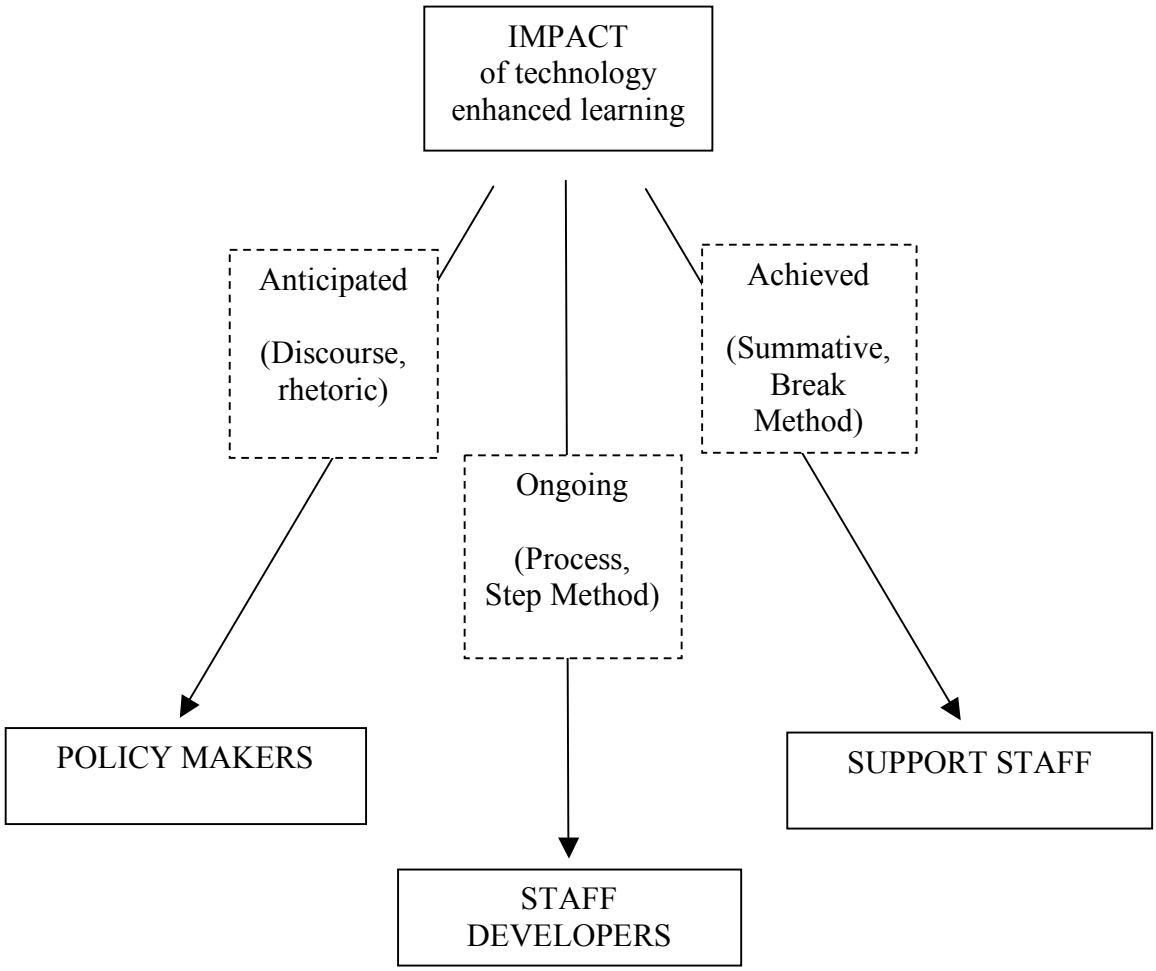


Figure 1: An overview of approaches to studying impact, indicating example audiences

The work undertaken in this empirical phase was distributed across these three areas, since for each partner to address all three components was impractical. Consequently the intention for this phase of work was not to provide definitive answers to this set of questions, but:

- To assess the usefulness of this three-part decomposition of 'impact';
- To identify methodological approaches that are appropriate to addressing each kind of impact; and
- To analyse a selection of cases that provide some new insights into the questions raised by the literature review.

To summarise, the emphasis was on undertaking new empirical research that laid groundwork and proved the principles necessary for further work in this area.

1.3 The identification of methods for studying impact

Before undertaking new empirical work, it was necessary to identify research methods suitable to studying each of the three kinds of impact identified in the review. Each will be outlined here, briefly, in order to provide an overview. The specific detail of how each approach was implemented will be described more fully in the studies that follow.

1.3.1 Anticipatory impact

'Anticipatory' impact was defined as consisting of statements about the relationship between technology, roles and practices. These would be amenable to forms of discourse analysis.

1.3.2 Ongoing impact

'Ongoing' impact was defined as a process of integrating technology into practices. Ideally, this would be identified by a series of observations of practice, or analysis of a sequence of evidence about practice, that could reveal differences. In order to study how people's understanding of their role, and its relationship with technology, changes over time, sequential interviews (or analyses of relevant documents, such as reflective diaries) are also required. To relate these two different kinds of data together, stimulated recall interviews were used.

1.3.3 Achieved impact

'Achieved' impact was defined as requiring a summative perspective over a period of change. Again, stimulated recall interviews are appropriate to study this, as are reviews of documents (including, for example, reviews of published research).

1.4 An overview of the empirical work

The varied topics identified in the previous review report, coupled with the different research techniques that might be required, has resulted in a complex problem space. Given the size of this project, it was not practical or helpful to expect all partners to attempt to study all possible permutations of question and research methods. Consequently, the project team organised the work so as to test the proposed approaches by spreading the work across the team, so that each kind of impact (anticipated, ongoing and achieved) was studied in at least two contexts.

The spread of work by partner is summarised in Table 1, below.

	Anticipated	Ongoing	Achieved
Bergen	Document analysis and interviews with managers		Summative evaluation of the implementation of the KARK virtual learning environment (VLE)
Institute of Education	An analysis of a UK policy documents	Case studies of the introduction of a new VLE	
Lancaster		How academics' use of digital resources has changed, relative to practice two years ago	
Sofia	A survey of the pros & cons of technology adoption, and on the forms of training best suited to supporting this		
Twente			A review of studies of the effectiveness of curriculum resources (ZAPs and the Teletop course management system)

Table 1: An overview of the work undertaken, in relation to the three areas of study

2 Empirical work in the UK

2.1 A review of the role of the lecturer in UK policies on technology-enhanced learning

As part of the 'prospective' strand of research, a comparison was drawn between two significant UK policies – the report of the National Committee of Enquiry into Higher Education (commonly known as the Dearing report; 1997) and the recent e-strategy (*Harnessing technology: transforming learning and childrens' services*; 2005). The purpose of this comparison was to examine how teachers in Higher Education were portrayed in each, and thus to see whether assumptions about the role or assertions about how such individuals should act had changed.

2.1.1 Methodology

A discourse analytic approach was adopted to explore the way in which the role of the lecturer was constructed through the rhetoric of each of the policy documents. The approach adopted followed the social psychological methods of Potter and Wetherell (1987), and involved the close analysis of the documents to identify the discursive repertoires used to talk about teachers in Higher Education.

The analysis followed the procedures laid out by Banister *et al*. (1994). Sections of the source documents were sampled, ways of talking about teachers were identified, counter-positions were considered, and labels were generated and refined in order to identify a series of discourse positions. Appendix B contains the summary step of collated statements about teachers from the second policy document as an illustrative sample of the work in progress.

Since the documents were far too long to analyse in their entirety, relevant sections were identified from each. For the Dearing report, any paragraphs that contained the word "technology" or the term "C&IT" (communication and information technology) was analysed, as was the whole appendix on new approaches to teaching. (A fuller account of this analysis can be found in Smith & Oliver, 2001.)

For the e-strategy, any paragraph that talked about lecturers, academics, teachers or professionals was included, *unless* the paragraph was exclusively about other sectors (e.g. school teachers only). Discussions of students' course selection were also excluded, since these were not about pedagogic practice *per se*. In addition, the whole of section 12 ("What this means for Higher Education") was analysed.

2.1.2 Findings: the Dearing report

Only one discourse about lecturers was identified, together with one linked discourse about pedagogy were identified. (The complete list of discourses, including discourses about students, can be found in Smith & Oliver, 2001.)

The lecturer as materials developer – this positioned lecturers as giving up teaching in order to concentrate on creating high-quality resources which will 'enshrine the core of their teaching'.

Resource-based learning is the (expensive) future for HE – expanding student numbers mean that many teaching methods will become ineffective; the only solution will be for institutions

to collaborate to produce high quality (ICT) resources so that students can use these independently, without requiring additional time from lecturers.

The simplicity of this account is striking. On the one hand, this could be interpreted as showing a clarity and consistency of vision. However, the complete absence of discourses about the lecturer as teacher, as research *etc* in relation to technology and learning radically diminishes the role, certainly when compared to accounts such as that provided by (for example) Henkel (2000). This point will be returned to in the summary to this section.

2.1.3 Findings: the e-strategy

A much richer, more complex picture of teachers and their work in relation to technology emerged from this later policy. The following discourses (the summaries of which are fully reproduced in Appendix B) were identified:

Social networks of teaching – teachers were discussed as being part of social networks that provided professional support and information; these were often subject-based. These are described as being facilitated by technology, and particularly by interoperable systems.

People whose practice is limited by their context – this involved the idea of working 'against the grain' of the organisation, and of wanting more varied technologies than are currently available to them. Senior management were seen as "essential", certainly if teachers are to perform their best.

People in need of training – here, the government is positioned as providing both accredited initial and in-service training, which is seen as crucial in a constantly-evolving field. Specifically, online learning will become a topic on courses for new staff and other staff development programmes.

People who need things to improve their own skills and knowledge – the complement to the previous discourse, teachers are seen as self-improvers, who should have access to flexible courses, and advanced support from experts if they wish to specialise. They also need time to experiment and opportunities to share practice.

Using ICT to bring their lessons to life – this suggested that technology can transform teaching and learning, permit new staff-student relationships (such as blurring research/teaching distinctions) and improve outcomes through shared ideas and more exciting lessons, making learners motivated and creating "real energy and excitement". Specifically, personalisation implies changes to practice, as does the use of conferencing and live video (such as for fieldwork). However, teachers need to be more than "merely an electronic page-turner" for this to happen. Moreover, the familiar and effective teaching methods of listening, reading, writing and class discussion will remain important and should be complemented (improved) by e-learning, since "traditional methods have not achieved enough" so that "we have both the opportunity – and the responsibility – to explore new approaches".

Teachers as people who will be able to assess differently using ICT – this topics was much more tentatively explored, since technologies are seen as just developing, but the potential formative role of such resources was stressed.

People who make (partial) use of resources – this suggests that staff want easy access to a common set of digital libraries' assets and commercial educational software for use in

teaching. However, "we" are not yet deploying existing resources effectively, partly because of the quantity and quality of available resources and because of the lack of robust evidence, but also because not all teachers are making good use of what is there. "It is crucial that we […] modernise the curriculum and its assessment". The government wants wider use of resources to "get better value from our earlier investment", and sees it as easier for digital resources to be recombined for new purposes than traditional media (e.g. print, video), so that it is less appropriate to develop educational resources for a particular curriculum subject and age range. "Design flexibility for teachers should be a focus", and flexible learning design packages would enable teachers in all sectors to build their own individual and collaborative learning activities around digital resources.

Ensuring standards – inspectorates were positioned as the setters of the standards that shape teaching work, "who therefore play a critical role in driving reform". However, they were described as *beginning* to develop evaluation approaches and a common understanding of quality of technology use, and training for inspectors was promised. Minimum levels of competence will be defined for teachers and incorporated into accreditation frameworks. Products should also be rigorously tested to ensure they improve understanding (as well as practical and cognitive skills).

Researching ICT in teaching – this is portrayed as "essential to make the most of ICT in teaching". This should "reflect how teachers teach and learners learn", but is positioned as something other than teachers' experimentation and innovation. Indeed, "staff, together with their unions and professional associations, are well placed to help us", but the implication is that they are not "us", and indeed must be given the means and motivation to help. This research focuses on the development of innovative pedagogical methods that should then be delivered through e-learning. The government must ensure that this research in e-learning and the pedagogy of subject teaching is given full recognition.

2.1.4 Discussion and conclusions

The contrast between the two documents is marked, with the more recent providing a far fuller and detailed account of teachers' use of technology. The emphasis on teachers producing resources is almost completely absent; instead, teachers are now *consumers* of resources, using them to build second-order structures (curricula). Similarly, the economic rationale has gone, being replaced by talk of improving quality as the motivation for change – although it is interesting to see the promotion of resource re-use being positioned as being about return on investment.

There is also a much richer account of teaching – as a social practice, as something that develops over time and so on. However, there are several elements here that teachers might wish to resist or challenge. The positioning of teachers is largely negative; although they might try and innovate, 'traditional' practice is inadequate, they need training (although, positively, they are seen as self-improvers), minimal competencies need to be assessed (although those responsible for this are portrayed as fairly confused), they require the help of senior managers and they are not researchers (and even if they were, this kind of research is not valued). Perhaps worst of all, traditional teaching (anything up to and including video) is portrayed as worthy but dull – dead, even.

These negative aspects are used to promote a particular kind of dynamism, a renewal of practice and a change in patterns of the reuse of materials. However, the rhetoric achieves this by positioning teachers (and their practice) as flawed and technology as a solution – albeit one

that will only work when teachers are more than "electronic page-turners". This positioning is likely to be one that teachers would wish to resist.

2.2 Exploring the introduction of the BlackBoard Virtual Learning Environment

This section of the report details a series of case studies carried out as part of the 'ongoing' strand of research, in order to explore the impact of the implementation of a 'new' technology on the roles and practices of academic staff in higher education.

The use of Blackboard in a PGCE course was set up as a pilot study by the university, with a view to more general implementation in 2006. A number of academics teaching on the PGCE course were selected for this pilot study on the basis of the course they were teaching. This set of case studies set out to explore the impact of such an implementation on the academic staff and on the support staff. Initial interviews with academic staff were undertaken prior to any implementation to find out how individuals felt about the policy, the technology and their views as to the both the usefulness of the technology for them and their teaching and their anticipated understanding of the impact this technology might have. Subsequent interviews were undertaken to establish similar opinions after the technology had begun to be implemented and to establish whether or not previous expectations were realised.

2.2.1 Method

A total of nine interviews were undertaken with six different individuals. Interviews were undertaken with four academic staff, three of which were subsequently interviewed after a period of one month. Interviews were also undertaken with two technical support members of staff.

Semi-structured interviews were designed to ensure that appropriate information was elicited, but also allow for unanticipated or unexpected responses and allow more detailed exploration of views or opinions that may contribute significantly to the data. An interview script was designed and used as a framework for the interview, but alternative or new questions were posed according to the direction of the respondents thinking. Each initial interview was structured around the respondent's views or understanding of the following: the rationale for using the chosen technology, its features and functionality, the policy decision and manner of implementation; the perceived benefits and/or disadvantages for teaching and learning; the perceived effects on teacher/ learner roles; anticipated difficulties, including individual concerns; expectations regarding training and their familiarity with technology (the proposed or otherwise). The follow-up interview was structured around the following, with additional questions arising from the first interview particularly relevant to each individual: how the implementation was progressing; how they felt about the technology now; ways in which the technology has been useful or not; ways in which the technology has affected teaching practice and/or role as a teacher; their need for training. In addition, where possible this interview used the stimulated recall method where respondents used the technology itself to describe how they used it. However, in the majority of cases this proved impracticable. (See Appendix 'x' for example interview structure).

Interviews were conducted in individual's offices or a pre-arranged room. Informed consent was obtained from all participants. All interviews were recorded and then transcribed for analysis. The interviews will first be described as case studies, and then collective themes that address particular research questions from deliverable 1 will be presented and discussed.

2.2.2 Case study 1

Respondent 1 was involved in a project to introduce Blackboard as a way of supporting learning through discussion groups for doctoral students, both within their own cohorts and between the different cohorts. The project is part of a larger innovative initiative within one of the Centres of Excellence for Teaching and Learning. This is therefore an innovation from within rather than an implementation based on University policy. The initial interview took place in the early stages of the project, with a follow-up interview two and a half months later.

2.2.2.1 Interview 1

The primary function of the technology is anticipated to provide voluntary discussion groups, both as on-line discussion and to build on face-to-face interaction. The main function of these discussion groups is to provide personal learning support and social interaction for the Doctoral students. The perceived benefits for learning would primarily be through sharing information and personal support.

> *"I think in terms of how the purpose is seen at the moment, is that there are some themes, if we can go back to the fact that there are a group of medics, there are some themes that are not taken up in the normal [doctoral] programme, that some people are particularly interested in developing their professional practice in the [doctorate]. So its to encourage cross year groups, cross cohort groups to have some discussion on that. ……. Now there's another purpose which is the social aspect of it, and… well its more than social, its um about the whole area of examining personal learning I suppose"*
>
> *By this was meant the possibility to share both intellectual ideas and personal issues about doing an [doctorate], providing both academic and personal support for one another during the [doctoral] process.*

In order for such technology-mediated groups to be successful the role of a facilitator in the groups was seen to be key. The respondent also pointed out that this role of tutor as facilitator is key in any teaching situation.

> *"I think, from what I've learned from this, the role of the facilitator is key. And I think the role of the facilitator in any learning event is key, and the stance that they take and the way in which they take up either the new technology, or any change in classroom practice in a face-to-face situation, will determine the response of the participants. .....*

The facilitator's role with Blackboard in this instance was expected to include planning of discussion sessions as well as facilitating them. However, it was anticipated that the particular role the facilitator played might be different, according to whether the facilitator was a tutor, a member of the teaching and learning support staff or a student. As the facilitators had not yet been identified, this role was in development and likely to be emergent.

> *"I think that is something that we'll come to decide as a group, because this comes down to the fundamental issue of what its for. So the purpose of this is yet to be decided across the group of facilitators"*

In addition, it emerged that different kinds of groups might support different aspects of learning. For example, productive personal learning support was proposed to take place through a group that is managed by the students, rather than the tutor, but this potentially creates tensions in the structure or set-up of the groups.

> *"Now I think there's huge value in that, being separate in a sense from a facilitated session run by a tutor. So I don't know if that'll be possible to do in relation to this, because I think those two things might clash, so it might be that there's room for a different sort of group that's set up and people find a need or use it to discuss those things.*

The technology was also seen as having the potential to extend learning:

> *"Well if it took off there could be extensions of learning both ways. So that if for example, there was a discussion about a particular research method in the taught session then people could go off and talk about it using Blackboard, and then it might then.. that discussion might be taken further next time the group met and I think there could be a lot of links both ways"*

The respondent had not used Blackboard before, but had attended one training session, where a demonstration of the software had been given. As a result of this session, the technology was perceived as 'easy' to use, and there were no underlying concerns about using the technology/software itself. Any perceived impact on day to day working was thought to fall on the facilitators:

> *"If I were facilitator, then yes I think it would because I would need to plan, I would need to spend time thinking what I would need to say to the students, how to get the discussion going, how often I need to look to see of there are any messages. .... I think I'd probably need to think about it in some way every day. Of course there might be a time where I started a group off and its perfectly fine without me, or I could see some person in it that I'd think, ah they'd be good, they'd be better than me, I'll encourage them to facilitate. And then I could just step away and look at it occasionally, because I think the most effective form for this would be to have it run by and participated in with all the students rather than someone like a tutor running it."*

The respondent described him/herself as initially feeling sceptical about the use of technology for supporting this kind of activity, but becoming enthusiastic as her awareness of the 'possibilities' (or potentials of the technology) increased.

2.2.2.2 Interview 2

The focus of the second interview was on the progress of the implementation of Blackboard; whether issues raised in the first interview had been resolved and how; whether expectations had been fulfilled; whether further issues or unexpected benefits had emerged; and whether using such technology to support learning had any implications for teaching practice.

At the time of the second interview little practical progress had taken place. Student groups were beginning to be identified; a group of three medical students who would form a core group, extending to three other medical students from the other current five cohorts, thus integrating students within years and across years. However, no discussion groups or sessions had yet been introduced, nor had facilitators, or the particular role that they would play, been

identified. Introducing and implementing technology to support learning through discussion groups, was more complex than was initially anticipated and several important issues had arisen, particularly with respect the expectation of the student participation, the role of the facilitator, and ensuring its success.

(i) Student participation: The first issue that had arisen was whether participation in the group should be compulsory or voluntary for students. The respondent thought that the environment should be voluntary because it was not being assessed and compulsory participation was thought to make students more nervous and tentative. However, with voluntary participation there was a concern that, unless the purpose of the group was clear to the students, they wouldn't 'bother' to take part. A national study was cited where such groups were found to 'fall away' when use was voluntary and prospective participants were busy. Given the desire to have voluntary participation, the importance of participants identifying with the purpose of the group and seeing the value of it was highlighted. The quality of facilitation was identified as key to this. A related issue, the concern over monitoring raised in the first interview, had been resolved through a clear decision that participation in the group would not be assessed.

A further issue raised was the different kind of interaction that could be engendered from students in different learning spaces. An example, was given where a student contributing to an on-line group had written in a well structured way, "a kind of conclusion". His/her explanation was that he/she was doing 'M' level work and clearly felt that this was expected way of expression. This was of particular relevance for this respondent who wanted to be able to extend students learning, and to do so by engaging in dialogue "with people in a way that really makes them think and have to identify what it is they really want to say". So, one issue here was how to encourage the kind of interaction you want, and being able to do so in a sensitive manner, given the difference in medium between on-line interaction and face-to-face interaction.

(ii) Role of the facilitator: One thing the respondent thought would influence the style of interaction was modelling by the facilitator. For example, the facilitator could engage by sharing unpolished thoughts and ideas, thus encouraging students to do so. Indeed, as part of the 'necessary conditions for successful online instruction' Berge (1995) proposes that modelling appropriate online behaviours prepares students for engagement in independent online interaction. Another important role of the facilitator identified by this respondent was to make the environment a 'safe' place for the students to interact. For example,

> *"When I went to the first session [beginning of the course], one of the questions was, 'What do you fear?' And people said 'Well I fear that I'm not up to the level' and that's a really important thing too".*

Although, it was acknowledged that if, for example, only three people ended up contributing in the group, and the training for facilitators created a high demand on time, then this implementation may not be worth doing. However, the hope and anticipation was that student groups would successfully begin to work independently.

> *"I think what would be great was if a facilitator started a group of medics off and for them after a period of time, well either its someone else's turn this term to facilitate it or to have a view that it'll only run if they're running it and if it doesn't run then that's up to them, so then the facilitator can pull out."*

2.2.2.3 Concluding factors

From these two interviews we can begin to see some potential impact on the tutors role during the process of adoption, for example, the need to be aware of the complexities of students interacting in on-line spaces as described above; the need to think out the purpose of the technology and the environment; as well as modelling strategies that make people feel safe.

These points also have implications for staff development, for example, providing expert input from experienced people/colleagues to raise awareness of issues that might affect the design of the environment or aspects central to that environment, like the role of the facilitator. Supporting staff in learning how to interact themselves in such an environment. For example, this respondent stated that "its much more than the technical know how, its about knowing how to encourage people and being able to use the right term of phrase that is not judgemental". In addition, this respondent highlighted the need for ongoing training, building in opportunities for people to keep going back as a reminder.

The following two case studies involved academic tutors, who were involved in a pilot study to introduce Blackboard into a PGCE course. This pilot study involves all tutors for one subject group for the PGCE course, related administration staff and learning technology support staff.

2.2.3 Case study 2

This respondent was familiar with using other informal virtual learning environment (VLE) systems with PGCE students, particularly with respect to keeping students in communication with one another and distributing information. VLEs with this group is perceived as particularly important because of the amount of time students spend away from the University during teaching practice, where they are isolated from their tutors as well as their peers.

2.2.3.1 Interview 1

The rationale for undertaking a pilot study using Blackboard was to look to extend and integrate the use of such systems beyond the subject level, to course level, and to move such technology use from an informal level to one that is adopted and recognised by the Institution, or in the 'control' of the institution. A pilot study was suggested by this respondent with the aim of,

> *"bringing it all under one umbrella, in as much as now it becomes a whole course thing rather than an individual subject matter, and that is going to be a big advantage. It means that a whole load of things like centrally distributed documents don't have to come to us first and then get transferred out to everyone else. So that will be a big advantage."*

The respondent's main concern was whether Blackboard had the features of VLEs that he/she was already accustomed to using. Loss of valued features from a previously used system was expected to significantly affect adoption of Blackboard. The efficiency of sending group messages (including simultaneous automatic copies sent to individual e-mails), and the calendar feature were described as deficient in Blackboard. Such differences mean, for example, that students would need to consciously log in to the new system. The knock on effect is that students have to take responsibility for finding information, and the tutor does not know if they have received information or not. The respondent anticipated that were this

to be the case, then his/her preference would be to continue to use the familiar VLE system rather than adopt Blackboard. He/she also thought that this might be an issue for other tutor staff involved in the Blackboard pilot study. However, his/her current understanding was that people (tutors) were quite keen to make the change over, and the respondent felt that if it was introduced in the 'right' way people would not object.

Although Blackboard was identified as potentially supporting teaching through distribution of resources, and student support when out on teaching practice in schools (particularly with respect to distributing information and sharing and discussion of experiences), it was not perceived fulfil this role as suitably as another familiar VLE. Student support was considered especially important for maintaining student motivation for continuing the course. The current VLE system being used by the respondent enabled him/her to monitor student interaction, which was used to assess levels of motivation, and where concern was raised, allowed appropriate input from the tutor to support the student in question. Such intervention was considered successful on a number of occasions, and seen as transferring to on-line a teaching role that is already present in face-to-face teaching situations.

An on-line discussion group was also highlighted as being useful in supporting learning, by enabling students to share different perspectives, especially about their experiences in their teaching practice.

> *"What they will do now is that they will go into their school for example, talk about lessons and assessments and go on-line and discover that there are various different ways of doing it. And there is some discussion usually about the pros and cons of the different systems…. they find that there isn't one best way…… here's a diversity and they understand that there's a diversity of approach".*

This was seen as especially important given the range of approaches to teaching and students physical isolation while on teaching practice, and is seen as critical to enabling students to be more self-reflective.

In addition to the potentially 'poor' features, the respondent also pointed out a number of other factors that might affect successful adoption of the technology: technology being additional to the course rather than substituting parts of the course mean that it is not a requirement; being used as part of a face-to-face course, rather than for a virtual course may affect the significance of it within the context. A further issue for successful adoption is being able to implement the technology so that it works well for individuals, but also works in a coherent way across the subject group and course leaders.

> *"The tension is, people wanting to do things their own way but having to do it within a coherent wrap-up. That's going to be the hard bit, nothing to do with technology".*

Given the number of 'stakeholders' in this kind of course level operation tensions are expected and most likely a certain number of compromises will need to be made.

> *"I suspect there's going to be some kind of catch there, between them, because there will be this enclave – I want to do what I want to do, compared with – its far more convenient for the whole course if we have it organised like this"*

2.2.3.2 Interview 2

The second interview took place some nine weeks later. As with case study 1, the focus of the second interview was on the progress of the implementation of Blackboard; whether issues raised in the first interview had been resolved and how; whether expectations had been fulfilled; whether further issues or unexpected benefits had emerged; and whether using such technology to support learning had any implications for teaching practice.

By the time of the second interview the respondent was not using Blackboard at all with the students. A lot of his/her time had been spent trying to use Blackboard in a similar way to the previous VLE he/she had been using, but the functionality on Blackboard was found to be deficient. For example, Blackboard was considered to mean more administrative work for collaborative tasks, where everyone can collectively take responsibility and contribute to the database;

> *"I'm looking at what they are doing at the moment, so for instance I've set up a list of tables. I've got a BT database with mentoring boards, placement details, all of these I get immediate access. But I don't want to be the person who's populating these tables. Whereas on smart groups I can have my own table, that only I can see or they can see it and they can edit it. So its a much more collaborative thing. Blackboard seems to operate on the basis of information going out rather than the students being able to participate in constructing it".*

Although Blackboard was seen as being extremely good for information distribution, it was designed for content distribution and to support students working alone on assignments and them dropping their file, or essay, back to the teacher. This meant that the particular features (or lack of features) in Blackboard constrain the desired kind of teaching practice, making it, in this individual's view, not worthwhile to implement. Talking in the context of a valued VLE, the respondent stated;

> *"In terms of files ..... I place common folders for them to use. Some are read only that they can take things out of, like course documents, [but what I can't do is place] a structure within which they can work, and can divide up in a way that they want to, so that I can observe them as they're working. Blackboard, seems to me, that I have to set up the folder, and tell them what they are allowed to put into it. It's very much on the do a course, write an essay, put it in the drop box, kind of thing. Whereas what I'm doing here is – they decided, I didn't know this would appear, they started building folders to put project work in that they're working on together. So it's quite spontaneous, whereas in Blackboard they wouldn't have the authority to do that".*

In addition, features that Blackboard does offer were perceived to be a waste of time,

> *"The idea of distributing large amounts of documents or videos or whatever, is no use to me. I do put a few documents on-line, but I've found that the key documents that I have, I just link to them on the course page anyway which stops them from having to go through the rigmarole of folder after folder after folder".*

The respondent stated, "to some extent I think we should leave Blackboard in the box at the moment". The perception was that others have expressed how 'rigid' they found Blackboard, and "for me to set up Blackboard to do something badly would not seem to be a useful investment of my time". However, the respondent also had heard that other features can be

added to Blackboard, as well as non-Blackboard modules that should enable the technology to work in the required way. But "we've got an operating system that nobody's been trained to use", which suggests that more in depth expertise is required for the potential to be realised.

Issues of group evaluation were raised with emphasis on the need for face-to-face user group discussions, so that everyone involved in the pilot was aware of what everyone else was doing, and what they found useful or not. In addition, a full evaluative study was recommended, that looked at people's needs, and where Blackboard fails and where it helps. A further issue with respect to ownership was raised. For example, there was a perceived danger that if learning technologists identify with the system they are supporting, they become less subjective, and begin to see others criticising the technology as people criticising 'their' system.

The most positive impact that Blackboard had had for this respondent, was to help him/her to identify more clearly how he/she wanted to work with VLEs, and to provide a vision of re-designing an environment that would be a 'composite between the two'.

2.2.3.3 Concluding factors

This respondent was experienced in using a VLE for students, the use of which was initiated by him/her, and was found to be useful in a number of ways, both practical administration and teaching/learning. The experience with this technology was positive. Therefore, it was important that the benefits, functionality and the ease of use of the new technology, were at least equal to those of the familiar VLE. Despite the potential of the 'new' technology to achieve the original aims of the implementation (i.e., bringing coherence of technology at a course level), the day to day functionality and use of the environment seems more influential on the likelihood of adoption for this respondent. However, he/she remained open-minded to future developments that would provide the kind of service that was wanted.

2.2.4 Case study 3

This respondent was taking part in the pilot study where Blackboard was being implemented at a course level technology within the PGCE course. He/she was unfamiliar with Blackboard, but was familiar with on-line communication teaching for Masters students.

2.2.4.1 Interview 1

The respondent was not included in any discussions planning this particular implementation, and only became aware of its imminence through e-mail informing of the pilot study and offering a training session, shortly before the start of term, when the pilot study was due to start. Although there was no choice in using the technology they were told that it was a great opportunity because of being able to be on a shared license with other Universities. This seemed an understandable reason, although it was unclear why the PGCE course had been chosen as the pilot group. The respondent was not concerned about the technology per se, but highlighted the importance of inclusive discussion for innovative pedagogical change;

> *"I do think that any kind of huge innovation is a matter of consultation because I think that whatever you do that affects pedagogy, if you think its going to affect pedagogy, is absolutely bound up with a teaching team on any course and I don't think that it can be implemented from outside, even when there are good economic reasons for doing it at this particular moment".*

Concern was expressed over the focus of the environment. In future technological support, he/she had hoped that a "focus on communication and learning, and collaborative learning, and collaborative pedagogies would underpin the choice of the electronic environment and what it was being used for", but the training session attended suggested that the focus was limited to delivery, administration and management – an emphasis on transmission of content to students. However, the respondent was aware of the possibility for communication with this technology, but saw it as being a secondary consideration (by the drivers of the implementation?), and expressed doubts as to Blackboard's suitability for that kind of environment.

> *"We haven't been given the time or scope to think about our pedagogy, and how we might work differently with it. And I don't know if blackboard would be the ideal VLE if we're going to be driven by communication".*

The training session and proposed future training were viewed positively, and were found to be straightforward and effective, but only in terms of the technology itself rather than supporting teaching practice;

> *"In the end its not where I want to spend myself. My time as a tutor as a lecturer here, learning how to manage content environments. To be honest I think an administrator can just post up stuff to send out to 120 of our students. I mean I can, but it's not the primary thing I'm interested in if I think about working with a VLE"*

In this respect the respondent was resistant to administrative tasks increasing his/her workload, and felt it particularly important that the technology did not add to workload in this way. It was expected that the administrator would be responsible for posting new content and readings etc… The issue of additionality was discussed further, in relation to both tutors and students. Given that Blackboard was perceived as unlikely to make a difference as a practitioner, it was important that to be worthwhile in this course, it would have to be enriching for the students in some way, that did not create additional workload for the tutors or students, due to the pressure and levels of workload they were currently under.

> *"If the VLE brings additional work for any of us, I think that that would be unreasonable. And if it suggests ways in which we can replace aspects of the course or the learning experience through the use of blackboard then that would be interesting".*

> *"I'm not convinced that it will affect pedagogy much at all, and in that I think it's a missed opportunity" and "I'm not convinced that it's going to make a huge difference to me as a practitioner".*

In contrast, on-line discussion groups in another course were felt to have a huge impact on teaching and learning. On-line the discussion is task driven and carefully crafted and students are required, for example, to share what's going on in their experience in schools and learning in other contexts, to comment on each others experiences, and to critique various bits of input from tutors. The awareness of others on-line, and the asynchrony of interaction are thought to make an impact on the quality of communication. For tutors this means taking on the role of 'moderator', which requires the skill to appropriately craft tasks, to comment at the end of the discussion, but generally not to intervene in between. This kind of practice can support students (here trainee teachers) to "learn in very self sustained ways, collaboratively without the need for constant tutor intervention". In this environment participation was compulsory,

but not assessed, similar to the requirement to attend face-to-face seminars but contribution itself is not assessed.

2.2.4.2 Interview 2

At the time of the second interview, one month later, use of Blackboard was minimal. It had not been used for any kind of teaching, just disseminating information, which was currently being done by course leaders. However, a training session about the communicative features of Blackboard had taken place, but the respondent was unable to attend.

One example was given of the students taking advantage of information on Blackboard, by downloading and marking readings in preparation for a seminar. However, further discussion revealed that this was no different from before, when readings were also given out in advance. At this stage in the development, Blackboard was seen to be beneficial for administrative aspects of the course, but not contributing in terms of teaching practice.

If there was time this respondent would like to explore ways in which Blackboard might support learning through communication, but with the time constraints already present on the course this would mean 'replacing' rather than 'supplementing' aspects of the course;

> *"It would be really interesting to see if there were parts of the course that we could change so that learning could happen through discussion on Blackboard. Not in addition. But if we could do that and thereby release face to face time here. It's a difficulty because the face to face time is quite precious for trainee teachers because they spend so much time in school".*

2.2.4.3 Concluding factors

This respondent was familiar with using technologies for on-line courses, where interaction between students and students and tutors take on a different form from face-to-face, and which is thought to effectively support learning. However, to be convinced of the benefits of using similar technologies in a predominantly face-to-face course, the respondent felt there needed to be careful consideration of what it is actually doing and whether it is worthwhile enough to replace existing ways of teaching on the course. In other words, to use the technology in would have to be better than a part of the current teaching and be used to replace that teaching aspect. This highlights the importance placed on the *actual* function and effectiveness of the technology for learning and not the *perceived* function.

2.2.5 Case study 4

The respondent interviewed here was also taking part in the pilot study where Blackboard was being implemented at a course level technology within the PGCE course, and was also unfamiliar with Blackboard. This case study comprises only the initial interview, during which several relevant points were raised.

This respondent perceived the bulletin board with discussion as being the primary purpose of adopting a technology like Blackboard (rather than content management), as it is this that is perceived to be the real benefit of Blackboard, i.e., students getting access to materials while on teaching practice, plus on-line interaction. As far as distribution of content and information was concerned this respondent raised a potential issue of information overload for students.

Of primary concern was how student would know or choose what information was most important for them.

As with others in the study learning to use a new technology was not seen as a concern, the technology is seen as being straightforward to use and simple to learn. In contrast with others though, this respondent felt that training should be compulsory, otherwise people would not attend and the technology implementation would not be successful. He/she also thought that training should be flexible, offering support when needed, in addition to training about specific aspects at pertinent times in the implementation, so that people can use what they learn.

> *"I also expect that there will be support as and when you need it because my view is that if you go on these courses and you're not using something straight away you.. the courses are no use anyway."*

2.2.6 Case studies with Learning Technology Fellows

Interviews were also conducted with two Learning Technology Fellows, who were involved in the training and support of implementing Blackboard in both of the courses identified above. The aim of these interviews was to access a different perspective and provide further insight into the impact of introducing 'new' technologies to staff in higher education.

Learning technology fellows described Blackboard as having three distinct components:

> *"Blackboard is a virtual learning environment, or more or less a learning content and management system. So, it is primarily there to manage content, learning materials, content of any kind, from text to text documents to media files including video. And the other main component is to manage the communication, so Blackboard can also be used as a communication medium. It offers all the features like discussion ports, e-mail centres and even real-time chat. And finally, the third component is [..] the learner management, so it helps to keep track of say grades, attendance and engagement and these kinds of things."*

This description differed from those given by some respondents, who were primarily aware of the content management rather than the other features of Blackboard. Interestingly, the technology support staff felt that content management was seen as the key feature wanted by academic staff, because there was not already a system for doing content management. This may be because tutors were already using communication features in another VLE. In addition, content management was seen as one of its strengths whereas the communication features were considered one of its weaknesses.

> *"It can be something very simple as an on-line backup of documents up to the range of having a normal communication, discussion based course. My view is that it doesn't do well that kind of job, the very on-line discussion based, because the tools that BB has available are note very sophisticated, they are quite simple."*

Together, these two aspects may influence the emphasis placed on the content management capabilities, influencing the conception of the technology.

The particular features and how they work were thought to have some influence on the students required activity and thus subsequently on the staff. For example, in Blackboard the

students have to take responsibility for logging in to find out the latest information, rather then receiving, for example, e-mails or alerts to the fact that new information is available.

> *"So what happens is that staff want them to go there when there is something new, but the problem is that you have to keep putting in something new in order for the students to get into the habit of getting in."*

In this instance Blackboard was lacking in quality in comparison with similar features in other familiar technologies already being used by tutors. Technology support staff were aware of the need for tutors to make some adaptations to the new technology if they were to successfully adopt it:

> *"In one case, in the secondary PGCE ICT subject they were used to having a very advanced calendar function and that is not available in Blackboard. So they had to find alternative there and basically they ended up not using Blackboard calendar"*

There is also a tension between the advantages of finding technology easier to adopt in practical terms (i.e., knowing how to use technology, being familiar and confident with the kinds of things technology can do and how to do it), and having certain expectations of the technology, which result in them having to adapt more, and having an increased awareness of the deficiencies of the technology.

> *"People who have used a similar system seem to have a better understanding of the technology so its easier for them to do things; they are more willing to explore things on their own and need less advice from us."*

> *"However, these are also the people who come with complaints about the technology itself, the features that aren't there that they want."*

The degree to which they make these kinds of adaptations depends on the level of *need* to use the technology. For example, in this case Blackboard is being used as part of a face-to-face course, and is additional rather than supplementary to other interaction. Therefore, tutors can just 'leave' these particular features and engage with their students in other ways (here, face-to-face).

> *"Blackboard is just an addition, so my current feeling is, and I know from one particular case that they rather let Blackboard be there where it is rather than use it"*

The learning technology support have access to data showing how much the different aspects or features of the technology are used. The most used aspect to date was the content management feature.

> *"Especially the announcement features and the content management, well they are used very much and people seem to be very happy. Judging from the sheer volume of use"*

However, given the stage in the adoption process, this seems to be the aspect of the technology that was first introduced and provided for staff development, this is probably not surprising. In addition the main problems that staff come to them with primarily concern content management. If this is the most frequently used aspect, again this is not surprising.

The impact of Blackboard on teaching practice was thought to be dependent on the kind of course the technology is being used for. In this case technology provides an additional component on a face-to-face course. But if it were being used as an on-line course the impact on the teaching practice and teaching roles were anticipated to be very different. And if the discussion feature of Blackboard were to be used it was anticipated that such interaction would need (probably) daily input and attention from the tutor. With Blackboard, to date, the most prominent change in role reported, was with the administrators, due to the primary focus on content management within Blackboard and its use in the course so far.

> *"Given that we are facilitating a change of practice in the departments, the administrators actually have a key role in the process, because they, in many cases they, appear to be the ones that are dealing with the content and the monitoring of people and so on, so we identified that group as a key group"*

> *"Well I think for the moment the least impact of the technology is on the tutors"*

Training for staff is run in a flexible manner, with pre-determined sessions combined with sessions specifically set up to address issues identified by staff – on demand basis. But one of the most important aspects to support identified here was emotional support:

> *"They know that it can be good, they get excited about it, but they get frustrated because its slow the way they deal with it in practical terms and my experience is that if you send them to deal with I ton their own without any support is the perfect way to get them, out of it and avoiding anything further. I'm not saying support in the way that someone goes and actually does something – its actual empathy with the thing – yes, this is boring, this is not good. Its like empathy with the kind of thing that they have to do."*

2.2.7 Discussion and conclusions

2.2.7.1 Policy change

- Are policies justified empirically?
- What assumptions are made in policies, and how do they achieve their effect rhetorically?

The policy to adopt Blackboard as a technology to be used at a course level with a group of PGCE tutors was brought about as result of various factors: the desire to have a technology/system that was 'official' rather than free downloads, such as, yahoo on-line systems; to take advantage of an opportunity for joint investment through a shared license with other local institutions who were also adopting blackboard; and to gain coherence of technology use within a whole course structure, rather than individuals developing their own use of their own choice of technology systems. Empirical research suggests that there are some issues with the successful adoption technologies, for example, tensions between achieving visions set out by policy makers and constraints of visions by policy makers; the focus of implementation being more on technology than learners; and tensions between the different perceptions of policy makers, tutors, support staff on what makes technology effective (Seale, 2003). Other research suggests reasons for problematic implementation more specifically for Blackboard. For example, Clarke (2005) found that unless students had reliable access to broadband, they are unable to download information and quickly became

frustrated. For PGCE students this may be problematic during teaching practice, as schools frequently have firewalls restricting this kind of access. This may be a particular problem for the course piloting Blackboard, as this period of teaching practice was when the technology was expected by the tutors to be most beneficial to the students. One respondent explicitly questioned whether this issue had been researched for these students prior to making the policy decision to adopt Blackboard.

Academic staff attitudes differed towards the policy decision. One respondent favoured a distinct policy decision for group implementation, on the grounds that definitive decisions for compulsory training and adoption have a higher chance of success, just because people have to 'just get on with it and do it'. Conversely, another respondent was unhappy that it was announced to them at very short notice and without prior warning or discussion that Blackboard was being integrated into the course. It was described as 'odd' and 'very strange' that policy decisions to adopt (in this case) technology that was likely to have some pedagogical impact without involving relevant members of staff in either discussion or the decision itself.

> *I do think that any kind of huge innovation is a matter of consultation because I think that whatever you do that affects pedagogy, if you think its going to affect pedagogy, is absolutely bound up with a teaching team on any course and I don't think that it can be implemented from outside, even when there are good economic reasons for doing it at this particular moment.*

This reflects the managerial style of policy makers to implement technology identified in the review (Price et al., 2005), that has an, albeit implicit, influence on pedagogy. Although staff attitudes towards such a managerial style may affect the effectiveness of adoption, this study is not sufficiently extensive to establish whether different views on policy decisions have an impact on the individual's attitude and level of involvement in the implementation.

2.2.7.2 Hype versus reality

- What is the value of affordances in understanding how technology can be used?
- What values (or rhetoric) influences judgements about the success or failure of instances of technology implementation?

This study suggests that the rhetoric surrounding the technology tends to focus on promoting particular features that are perceived as potentially beneficial, regardless of the quality of those features in the particular technology in question. Staff interviewed consistently identified communication and collaborative learning as being important features for supporting learning. In the case of Blackboard, the facility to communicate exists but the features were described as 'unsophisticated', 'simple' and 'weak'. For those who are unfamiliar with communication technologies such rhetoric can lead to raised expectations of the technology, increasing the risk of disappointment or frustration when the technology does not fulfil expectation. On the other hand, those who were familiar with working with effective on-line communication technologies were sceptical about the technology, and disillusioned about its pedagogical value.

> *I had hoped that a focus on communication and learning, and collaborative learning, and collaborative pedagogies would underpin the choice of the electronic environment and what it was being used for. And I'm not aware [..] that that's been a*

> *consideration of why we've gone over to Blackboard. My understanding of it at the moment, which is very limited [..] is that its about delivery, administration and management.*

In order to encourage adoption of technology, support staff report a tendency to focus on features that the technology does have, rather than its potential constraints. There is a tension or trade off here between the importance of being positive' rather than restrictive, potentially making the technology unattractive to adopt, and being realistic enabling staff users to assess its relative benefits and disadvantages for the courses or teaching they want to use it for. In other words enabling teacher to appropriately plan their use of the technology and *usefully* integrate it into their teaching or develop *effective* teaching practices.

2.2.7.3 The adoption of technology

- Can we adequately describe the process of adopting technology?
- How do academics perceive technology, and how do these perceptions affect their subsequent practice?

The process of adopting technology is complex, with numerous factors affecting effective adoption, including its ease of use, the learning curve involved in gaining expertise with the system, its features, its effect on teaching practice or on teachers' time. One question is whether academics perceptions of technology generally or the specific technology in question influences their practice and/or effective adoption.

One factor that affected attitudes to the 'new' technology and aspects that were considered of primary importance during these early stages of adoption was the level of familiarity with similar technologies. For those unfamiliar with technology their initial focus of concern related to the ease of using or learning the system. Demonstrations of Blackboard and initial training sessions enabled staff to feel that it would be relatively simple to learn and use. However, for those already familiar with similar technologies the primary concern related to the comparative value of the technological features. Features valued in a familiar system that may no longer be available or as effective in the 'new' system can have a significant effect on whether the new system is perceived as desirable and may affect its subsequent adoption. For example, one of the respondents in this study highly valued the efficiency of sending group messages (including simultaneous automatic copies sent to individual e-mails), and the calendar features of a familiar technology, and was concerned that the 'new' technology was deficient in these desirable qualities, which would have negative effects for both students and tutors. The consequences may be that continuing to use the familiar VLE system is considered a more efficient and desirable course of action than adopting a 'new' one. So one problem here is that tutors used to particular features that work well with one system, become focused on the aspects that 'new' technology is not delivering. And, although the 'new' technology might provide better features in (in this case) content management, lack of desired features become a significant issue. The interaction between time and use is an important consideration. If there is a perceived risk that using the technology will fail or demand more time than its purpose is considered worthy of, the attraction of adoption is considerably decreased.

A number of respondents in this study felt that adopting technology should not significantly increase their workload, especially their administrative work. Where Blackboard was being introduced as a whole course programme, both administrators as well as tutors were involved

in the process, with administrators playing a key role in content management and information distribution. On the one hand with administrative staff taking primary responsibility the likelihood of increased administrative work for tutors is reduced. On the other hand, although some administrative tasks are taken over by administrative staff, it could mean changes in the administrative system within the VLE takes place, creating complexity for those familiar with a different administrative way of working. For example, one respondent found Blackboard did not allow collective contribution to particular administrative documents, thus requiring information to be collected by one person and inputted to the environment, instead of each person putting in their own data, thus reducing the administrative load.

Of significant importance to all academic participants in this study was whether the technology was perceived as being pedagogically valuable. If it was considered to be, or turned out to be pedagogically valuable then they were prepared to invest more time and/or make changes to their practice or courses to have a positive impact on learning. Respondent 1 described how her role might evolve and the input required were he/she to take on the role of facilitator to support group interaction in an on-line environment. Respondent 3 expressed a willingness to change part of the course to use Blackboard, if it could replace another aspect of the course and improve learning. Respondent 2 specifically expressed the rationale for using technology if it was pedagogically effective.

One respondent was taking a particular pathway through the process of adopting Blackboard. This respondent had gone through an initial stage of being enthusiastic and excited about the 'potential' of the technology, and having particular expectations of specific technological features to support particular kinds of interaction. In researching how to implement this the respondent became aware of research findings, and other people's experiences using on-line communication technologies that indicated potential pitfalls and failures. For example, Cowan's (2005) research revealed trainee teachers' feelings of vulnerability in discussing their experiences in online groups. This resulted in her embarking on a further stage of thinking in more depth about how to work with the technology to achieve her goals. For example, understanding more clearly how dialogue works on-line, what kind of dialogue students do engage in, and what they don't engage in, may be an important part of the process of adopting communication technologies.

One question is whether, despite this 'new' awareness, expectations continue to be unrealistic. For example, expecting students to spontaneously discuss issues on-line when they don't necessarily readily engage in discussion in traditional face-to-face situations.

However, with technology (support) these practices/roles are often predicted to be better, more efficient or more reliably reaching students. This was the case for information dissemination and for supporting students in becoming more independent learners (e.g., respondent 1 and 3). But do expectations of what students will do on-line far exceed reality and, indeed, what they currently do in traditional teaching settings? Rhetorical hype of technological potential and lack of distinction of quality of features contributes to the risk of failed expectations of the technology itself and of student activity in comparison with conventional learning contexts.

The process of adopting a new technology is both complex and variable according to circumstances and context. Nevertheless, during the early stages of implementation, the adoption process for respondents in this study involved a number of elements:

- The need to learn how to use the technology;

- Establishing and understanding the trade offs of investing effort into overcoming technological limitations and constraints to achieve the desired teaching/learning goals;
- Understanding how to effectively use the system to support the kind of learning you want, by for example, understanding your role, the students role, and how to manage and structure the work. This involved, for example, finding out what the technology does and does not support in terms of learning, and in particular, understanding the kind of interactions and learning activities that make sense in the environment concerned; and finding out what the technology does and does not support in terms of administration and daily tasks, and in particular, knowing how the use of the technology fits with what the students do on the rest of the course.

Information from interviews in this study suggests that the adoption *process* may follow different pathways. For example, the technology being implemented for a very specific purpose (respondent 1) began the process of adoption by undertaking research and reflecting on how research findings can inform the design and set up of the course to effectively achieve its aims. Whereas technology adoption for a larger scale whole course was taking a more technology led pathway to implementation. Weller (2002) points out that the different motivations for implementing technology may influence the process or success of adoption. Oliver (2003) raises the benefits of teachers trying out the technology, perhaps their use being underpinned by current teaching practices initially, but extending their practice into new realms as an evolving process with the integration of the technology. Such a process can surely not be significantly different from the process of introducing any new 'way' of doing something in teaching e.g., like introducing new ways of assessment or new ways of teaching a particular topic. A period of trial seeing what does and does not work for that tutor in that course context is essential and enables tutors to begin to build a repertoire of uses of technology. Such a repertoire can both facilitate further technological innovation, as well as contribute to others' insight into effective technology use for teaching and learning.

2.2.7.4 Models of learning and models of teaching

- What models of learning do teachers hold and can these be changed?
- To what degree does the teacher 'impart' knowledge?
- How does a teacher facilitate learning, for example in helping the student to undertake appropriate activities?
- How can learning objectives and forms of assessment be reconceived to reflect this broader understanding of what it means to teach and learn?

One question is whether integrating technology into teaching results in a change in teaching practice or just a transfer of a particular practice from one situation to another, e.g., communication from face-to-face to on-line. Current models of teaching or practicing are used as an underpinning for the way in which the technology is predicted to be used. Respondents in this study often talked about their predicted role or practice in relation to their current teaching roles or practices. For example, the teacher providing a support role on-line was equated to a similar support role in face-to-face situations; the role of teacher as facilitator was equated in importance to that of facilitating any teaching situation; dissemination of information on-line talked as being similar to using e-mail or paper in face-to-face situations.

This attempt to reuse familiar practice in a new context may be appealing (since it attempts to build on established expertise and an extant professional identity) but it is problematic. The degree to which such practices be transferred from one situation to another is unclear, raising the question of whether such a change in technology necessitates a change in approach, too. In other words, within these case studies, is it just the tutor's perception that it they are merely transferring the same practice from one situation to another, rather than requiring the practice itself to change? Or, because of the new context, environment or technology, is practice necessarily modified, with *emergent* changes in practice arising as a consequence? To explore these issues, several examples can be highlighted from this study:

i. *Role of facilitator. Rhetoric without yet thinking about what the role of facilitator means.* The role of facilitator is seen as key in 'any learning event' and is predicted to also be crucial in on-line discussion situations. This may be the same role in name, but when transferring a concept already employed without technology to a technology-mediated situation, does it remain the same in practice? This study revealed a number of differences and potential changes to the role of facilitator in on-line discussion groups. The role of facilitating support differed in that face-to-face discussion was thought to enable productive emotional support in a way that on-line discussion did not; the identity and roles of participants may change if students take on the role of facilitator, e.g. student becomes a teacher rather than a student; and the patterns and intensity of interaction changes between students and tutors, e.g.,

> *"The way we craft the tasks is such that* they *talk on line, we as a moderator only comment at the end of a discussion, unless there's a serious reason for intervening, we let them talk. In a face to face seminar, I can't imagine not talking myself as a tutor, although we carefully monitor ourselves not to dominate, and all the rest of it, and the end of the day in the discussion, you join in don't you."*

ii. *Role of tutor as support*. One respondent described his role of 'support' within the VLS environment as being the same as within a physical environment. So, for example, picking up signs of disinterest, unhappiness, or loss of motivation in a student early enough to intervene.

> *"I'm looking for some kind of contribution, any contribution, I look for basically and if I don't get that then I know there's probably something wrong. It's when people are chipping in their bits and then all of a sudden it goes quiet. That's the danger sign. You do pick up on odd stuff like that – its just transferring what you normally do in normal situations to a virtual environment."*

In a face-to-face situation, signs identified were non-attendance or reduced contribution at meetings. So, the question here is whether the signs take on different characteristics and whether the mechanisms for support also change.

iii. The role of 'monitor' is another current role that tutors see themselves as already undertaking. But does it change with technology? Does it differ in the on-line environment of Blackboard? Monitoring student interaction, and use of discussion boards was perceived as a potentially challenging issue for two of the respondents in this study. They expressed concern over the potential to become too "Big Brotherish", with the facility to monitor all input, and the potential for value judgements of inputs to be made in ways not possible in transient face-to-face situations. This raises several questions that need to be considered in the process of adopting the technology, such as, what should be monitored and how? On what basis is this decision made? Who makes this decision? Is it in the sense of student assessment or of 'student support'?

The nature of interaction: One area that was specifically identified as not transferable from traditional learning contexts to on-line was learning through peer interaction and support. The significant role of peer support in the PGCE and Doctoral courses was highlighted by several respondents in this study. Berge (1995) also identifies social interaction on-line as critical to the success of such group interaction, in developing group cohesiveness, unification and working towards mutual goals. Hand in hand with the desire to facilitate this kind of interaction on-line, is an underlying assumption that technology will provide the medium to do so. However, experience suggests that achieving this is fraught with complexity, due the permanent and public nature of on-line expression:

> *"As trainee teachers they go through some fairly traumatic self assessments and finding they're not very good at it at first. Whereas in face to face situation you can make it very comfortable for people to talk about problems that they're having – people will say they've had a terrible session, they were terrible etc.. and then we can talk about it. On-line there's a marked difference writing such things in text and to remain for the duration of the year because they were terribly aware that to be candid was very exposing – your tutors on-line, its in text, its on the record and the desire to appear confident was extremely important to them when they were on-line. That completely defeats the learning objectives of them talking on-line"*

Other research suggests the importance of students feeling 'safe' in the environment for dialogue and communication to take place (Salmon 2004). In an on-line environment it is harder to know how people are judging you by what you say and how you express yourself due to the lack of other familiar social interpretive clues that go along with face-to-face interaction or even voice-to-voice interaction e.g., facial expression, tone of voice.

> *"So I think that illustrates the complexity of what is going on here and what people feel when they're typing something in about, well what is this going to say about me, what will other people say, how will they judge me. And there's all this going on that perhaps when people are less experienced in creating a group they wouldn't really think about it"*

Such complex interaction between the technology, the situation, and student needs can affect the amount and kind of dialogue that may take place. In addition, the dialogue is 'public', 'permanent' and 'reviewable' in a way that conversation is not, thus potentially changing the nature and content of interaction. This can apply to discussion about learning topics, as well as personal issues. For example, Hammond and Wiriyapinit (2004) found that although on-line groups were active within discussions, they were restrained when there was potential for disagreement, maintaining significant levels of politeness. Such interaction is likely to reduce the degree to which critical reflective learning can take place.

What does this show about the impact of new technology on roles and practices? The findings here suggest that preconceived ideas about mappings between technology characteristics and teaching/learning practices may need to change. The degree to which transfer of practice can occur without modification may depend on the function of the practice itself, with some practices being more easily transferable than others e.g., monitoring student interest/ input as oppose to discussion especially of emotive kind on-line. This study also highlights the importance of understanding the nature of the particular technology possibilities and constraints, and possible student and tutor interaction. Reaching a good understanding of the complex relationship between technology, context, interaction, learning outcomes will be an

ongoing evolving process, requiring a certain amount of adaptability from both staff and students.

Analysis of this complex, emergent relationship between practice and technology can be undertaken using the perspective of Activity Theory (Kuutti, 1996). This involves analysing the way in which people (subjects) use tools (which may be physical, symbolic or conceptual) to achieve objects (intentions), within the context of a community that maintains certain rules (tacit codes of practice) and organises work in particular ways (the division of labour).

This form of analysis draws a distinction between different levels of activity: the activity itself (a strategic-level description of intentional tool use in context), the series of actions that constitute it (specific conscious uses of tools, in context, to achieve tactical components of the overall task) and the myriad operations that constitute each action (each of which is so simple and routine that, unless a problem occurs, we remain unaware of undertaking them; they are not consciously perceived). This distinction allows the creation of nested accounts of practice that encompass both strategic and 'automatic' acts.

Within this conceptual framework it is possible to revisit the cases outlined above to provide a deeper level of analysis. For example, consider the support provided by the tutor (point ii, above). At the strategic level (the level of Activity), the move online results in no significant change: the overall object is still that the tutor provides support to their student, looking for signs of disinterest, unhappiness *etc*. This remains the tutor's responsibility, and the tools used (watching for symbolic events such as non-participation) are the same. This explains the claim that the role of the tutor remains the same within the new environment.

At the level of actions, however, differences start to emerge. The way in which signs of non-participation *etc* are noticed changes. Rather than looking for non-attendance by glancing around a room, the same object is achieved using a different tool – such as the student monitoring functions within the virtual environment. Thus although the object remains the same here, the system as a whole (the inter-relationship of subject, tool and object in their social context) changes, not least because the tools being used are now different.

At the level of operations, the differences are substantial. Rather than operations such as 'scan the room', 'listen for things to go quiet', there are now operations such as 'click this link to generate a list of contributors', 'click this link to reveal students' patterns of reading the online materials', and so on. The entire activity system at this level has changed. At this fine-grained level of analysis, the role of the teacher is almost entirely different online than face-to-face.

What this reveals is how the move to teaching online renders the role of the teacher both the same *and* different *simultaneously*. The purpose and strategic direction may remain unchanged, but the methods of achieving this alter in significant ways.

This also explains a number of related phenomena, such as the relatively frequent breakdowns in teaching online (compared to established teaching), until the new operations that are required are mastered. This means that a higher level of effort and commitment is needed *until operations become routine*. It also explains how successful practice becomes invisible – once the breakdowns at the operational level are resolved, this entire layer of teaching is undertaken without conscious intervention. (This makes it even more likely that successful teachers online will see no real difference with their teaching face-to-face, because they will become unaware of the majority of the ways in which their practices are different.)

However, it does seem likely that components of these systems might be differentially affected. Tools will change more often than objects, for example. In particular, it might prove interesting to study the rules that govern behaviour in different settings, since it is not clear how these differ.

2.2.7.5 Staff development/professionalisation

- How can academics be encouraged to engage with staff development? (Are particular forms of intervention or topics important to promote?)
    - How can academics be supported in carrying out evaluations of their practice?
    - Can academics and/or support staff be encouraged to become researchers of their own practice?

Interviews with academic staff brought to light important issues surrounding the use of technology that point to the central role that staff development could play in the design and implementation of technology for teaching.

Staff development plays an important role in the successful implementation of technology. A primary focus of staff training and development reported here was on how to use the technology, and developing technological expertise. Providing ongoing and flexible training that presents the technology in a straightforward way, promoting a positive and relaxed attitude in staff towards the technology itself, is clearly essential. This study shows how such input from technology support allowed staff to feel comfortable and confident about the technology itself. However, the rhetoric surrounding technology innovation is well known to raise expectations of what can actually be achieved with technology. Knowing the limitations as well as the potentials of particular technologies in relation to teaching and learning would enable staff to have a more realistic view of what the technology can do, and a clearer understanding of how it might be integrated into their teaching.

To complement this staff also need to learn how to use the technology effectively. Weller (2002) points out that teachers need to have much more than just technical competence if they are to be successful online. They need an understanding of the dynamics of online communication and interactions and need to learn effective ways of facilitating and teaching online". One respondent in this study was usefully integrating relevant research findings into the planning of the technology use. Furthermore, accounts were given that exposed differences in action and interaction when integrating technology and the potential implications for teaching practice. During these early stages of implementation being informed of pertinent research which facilitates appropriate design and use of VLEs or other relevant technologies in different learning situations could form a productive part of staff support in planning technological implementation. Understanding the differences in interaction with technology and how this affects what can be valuable for learning is crucial to designing effective activities, content and learning goals. Discovering what does and doesn't work for different contexts of teaching and learning with technology, and how to implement this is also instrumental in developing effective teaching practice. "Learning to use technology to effectively mediate the communications process is a critical skill to be acquired early in the teaching process" (Gunawardena 1992, cited Collins and Berge 1996). For example, ensuring critical learning and reflection takes place and learning how to effectively realize this.

Further to developing such skills is the need to encourage innovative teaching practices is advocated. However, successful innovation requires recognition that teaching and learning on-line is different from conventional teaching and integrating innovative practice with existing practice requires a good understanding of the technology, the content, and the context (Salmon 2004). Staff training that helps develop a good understanding of the medium and how it may be usefully employed for teaching and learning is one thing, but can 'innovation' be taught. Are there ways of helping staff to develop innovative and creative skills?

This study revealed a flexible design for staff development, incorporating ongoing training possibilities, as well as training tailored to staff need as it arises. The concept of staff support extended beyond practical difficulties with technology, to recognise the role of emotional and empathetic support in maintaining motivation.

2.3 Academic use of digital resources - change and the practices of teaching staff

2.3.1 Introduction

This section of the report provides data that contributes to our understanding of the ways in which teachers understand learning, the process of adopting technology, and how academics perceive technology.

Our principal focus for this study was the consideration that there is a move toward mainstream activity in the use of digital resources for teaching and learning. We examined the ways in which academic approaches to the use of digital resources have changed over the past two or more years and the ways in which the academic experience of digital resources has altered.

The research also touches upon the policy push in this area and the ways in which technology is impacting on practices, the development of team working and the ways academic engagement with technology is related to approaches to teaching.

Earlier research based on interviews conducted with academic staff at a single pre-1992 University who had been identified as making significant use of digital resources in their teaching has been reported in two conference papers (Jones et al 2003: Jones et al 2004). This research adds a longitudinal element to the original research by returning to some of the staff interviewed for the earlier work and re-interviewing them about the changes that have taken place since the first interview was undertaken.

The focus for the original research was an evaluation of a large-scale national programme intended to supply digital resources for use in Higher Education. The results of the research were a set of categories describing the variation in how academics perceived digital resources used for teaching and learning and an assessment of the disciplinary and subject differences in the ways that digital resources were used.

At the time that the research was conducted the large-scale use of digital resources for teaching was limited and relatively recent. Returning to staff who were advanced users at the stage of early adoption provides some interesting clues to:

a) the ways in which academic practice has altered with the increasing supply of digital resources

b) changes to the academic experience of using digital resources

c) the move into more mainstream institutional support of academic use of digital resources by libraries and central support staff.

2.3.2 The initial research

The original staff sample was identified either by subject librarians or the central support staff who administered the virtual learning environment. They were identified as advanced users of digital resources for teaching and learning. Twenty-one members of staff were chosen from the list of names provided to achieve a wide spread of subject and disciplinary areas. They were emailed in the second half of 2002 with a request for an interview. Ten members of staff were interviewed in the first wave of interviews covering a range of departments including Physics, Mathematics and Statistics, Biological Sciences, Engineering, Applied Social Sciences, Politics and International Relations, Modern Languages and Culture and History. The interviewees were mainly experienced lecturer grade staff but they included one professor and one researcher with limited teaching commitments. The researcher interviewed was responsible for the development of his department's Intranet.

A second round of interviews was conducted later to increase the range of disciplines included in the research. This larger data set was used to investigate disciplinary differences in the ways in which digital resources were used for teaching and learning. This issue was identified from the first 10 interviews and the second set of nine interviews was similar in form to the first set but the interviewees were opportunistically gathered to increase the overall subject and disciplinary range of interviewees.

2.3.3 Method

The research adopted a broadly phenomenographic approach and aimed to build upon earlier work in that tradition concerned with academic staff and their approach to digital resources (McDowell 2002) and teachers' conceptions of teaching (Prosser and Trigwell 1999). The methods were centred on interviews with an element of stimulated recall to focus the interview on specific phenomena rather than general opinions. Stimulated recall in this context meant that staff were interviewed in their own office with access to a networked computer. The interviewees were encouraged to make use of available documentation, display the digital resources they used and to access the courses in which they used digital resources. The interviews were conversational in style and began with a request from the interviewer for the member of staff to describe their personal use of digital resources in their teaching.

> *Interviewer: So if you could just start by telling me a little bit about your teaching and what you use, what sort of digital resources you might use?*

The interview continued with the interviewer asking the respondent to amplify and clarify areas of interest that had already been addressed by the respondent rather than using any kind of schedule. The interviews were conducted in the member of staff's own office and a computer was always available. The availability of the computer allowed the member of staff to show relevant resources, departmental, course and personal areas that they used for teaching purposes. A section of the interview towards the end was reserved to allow the interviewer to show a number of relevant sites to the interviewee. The interviews were varied in length but lasted between 30 minutes and 1 hour in all cases. The interviews were later transcribed and analysed using the qualitative data analysis package N-Vivo.

For this follow-up study, we have contacted the original 19 interviewees and tried to arrange a second set of interviews. Seven interviews have been conducted. We expected that some of the original interviewees would have changed job, left the institution or changed their role within the institution, and this is indeed what has happened. Of those contacts one has left and four have changed role. These cases so far have been of people moving to a research-only role or becoming head of department and no longer being involved in teaching.

The interviews so far have taken a similar conversational form to that used in the original study, including the use of stimulated recall by asking participants to show some of the resources that they use in their teaching. The approach is once again broadly phenomenographic, with the aim of identifying in the first place sets of categories of description that identify the variation in experiences and perceptions in the conceptual areas\question areas described above. In this regard the study has a somewhat wider area of interest than the original study.

2.3.4 Results and discussion: themes in the original research

This section examines issues that arose from an analysis of the rich data contained in the interviews. The first section is organised into two sub-headings that summarise issues found across the range of interviews. This approach is distinct from a phenomenographic approach in that it examines the data as much for the commonality of experience as for its variance. It is perhaps worth noting in this regard that any examination of data for variation is more than a set of relations between independent aspects of a phenomenon and rests upon some common understandings that this analysis of the data identifies.

The following sections examine the role of electronic information resources utilising and developing the categories of description suggested by McDowell (2002) for teachers' conceptions of networked digital resources in teaching.

2.3.4.1 Progression

All academic staff in all subject areas had some degree of progression in the use of networked digital resources. The involvement of staff in first year teaching varied but all interviewees reported some student use of digital resources from the first year. However even when all students were introduced to digital resources in their first year it was students in their final year or sometimes their penultimate year of study that made the most significant use of digital resources. Staff clearly differentiated between an introduction that was often described in terms of basic information skills and sometimes left to librarians and higher order research-like skills that were developed in the final undergraduate years or at postgraduate level. In some subject areas such as Mathematics and sciences the use of journals and e-journals was largely reserved for final years students or postgraduates.

a) Interviewer	*So that is the historical abstract?*
History lecturer:	*Yes. So we use this a lot. Students are introduced to this in the first year but I don't think they need it at that stage but I use all of this in the third year*
b) Interviewer:	*...you have mentioned that e-journals and databases would be used more by post-graduates but is there a point the second or*

third year where students would begin to use those sorts of structures?

Mathematics lecturer: *If students are doing projects they start to use the Library more and in the third year they start to use catalogues much more…. but the actual electronic journals and electronic searching … I think they will be reading more beginning the post-graduate level.*

c) Interviewer: *Would you direct students to e-journals?*

Engineering tutor: *It would depend on the member of staff, we don't do a lot of teaching by e-journals, that is more when you get on to the fourth year teaching and research where we will propose further material.*

The view of progression provided by academic staff could have been influenced by the structure of the university programmes, which were organised into a first year Part 1 and a Part 2 covering the final years of the undergraduate programme. However it is consistent with findings from other sources, for example the Open University, in which students at lower levels experienced difficulties due to skills deficits despite course guidance in information skills, whereas postgraduate students were reported to have more fully developed skills on entry (MacDonald *et al* 2001). McDowell also noted the effect of progression on student use of electronic resources in relation to academic library like resources (McDowell 2002 p259). The most notable change in the use of electronic resources was often when students were undertaking projects and it was at this point in undergraduate programmes that they were encouraged to make use of digital resources in particular e-journals and digital searching for additional materials.

2.3.4.2 Disciplinary and subject approaches

The use of digital resources was significantly related to subject and discipline area. This could be broadly divided into two main types of use. In Physics, Engineering and Mathematics the use of digital resources was closely related to the use of specialist software. In all cases the staff in these subjects expressed an interest in the use of images, including moving and 3D images and simulations, this was particularly so in the case of Biological Sciences. In social sciences such as Politics, Languages and Applied Social Sciences the staff interviewed were most interested in the use of particular types of Web based materials. These subjects needed access to the most current up-to-date material often from Government or specific agency (e.g. MIND) sites. Languages were also interested in access to news media such as local language newspapers.

All subject areas had an interest in using digital searches for materials that could be accessed either digitally or using traditional methods but History was the subject area that most emphasised this type of use. It was noticeable that maths and science based subjects did not direct students toward journal use of any kind until the final stages of an undergraduate programme whereas social science and arts students were more likely to make use of journals and e-journals throughout their degree. The degree of variation by subject and within subject areas is an area that requires further study. It touches on a large volume of work concerned with subject and disciplinary differences in teaching. For example Becher and Trowler (2001)

comment that "the ways in which particular groups of academics organise their professional lives are related in important ways to the intellectual tasks on which they are engaged" (p23).

Unsurprisingly perhaps this subject and task differentiation appears to carry over into the use of digital resources for teaching and learning. This area provides one of the main points of interest in the second round of interviews.

2.3.4.3 Categories: teachers' perceptions of roles for electronic resources

Liz McDowell (2002) has identified three 'functional' categories representing distinctly different roles for electronic information resources. She emphasises that these categories describe the nature and use of the resources in relation to teaching and learning. The categories she identified were:

1. Using the "electronic academic library"

This conception was that some uses of electronic information resources, such as electronic journals and online bibliographic data-bases were an electronic equivalent to the university library

2. "Bringing the world into the classroom"

This conception was that students use the kinds of information which academics and researchers use in order to develop knowledge.

3. Venturing into the "unregulated electronic information world"

This conception was of a mass of unregulated electronic information resources different in character to traditional library resources or conventional primary resources.

These categories appear to replicate the division of resources that would be found outside of an electronic environment and are broadly similar to library resources, primary sources and ephemera. The interview data we had gathered was read and interpreted initially without the use of these categories but a further reading of the interviews with these categories in mind found that they could all be identified in the interviews we had gathered.

Most of the interviews included reference to more or less extensive use of e-journals and electronic bibliographic databases, even when in science subjects this was often restricted to the final years of study. The use of digital resources to bring the world into the classroom was significantly skewed towards subject and disciplinary areas that had a need for current information and authenticity of information.

> *"I mean, things in Spanish change very, very rapidly and what we teach from year to year sort of changes as well." (Language lecturer)*

> *"We are encouraging students to look at, to look in detail at what is going on in contemporary conflicts …. if it was the Kosovan conflict we would encourage them to look at what the Foreign Offices view is, what the Russians view is, what the American view is and you often can't do that from resources in the Library because they are bound to be several years out of date." (Politics lecturer)*

However the data from our interviews raised questions about the categories that McDowell had developed, especially the distinction between 2 ("Bringing the world into the classroom") and 3 ("unregulated electronic information world"). We identified cases in which there was not a clear distinction between bringing the world into the classroom and the unregulated electronic information world. We wonder if these two categories should be combined into a single view. For example a social science lecturer noted:

> *"The other thing I encourage students to look at which I think that the web becomes particularly useful for is websites that have been put up by people who are wanting to write their personal experience of illness because then they are getting perspectives that are different to what would be presented in the sort of academic press or just general news and that, I mean that was when I mentioned anorexia last year, there was quite a wide range of sites which were called, which came under a heading of "PRO-ANNA" and these were sites put up by people with anorexia advising other anorexics on how to diet." (Social Science lecturer)*

In a similar way a language lecturer noted:

> *"I mean there are two issues, one is actually to do with language which is the fact that a lot of Spanish websites, if they are done by a private individual, they are not very fussy about putting things like accents on words and so you need to tell them 'look, you know, you may come across a page which has half of the accents missing, in which case you are obviously not going to take that as good linguistic model'. The other thing is content .... to take an extreme example, Spain still has a fairly restrictive Abortion Law so if they are doing a project on Spanish Abortion Law then they would come across obviously extremist groups, they come across Catholic groups, they come across Government web pages, so it is just, I suppose, teaching them to identify or making it clear that they have to identify the source of the information and from that to actually say 'ok well this is a Catholic group, the Catholic obviously have, they have this particular stand point on abortion, therefore the information I am getting is liable to be biased in that particular way'." (Language lecturer)*

These lecturers that used networked digital resources to "bring the world into the classroom" were clearly interested in access to primary materials but not only from government sites and reputable organisations that provided primary resources. It was clear that some of these lecturers were also interested in the unregulated aspects of the environment both as a way of bringing the world into the classroom and as a way of introducing students to powerful and potentially dangerous sources. This was done in a way that would help the students to develop skills in how to read and handle such information.

We also found what we think may be an additional category that is related to this idea of introducing students to materials in order to develop skills.

2.3.4.4 Enabling training in skills

A perspective most clearly found amongst scientists was that this use of digital resources was not like a library, nor was it bringing the world into the classroom in any ordinary sense. It was providing access for students to specialised software, databases, simulations and potentially networked experiments. In this sense it was related to workshop or laboratory work. Unlike category 2, the purpose of bringing these sources into the educational

environment was not so much to make available primary information sources, but to develop skills in handling information that were likely to be required in further study or in work.

> *"So for instance [course name] is a lab class that works on SolidWork and in that there is a SolidWorks part so if we want to do assembly file the common place for them to find the information and the actual parts is from the intranet and then they can download it onto each PC where they are working and then configure it." (Engineering tutor)*

> *"Oh they are basically, the students are being introduced to these as beginner users as it were, they are not student teaching packages, students are taught how to do basic things on them … So we don't actually use any Mathematics teaching package it all tends to be professionals' software that we use in an introductory context." (Mathematics lecturer)*

In some ways this aspect of training students in data handling skills is also present in the social science and language lecturers' comments about making use of the unregulated aspect of bringing resources into the classroom. It is possible then to suggest that another functional category describing the role of networked digital resources is to enable the development of skills in handling materials necessary either to further study and research or for entry into the workplace.

2.3.4.5 Teachers' conceptions of teaching using digital resources

Prosser and Trigwell (1999) have discussed phenomenographic research in relation to the development of outcome spaces from phenomenographic work that identifies variations in the way in which phenomena are experienced. Their work goes beyond the identification of categories and organises different conceptions into a hierarchy. An outcome space articulates the internal relations between the different ways of experiencing a phenomenon and relates the categories of experience together. The phenomenographic work conducted in education has developed outcome spaces for students' experiences and more recently for teachers' experiences of teaching (Prosser and Trigwell 1999). These categories may be of relevance to the study of academic staff and their experiences of teaching using digital resources. To test if this area was open to further development an outcome space was developed from a reading of the transcripts in full knowledge of the work previously done in relation to teachers' conceptions of teaching. The categories devised from this reading were then passed to a second researcher with a brief note explaining how the categories might be applied.

When we read the transcripts of the interviews in relation to what conception was underlying the use of digital resources for teaching we proposed the following categories which are closely related to teachers' conceptions of teaching. The second researcher found that these categories could be easily applied to the interview data.

1. Resources as *transmission* of information
2. Resources as a means for students to *acquire* concepts/knowledge
3. Resources as a means for students to *develop* their conceptions/knowledge
4. Resources as a means for students to *change* their conceptions/ knowledge

It may be the case that academic staff hold conceptions of teaching using digital resources that have a relationship to the conceptions that they have about teaching generally. To explore this further we explored the interview data with the categories derived for teachers' experiences of teaching in mind. This is a variation upon the usual process of phenomenographic analysis as the categories were not wholly derived from a reading of the interview data but were prompted by an iterative reading of the data in relation to known categories for teachers' experiences. It is our contention that this makes explicit a process that may well take place ordinarily in phenomenographic analysis. This question has recently been addressed in a somewhat different way by Christine Bruce (2002). Bruce suggests that even when the same research team approaches data from two projects with a similar outlook and topic areas the analytic framework varied in relation to the data. She goes on to argue that a dialectical process develops in which the data and the researchers are interrelated.

2.3.5 The new data: themes

We have explored a number of impact-related themes and issues in the new data, focusing on the impact of the deployment of digital resources on the practices of lecturing staff. Lecturing staff are a locus for changes that are driven by policy and commercial changes at all levels of society, including the institution in which they work. Changes in the availability of digital resources only become effective through the mediating activities of lecturing staff who direct students towards certain resources, authorise the use of resources self-discovered by students and build into assessment regimes requirements for students to make use of certain kinds of resources. Lecturing staff can be seen to have a critical role in the way in which digital resources are integrated into student learning. At another level impact in this research is focused on the ways in which teaching practices are or have been affected by changes in the volume and type of digital resources that are available. A particular feature of this research was to try and discern any changes occurring over time.

We have revisited themes described above, including:

- Perceptions of disciplinary differences
- Perceptions of what constitute online and electronic resources
- Perceptions of progression

To this we have added an exploration of:

- Perceptions of changes in academic practice, roles and tasks
- Perceptions and experiences of the adoption life-cycle
- The extent to which digital and online resources are entering the mainstream
- Pressures presented by new technologies and the ways in which academic staff cope with these.

2.3.5.1 Disciplinary differences

It is clear that disciplinary differences remain significant. In Marketing and Applied Social Science the sources used are limited and selective. A key element for applied social science is the use of government documents, in particular legislation. Despite the use of government

sources a major issue here is the continuity of links. This lecturer was centrally concerned with whether it is still possible to point students at particular links:

> *Lecturer: "...if there are documents that are usually, usually sort of on the Department of Health website that are relating to the Social work course then I'll quite often take them off and put them on the noticeboard so that they're easy for the students to access" [.....]*
>
> *Interviewer: "Do you prefer to do that rather than say 'here's the url, go and look at it yourself?"*
>
> *Lecturer: "Erm, it's always felt - yeah, I mean it's felt for me like that's a way of er making it a little bit safer, some of those documents might change, they may move sites, may move address erm though that you know..." (Applied Social Science lecturer)*

When we first interviewed it was clear that a lecturer strategy was to point to agencies that maintained resources and sites. Government was one example of that strategy. The finding that problems persist is significant in that it points to a need for more secure materials, or the inclusion of types of resource as 'ephemera', which might reduce their importance for some teaching and learning purposes.

In relation to what have been described as hard and soft disciplines (Becher, 1994), all participants in the second round of interviews have so far have been from the social sciences so we have no evidence bearing on this question to date. One point that was made on the basis of the earlier study was that although there were differences in the 'soft' disciplines (arts, humanities, social sciences), these were not as distinct as that between hard and soft disciplines. However, we note that there is a distinct difference between the kinds of resources used in marketing and applied social science and in history. The latter has a recent focus on the use of digitised primary source material, associated with an interesting profile of student progression. This finding reinforces a finding from the earlier research. At that time it was noted that some discipline or subject areas were affected by either an ease of use based on particularly large non-copyright sets of resources or in the case of Music particularly strong copyright restrictions constraining the use of digital resources.

One interesting conception that has emerged is that for teaching purposes staff members may be thinking in terms of the profession into which the students may be going rather than the discipline within which they are working. So for instance in Law what matters is that students learn the kinds of skills in the analysis and organisation of case material that will be required in professional practice. This relates to the other dimension that has been applied to disciplinary difference, that of pure or applied disciplines. Disciplines such as Law are a sub-set of applied disciplines in their precise focus on a specific occupational group with its own standards and occupational practices. Other such areas would include education, medicine and engineering and they contrast with more pure disciplines that have a less direct connection with specific occupations such as history or theoretical physics.

2.3.5.2 Conceptions of online and electronic resources

An interesting question that arose from our first set of interviews was that almost no interviewee requested any clarification about what we might have meant by digital resources. Those few who did ask did not need any detailed discussion and this pointed towards a

confidence about the term and an assumption of common usage. We explicitly pursued this in the second set of interviews, as it was clear that although there was an assumption of common usage and understanding the interviewees actually understood and used the term digital resources in somewhat different ways. From the interviews it appears that staff hold a broad conception as to what is meant by digital resources. Online papers and journals are usually part of this conception. The world-wide web (WWW) as a whole is included, but it tends to be taken as a given and staff often have to be reminded for them to mention it explicitly. We have not yet performed a full analysis of this data, but we have no sense currently that the conceptions described in the previous study will need to be revised.

Self-produced items have emerged as an important part of the way in which digital resources are conceived for some staff. Several staff were keen to talk about and show resources they had generated themselves, including lecture notes presented on the web as PowerPoint slides, and their own web-sites. Courseware, interactive software with an educational purpose, has not appeared as a significant element but assessment software has been mentioned.

The WWW appears from our current informants to have become a normal and unremarkable part of our academics' working life, with participants often having to be prompted to talk about the role of the web:

> *Interviewer: "Do you ever use things like Internet-based resources? Do you point people at resources?"*
>
> *Lecturer: "Oh yeah, [surprised] - absolutely." (Educational Research lecturer)*

Online databases are similarly part of the working landscape

> *"I mean we we use law reports, they're, they're our primary sources of much much material. Those have been, there've been online databases of those for some years now…" (Law lecturer)*

2.3.5.3 Teachers' conceptions of teaching using digital resources

Some conceptions are based on traditional notions of what it is to teach in a university, a conception that fits with the notion in our earlier study of resources as transmission of information, with digital resources being seen as much the same as the traditional resources but a little more accessible:

> *Lecturer: "…it's also - some of this [digital resources] is a bit of a distraction from what feels to be important, which is actually the... fact that we're teaching in a classroom."*
>
> *Interviewer: "You think that's the, that's the kind of, the model that matters? That's the core activity?"*
>
> *Lecturer: "I, I think so, yeah. I much-"*
>
> *Interviewer: "That kind of classroom-oriented er kind of pedagogic approach?"*
>
> *Lecturer: "Yes" (Applied Social Sciences Lecturer)*

And goes on to articulate it further:

> *Lecturer: My view is I look at the type of stuff that the Open University does and think well there's no way I'm going to put anything, do anything that's on a par to that, so erm should I even start? What I can do is, you know, is to maintain what I, what I do, which is the classroom teaching approach. Now, so, and that's why people have come here rather than to, to the OU, and if they want any distance learning they go to the OU. So erm [pause] well we write [?] books, papers or whatever else." (Applied Social Sciences Lecturer)*

It is worth noting that this person was not in any way Luddite or technologically untutored, having been an early adopter and maintainer of the departmental website. This approach to digital resources suggests a strong value being placed on the place based and face-to-face element of the experience of a university student. Whilst not counter posed to digital resources it seems that this lecturer's view is that such resources are a potential distraction to core classroom activity and reliant on special organisational support, such as that found in the Open University.

Others are more concerned with the engagement that students are able to make as a result of the use of digital resources and tools:

> *"...to me it's the academic, the pedagogic sort of rationale is is the independence, the interaction, um, and the fact that... well, we we provide them with a space where they they create a team name, a law firm, a fictitious name, and there's a bit of fun introduced [...] and when you get students actually engaging, even at the humorous level like that, they they - I do think they get a sense of ownership of the process of learning that they're engaged in which to me is is, you know, crucial to enhancing a) what they're able to produce but b) also their experience, and the two things are, you know, in my view, completely related." (Applied Social Sciences Lecturer)*

This lecturer falls into the third category identified in our earlier work: seeing resources as a means for students to develop their conceptions and knowledge.

Interestingly it appears that lecturers are quite capable of holding more than one conception simultaneously. An Educational Research lecturer at one point appears to hold a clear transmission conception:

> *"...you're making me think 'what do I use the technology for?' Well mainly it is to send. I'm not on receive [laughs]". (Educational Research lecturer)*

But as one might expect for an educational research specialist this is not the whole story, and he also describes his pedagogic philosophy in these terms:

> *"...I'm well practiced at scoping a field, at giving them an opportunity to construct the knowledge for themselves in some way, which means play - opportunities to play, giving them opportunities to play discursively as well, to use the language and so on, and giving them opportunities to talk to each other, to test things and play with things off each other as well as off me, so that means really I suppose if I was to sum it up, that, you know, there's a bit of didactisism there - I map the field for them, provide concepts and theory and so on, but then try to um, try to play, let them play...". (Educational Research lecturer)*

This raises the interesting possibility that the digital resources that this particular lecturer conceived of, mostly PowerPoint and web-based resources, was playing some part in directing the lecturer into a more didactic model. However we found no evidence of this in our other interviews.

2.3.5.4 Changing academic practice

The impact of the use of online resources on teachers' roles and tasks was not a direct focus of the original study, and was not therefore examined in detail. We intend to re-examine the earlier data with this as a focus. In the meantime, we asked our participants about changes in their practice in relation to teaching, and found that this fitted with what we were finding about their pattern of resource use: there is a sense that academic staff have adjusted to a way of teaching with electronic resources that works. For some lecturers there has not been a great deal of change since our last interviews"

> *Interviewer: "...since you were interviewed about two years ago how has your use of digital resources changed?"*
>
> *Lecturer: "Er, not a great deal to be honest with you er, in other words we're still using the resources that were provided by the the unit. Umm, I think that OK we experimented with a couple of other things mainly videos online, um, but largely I think largely that has been it to be honest with you..." (Marketing lecturer)*

Educational Research has an established set of resources, administered via his own web-site:

> *"I say to my students, 'you know, this is the way I work, you know, people work differently, take it or leave it.'" (Educational Research lecturer)*

With this is a feeling that really things haven't changed that much in terms of teaching approach, and the same lecturer said:

> *"Yes, my point is that that's been consistent really; I don't think it's changed... what... no, what this, what the pedagogical shape of my teaching is like really…" (Educational Research lecturer)*

There is occasionally a sense that the digital revolution has in fact been less than revolutionary:

> *Lecturer: "When when it comes down to it I mean we, you know, we upgrade and have bigger and better computers and that kind of thing but actually the use is quite limited."*
>
> *Interviewer: "Things don't actually change that much, the software that you use?"*
>
> *Lecturer: "Yeah." (Applied Social Science lecturer)*

In some cases, as with this History lecturer's comments on working approaches in his department, it appears that digital resources have simply been substituted for traditional resources:

> *"So colleagues would make photocopies of things that were not available here, and in terms of students doing u/g dissertation projects, clearly it depended on what we had*

here or what they could get access to wherever they lived. Whereas now it's been increasingly possible depending on the subject area – it is very uneven – it's possible for them to do an awful lot electronically and it's possible for us to download a lot electronically." (History Lecturer)

However, this sense of traditional working practices slightly disrupted by more efficient new media is not the whole story. The same History lecturer reports:

Lecturer: "It's – in a way one becomes – whereas in the past you were the gatekeeper because you knew what sources you knew about – look, if I wanted to find out what was in the National Archive, the Record office as it was in the past, I had to go to the national archives to find out what there was."

Interviewer: "Right"

Lecturer: "So what I was able to advise students on was what I knew. 'Cos I'd been. But of course you don't know everything. Whereas now all 9 million records are indexed online. So you just sit at the computer and say 'well let's see if they've got anything'. And that means that your role changes - in the past, I had to go to the national archives to find out what there was." (History lecturer)

2.3.5.5 Progression

The earlier work found clear connections between the stage in course of students, the kinds of online resources that were deployed by staff, and the issues that arose in this deployment. The progression was also related to subject and disciplinary difference. For example in Maths and Science subjects it was only in the final years that students were directed to electronic journals whereas in Social Science subjects this took place early in the students' studies. These differences still manifest themselves. For instance in History journal articles are important in the first and second years but by the third year the focus moves to the availability of digital resources.

Lecturer: "Now essentially I think the first year students are going to be using access to printed materials like J-Store."

Interviewer: "Yeah."

Lecturer: "And probably that's true of largely second yr. students as well."

Interviewer: Right.

Lecturer: "But once they move into the third year and they're doing primary research, their own dissertation, and post-grad work thereafter, then the digital resources would become invaluable." (History lecturer)

These issues have a direct impact on the things that staff have to do, and there is still evidence of clear divisions by year and level of study. In particular final year students were particularly likely to be involved in the use of online resources, and their teaching reflected this, with a tendency to concentrate on teaching research skills. By contrast first year students are the focus of efforts to teach information skills. The focus on information skills is still apparently very necessary, but participants report that new students have increasingly sophisticated skills. For instance one participant reports that his students have little idea as to how to reduce

thousands of search hits to a manageable number but are very happy to work with a number of applications and windows on screen in a way that he would find difficult. Another reports a general tendency for new students to have all the basic skills whilst postgraduates have more problems:

> *"…and the undergrads these days are actually doing a lot more. I mean they they - the post-grads still have a little bit of problem, but the undergrads, I mean we we [?inaudible] on social work in particular we we have students who are supposed to have the ECDL in order to graduate, and, and when we looked at erm their qualifications that they have in IT I'd say more than well, over, well over 50% of our undergraduates now come with erm something like, er, GCSE in Information Technology. So you know they're, they're using it quite a lot." (Applied Social Science lecturer)*

2.3.5.6 Experiences of the digital resource adoption life-cycle

It is becoming apparent from our interviews that there is a developing pattern of adoption and mature use. One participant reports being an early adopter in his department (understood in terms of the Technology Adoption Life Cycle – Rogers, 1995) and learning extensive skills in authoring HTML. The department has caught up to the extent that it has adopted a VLE across the department and he finds himself needing to learn and use a new set of skills but feels there is now just not enough time. He perceives himself as being overtaken by the technology.

> *"I used to have responsibility for upkeep of the department website but since it's changed I just find the - I I haven't got the inclination to erm learn a new set of software um, to do things in a different way, so the kind of sort of new DreamWeaver, website management, [.....] I haven't, I don't feel in any way motivated to learn to do it all again, even though I know it's better." (Applied Social Science lecturer)*

This coincides with his appointment to the position of head of department, and it is clear that changes in his work role interact with changes in resource use to produce this situation.

Other participants who were early adopters also clearly consider themselves old hands, but there is a sense that they are in a stable situation having adjusted to the use of digital resources with no major changes under way or in the offing. So in one case a Law lecturer reports that there have been no significant changes, just a few 'tweaks'. Changes that are taking place are in the supporting structures, and the law lecturer told us of a mentoring scheme that has been introduced in which second-year students help new students adjust to studying with the course VLE. In another case the changes are in the ways in which tutors are paid: the traditional model of payment by the hour has been found to be inadequate where extensive online moderating is involved, and alternative structures are being sought. This may point to a ratchet or lockstep approach to change in which lecturing staff make significant changes but then settle into either a pattern of use or settle back into a less dynamic role with regard to change. This contrasts with the idea of a technological revolution and some approaches to change management that can imply a continuous or smooth change process moving in one direction.

The other pattern that is apparent is that of the effect of new resources coming online. This was most notable in history, where our participant reported a transformation in resources available:

> *Interviewer: "Since you were interviewed […] approximately two years ago – how's your use of digital or online resources changed?"*
>
> *Lecturer: "Er quite dramatically probably. Depends what you mean by resources." (History lecturer)*

The lecturer then goes on to describe a series of primary sources that are now available in digital form:

> *"There's also increasingly in history, depending on the subject area, huge amounts of primary information being put out, made available online." (History lecturer)*

And concludes:

> *"So I think these sorts of things were just not available two or three years ago. Quite phenomenal." (History lecturer)*

2.3.5.7 Evidence of the move into more mainstream institutional support of academic use of digital resources by libraries and central support staff.

There was little evidence of this in the overt sense from other informants. One or two of our participants had had help from the University's teaching and learning support centre, and several of them mentioned their use of the University's VLE, but there was no evidence of any policy impetus or pressure to use online methods. On the face of it this is surprising given that over this period increased funding for learning support was put in place, resulting in the employment of new support staff, and library provision for electronic resources was extended and developed with the addition of additional library services such as MetaLib and SFX. However we also noted that our participants took for granted the role of libraries as providers of digital journals.

2.3.5.8 Pressure and coping

A number of commentators, for instance Hill (1988), have pointed out that negative effects can be associated with the introduction of new technology. It is to be expected that the early adopters in our study were in some ways convinced that there were benefits to be obtained from the introduction of digital resources into their teaching programmes. But it is also important to consider whether any negative aspects were encountered. It has been suggested (for instance Winner, 1994) that technology is paradoxical in its effects, and Mick and Fournier (1998) have developed this notion to identify a number of commonly found technological paradoxes such as feelings of competence-incompetence and efficiency-inefficiency. In our earlier study we did not directly consider the question of the new pressures generated by changes in academic practice, but took the opportunity presented by the second study to ask about pressures and how staff coped with them.

When asked about whether they are coping with pressures generated by the use of new resources in teaching staff are on the face of it managing fairly well. In some cases they appear to have no problems at all. But they also report steep learning curves in getting to grips with new software and where online communities and similar approaches are involved they report a high workload. The main complaint is the increased workload and the lack of time, whether expressed in general terms:

> *"...I've got friends who who do blogs, they're in online communities, you know, who do all that, and I just think 'how have you got the time?'. XX said to me 'Oh, I'll set you up with a blog,' and I wasn't sure what a blog was, and he set me up with one before I even knew it, and I thought, 'Oh shit X, I don't want this, I - you know - I've got enough people to talk to, I I don't want more! I get things from all over the world from mad people, you know... I don't want to attract that kind of thing.... but I certainly haven't got time to you know, do a daily diary, respond to people and all that..." (Educational Research lecturer)*

Or specifically with regard to teaching:

> *"All these things [digital resources] increase workload." (Maths lecturer)*

On the other hand, where lecturers have been using digital resources for some time the work has decreased after the initial efforts:

> *Interviewer: "How much extra work would you say that this imposed, maintaining this over the years?"*
>
> *Lecturer: "Well, less each year. I think the initial investment of time in in in creating it was significant." (Law lecturer)*

This lecturer also notes that there are ways to cope that can be developed with experience:

> *"... the assignment we set them, in the second term, which is an online negotiation, um, team-based, monitoring that has the potential, because it's it's an asynchronous discussion, a whole series going on concurrently, for different seminar groups, I mean the potential for that is is, in terms of time, is erm, well, unlimited, because it's it's 24/7 access to potentially - and that is an issue which we gradually began to address really through practice as opposed to anything else, it was, how do we manage this without it's simply subsuming us with with the time implications, um, and we've developed little techniques..." (Law lecturer).*

There is a strong sense of ambiguity in many of the participants' statements about technology. One participant is very welcoming of the new technology. He doesn't believe that it's necessary to prepare afresh for every teaching session:

> *"I'm a believer in cost-effectiveness." (Educational Research lecturer)*

Technology makes it easier to be cost-effective in teaching:

> *"It's kind of efficient - I like that. I always make sure I always know where all my stuff is and I always have a record of it digitally, and a back up, and nowadays, very often, if I'm doing something new it's, it's cutting and pasting..." (Educational Research lecturer)*

However the same participant also feels strongly about the capacity of certain aspects of new technology to waste time:

> *'If I leave my inbox for three days, it's going to take me hours to to deal... with the stuff. So it's partly that, you know, I want to keep on top of it, er, and it's partly a kind of Christmas present thing really, you know, what's in there, I think. Mostly it's*

> *horrible, on the whole, mostly it's banal, ummm [?] something that can be dealt with quickly, sometimes it's an elephant of a job, but you know, it's going to, it's going to be around for the next three months, um, and sometimes it's a nice thing, you know, 'could you come and talk to us in in Capetown'." (Educational Research lecturer)*

Overall this participant appeared to have a conception of technology in which there is a paradox between efficiency and inefficiency resulting from use of the technology. This is one of the technology paradoxes identified by Mick and Fournier (1998). With regard to email there is a further paradox between the positive and negative aspects of the content that the medium entails.

One interesting comment is that it is difficult for staff moving into online tuition to develop an appropriate persona: the participant concerned, a Law lecturer, says that having been using a VLE for some seven years now he has several personas that he adopts for different contexts and individual, and often signs himself to indicate which persona he is adopting. This experience is connected with the perception that the purely written aspect of the communication involved removes visual cues to the communicator's mood that need to be supplied by other means.

> *"…how you create the online personality if you like. Because it's not - you you you're not in a classroom, you've not got body language, you've not got facial expressions, so all your your nuances which you can convey with all that you know, body language etc. you're having to do purely through language,, text - in in text textual form, and er, can very easily be misinterpreted, and I've been doing this for some years and I've developed my sort of techniques, so, frequently, when I'm responding to queries when we're dealing with the negotiations, I always sign myself off as Lord Justice somebody or other…. I have on one or two occasions signed myself off as Exasperated LJ, and that's because the question has been basically so inane, or it's already been answered, you know…" (Law lecturer).*

2.3.6 Discussion and conclusions

In this study our principal focus was on the ways in which technology was affecting practices in teaching, and in the ways that approaches to teaching might be related to how academic staff engage with technology. We addressed three particular themes emerging from the earlier Impact report. We found data that contributes to our understanding of the ways in which teachers understand and practice teaching and learning with technology, the process of adopting technology, and how academics perceive technology. Beyond this we were interested in how teaching practices and the adoption of technology were related. A particular feature of this research was to try and discern any changes occurring over time.

With regard to perceptions of teaching and learning with technology, the overall sense here is that teachers do not see that the use of technology fundamentally alters the way in which they teach or their students learn.

We looked for evidence about the ways in which academic practice has altered with the increasing supply of digital resources and found that there was no simple relationship between the availability of digital resources and their incorporation into academic practice. The example from History suggests that the more profound changes occur when the availability of a resource feeds directly into a perceived niche already understood within a subject or

discipline. The new availability of primary resources fed directly into a previously understood set of subject preferences and practices within History.

We also looked for evidence of the effects of use of online resources in terms of pressure at work, and we looked at the strategies that staff used to cope with these pressures. Here we found that time pressures were the main issue and that coping practices may be related to a rhythm of adoption in which exceptional efforts may be made in the early stages but that once they have been made either staff fall back into regular practices that require less effort or they can fall away from a leading position they may have once held on the grounds that keeping up with changes in technologies required too much effort.

We were particularly interested in the notion that there has been a movement in the use of digital resources in teaching and learning from a pattern of smaller scale and often independent initiatives to mainstream adoption. There was surprisingly little evidence of this in any direct way. What we did find was a sense of normalisation attached to the use of digital resources, with a possible pattern of adoption emerging (noted above) in which periods of innovation are followed by periods of adjustment and stability, followed by further waves of innovation. In this framework we could see different staff responses, with for instance one early adopter in a plateau phase characterised by tweaks to the relatively stable systems in use, whilst another finds himself somewhat sidelined by a new wave of innovation in the form of a VLE, and yet another is excited by a recent period of radical change. This implies that for policy-makers it would be misleading to make organisation-wide generalisations about the state of progress of technology adoption within a university or even within a department.

The process of normalisation described fits with our sense that there does not appear to be any fundamental change in approaches to teaching and learning.

We were very aware from our earlier research of significant differences between disciplines in terms of their use of digital resources. We did not have the range of representation from different disciplines that we managed in the earlier study, but we did see some very clear-cut differences still manifesting themselves, and see no reason to alter our earlier conclusions.

3 Empirical work in Bulgaria

3.1 Introduction

This section addresses questions about different models of technology-enhanced learning being implemented in the Bulgarian Higher Education system and will focus on the main problems concerning technology adoption into curricula.

Little in the world is changing as fast as educational technology, and it is already having a profound effect on how students learn and how they are taught. As schools move away from didactic learning to more motivating, interactive processes that develop higher order thinking skills, multimedia classrooms are increasing. The technologies include, in different combinations: audio, video, computers, telecommunications, distance learning, and HyperMedia (which integrates music, text, images, live-action video, spoken voices, and animations).

Technology-rich classrooms are most successful when advanced technologies are linked with advanced teaching strategies, such as cooperative learning, thinking skills, guided inquiry, and thematic teaching. Successful implementation of the technology does not remove teachers from the scene, but casts them in new roles as learning coaches and motivators who can create humane environments for students as they work their machines.

Research indicates that it is far more productive for students to work with technology in pairs or in small groups than alone. They become active participants in the learning process, exercising many kinds of intelligence in dynamic ways, spending more "mind on task," and developing effective interpersonal skills.

Interactive videodisc instructional systems enhance both student and teacher performance through technology that improves learning efficiency, comprehension, problem-solving, and decision-making. It may be that interactive videodisc instruction is effective in enhancing thinking skills largely because of its ability to simulate situations and allow students to foresee the results of their decisions. Unlimited sources of information are offered along with the technology to process and manage them.

Computers are providing individualized instruction in almost every subject. They are valuable tools for building basic skills, developing problem solving strategies, providing innovative methods for teaching abstract concepts, developing ways to manage information, diagnosing and prescribing for special needs, and managing student learning and records. Computer networks offer teachers and students valuable help by sharing information and other resources as schools develop new ways of applying technology.

3.2 Bulgarian Higher Education

The data presented below shows the readiness of Bulgarian Higher Education Institutions to implement technology-enhanced learning.

According to the State Registry of higher schools there are:

- 49 Higher Educational Institutions in Bulgaria (state & private)
  - 10 Colleges and Higher Schools

  - 39 Universities and Academies:
    - Technical, economical, military, arts, medical etc.
- approximately 228 500 students in Bulgaria for the period 2003-2004:
  - 17 of these institutions train less than 1000 students
  - 32 cover less than 5000 students
  - Only 7 of them provide training for more than 10 000 students.

The model of distance education was introduced into the Bulgarian Higher Education System in 2004 when the Bulgarian government starts the initiative "Virtual University". According to IDG Research Investigation:

- 31 universities training 145 600 students.
- 24 with ICT education.
- 14 500 students in technologies
- 94% universities have a strategy or in the process of development of such strategy for using ICT in education

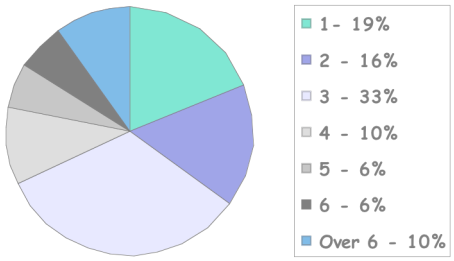


Fig. 1 The proportion Students/Computers at Universities

Infrastructure
- 29% - developed infrastructure
- 71% - partially developed infrastructure
- Leading Universities:
  - American University - Blagoevgrad (private) - 26 PC per 100 students.
  - National Militarry Academy (state): 16 PC per 100 students.

Internet connection
- 65%– connection speed over 1Mbps.
- 90%: local network.
- Campus-networks (teritory of student hostels): 26%.
- Local networks for different departments : 76%

Information Systems
- 80-90% of Higher Educational Insitutions are developed Management information systems in different level
- 68% using e-Learning platforms
- 19% using e-Learning platforms implemented by their institution

The main questions that arise after analyzing current situation in Higher Education Organizations are:

- What is the optimal proportion "students-computers"?

- Are there international standrs?
- How to find neccesary funding?
  - Government
  - Business
  - Other resources

3.3 The process of implementing technology-enhanced learning in Bulgarian Higher Education

The successful implementation of the policy of technology-enhanced learning integration is grounded in a sound analysis of the situation and the identification of existing problems. In recent years, the processes of technology-enhanced learning integration in the higher education system have been challenged by cultural, financial, technical, technological, and personnel difficulties. Most of the problems and obstacles, as indicated below, are common to all countries trying to modernise their systems of higher education. These include the following:

- the constant expansion of the spectra of information sources that are used by professors and students in their work in and out of universities;
- the growing use of the Internet by the academic community as a whole, by professors and students;
- the required financial resources needed by a higher education institution in order to be connected to the World Wide Web and the limitations set by the providers;
- the continuous budgetary pressure on higher education and the need for the offering of effective information services by higher education institutions;
- demands that institutional budgets be used only to meet strictly indispensable objectives and the pressures on institutions to repeatedly prove that there is a need to integrate the ICTs into the teaching and learning processes.

In addition to these financial and technological limitations that affect the information environment of universities today, the latter are facing other problems rooted in the historical heritage of the system and caused by cultural and language barriers and by the difficulties associated with reforming the sector. From an historical perspective, each university and, in some cases, each department, began by purchasing a variety of computer hardware and software with its own funds, and only later, according to a plan taking its clearly defined needs into account. This situation creates serious challenges to the recently attempted interuniversity integration of the information resources and their national co-ordination for the purposes of comparative education statistics and indicators of programme and institutional performance. A serious challenge to Bulgarian universities has come from efforts to introduce and to use ready-made software and programmes provided by Western European partners. These have needed to be adapted to the Cyrillic alphabet. Their use for teaching and for the exchange of information on different platforms and with various software versions have given rise to difficulties.

The most debated problems are the following:

- the outdated and insufficient information and communication technical support;
- the limited infrastructure and access to the ICTs in almost two-thirds of the higher education institutions;

- an insufficiently developed network for connecting all academic institutions and departments in the country.
- as a result of the above, the lack of connections and communication among the university libraries, which increases the difficulty of information transfer and access, both from within and outside the country, to library resources;
- the discrepancy between the range, the resource support, and the content of education and training for ICTs use and the rapid expansion of demand;
- the lack of a prompt response (not so much technical as culturalpsychological) on the part of higher education institutions to the lifelong learning needs of citizens through the offering of modular course systems and programmes and distant modes of learning.

In order to meet these challenges, the government has taken measures to stimulate the integration of the ICTs into the higher education system as a whole.

3.4 Policy

The integration of the modern information and communication technologies (ICTs) into the Bulgarian higher education system is, to a great extent, providing solutions to the problem of satisfying the growing educational aspirations of Bulgarian society (providing access to quality higher education for all) in a reasonable amount of time with the use of a reasonable level of resources. For these reasons, the use of the ICTs in higher education is an important element in institutional and governmental policy in the process of modernizing and democratizing the sector.

The recent liberalization of the Internet market in Bulgaria has resulted in a significant expansion of Internet service providers. This expansion is proof of the high potential for innovation and technological development of the national economy and also of the strong competition in this sector.

Educational policymakers in Bulgaria share the vision that educating young people in the use of Internet services improves the quality of these services, reduces costs, and creates conditions for the greater flexibility of candidates on the labour market in the later stages of their working lives.

The current situation of the personal computer (PC) and Internet market in Bulgaria clearly indicates a need to encourage the use of the ICTs in education, particularly in higher education.

3.4.1 Measures Taken at National Level

In order to overcome the considerable lag in the ICT field, in May 2004 the national initiative "i-Bulgaria" was started. In order to overcome the considerable lag in the ICT field, in May 2004 the national initiative "i-Bulgaria" was started. Its aim is to accelerate in Bulgaria the process of reaching the average indices of Information Society development in the EU.

The work in the frames of this programme is concentrated on five significant projects, three of which are crucial for the Bulgarian education and science and in which implementation the Bulgarian government (the Ministry of Transport and Communications and the Ministry of Education and Science, in particular) have already invested considerable resources:

- "i-Class" – project for computerisation of Bulgarian schools;

- "i-University" – project for building computer laboratories and websites for e-learning in the state universities;
- "i-NET" – project for establishment of information highway between the Bulgarian universities and scientific institutes, as well as make connections with the European research networks.

The proeject i-University aims:

- Establishment of High-technology labs for distance education in all bulgarian higher educational institutions and many research institutions
- Equipment of about 120 labs with over 2000 computers, servers, multimedia projection systems and other technique in 37 universities and 40 research centers
- Development of curricula and projects for further infrastructure growth and stimulating digital content creation

The project i-Net aims:

- Connection of all Bulgarian universities and research centers in the unitied high-speed Internet network
- Establishment of connection with pan-european and international scientific network initiatives -GÉANT, Internet 2
- Development of the network for new services
- Equal conditions for all universities

The recently adopted government policy has become visible with the establishment of the Co-ordinating Council for the Problems of the Information Society and the preparation, by the Council, of a Strategy and National Programme for the development of the information society in the Republic of Bulgaria. The strategy and the programme define the national priorities in the area and their legal, technological, economic, and social contexts, and they identify the principal measures that must be taken. Higher education and science in Bulgaria are playing a leading role in the achievement of the strategy, and the Ministry of Education and Science functions as a mediator between the spheres of education, science, and public administration.

An important step in this direction was the establishment, within the Ministry of Education and Science, of a public support unit for scientific information called the National Education and Research Information Network. The network co-ordinates, finances, and controls activities concerned with the use of the information and computer communication systems by the academic community in Bulgaria.

The next step in the implementation of the national policy on the integration of the ICTs in the higher education system is the establishment of support centers for information and communication services, which have to guarantee the new quality of the information provided. An example is the recent founding of a National Center for Information Support for Scientific Research at the Ministry of Education and Science.

3.4.2 Measures Taken at Institutional Level

Higher education institutions are also seeking and providing solutions to problems of computer communications and information services for academic teaching and research purposes. The need to unite and to make effective use of the limited resources of individual

institutions is driving some of them to participate in common projects and to develop solutions to the common problems they face on a daily basis.

A good example is the emergence of an inter-university network, BANET, that links three universities: the St. Kliment Ohridsky University of Sofia, the University of National and World Economics, and the Technical University of Sofia. The network is connected to the Internet through the UNICOM–B and other national providers and presents a grassroots approach to the development of the ICT infrastructure at inter-institutional and national levels. The inter-university network is also allowing for the creation of new opportunities for the development and use of new applications, information resources, and services, thus allowing for the improvement of the information resources at institutional and regional levels. From an internal institutional perspective, the BANET network guarantees full-time access to the Internet for students and professors, provides hardware support and on-line courses for distant education, video conferencing through the Internet, and ensures the administrative support of student admissions. The further development of the services and the application of new products in the BANET network includes the start of a computerized library system and the co-ordination of the library resources of universities, which will help decrease the financial resources needed for their constant renewal and support. The association of specialized information servers by fields of science (economics, technical fields, the humanistic sciences, etc.) is the next step in the implementation of the BANET network at national level. Another task is the use of special servers by each university administrative and management information system. The Ministry of Education and Science is responsible for making these changes at national level.

4 Empirical work in Norway

4.1 Introduction

The previous report identified three ways of looking at the impact of technology enhanced learning in higher education; namely as 'anticipated', 'ongoing', and 'achieved'. Furthermore, it suggests main target groups and methods related to each strand. With this model in mind, two case studies were identified at the University of Bergen, Norway.

The first case study and question relates to the 'anticipated' category. Aimed at exploring strategic efforts concerning the organisation-wide introduction of ICT in education at the University of Bergen, Norway, we ask:

1. How does the introduction of Technology Enhanced Learning (TEL) contribute to transforming the organisation of education at the university?

The second case study have been concerned with the 'achieved' impact of a particular TEL environment. The particular system in use at the Department of History is Kark, and we ask:

2. How has Kark changed the role of the teacher at the Department of History?

Within this section, the methods used to address these questions will be discussed, followed by an exploration of aspects of the national context concerning ICT in higher education. The main parts of the section then proceed with the two case studies, exploring each research question.

4.2 Research methods

This section contains a description of the research methods employed to shed light on our research questions. Principal questions about our research methods are not discussed in detail, instead the focus is on describing about what we have done. The research is mainly based on interviews and document analysis.

The methods used for answering our first research question ("How does the introduction of Technology Enhanced Learning (TEL) contribute to transforming the organisation of education at the university?") involve analysis of interviews and textual artefacts, both on paper and the world wide web. The textual artefacts take the forms of plan documents, strategy documents and reports from various advisory-groups. We have also interviewed administrative leadership, project leadership, programmers and teachers.

For our second research questions, how Kark has changed the role of the instructor at the Department of History, our methods have been mainly interviews, and some observation of the digital environment and textual artefacts. We have interviewed system programmer, teachers and support staff. In this case, some of the roles are intertwined. We have also done some observation of the pedagogical tool in use – Kark, mostly for us to be able to gain knowledge about how it can be used, through scrutiny of it's functionality.

The researchers Stig Mjelstad and Jo Dugstad Wake were present at the interviews. The interviews were conducted in Norwegian, and the transcripts are also in Norwegian. Quotes in

the text are thus our own translations to English. The interviews lasted on average one hour, with the exception of two interviews that lasted two hours. The interviews were carried out conforming to the ethical standards for social research as directed by «Norsk Samfunnsvitenskapelig Datatjeneste» or, the Norwegian Social Science Data Service. The ethical standard require the informed, voluntary and explicit consent of the participating subjects, and that the primary material from the interviews, such as tape recordings, are deleted upon conclusion of the research project. All informants have been informed about the right to withdraw their statements at any time, and they have been anonymised to as large a degree as possible.

4.3 The context of Technology Enhanced Learning in Higher Education in Norway

The following section is devoted to giving a short description of the national context for technology enhanced learning in higher education. The section builds on themes discussed in Oliver et.al. (2005), namely the line from the Bologna Process and report from Mjøsutvalget, through the «Quality Reform» towards the trend of implementing virtual learning environments (VLEs) for Universities in Norway.

The «Quality Reform[1]» is often described as the Norwegian national continuation of the international developments through the Bologna Process[2], and is also based on the recommendations of «Mjøsutvalget[3]», a governmentally appointed committee with the mandate of discussing new challenges to higher education in Norway. Finally, «Aamodtutvalget» also constituted a committee with the mandate to evaluate the Norwegian study financing arrangements. The consequences of the «Quality Reform» stretches into many areas of higher education, but for the students, the aim is to achieve a higher degree of internationalisation through changing the degree and grade structures. Higher pass-through rate is to be achieved through closer cooperation between the teaching institution and the student. Furthermore, courses are modularised and shortened. Two institutions are dedicated to the evaluation of the «Quality Reform», NIFU STEP[4] (Norwegian Institute for Research on Education) and "Rokkansenteret[5]" (Centre for Social Studies) at UoB, affiliated through Unifob (University Research Bergen). The evaluation of the reform was initiated as a part of the reform itself, and the contracts for the evaluations was negotiated through "Norsk Forskningsråd" (The Research Council of Norway). A large degree of the evaluation results are still "forthcoming".

The mandate of the "Mjøsutvalget" came as a result of both national and international developments. The main trait of the national developments that influenced the reform was the

---

1 http://odin.dep.no/ufd/norsk/utdanning/hogreutdanning/kvalitetsreformen/045061-990011/index-dok000-b-n-a.html

2 http://www.dfes.gov.uk/bologna/

3 http://odin.dep.no/ufd/norsk/publ/utredninger/NOU/014001-020004/index-dok000-b-n-a.html

4 http://www.nifustep.no/

5 http://www.rokkansenteret.uib.no/

explosion in student numbers that took place in the 1990's in Norway. A high unemployment rate, in conjunction with another reform that increased the applicant pool eligible for higher education caused this, which in turn has lead to several other reforms of education in Norway. Recently, through the ideas about the emerging knowledge society, education has become the centre of attention to policy makers to an even higher degree. The amount of reforms and "changes to the workplace" have led to the coining of the term "reform-sickness", usually referring to practitioners in primary education. Furthermore, students have increasingly been described as "customers", and the term "education as a commodity" has been frequently been used in the press.

The firm belief in what (often adminstrationally natured) Information and Communication tools can do in the classroom, justifies the need for a discussion and scrutiny of what actually happens when students engage in learning activities mediated by ICT. Instead of taking for granted that "computers are good", the understanding of what actually happens must be sought.

4.4 The introduction of ICT in Education at the University of Bergen

4.4.1 Introduction

In this section we to give an overview of different initiatives towards the integration of Information and Communication Technologies (ICT), and more specifically Virtual Learning Environments (VLEs) at the University of Bergen.

Framing the research question, we draw the attention towards an emerging pattern that seems to apply both on the national and the international level: Without explicit references or stated reasons to *why* this is going on, governments launch a host of initiatives towards promoting the integration of ICT in education (Price et al, 2005).

4.4.2 Our research question

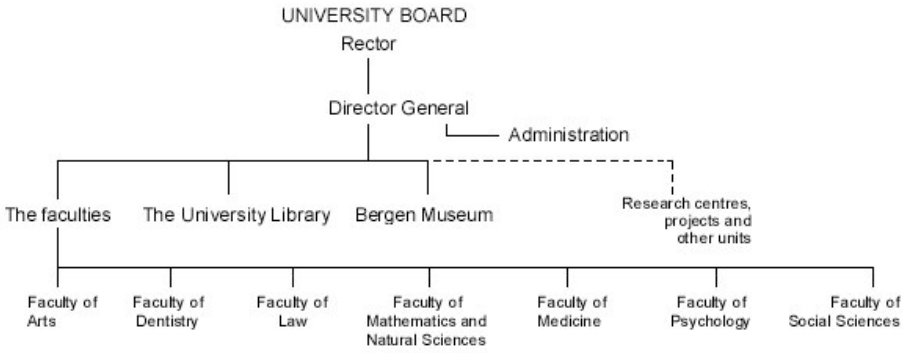
How does the introduction of Technology Enhanced Learning (TEL) contribute to transforming the organisation of education at the university?

Our method of research is based on analysing documents, such as strategic plans, committee reports, and minutes, most of which are publicly accessible. In addition, we have carried out interviews with employees in central positions. The interviews have been recorded and transcribed. Furthermore we have made field notes based on telephone interviews with other informants.

When setting out to answer the question raised, we start by describing different organisational levels at the University of Bergen (UoB). Following this overview of 'the players', we aim to show how the organisation went about putting strategic plans into practice. We describe how this task was undertaken by centrally governed processes where two virtual learning environments (VLEs) were introduced to the organisation. In addition, we take into account local initiatives that co-existed alongside these centrally governed processes. By describing these initiatives and their relations, themes emerge that we argue are fundamental when the introduction of ICT in education is seen from a policy perspective.

4.4.3 Actors at the University of Bergen

The University Board[6] is the highest organisational level at UoB, and the unit is «[...] responsible for the quality of the activities taking place within the university and for an effective administration in accordance with rules and regulations given by the government[7]». Figure 2 depicts the current organisational structure at UoB.



As can be seen from the figure, the Director General is the next in the chain of command, and is also delegated direct responsibilities for the administrative units such as the IT Department and the Department for Education[8]. As these units are important in this story, we briefly describe them more or less as they describe themselves through their official web pages.

The Information Technology (IT) Department is a service organisation within the university, offering services for information technologies, such as hardware, software and user support. An important role is "[...] binding together the different parts of the University[9]" The department has five sub-units, and in our case it is the Unit for Web Development that is of particular interest.

The Department for Education is closely associated with the Committee for Education[10]. The latter is an appointed (political) organisation, whereas the former is a professional administrative body with separate sub-units responsible for different areas. As we describe in

---

6Formerly DAK, (Det akademiske kollegium – translated: the academic collegium)

7http://www.uib.no/universitetsstyret/ (Note that all citings are translated from Norwegian by the authors)

8 Note that this is an administrative and not academic unit, thus mapping to the label 'Administration' in the figure.

9http://it.uib.no/?mode=show_page&link_id=1535&toplink_id=1535

10http://www.uib.no/utdanningsutvalget/ : In Norwegian: Utdanningsutvalget

further detail below, the Committee for Education was appointed in 2000 by (what was then called) the "The Collegium of Academics", DAK[11].

In the case of ICT in education at UoB these are the key actors concerning the strategic as well as practical work of implementation. Typically, the IT Department is responsible for preparing the organisation-wide IT strategy document. The strategy document is then reviewed, commented and finally agreed upon by the University Board. When it comes to the implementation phase, this task is assigned to the IT Department, who executes this with a certain amount of autonomy.

So far we have only mentioned the central actors within ICT and education at UoB, but by citing from an early IT strategy document we try to draw attention to what we call *local initiatives*, in the sense of teachers making use of ICT technology in their teaching activities without any organised institutional support[12]. Such teachers are often referred to as pioneers or willing users (Cuban, 1986).

From an early IT strategy document in 1992 (Towards the next level[13]) we cite:

> Finally, we must admit that if Information Technologies (IT) is to be integrated in educational activities, we need pioneers to show the way. Furthermore there has to be incentives and accreditation to those willing to try. We know all to well how hard it is to get accreditation based on the skills of classroom teaching. And in a general sense, it is within the art of education that we feel that it is of little, if any help, to kick-start the introduction of ICT with purely economical means. .
>
> (Section 5.4.3, IT for teachers)

Even though this is an early document, we take this statement as an indication of a history and experience with local initiatives.

4.4.4 Central initiatives: Planning ICT in education at UoB

As evidence of a trend of centrally organised attempts to use ICT as an instrument in the completion for prospective students, both on campus and in distance education, we cite from the IT-strategy plan:

> The committee would in particular like to emphasise the great possibilities and challenges related to IT-based forms of education and digital learning. In the future, UoB will need to continuously improve in order to meet the increased competition for prospective students. In this respect UoB will have to commit to taking actions that secures its position within digital learning, and also when it comes to offering off-campus students from all over the country further education based on digital media.
>
> (Mot elektronisk universitet[14], 1999)

11After the restructuring in 2003, DAK became the University Board.

12Reflecting "individual innovation" (see: Hannan and Silver, 2000)

13http://www.uib.no/itstrategi/tilnyttnivaa/

14Translated: Towards the electronic university

These ideas are also reflected in the general strategic plan 2000-2005[15] and by the Director General (DAK 1999, 11/11[16]).

In 2000 DAK appointed the Havik committee to investigate how UoB could meet the above cited challenges. The members of the Havik committee were drawn from different groups of staff, including both administrative and faculty members. Their appointed task was to suggest how UoB could «strengthen it's position within ICT-based learning» (Havikutvalget, 2000). The Havik report was submitted to DAK 10 months later, proposing a fundamental restructuring of how UoB should be organised, and also a commitment to allocate the necessary economic resources for such a restructuring. The need for a common strategy and coordinated efforts was emphasised in order to achieve success in meeting the challenges represented by the emerging «networked society».

To restructure the UoB the Havik committee suggested that the university should have a more distinct academic leadership, with an appointed vice-rector responsible for developing the university with regards to education. Havik also suggested that the vice-rector should lead a new Committee for Education that should include representatives from each Faculty as well as from the students. In December 2000, DAK (DAK-sak 176[17]) agreed to establish such a committee[18], with a vice-rector as leader.

The Havik committee appointed their own reference group (IKTL-Reference Group, 2000) with the task to assess different types of learning systems and to present the experiences of the use of such systems in various settings at UoB. The reference group report starts by drawing attention toward two underlying challenges: creating a new learning culture [1]; and, supporting innovators and encouraging sceptics [2]. The group also stressed the need " [...] to distinguish between ICT support for course management/administration and ICT support for learning processes (p. 3)". When it comes to recommendations, they argue that pedagogical and technological support was more important than the choice of technology itself. And furthermore, that it would not be advisable to choose one single system to meet the pedagogical needs of the entire organisation.

4.4.5 Making things happen: UoB implementation initiatives

The Department for Education[19] (DfE) has, with the assistance of the IT-department (ITD), been the main driver regarding the implementation of systems to support the *central* initiatives towards the integration of ICT in education, and the DfE is referred as the «system owner». By trailing documents and interviewing stakeholders with interests towards initiatives of integration of ICT in education at UoB, we turn to a description of the process whereby the organisation tries to implement plans, or turn ideas into reality. Of course, trying

---

15 http://www.uib.no/eline/vevprinsipper/csseks/03.html

16 http://www.uib.no/kollegiet/saklister/1999/11-11/155.html

17 http://www.uib.no/kollegiet/saklister/2000/12-14/176.html

18 Starting January 1st 2001

19 Utdanningsavdelingen (in Norwegian)

to describe such processes may be cumbersome, and one particular reason has already been pointed out by Håland:

> The available written documentation from the implementation phase of the Student Portal is sparse and insufficient. No requirement specification exists; only vague descriptions of how the Student Portal should function. These descriptions are of a very general character and are not highly detailed in terms of what requirements are connected to the functionality, user satisfaction, online help features, security etc.
>
> (Håland, 2004, p. 7.)

We note here that the Classfronter project is fairly better documented and disseminated, mainly through the public documents «Project plan for the implementation of Classfronter» and the final report (Classfronterprosjektet, 2005).

4.4.6 Establishing the common (administrative) student portal, dotLRN / the Studentportal

The unit for Web Development and the Department for Education had been developing a system called «mi side»[20], where students could view a personal calendar and messages from administrative or faculty staff concerning the courses they were attending. According to DfE the reason for developing «mi side» could be traced back to the Havik report, as "[...] Havik wanted a campus.uib.no, and that is what we developed during the fall of 2002". In line with the system owner, we refer to this initiative as *administrative*, as it was clear that the target user group was the administrative staff and the students.

In January 2003 a report (Ei arbeidsgruppe, 2003) was presented from a committee consisting of members from the DfE (3) and ITd (5) well as from the Department of Informatics (2). Their aim was to decide on a system that was to be implemented as the common student portal. At a general level the requirements pointed towards a "[...] web-based solution offering personalised pages to the students, adapted to the study programme and including the services needed by the student". In the report five particular systems/technologies were considered:

- it's learning[21]
  - commercial VLE (or LMS) alternative.
- dotLRN[22]
  - community based, open source VLE framework.
- «Innsida» at NTNU
  - open source system used by another university (NTNU).
- MatNat portalen[23]
  - local initiative, developed at the Institute of Informatics.
- Extension of «mi side»[24]

20English version: "My Space"

21http://www.itsolutions.no/

22http://dotlrn.org/

23Aka. Realfagsportalen (refering to the portal for the Faculty of Mathmatics and the Natural Sciences)

- locally developed system (IT department)

Besides drawing a distinction between one commercial and four free systems[25], other criteria that were pointed out as important in the report were:

- Resources needed to adapt the system to UoB (integration)
- Resources for running and maintaining hardware and software
- Existing functionality
- Scalability (how well does it handle large user-groups)
- Potential

In the discussion, «Innsida» and the extension of «mi side» were both considered as less viable approaches, lacking in functionality and partly also in adaptation costs (Innsida). The commercial system was ruled out mainly due to the price; maintenance, yearly costs based on student numbers, and the need for local expertise made it's learning a less attractive option. This left two options, Realfagsportalen and dotLRN. In a detailed comparison between these two systems, it was concluded that dotLRN was the most appropriate starting point for the development of a common student portal.

4.4.7 Establishing the common pedagogical system, the Classfronter project

Along side the administrative initiative mentioned above, things started happening with regards to the didactical use of ICT in education as well. This process was driven by the Committee for Education, and an important document is the plan of action dated February 6th 2003 (Utdanningsavdelingen, 2003). This document came to pave the way for testing a common *didactical* system as a potential organisation-wide virtual learning environment (VLE). Besides determining the practical action points, this document gives an overview and status of ICT in education based on collected reports from each Faculty at UoB. With regards to the goals set by the Havik committee, it was suggested that three faculties stood out as good examples of systematic integration of ICT support in education: Law, Medicine and Psychology. Additionally, it was mentioned that there existed quite a few local initiatives based in departments and individual members of staff.

When setting out to describe the current status of systems in use, the report made a point of separating VLEs from other types of software. In the VLE list examples of commercial and in-house systems, such as Classfronter and Lingo are found. In a category labelled "other systems", we find systems such as Microsoft Word and Matlab. Finally there is a label called "Studentportal", where the Studentportal[26] and Realfagsportalen are mentioned. Furthermore, a note is made to suggest that Realfagsportalen in practice also serves as didactical support.

When the report goes on to argue for the need for *one common* didactical VLE, it is clearly going against the recommendation by the Reference-group in Havikutvalget, which stated that such systems should be chosen as seen fit based on each subject taught and it's local needs. However, the argument as stated in the report is grounded in the «Quality reform», and its

---

24In the English version: «My Space»

25Based on Open-Source software

26At that time forthcoming.

recommendation for systems and services that build a common identity and makes it easier to follow up the students, both in terms of administrative and didactical issues.

After the Plan of Action was approved by the Committee for Education, several systems were evaluated during the spring of 2003. Classfronter was finally selected as the system to serve common didactical needs in the summer of 2003, and a contract was signed for a two year trial period (1st September 2003-2005[27]).

4.4.8 Local initiatives

So far we have described the *centralised* efforts by the UoB. However, as mention elsewhere, there is a long tradition related to the many *local initiatives* and experiences with the use of ICT to support education at UoB. Many of these are personal undertakings, but quite a few may be found with the label 'project', implying more than a personal quest. The projects mentioned below involves more stakeholders in the process of design, use, support and evaluation. We will draw the attention to a few examples of such initiatives and then look more closely at two specific projects and discuss their relations to the central initiatives we have mentioned above.

Launched in 1997, the *Lingo*[28] project has developed, implemented and been evaluated. The idea was to provide internet-based learning environments for use in *foreign language learning*.

Kark[29] is tool for supporting network based education; more specifically, interactive work with texts. In other parts of this report we have described Kark more closely.

Rabilda[30] is a program for training medical students in the field of *radiology*. A student is to solve a case presented by the system, and based on both the clinical information and the radiology images the student is prompted to suggest a diagnosis (Haagensen, 2003). Within the same subject matter, *Radioweb*[31] offers a collection of lectures, online quizzes, and discussion groups. Radioweb was developed mainly with the goal of preparing students in advance to encourage more discussion in the on-campus lectures (Sevik, 2003). Both systems were developed by Masters students at the Department of Information Science.

MatNatPortalen/Realfagsportalen was an initiative that originated at the Department of Informatics. As the name suggests, this was a portal targeted at staff and students within the Faculty of Mathematics and Natural Sciences.

27At a later stage the contract was extended to last until June 2006.

28http://cmc.uib.no/lingo-uib/starteng.html

29http://kark.uib.no/

30http://cobra.med.uib.no/rabilda/rabilda.php

31http://www.med.uib.no/radioweb/undervisning/grunnkurs/

A different case is *SEVU*[32], a *unit* within the Department for Education. SEVU's primary concern is offering further education, with the public as target group. SEVU has extensive experience in running distance education programmes. One such example is *PRISME*[33], a course for teaching Norwegian language to non-native speakers. Despite the fact that SEVU is a section within the Department for Education, we view this unit a special case with regards to the central/local distinction that we have drawn within the traditional university structure.

We now turn to presenting two of these local initiatives in more depth, in an attempt to explore their relations with the central initiatives as described in the previous section.

4.4.9 Closing down local initiatives - the case of Realfagsportalen

MatNat portalen or Realfagsportalen was launched in 2001 as an initiative from within the Department of Informatics. The rationale was mainly to streamline the communication process with the students, by allowing staff to update the pages within the portal through a management interface. The portal was made by developing a main portal page with links to the different subjects within the Faculty. Each subject had its own standardised homepage, and every student could log in to his or her personal space with a username and password. The student data were gathered from the national FS, through an integration. A news service and a marketplace extended the system functionality. Technically, the portal was built by using a content management framework by Zope, an open-source web application server[34].

The administrative staff were considered the main user group and were given responsibilities and training. The faculty were only encouraged to use the portal at their own discretion. However, we have sources indicating that about 60% of all subjects at the Faculty used the portal in an active manner.

According to the Unit for Web Development at the IT department, the MatNat portal was suggested as a potential service to the entire organisation. Even though they basically considered the system a «good thing», this offer prompted the need «do politics» in terms of gaining central control of the process. Finally the MatNat portal project was shut down in the summer of 2003 after a ruling by the IT Department. This came as a consequence of the report where dotLRN had been preferred as the future administrative system (Ei arbeidsgruppe, 2003). The Studentportal was to be launched from August 2003, and it was stated that there was no room for a portal with similar functionality within UoB.

4.4.10 A local system in pedagogical havens - the case of Kark

As Kark is described in more detail in other parts of the current report, we will only briefly explain how we see Kark related to issues discussed in this section.

While Realfagsportalen was efficiently put to rest by the IT department, the case for Kark is different. As mentioned elsewhere, Kark dates back and can certainly be classified as a local

---

32 http://www.uib.no/sevu/

33 http://elg.uib.no/sevu/vis.php?spraak=bokmal&file=/sevu/040203015632.xml (using Kark as ICT support tool).

34 http://www.zope.org/WhatIsZope

initiative. The developer has written (and re-written) every line of code behind the system, and has tight control over the technology.

We suggest that the Kark project, through its novel approach has created some form of pedagogical haven. For one, they seem to actively avoid «pushing» the system towards new groups of users. And neither does the Kark developer seem to have intentions towards developing an administrative framework, a step that inevitably would have made Kark a competitor in the VLE market. Rather, quite the opposite is the case here, as its reason for existence is founded in a pedagogical idea, upon which the entire iterative design of both the technology, the curriculum and their orchestrators is based.

To illustrate this last point it is tempting to cite how certain VLE vendors sell their products under the label of flexibility, with frequent use of positive words such as «pedagogically neutral» and «any time, any place». Kark seem to make few claims in this direction. And when looking closer at their practice we observe that the design of the courses where Kark is in use at the Department of History seem extensively scripted and documented, in other words quite inflexible.

Finally, Kark relates to the broader issue in at least two ways. First, by the fact that the Kark-Essay module was integrated in the commercial VLE Classfronter at an early stage; and second, that by the active participation in the Classfronter project group, the Kark team shared their experience in many aspects of managing a specific virtual learning environment. They also took care of educating the faculty members recruited to the pilot projects, by offering courses, private lessons, consultancy, and helpdesk services. The competence of the Kark staff is sought after, and their special position as both historians/faculty members and technology experts, seem to bring about a «one of us» effect in relation to other faculty members, as one who shares their perspective.

4.5 Analytical themes

4.5.1 The difficulty of classifying content as administrative or didactic

Since the onset of our research into ICT in education we have continuously been made aware of how different roles and tasks are ascribed to the administration and faculty members respectively. Sources such as the Havik committee, Plan of Action document, and the respondents remind us of this dichotomy between “the administrative” and “the didactic”. We will try to show in the following section, that when a virtual learning environment is implemented, especially with strong institutional anchoring, it may be fruitful to explore this dichotomy rather than subscribing to it as a fact.

The initial goal of the Studentportal was to fulfil purely administrative needs, mainly as offering a «deep integration» with the existing administrative system (FS[35]). As mentioned in the section above, this type of integration was already in place the early stage of «mi side», developed by ITd and DfE. However, we propose that Realfagsportalen lead the way in this respect, and thus came to guide the discovery of the technology and approach that later was

35Felles Studentsystem («common student system», developed by USIT at UiO)

implemented through the dotLRN framework, and called the Studentportal[36]. Interestingly, and according to two of our respondents, the system chosen as the administrative system *unintentionally* turned out to be a VLE. Leading us towards the question:

What is a Virtual Learning Environment, and what is the relation to administration/didactics?

There exists an array of definitions with respect to VLE. However, in our opinion most of these encompass the idea that a VLE in one way or another can bridge the administrative and the didactical sides. Often this is occurs skewed, for instance with heavy focus on the administrative capabilities, but the opposite may well be the case. In either way, the VLE has the potential to bring together traditionally different players in one single system For that reason VLEs bear a certain resemblance to Enterprise Resource Planning (ERP) systems and more generally groupware. The main point is that the system is used by different users and groups of users with differing interests and goals.

A definition was suggested in the interview with the Kark-developer, where he more or less concluded: "A VLE is a system that allows you to do what you want to do with your class." Not surprisingly, the developer takes on a non-deterministic view by this definition, as one of his main arguments is that technology should be "the slave" and not "the master" in the relation to the teacher. On the other hand, we find more typical, system perspective definitions, such as the one proposed by Sørborg and Strømme (2002, our translation), who sees these features as defining a VLE:

- Log-in system
- Integration with student administrative systems
- Available through browsers (Internet Explorer, Opera, Netscape, Mozilla, Safari…)
- Tools for communicating (e-mail, chat)
- Tools for cooperation (discussion boards, intranet, calendar)
- Tools for producing, uploading, and administering assignments, content and learning objects
- Tool for assessment and grading
- Possibilities for controlling access to digital learning material

From these different definitions and perspectives, one question that arises is what should count as 'administration' and what should count as 'didactics'. When we approached the field with this question at hand, it became clear that this issue had been occupying the minds of many of our informants within the central UoB organisation. Perhaps this is most pronounced in the case of the leader of the Classfronter project, as she pointed out herself:

36Naming is tricky, and we observe that at least three labels are used refering to more or less the same instance: «dotLRN, the Studentportal, Mi side» .

> Administrative tasks are done by the administration (in the Studentportal) and Classfronter is more aimed at the faculty members. But we are aware than on many occasions the administration needs to help out, and in practice both groups have to know both systems. Then the boundary gets blurred, and it is impossible to explain what content belongs in which system. I have tried this for one and a half year, and it is impossible.

We take this as an example of how difficult it is to classify the information given to groups of students, and it becomes especially clear when one tries to keep administrative information in one system and the didactical in another.

4.5.2 Two methods of staff development

Looking closer at the two centrally governed implementation processes, we observe that the Studentportal and Classfronter have taken on very different approaches with respect to how they were introduced to their main user groups[37]. We have already mentioned that initially the Studentportal was considered the administrative and Classfronter the pedagogical system, a distinction that probably was inspired by the IKTL reference group.

In the case of the Studentportal, this view led DfE to mandate use of the system through a process tightly controlled by the administration within each Faculty. Superusers were appointed at each Faculty, and they successively appointed and trained administrative staff at each Department. Another important factor was that due to the tight integration with other systems at UoB, every course would appear "alive" in the Studentportal because students would be automatically assigned to the course based on his or her registration in another service, the StudentWeb[38], where students are requested to register for courses each semester. Furthermore, information about each course was imported in the same fashion, from FS, the same system used for student administration. All these factors led to a situation where the Studentportal constituted an off-the-shelf system for the teachers. Indeed, some Departments mandated the students to consult the Studentportal at a regular basis, and used it as the main source of information from the Department to the students.

According to DfE, such an approach could never be chosen to implement a didactically oriented system with faculty members as the main user group. In such cases it has to take a form of an offer to each teacher, as stated by the project manager of Classfronter: "It's not an option to mandate the teacher's use of ICT in education. It would be completely meaningless". Consequently, this led to a *guided* process of implementation in the case of Classfronter as opposed to *mandating* the use of the Studentportal. To guide the process of implementation a project group was appointed shortly after Classfronter was chosen as system, in October 2003. This group suggested limiting the total number of pilot projects in order to follow these more closely. After the sites for the pilot implementations were established they started a controlled roll-out in January 2004. A review of the initially stated goals reveals an awareness of the importance of involvement and engagement at all staff levels at the pilot sites as a critical factor for success. Furthermore, some potential pitfalls were identified and dealt with at the onset, specifically the relation between the Studentportal

---

37 We find it interesting that the largest single user group would eventually be the students, a group that seems neglected in both cases.

38https://studentweb.uib.no/

and Classfronter. As previously mentioned, the development of the Studentportal was frozen during the testing period, as not to interfere with the Classfronter project. Nevertheless, the Classfronter project ran into trouble regarding exactly this relationship. As for instance, at one point during the summer of 2004, the Classfronter steering group decided that all files were to be uploaded to the Studentportal and not Classfronter, in order to avoid confusing the students.

Another effort established by the Classfronter project, was the «Kompetanseforum», a place for teachers, super users and other staff members interested in the use of ICT in education to meet face-to-face. These meetings were arranged once a month, and initially the forum was more or less exclusively aimed at the pilot projects involved in the Classfronter trials. At a certain point, however, one made the choice to involve and invite other groups with the same interests to share their different experiences.

4.5.3 Choosing between outsourcing or in-house development

In terms of choosing between outsourcing or in-house development, UoB constitutes a particular interesting case. The issue relates to how the organisation chooses to rely on internal resources or whether the delivery of technology and services associated with ICT in education should be administrated by a commercial company, known as an outsourcing model. As opposed to the other Universities in Norway, UoB is not in a long term contract with a commercial company delivering a VLE. Table 1 shows the current status of each of the six national universities with respect to organisational wide VLE systems.

Table 1 National Universities and VLE systems with integration

Organisation	***Main VLE, year***	***Integration with FS, year***
University of Oslo	Classfronter, 2001	Yes,
University of Bergen	Studentportal, 2003	Yes, 2003
University of Tromsø	Classfronter, 1998	Yes, 2005
University of Stavanger	its learning, 2002	Yes, 2002
NTNU, Trondheim	its learning, 2003	Yes, 2003
UMS, Ås	Classfronter, 2005	Yes, 2005

The situation is slightly more complicated than the table suggests, since every university typically uses more than one VLE[39]. However, in terms of organisational-wide implementation and the (rather costly) trend towards system integration, each university can only afford to make one single VLE integrated with their legacy systems. Such integration is done with the goal of automating labour-intensive manual procedures, such as creating different courses and assigning the right students to them. As we already have noted, the case

39For instance, at UoB different departments that have used Luvit, Classfronter, it's learning, FirstClass as VLEs.

for UoB was that this type of integration was well established[40] prior to the onset of the «Quality Reform» that seems to have sparked initiatives at the other universities.

Consequently, we propose that the *timing* of this integration had an impact on the question of outsourcing, as it would probably be more difficult for a commercial company to sell a VLE when a system integration already was in place. We subscribe to the view of one our informants, who proposed that the Studentportal had a clear advantage in this respect, and that "[...] there has been so much integration between FS, Syllabus+ and dotLRN, that it is hard to see how this work can be abolished". In other words a lot of work has been put in to customising the framework upon which the Studentportal has been built, and the reason for shutting the Studentportal down would have to be of great importance.

As reflected in the interviews, we also found rather critical views towards outsourcing as a model. These views seem to be based on their own experiences in at least two distinct ways. First, by dismissing the general (positive) idea of having an external contractor to «push around», as they have experienced how difficult it can be to have problems solved by the contractor. Second, some of our informants expressed their dissatisfaction with the contractor's development model, where in fact the customers are partially paying for the development through their participation in a reference group. Both these arguments are also put forward in the final report issued by the project group (Prosjektgruppen, 2005).

In terms of the views on the in-house development, some of the arguments proposed could perhaps be classified as more related to potential problems rather than to experienced ones. The IT Department is generally oriented towards supporting a Microsoft-based service model and the argument for hosting a major service based on open-source software is not the direction the department seemed to be going. Hence the argument that by choosing an open-source system as the VLE framework, the department has to keep at least two persons employed to assure the competence to develop and maintain such a critical system. The other argument is related to continuity, and specifically the question of *what if* the community supporting the project seize to exist, and the system is abandoned? One of our respondents turned the question around, pointing out that such an argument in fact also applies to commercial companies and products.

What we find interesting with the UoB case in this respect, is the balanced view our informants display with regard to the question of outsourcing. All the people we interviewed responded to this question in an ambivalent manner, taking on the view that both represent different strength and weaknesses, and that it finally becomes a question of choice. It seems clear that whatever method is chosen the major concern of the system owner is to assure *control* over the factors that actually keeps the system working. On the other hand, *controlling* cost is probably the most important concern of top-level management.

4.5.4 New implications and challenges - re-establishing the Studentportal

The current situation at UoB is going in the direction of one single organisation-wide VLE. This was recently suggested by the Committee for Education, who have decided to stop the Classfronter project and continue the development of the Studentportal[41].

40Technically, Realfagsportalen should probably be attributed as single most important factor.

By taking on a different perspective, we attempt to discuss this new situation based on observations and themes that identify potential impacts of introducing the proposed «one-size fits all» VLE at UoB.

On one hand we take the decision towards choosing a single system as an indication that it has become evident that a VLE may indeed be used as a channel for communication of different sorts of content. In our view, this marks an end to the arguments that were put forward in order to separate the "administrative" and the "didactical" in the first place. However, our guess is that new challenges will arise when the organisation starts re-establishing the Studentportal, suggesting a parallel that is found in studies discussing the introduction of ERP systems (Koch, 2001; Pollock and Cornford, 2004).

A tension that most likely remain unresolved is related to the service offered by the organisation (referred to as the "standard-package" by an informant), and the local needs of the teachers. The organisation will not deny local initiatives, but on the other side the responsibility for supporting different solutions, in terms of economy, technical support and training will have to be done locally. Our assumption is that this appears harder, given that the IT Department is going through a process of centralisation, where IT staff members are pulled out from the Faculty and Departmental levels. Consequently, the challenge becomes to support local initiatives at the same time that one is only offering support for the "standard package".

The Unit for Web development have proposed that in the future this "standard package" ideally should include (technical) interfaces open to other system as illustrated in Figure 3.

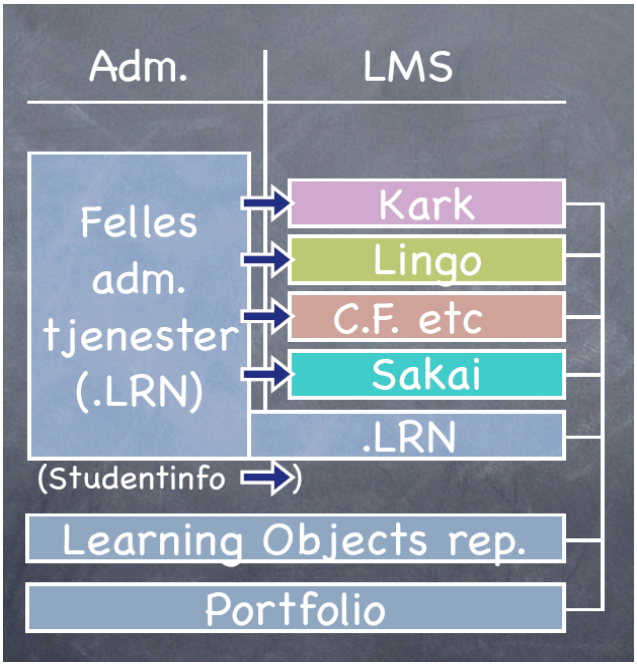


Figure 2 Plans for future integration. (Source: Department for

41Minutes from meeting October 2005 (70/05): http://www.uib.no/utdanningsutvalget/innkall-og-refUU/2005/Mote_7_04102005_ref.htm

In this way, the model could be described more as what we would suggest to call an *Administrative Framework for Education* (AFE). As a high-level description, the AFE (either an implementation of dotLRN or Sakai[42]), will provide (optional) VLE features *as well as* the administration features to handle courses and students through integrations with for instance, FS. In this way, the proposed tension may be reduced as the Unit for Web Development open for the possibility of extending the AFE to support the special needs of different teachers. With an AFE in place the responsibility of offering administrative services could be "delegated" and managed by the AFE through it's interfaces with other plugged-in modules, as illustrated in Figure 3.

Finally, with regard to the point reflected in the memorandum from the latest meeting in the Committee for Education[43] that relates to the importance of clarifying responsibilities in terms of technical, didactical and administrative support — there is an indication that the teachers should expect more opportunities to be heard in the process of re-establishing the Studentportal.

4.5.5 Summary

In this section of our report we have shown how the organisational-wide introduction of ICT in education took the form of two parallel processes, both governed by the Department for Education. At the onset of the introduction, the roles were clear as one system aimed at fulfilling administrative needs while the other was to become a didactical tool for the teachers. However, something was distorting the image of separation, and eventually it became evident to the system owner that the two different systems actually were pretty much "two of a kind". This discovery prompted the organisation to make a choice between a commercial and an open-source VLE. By describing this process, with it's actors and systems involved we hope to have made a contribution towards the understanding of some of the complexities that emerge when different perspectives a forced to meet.

In the next part of the report, we turn towards the Department of History, and their relation to the locally developed Kark system.

4.6 Kark and the Department of History, University of Bergen

4.6.1 Introduction

The Department of History (DH) at the Faculty of Arts, University of Bergen (UoB) serves as basis for this case study and as a backdrop for identifying possible changes in teacher roles, where technology has been introduced to the teaching. The technology we focus on is Kark, a net-based tool for writing and commenting text. The current study of teacher roles are concentrated on the bachelor level, thus excluding the tutoring at master and doctoral level, although education is carried out at all three levels at the DH.

42Sakai (http://www.sakaiproject.org/) is an alternative open-source VLE.

43http://www.uib.no/utdanningsutvalget/innkall-og-refUU/2005/Sak_70_05_Evaluering_av_CF_og_dotLRN.htm

Structurally, this text is first devoted to a background description of the Department of History. Apart from the department itself, issues that are relevant for the study are teaching at the department, the historical development of the significance of digital tools in the teaching, a description of the educational tool in question, Kark, and a description of how it is currently being used in the different facets of the teaching at bachelor level. Second, a section is devoted to a discussion of themes emerging from the research carried out within this study.

4.6.2 The research question

Kark was introduced, although in a somewhat different form, to the teaching at the DH in the early 1990's. To focus on the teacher's role we ask:

How has Kark changed the role of the teacher at the Department of History?

There are two main assumptions implicit in asking our research question in this particular way. The first is there have actually been changes to the role of the teacher at DH following the introduction of Kark, and second, that Kark is at least a partial constituent in the transformation of the role of the teacher taking place. The first assumption rests on a view that the teacher roles are emergent in a context for teaching, a context which includes the tools being used, given that the tool is being used to some extent within this context. However, several other aspects are relevant when it comes to understanding the conditions for the carrying out of teacher roles. Sørensen (1997) and Fjuk (1998) give examples of the aspects that form the poles for interconnections in a distributed collaborative learning environment:

> "... theories of learning and instruction, subject domains, teacher's roles, delivery institution's educational praxis and tradition, organisational and administrative arrangements, costs, properties of ICT (information- and communication technology) and available software, geographical distances between co-learners, etc. Any changes associated with one of these aspects will inevitably *influence* and *change* the others."
>
> (Sørensen, (1997), Fjuk (1998), cited in Fjuk & Ludvigsen, 2001, p. 237, italics in original).

Even though this highlighting of aspects that are important in a context for distributed collaborative learning, they are also relevant to our context. We are not trying to make assumptions about cause and effect in this social environment, with complex relationships and interactions between people and tools, but rather attempt to identify some of the conditions for change in the role of the teacher. Thus, when introducing a new tool in a context for teaching, the tool represents a change in the conditions for teaching, and accordingly we can look for changes in the way the teacher carries out his or her role in a real-life context. Regarding our second assumption, that Kark represents one of several conditions for change in this environment, we also point to other changes in the conditions for teaching that have taken place at the DH, most notably the multifaceted and polychrome organisational restructuring of the education which has appeared in the wake of the "Quality Reform". Therefore potential identifications of role changes can be attributed to more than one change in the conditions.

Kark was introduced to the teaching at the DH in 1992 under the name of Absalon. It has undergone several changes since the introduction, and has also been a partial constituent in the transformation of the teaching practices at the department several times since then. To cast light on the research question, the conditions for teaching at the DH is depicted through a description of the department itself, the teaching and the courses, the tool, and how it is being

used in the teaching. Then we examine possible themes that arise from the gathered data material.

4.6.3 The Department of History, University of Bergen

The UoB, founded in 1946, grew out of a basis provided by Bergen Museum. Bergen Museum[44], founded in 1825, was an institution with strong academic traditions, and raised the issue of the need for a university in Bergen in the 1890's (Thue, 1996). The Museum of History, which separated from Bergen Museum in 1925, served as a basis for developing the Faculty of Arts in 1948 (Thue, 1996). As of today the Faculty of Arts has eleven departments covering the topics of linguistics, languages, religion, philosophy, music, archaeology, history, culture and literature, and two sections, one on humanistic informatics and one on middle eastern language and culture. and literature. In addition there are six multi-disciplinary research centres and units, such as the "Research Group for Linguistics", the "Centre for Women and Gender Studies" and the "Bergen Museum". The establishing of multi-disciplinary, independent research centres became a trend at UiB during the 1980's (Larsen, 1996).

DH is one of the largest departments in the Faculty of Arts. It has 700 students, 550 at the bachelor level, 150 at the master level, and 14 Ph.D. students. It has 24 professors and associate professors, and five administrative positions (Department of History, 2005). DH is lead by the Department Board, which is comprised of all staff with permanent academic positions, six students and three representatives from academic staff with temporary contracts. The different groups elect their representatives themselves. The daily leadership is provided by the Head of Department, who is elected between academic staff and the head of administration. Additionally, the department has several separate committees with specific interest, for example the Committee for education, Committee for research and Committee for Information Technology.

DH conducts history research, and offers education at the bachelor, master and PhD. levels (Department of History, 2005). The themes covered at the bachelor level are at the most basic level divided between "newer" and "older" history. More granular courses that are offered at the bachelor level the autumn semester of 2005 include "The Global World of the Antiquity", "Urbanisation of Northern Europe, 1000-1750", "The History of India" and "Society, Gender and Crime in Norway and Europe in Modern Times". These courses are traditionally not fixed, and the course content is dependant on the teacher that organises the course, thus can change from semester to semester.

The activity of teaching is considered important to the academic staff at DH. In their report on portfolio assessment at DH Tolo and Dysthe, state that "*From the position of an external observer, a characteristic of the Department of History, is that teaching has high status. This is not self-evident, because traditionally research has had the higher status within academia* [...]" (Tolo & Dysthe, 2004, p. 7, our translation.) DH received "The Evaluation Award" from the Ministry for Church, Education and Research Affairs in 1997, for "*goal-oriented, systematic, student evaluation over time*" (Ministry for Church, Education and Research

---

44As UoB grew out of the Bergen Museum, dissemination (of popular science) was one of it's objectives. UoB was the first University in Norway to have stated this objective, and similar wordings were later added to the other Universities' regulations. (Forland & Haaland, 1996).

affairs, 1997). The object of this award (now abandoned) was to stimulate the development of quality in teaching in higher education in Norway, by teachers and students in conjunction (ibid.). The student evaluation of teaching at DH, which here means student-feedback on the courses, is driven forward by the academic staff, and not the administration, as is the case in several other departments at UoB (Tolo & Dyste, 2004). Our interviews with the teachers at DH reveal a genuine interest in, and thorough reflections about what the students learn, and their development as academics.

4.6.3.1 Bachelor Education at Department of History

As a part of the previously discussed "Quality Reform", the institutions of higher education in Norway transited to the Bachelor/Master/PhD.-system in the autumn of 2003. The previous degree structure was first introduced in 1915-1920, with separation of Cand.Mag and Cand.Real/Philol[45] as lower and higher degrees, and submission of a thesis as a requirement for the latter degree (Collett, 1999). Prior to this, the degrees were largely tied to the profession for which the candidates were educated (ibid.). The reform of the degree structure thus represented a break in an 85 year old tradition, although minor alterations of the original structure have occurred at later stages as well. As the ICT tool that we are interested in, Kark, existed ten years with the old degree structure, and two years with the new, the old structure is described in brief, before the organisation of the bachelor education at DH is presented.

Traditionally, the bachelor study of history was divided between part, basic and intermediate levels ("Delfag", "Grunnfag" and "Mellomfag"). Each level took one semester, had a concluding exam covering topics of the whole semester, and gave 10 credits ("Vekttall") towards a required total of 80 for the degree of Cand. Mag. Largely the teaching comprised traditional lectures and writing seminars. The intermediate level served as a basis for application to the higher level study of history. Submitting a thesis at this higher level together with the completion of mandatory seminars, qualified the student for the degree of Cand. Philol. The grading system range was 1.0 (highest) to 6.0 (lowest), where grades from 1.0 to 3.9 was accepted as passing of the exam.

The introduction of the Bachelor/Master/System.-system was naturally more comprehensive than a change of only the names of the different levels. The main structural changes that are of relevance to bachelor students is that this degree is shortened to three years as compared to four for the Cand.Mag[46] degree, that the courses are modularised into smaller units, that the old system of "Vekttall" is changed to the European Credit Transfer System (ECTS) points system, and that the grading system is changed accordingly. Additionally, the reform opened for alternative examination methods, such as portfolio evaluation. New inter-institutional theme-oriented "study-programmes" were also created.

Today, the DH teaches history on two levels for bachelor students, the "100-level" and the "200-level", which can be understood as a continuation of the previous basic and intermediate

45 Cand.Mag was usually translated to English as bachelor and Cand.Real/Philol as Masters

46 The original 4+2+3 year model was changed to 3+2+3 bachelor/master/ph.d model (Parliamentary report nr. 27, 2000- 2001).

levels[47]. The students can either study history as a one-year study as a part of a bachelor or masters degree with specialisation in history, or study one of several of the modules as a part of a theme-specific study-programmes. The one-year study of history has four mandatory parts. They are divided between "*overview*" and "*specialisation*" levels, and "*older*" and "*newer*" history. The overview level study of history is the same each year, and older history is taught in the autumn and newer history in the spring. The examination method for the overview courses is the traditional written exam. The specialisation courses, offered each semester, vary with respect to content from semester to semester, and with respect to examination form. The two forms of evaluation are the traditional written exam and the digital portfolio evaluation. Kark is used in courses with both examination forms, but more extensively in the digital portfolio courses.

4.6.3.2 Kark – the pedagogical thrall

This section is dedicated to a description of Kark, with emphasis on the technical and functional aspects. Kark's development and how faculty at DH use it, is treated in a separate section below. These sections are separated for purpose of readability, at risk of implicating that these are actually separate issues. They are of course intertwined.

Kark is written in the programming language Delphi, a language which was developed from Object Pascal, and is implemented as a web application that runs on a server. It's basic functionality is to allow a user to upload a text document to a database, format it to .html and make it readable to an Internet browser upon (authorised) request. The database is implemented as tables in Delphi. It treats information in the database as objects, and traverses all changes as links to the same object, in order to avoid multiple user problems.

Kark consists of two main tools. Kark Essay (KarkEssay) and Kark Discussion (KarkDebatt). Additionally there are a number of subservient tools, such as resource-pages, calendar, presentation-system, dictionary, chat, evaluation tool and portfolio assessment functionality. Kark is also integrated with Euphorus, which is software that detects academic misconduct in student assignments. In Kark Essay (see figure 1), the teacher can give assignments, read texts that the students upload and comment on the uploaded texts. Students can also comment on the uploaded texts (peer comments). The comments, both student and teacher, appear "inside" the text that is uploaded, and is activated by clicking a pencil icon that is placed at the end of each paragraph in the presented text. The texts can only be commented at the end of each paragraph. Three document formats, txt, HTML and doc are supported. Administrator functionality allows an administrator to add students, assign read/write rights and so on. Kark creates a log that gives the teacher version control over the students' texts and peer/teacher comments for the portfolio assessment courses. The log is available for teachers, administrators and external examiners. Kark creates a folder in which the students can keep track of their own work. Kark Essay has been integrated with the commercial LMS

47 The master level is called "300-level".

ClassFronter[48]. The integration was the result of a requirement UiB had for testing a commercial LMS[49].

Figure 4 illustrates the administrator view of Kark Essay. The topmost text in the window gives feedback on where you have navigated in the system. The topmost dark blue line lets the user choose between different cross-Kark tools, Kark Essay, Kark Discussion, Resource Pages, Notices to students in the course, E-mail and information and the Login form, respectively. The table in the middle of the screen is the administrative functionality of Kark Essay. From top to bottom, it allows the teacher to see assignments that have been uploaded by students for the course, and see the latest added text. Second, it allows the teacher to read/edit the assignments for the course, add a new assignment and add a common comment for all the assignments. Third, it can display the student portfolios for the course. The following line has administrator functionality, such as a simulated student view of Kark, preferences and copying of themes and preferences from other courses. The last line is Kark documentation, or "help/support pages", for teachers and students. The light blue line displays which course you are currently logged onto, and the following dark blue line allows the teacher to see the student log files. The text at the bottom of the page is database response time for the uploaded page.

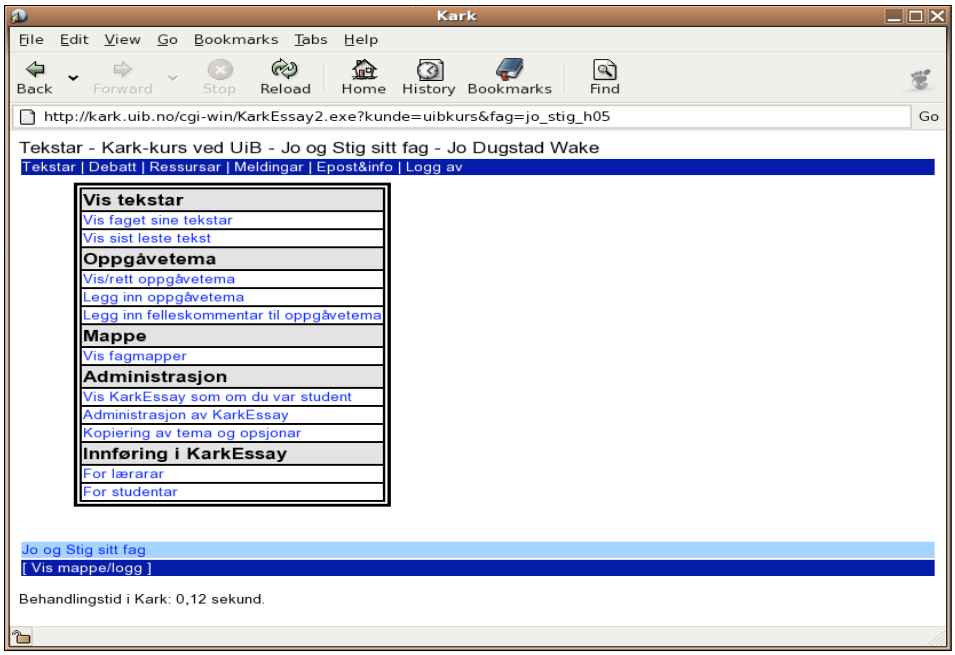


Figure 4. Teacher view of Kark Essay administration

48 Fronter AS

49 This was decided because many departments were already using Kark Essay. The contract between Fronter AS and DH continues today, although Fronter does not regulate how UoB decides to use Kark.

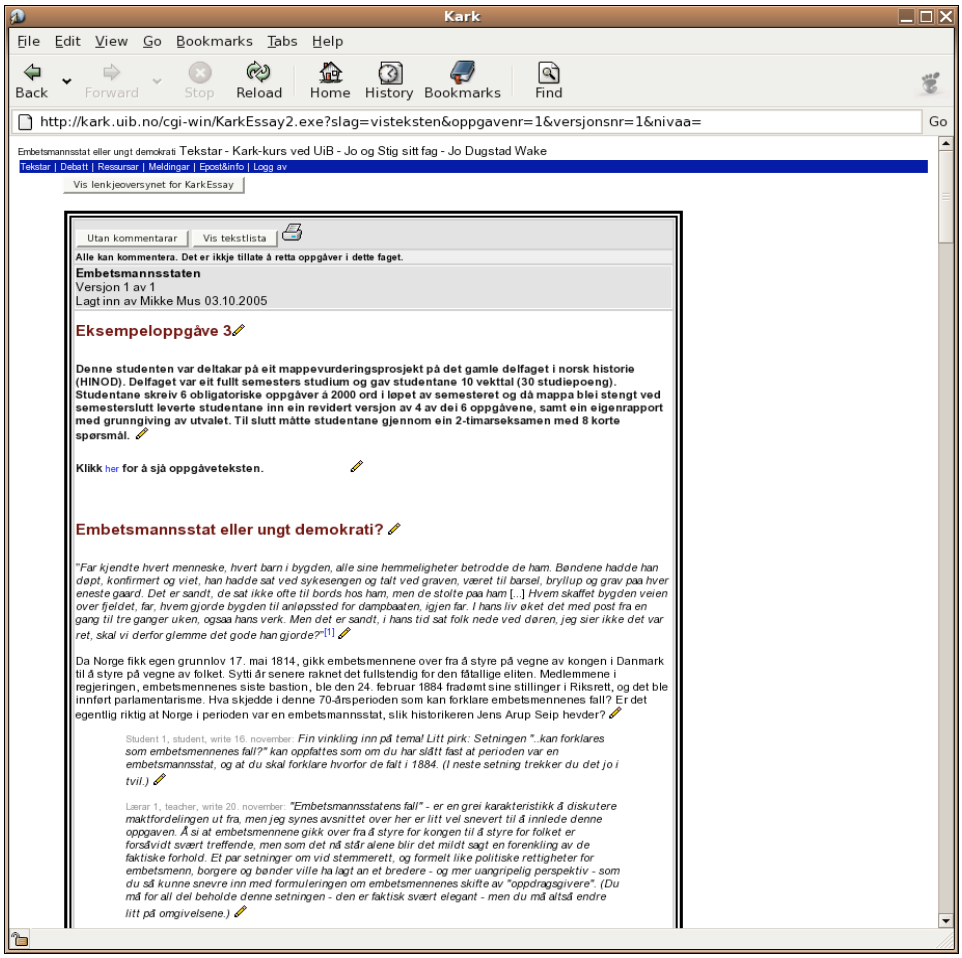


Figure 5. Commented student assignment in Kark Essay

Figure 5 illustrates both a teacher and a student commented assignment in Kark Essay. The grey fields allows the reader to remove or include comments to the text, displays the theme and version of the assignment, and who wrote it and when. The topmost paragraph is text that describes the assignment. The paragraph in italics is resource material for the text. The following paragraph is the first paragraph in this students assignment. The following paragraph in italics is a peer comment, and the following is the teacher comments. The pencil icon at the end of each paragraph invites the reader, the teacher in this view, to add comments to the paragraphs. Having commented one of them, a hammer icon will appear next to it, so that the commenter can mend the initial comment.

Kark Discussion (see Figure 6) is a tool that basically works like any other discussion forum on the Internet. Themes and questions raised in the lectures, or general issues of interest are discussed here by students and teachers. The interviews with the teachers at DH revealed a lot of reflections on how to successfully facilitate fruitful discussion in the forum. Figure 6 depicts Kark Discussion, and gives an overview of the debate in the test course made available to us by the Kark support group. This only has one discussion thread, but Kark Discussion averages 2-3000 postings during a semester, as the interview with the same group revealed. It displays the discussion threads by title, author, last viewed, amount of replies and how many times it has been read.

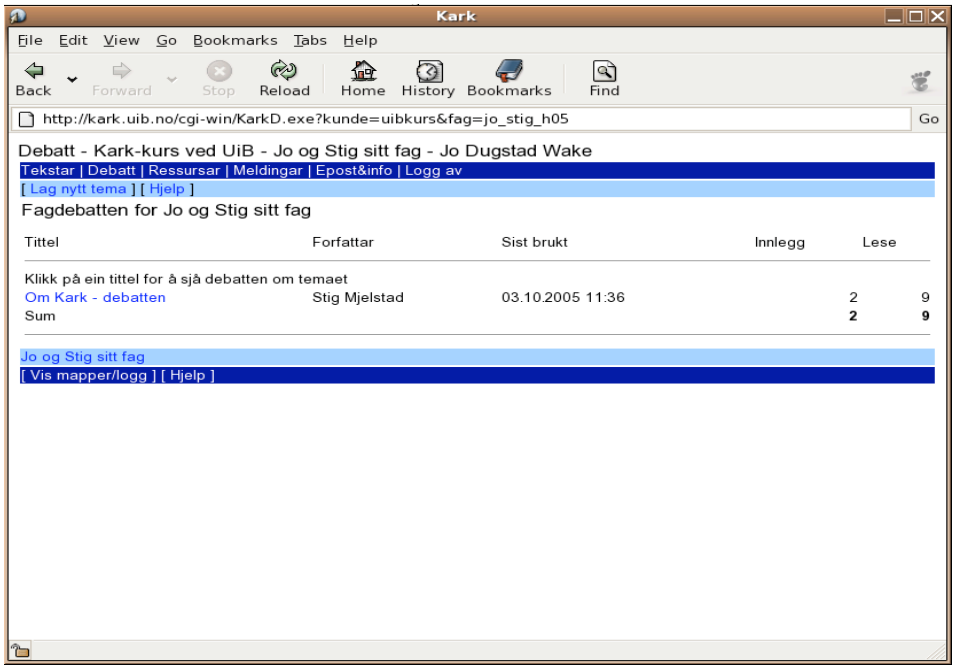


Figure 6. Kark Discussion tool

Kark is first and foremost a tool for writing and discussing on the Internet, developed in the context of DH and with a pedagogy of learning through writing in mind (Oldervoll, 1996). Much more can be made of a discussion of it's functionality, but the discussion is left here. The following section gives a more detailed description of it's development through time, and how it is currently being used at DH.

4.6.3.3 The development of Kark

Kark was developed with background in, and in light of, the writing seminars for bachelor students at DH. Several other aspects were also relevant, however, when trying to understand the reason why Kark was developed and introduced to teaching at DH. First, the developer had already participated in a history-specific system development project, through digitalising the results from the first Norwegian national census carried out in 1801, thus gaining system development experience. Second, the student numbers at DH, and UoB in general doubled between 1987 and 1993 (Larsen, 1996), a situation that was very demanding on teaching resources, particularly with respect to carry out the writing seminars. Third, the then named Norwegian Ministry for Church, Education and Research Affairs financed a pilot project, the Absalon-project, where the tool could be tested in use at DH, hence making the decision to include it as a teaching tool less problematic for the department leadership. A short recapitulation of distinguishable phases in the development of Kark at DH is provided, before we look more closely at the tool itself, and how it is being used.

DH carried out an intervention in their bachelor-level education between 1992 and 1995, through the Absalon-project (Oldervoll, 1996), financially supported by the Ministry for Research, Education and Church affairs (Oldervoll, 2003). The background was a large increase in student numbers at the department, together with a lack of corresponding increase of funding of the department (ibid.), thus creating a staff consensus of the need to take

measures. DH taught approximately 300 bachelor level students each semester at this point. The failure rate of these students was 35%, and there was a common understanding between faculty that even the students who passed were not learning what was intended (Oldervoll, 1996). Many of the students who passed the exams, got poor grades because they demonstrated a lack of skill in academic writing (ibid.). The student activities in the then existing form included syllabus-reading, attending lectures and taking written exams, all characterised "one-way teaching" by Oldervoll (Oldervoll, 1996, p. 2). There was no writing component during the semester, only a written exam. A central pedagogical tenet for the intervention was that writing is an essential element in gaining an understanding of the relationships of events, as opposed to learning facts, and also in learning to communicate the understanding in a scientific manner (ibid).

The two main pedagogical interventions in the Absalon-project were first to increase the amount of writing required by the students, and second to provide room for evaluations of the written material. It was decided that the writing was to be centred around the lectures, in that the students were to compose short summaries of them, and the evaluation included student-student as well as teacher-student commentary of the summaries. One student was to write a short summary of a lecture each time, and the remaining students were to comment on it. For this purpose, a simple writing tool, Absalon, was developed. Oldervoll (1996) calls it an outlining or "text-structuring tool" (p. 233). Absalon facilitated the generating of hypertext from the written text, and used the book as a metaphor (ibid.). In order to facilitate the sharing of the material, the HTML-formatting tool Kark was developed. Kark stored the text written using Absalon in a database, and made it readable to a web-browser, thus making Absalon part of a tool for communication. It also stored comments to the presented material, produced by teachers and students. No scientific evaluation of the results of this particular intervention have been made available, but Oldervoll (1996) reports that only one of the 200 students who took part in the project failed the exam.

The experiences from the Absalon project have provided a basis for the further development of the use of Kark, with focus on writing and peer/teacher commentary of text, in the learning activities at DH. Until 2003, it was used as a digital continuation of the previously face-to-face writing seminars, and as a discussion forum for the individual courses. Digital portfolio assessment entered higher education in Norway with "Mjøsutvalget" and the "Quality Reform" (Tolo & Dysthe, 2004). UiB opened for "increased use of alternative forms of student examination and evaluation during student progression" (UoB, 2000, p. 4.), for example digital portfolio evaluation, in their response to the "Mjøsutvalg" hearing (UoB, 2000). DH introduced this form of teaching and evaluation first as an experiment in 2001, and as part of an ordinary course module in the autumn, 2002 (Oldervoll, 2003). As mentioned, digital portfolios are one of two assessment forms at DH. The following sections are dedicated to a description of the difference between courses employing the two, and the difference in how Kark is being used in the courses.

4.6.3.4 Kark and the different courses at Department of History

DH teaches courses on two levels for the bachelor students, and the levels are labelled "overview" and "specialisation". The students complete two of each, to complete a one-year study of history. The overview level courses are divided between "older" and "newer" history (Department of History, 2005, our translation.). The "overview" courses have a traditional written exam as the method of student evaluation, and the "specialisation" courses offer both digital portfolio assessment and traditional written exam. Additionally, Kark is used to some administrational ends which are not directly tied to the two course forms. One example of this

is the student registration at the start of each semester. The students need to register at UoB using one system, "Studentportalen[50]", and then register as students at DH using Kark. This is unique for DH, as students at other departments only register in "Studentportalen".

4.6.4 Overview courses

In the "overview" courses, Kark Discussion is used to host a discussion that lasts through the semester. The topics that are discussed are more or less tied to the course in question, and can be questions from the lectures, or topics that the lecturer introduces. Thematically, the teachers deliberately keep the discussion open in nature, as they want to keep the discussion going, as excerpt 1, from an interview with the Kark Support Group, illustrates. This comment is from when the Kark Support Group demonstrated Kark Discussion.

Excerpt 1

> "... And here they discuss everything from... Here, you can see that "Teacher" has written a "Welcome to Kark" notice. That is the first discussion thread. Then it gets started, and after that everything between heaven and earth is discussed. We are fairly open, in terms of what they are allowed to write. If they happen to think that the concert last night was interesting, then... Well, we think it is ok, because it keeps it [the discussion] above a certain level, I mean that they enter the system and check it out, and that they find it interesting."
>
> (From interview with Kark Support group.)

Second, Kark is used to deliver, receive, and give feedback on a mandatory assignment early in the semester. The objective is to weed out students that do not plan to take the exam at the end of the semester; students who do not deliver the assignment are removed from the course. Third, resources are shared on the Resources Page for the course in Kark. That can be lecture notes and handouts, links to web-pages and so on. The tasks of marking the early small assignment, keeping the student discussion going (although that is voluntary) and sharing of resources existed before Kark, (with the possible exception of the student discussion), and existed at other departments, but at DH they are all mediated by Kark.

4.6.5 Digital portfolio assessment

Kark is used more extensively in the digital portfolio assessment courses. In these courses, the students write three assignments that are submitted as their portfolio at the end of the semester, and together with a small written exam serve as the basis of evaluation for the student. The written exam has six questions that covers the span of the curriculum, and lasts two hours. The written exam has mainly a control-function, to prevent students from handing in someone else`s work. In addition to handing in written assignments, the students are also required to comment each others work. This commentary is carried out asynchronously, and has background in the pedagogical ideas from the aforementioned Absalon-project, that the students learn more when they act as teachers. Each student gets his or her assignment commented by two peers before receiving comments from the teacher. The teacher is either the lecturer, or an especially dedicated commenter for the assignments. All comments are visible to all the students that are registered in the course, and to all teachers at DH. The

50 Cf. Case 1: Establishing a common administrative student portal, Studentportalen for a more detailed discussion of Studentportalen.

student then gets the opportunity to rewrite and improve the assignment. Interestingly, it is the first assignment version that serves as the main basis for evaluating the student in terms of a grade.

All aspects of handing in and commenting assignments is mediated by Kark. The lecturer is responsible for commenting the assignments together with an assistant teacher who only is responsible for some of the comments. The assistant is always a person with at least a Masters degree in history. The division of labour between what is labelled as the lecturer and the assistant is described more closely later. In addition, the digital portfolio courses have a discussion forum like the overview courses.

The portfolio assessed courses have gone through several changes since the first experiments with the course form. At one point, the students were evaluated on the basis of the quality of their comments to their peer's assignments. This was later toned down. A second change is where the emphasis of the assignments are placed. Earlier, it was important to improve the assignment, thus emphasising the second, revised version. Currently, the assignment handed in first will have most effect on the grade that the student receives.

4.7 Emerging themes

This section is dedicated to a discussion of themes emerging from the research carried out for this study. One theme identified is the emergence of a new role of the teacher at DH, in the sense of a completely new kind of teacher. A contradiction is identified in the span between the extended workload of academic staff and the opportunity that Kark affords when it comes to contact with large groups of students. Finally, the contradiction of distantness and closeness associated with teaching with Kark at DH is discussed.

4.7.1 New teacher roles

Our case study of DH reveals two new kinds of teacher roles, apart from the traditional lecturer, that emerge in light of teaching with Kark. These new types of teachers are the *Assignment Commenters* and the *Orchestrators*, represented by the Kark Support Group. Although the traditional lecturer has new pedagogical tasks in light of Kark, (e.g. running the discussion forums throughout the semester), the new kinds of teacher activities only have particular meaning when seen as being mediated through Kark. If Kark was removed, as a thought experiment, or a thought breakdown, much of their activity would lose its meaning. In the following sections, the two emerging roles are discussed more closely.

4.7.1.1 The assignment commenter

The traditional lecturer means the teachers giving lectures in the Overview and Specialisation courses hereafter. In addition to the lecturers, DH employs personnel that comments student assignments in the portfolio courses. They are hereafter called assignment commenters. The term teacher is used to describe both roles interchangeably. They both comment assignments in the portfolio courses, although this is the main task of the assignment commenter. The lecturer comments some assignments as a matter of fulfilling department policy – the commenting is most fair to the students when it is carried out in cooperation between the two, as it is believed that the comments become more unified through such a division of labour. The following sections are dedicated to a closer description of the Assignment Commenter.

In the courses that use digital portfolio assessment, DH hires a person whose main task is reading and commenting the students' assignments for each course. This particular teacher role has been described in Tolo and Dysthe's (2004) report on the digital portfolio assessment at DH, where they label them as "teaching assistants" (Tolo & Dysthe, p. 17). It is not uncommon for teachers at the different departments of UoB to employ master students as teacher assistants, but DH hires persons with a masters degree in history (ibid.). This teacher role has it's origin in the earlier face-to-face writing seminars. One of the reasons for the emergence of their market is the large number of students who hand assignments in several seminars during the semester, a workload that the lecturers say it would be impossible to carry by themselves. The assignment commenter gives students feedback in cooperation with the lecturer. This cooperation is discussed in more detail later.

These teachers are hired on a temporary basis and their position percentage is dependent on the amount of students for which they are responsible. They are often referred to as freelancers. They receive no official training in commenting assignments, other than their previous experiences with Kark, and with privately organised writing groups as master students. The format of the commenting does not follow a standard scheme or script, but is individual in nature, and dependent on the commenter that gives them, as excerpt 2 from the interview with the lecturer at the portfolio assessed specialisation course indicates.

Excerpt 2

> "They [the comments] are not particularly standardised. It depends on the assignments given, and the person. In addition, there is another type of assignment that is commented, that is a compulsory assignment at the very beginning of the semester. And there, the comments are standardised. That is because of the large amount [of assignments]. Our students all receive a large amount of comments, in addition to a common comment if there are general things developed by everybody".
>
> (From interview with portfolio lecturer)

The commenting is also carried out in cooperation with the lecturer on the particular course, and their co-operation during the semester. The lecturer in this particular course comments half of the student assignments. The students are divided into groups of 10 at the beginning of the semester, and the groups are then divided between the lecturer and the assignment commenter. The assignment commenter would usually comment a larger percentage of students, but in this case the lecturer, a doctoral student, needed enough students to "fill up" his 100% teaching position. In excerpt 3, the portfolio lecturer describes the division of labour and the nature of communication between them.

Excerpt 3

> "Since I both deliver the lectures and the assignment texts, and... Have all the assignments that they write, naturally I am very interested in his comments. How he comments, and that we are more or less on the same page. In that way, we are actually dependent of seeing each others comments, so that we can treat the students equally".
>
> (From interview with portfolio lecturer.)

A link from the temporary but consistent hiring of assignment commenters to the "Quality Reform" is made. One of the most explicitly stated goals of the Quality Reform is to increase the quality of Higher Education, and one of the ends towards this goal is to increase the

contact between the student and the institution. One of the suggestions from "Mjøsutvalget", to meet this demand, is to increase the hiring of Assistant Professors on temporary contracts. This was one of the areas were UoB agreed to the suggestions made by the "Mjøsutvalg". The consequences of this are to early to comment on, but it seems that it suits DH very well in their employment of the assignment commenters. I can mention that the general increase in the hiring of temporary staff is not without controversy in Norway, and was one of the big topics during the last election of parliament. The labour unions from all strands of working life are opposed to this, apart from the Norwegian Union for Trade, or the "employers union". They, of course, wanted less restrictions in the use of this contractual employer – employee relationship.

4.7.1.2 The Orchestrators

The second kind of role identified, is found in the group of two people often referred to as "Kark support". Assigning a name to describe all the facets of their roles at DH is challenging, but closer analysis of what they do reveals roles as different as teacher, administrator, consultant, negotiator and moderator – thus we call them Orchestrators. We will look more closely at the different roles, but first the emergent and *persona plasticus* nature of this type of staff at UoB is argued, or at least that their kind of roles have not yet been cemented or formalised within the university employment structure. In particular, their roles of consultant and negotiator of Kark in relation to other units both internal and external to UoB indicate that they perform acts that seem similar to what Wenger (1998) labels as brokering, an issue which will be discussed in the conclusions.

The person who hired the Kark support group was the developer of Kark, and when asked to describe how he found the persons that he wanted, he said that they were "hand picked" from the Master students that he was supervising in their writing of a thesis. At the time of hiring the second person, the funding of the position was very uncertain, but he demonstrated a firm belief in the need for this type of staff, which is illustrated by excerpt 4 below.

Excerpt 4

> "And I managed to gather funding [...to hire them]. And then it was... But you can say... In a way, you can say that it is of crucial importance when it comes to ICT-based education, that you have someone who is willing to take the whole responsibility, and is capable of taking the whole responsibility. That is, at every department, you need a key person. If this person is not there..."
>
> (From interview with developer of Kark.)

Originally, they were hired as administrative staff, with their position placed under Unifob (University Research Bergen), a non-profit research organisation affiliated to UoB. Later, their positions were moved to the Faculty of Arts, still as administrative staff. In excerpt 5 the developer of Kark gives some details about how the positions were changed to academic positions.

Excerpt 5

> "And then I managed to convince the Institute [for History and Philosophy] that it was much more smart to have them employed as Assistant Professors [Academic staff without PhD]. At first, they didn't think it was a very good idea, because

> that would entitle them to research leave, and so on. But at the same time, the policy of UoB was to reduce the number of administrative positions. So then I said "this will effect this statistic greatly, because you will get rid of two administrative positions, and gain two academic positions at the same time..."
>
> (From interview with developer of Kark)

The main qualification of the orchestrators is that they have graduated with a Masters degree in history at DH. Second, they are familiar with Kark, and have qualities that the developer of Kark found relevant and likeable when "hand picking" them. Their tasks or roles have, as mentioned, many facets. On one hand they fulfil a teacher's role, mainly through the commenting of assignments submitted by students. On the other hand, they perform a different set of roles, all of which gain meaning only through the presence of Kark. These are the administrative role of managing students, courses and teachers in Kark, the moderational role of observing and managing the discussion forums for all the courses, and the similar role of observing the other teachers and lecturers work, and finally the role of the negotiator when communicating with teachers at other departments or Institutions that approach them when wanting to use Kark in an educational context. It is noted that when UoB decided to try out Classfronter, described in sections ?.?, they asked the Kark support group to also function as a support for the user groups of Classfronter, and to take part in the evaluation of the project.

The following sections are dedicated to a closer look at the roles that the Kark support group actually fulfils. As mentioned they are hired on the basis of being history graduates that have the potential capability to teach history. They do not have the task of giving lectures, but in some courses act as commenters of assignments in cooperation with a lecturer, in the type of role previously described. In the citation below, excerpt 6 and 7, they comment on a question about what they do when they act as teachers.

Excerpt 6

> "Yes, then we function as teaching assistants. That is what we do, when you look at it. And we think it is fine to do just that. Because then we get to try out our education on ourselves."
>
> (From interview with Kark support group.)

Excerpt 7

> "Plus that you don't get to work with Kark [at DH] unless you are a historian. Given that, it is good to maintain our level of knowledge every now and then. To improve the academic activity..."
>
> (From interview with Kark support group.)

The role of acting as moderators of the discussion forums mediated by the Kark Debatt tool, is related to the role of being a teacher. They have a stated interest in keeping the discussions going during the semester, although they are tied to the different courses. Additionally, they have the role of administrators of the different courses, and their tasks are dependent on the course, and the unit at which the course is offered. They have the task of student administration for the recently established "Section for First-semester Students", which offers an introductory course in philosophy and a course in academic writing for all students that are new to the Faculty of Arts. Here, they create student accounts, and update course content

information, for example. The reason, they state, are that the staff at this section has yet to be trained in Kark, and it is easier to do the work themselves preliminary. At DH, many of the administrative tasks related to students, for example registering for courses, are done in Kark by the students themselves. The administrative tasks are here more a case of following up the lecturers, and monitoring the activities in Kark in general. The following up of lecturers is a role that they describe as "shepherds" (cf. excerpt 8), and involves activities such as monitoring that the teachers keep deadlines, and that they either make course material available on the "resources"-pages in Kark or have the lecturers forward it to them. Excerpt 8 illustrates the relation to the lecturers at DH, with respect to this.

Excerpt 8

> "[...] I keep myself posted on the lecturers' activities, and help them with things they wonder about. I will admit that I keep an eye on them, that they keep deadlines and such, I shepherd them a little bit. And I also prepare things for them in Kark, so that things run smoothly and so on."
>
> (From interview with Kark support group.)

This and similar statements in the interview with them also reveals indications of what can be described as a sense of ownership to Kark. When Kark is a tool which is central to the teaching at DH, their activities stretch far into the role of the other teachers, or lecturers. The sense of ownership is also revealed in relation to their contact with other units or departments that use Kark. In relation to potential users of Kark, they are the entry point, or what Latour (1987) calls an *obligatory passage point*, which must be negotiated before the potential educational institution is permitted to use Kark, something which is presumably very different from obtaining educational software or tools from a commercial vendor. In our interviews with them, the Kark support group and the developer presented ideas about when the use of the system would be helpful and when it might not. In addition, some criteria of success were identified. They communicated no direct or personal interest in other institutions using Kark, although they naturally are convinced of its advantages. When discussing the default settings of Kark (excerpt 9), and how a administrator or teacher new to Kark would make a selection, it turned out that the new user would adapt the default settings after a consultation with them, the consultation meaning a discussion of for what the tool was to be used.

Excerpt 9

> "Anyone that uses Kark or Classfronter [at UoB] comes here to talk to us, and then we listen to them to find out what they want to use it for. That is [issue] number one. To find out whether we think this is something that this tool can help them with or not. Or in use, at their institution. And if the answer is yes, we try to find out more about how they organise their teaching activities, and then we arrive at, in discussion with them... Or help them to arrive at the settings that would be useful to their course. And then they have sort of decided upon the default settings themselves. And then we help them, of course, by training them [in Kark] at the same time as we manipulate the initial settings. After that, they manipulate the settings themselves."
>
> (From interview with Kark support group.)

According to Wenger (1998), brokering is the act of using multi-membership in communities of practise to "transfer some element one practice into another" (Wenger, 1998, p. 109) An example of brokering in the Kark-support group is when they were asked by the group leading the Classfronter-project to participate in the group, and act as support for teachers that took part in the project by using Classfronter in their teaching. The background for being

asked was that one of the members in the Classfronter-project previously had used Kark and was aware of their competencies, another was that Kark Essay was integrated with Classfronter when this particular commercial LMS was chosen to be tested at UoB. In the interview with the leader of the Classfronter-project, we discussed the initial training of the teachers that were to take part in the pilot project and how the task was later awarded to the Kark support group (see excerpt 10).

Excerpt 10

> "[initially] we trained the academic staff directly which I found useful regarding the pilot projects. Later, Kark [the Kark support group] has taken care of the training of the academic staff, and guidance relating to the issue of pedagogical use of ICT. Because they are the ones that have, at least in the project group, competencies within this field. Of course you can discuss whether someone who works with purely text-based tools is the right person to guide natural scientists of course, but that is another issue."

(From interview with leader of the Classfronter-project.)

Another example of brokering is when the Kark support group are invited to participate in a central University project group with interests in, and focus on, more diverse activities than teaching students, for example administration. They are invited, based on their competencies with Kark, and perceived general competencies in the use of ICT for educational purposes. Without concluding or presuming that either DH or the Classfronter-project group are communities of practise, we can understand this as a phenomenon of the groups' competencies of acting with the tool Kark in the context of DH, the practitioners are invited to use their perceived competencies in a setting with very different conditions.

In summary, through the examination of the development of a tool that has become embedded in the teaching at DH, together with other developments in higher education in Norway, we have described the emergence of a new role in that context, with similar tasks to the traditional lecturer, but also with several tasks that are not similar. There may have been changes to the role of the traditional lecturer, but here the focus has been placed on other, new kinds of emerging teacher roles. The Orchestrator role has been described as new and relatively plastic in nature with regard to the content and position, and also associated with the diverse tasks of teaching, administrating, moderating, and consulting and negotiating with external units, thus leading to an understanding of the role as an orchestrator of several related but diverse tasks, tasks that are all more or less tied to technology and teaching.

4.8 A possible contradiction

In the following sections a possible contradiction in the teaching with Kark at DH are identified and discussed in brief.

4.8.1 Openness of student feedback versus privateness of lecturers' work

One of the characteristics of the comments on assignments, is that it is open for everyone to see; that is to all the students that are registered in the same course, and for all the teachers at DH. This means that the teachers also are able to see each other's comments, and thus are able to observe how colleagues perform their job, opening for an unintended teacher-teacher

communication. As discussed in Oliver et. al. (2005) the teaching in higher education in Norway is traditionally teacher dependant, and more or less a personal matter. The developer of Kark pointed out that early in the process of teaching through Kark, this new openness was problematic for some of the lecturers. He used the analogy of students' recording of lectures to point out that what is being said in the auditoriums, is understood as being said within this context, and "*einmahliges*" in nature. The interview with the lecturer in the portfolio assessed specialisation course revealed awareness of this topic or theme, but a different attitude towards it. He said that in his relation to the teacher that commented the assignments in his course, he was more or less dependent on reading his comments, so that they could treat the students equally. This indicates that a division of labour has taken place in this respect, and that it represents a coordination mechanism (Malone and Crowston, 1993) for teachers that haven't cooperated on a course before. The same lecturer also expressed close cooperation with the other lecturers within his themes, and found the openness of his comments unproblematic for the same reason, he was at the same time, however, open to the fact that it may represent a problem for other lecturers.

4.9 Conclusions

This case study has investigated possible changes in the roles of the teachers in an Institution of higher education in Norway related to the introduction and use of digital technology. The focus has not been on the possible change in the role of the traditional lecturer in this case study, but rather on what seems to be new, emerging teacher roles, at least in the Norwegian context. These are teachers that operate through and with technology, that have not yet had their roles formalised in the University employment structure, and that have a complexly interconnected set of tasks, through the orchestrating of several more or less related activities. The tool that is described in this case study was developed on the basis of an expressed need, and through clearly expressed thoughts about how the students may benefit from its use, here represented by the usefulness of learning through writing, and learning through acting as a teacher. By cultivating the teacher role as a gatekeeper of the pedagogical tools, or shepherd if you will, rather than as for example administrative personnel, politicians or bureaucrats, it is more likely that focus on the use of the tool will remain pedagogical, or at least on what the students can learn through its use.

5 Empirical work in the Netherlands

5.1 Introduction: a closer look at two technological innovations

This section focuses on two technological innovations from the University of Twente that bear on teaching and learning in higher education. Both innovations have evolved into a commercial product with widespread usage. The first innovation revolves around 'ZAPs', which are interactive computer programs that make it possible to experience psychological phenomena. The second innovation concerns the Teletop course management system. In each presentation the following questions are discussed:

- Why was it developed?
- What are its main characteristics?
- How was it implemented?
- What was its impact on course delivery and learning?

5.2 Stretching the mold of psychology teaching and learning: ZAPs

An example of a technologic innovation that extends existing practices in an innovative and yet unobtrusive manner is the ZAP. ZAPs supplement existing teaching approaches in psychology. They are interactive computer programs that make it possible to experience psychological phenomena in a vivid and self-explanatory way. They give users the unique opportunity to quickly find out for themselves the meaning of phenomena such as classic conditioning, the Ponzo illusion, mental rotation, logical reasoning, split-brains, prisoner's dilemma and many more. ZAPs were developed in a partnership between the University of Twente and the Erasmus University Rotterdam.

5.2.1 Why were ZAPs developed?

ZAPs were designed to enhance first-year psychology students' motivation and understanding of psychological phenomena. Students generally get to know these phenomena mainly from attending lectures and reading introductory textbooks. These activities often lead to rote learning with students failing to connect theory to real-world experiences. ZAPs stimulate students to explicitly make real-world connections by affording them an engagement in new experiences or a re-engagement in experiences that they would otherwise only read about in their textbooks. The instructional paradigm behind ZAPs is that of experiential and discovery learning. The assumption is that these self-directed activities increase students' understanding of psychological phenomena. A second major goal of ZAPs was to increase students' engagement. ZAPs were expected to enhance motivation.

At the start of the project there were already several computer programs with similar aims (Hulshof, Eysink, & De Jong, 2005). The ZAP team found these programs deficient for three reasons. One, these programs often gave students only limited opportunities to experience phenomena. For example, some programs were little other than multimedia presentations asking for the students' opinion. The feeling was that most programs focused too much on expository teaching strategies. The ZAP team wanted students to become more active and self-directing participants. ZAPs therefore were designed to be highly inter-active and student-controlled.

Another reason for developing their own programs arose from the fact that most competitors had programs only for phenomena in one specialization with a majority focusing on topics from cognitive psychology. This severely limited their usefulness for introductory courses whose aim is to acquaint students with the broad spectrum of specializations within psychology. The ZAP team thus planned and developed interactive computer programs for functional, social, cognitive, personal, clinical and educational psychology. Within these specializations, ZAPs were created for phenomena of attention, memory, learning, development, perception and language, among others.

The third reason for the development of ZAPs arose from the finding that the competition often presented their programs with a varied set of user interfaces with different screen lay-outs. This typically reflected their evolutionary development over the years, a development that was not guided and guarded by an overall concern of consistency across programs. The ZAP team took this lesson to heart and decided to pay a considerable amount of time and effort to creating a similar look-and-feel for all ZAPs. Thus, behind the ZAPs there is a single user interface model that dictates both what kind of information is to be presented and how that is to be presented.

What are the main characteristics of ZAPs?

To realize the two main goals of the project, namely to enhance student motivation and understanding, 57 interactive computer programs were developed called ZAPs. The teaching/learning approach in the ZAPs is experiential and discovery learning. ZAPs are seen as supplementary materials. They can be used as an add-on to lectures and textbooks for introductory psychology.

All ZAPs consist of four key components: Introduction, Activity, Theory and Further Information. Although students can start with components in any order they like, the preferred sequence is that of Introduction -> Activity -> Theory -> Further Information. Figures 1 through 4 illustrate the screen lay-outs for each component for a ZAP on the Ponzo illusion.

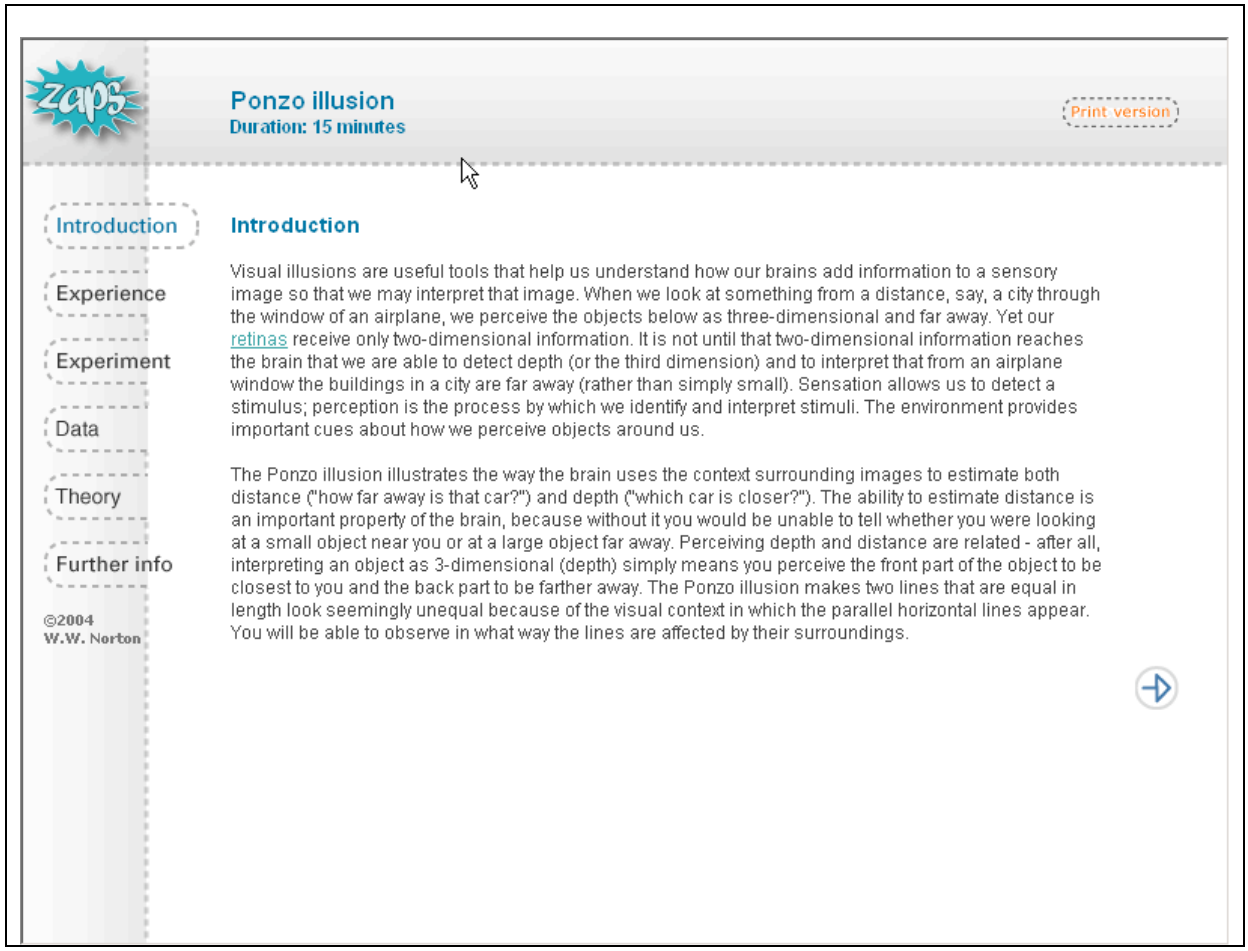


Figure 1. The Introductory page of the ZAP for the Ponzo illusion.

The Introductory component of a ZAP always consists of a concrete and real example that pertains to the phenomenon. It is chosen so that students easily become motivated and can recognize it from their own experience. The example also clearly illustrates the kind of phenomenon involved. Jargon is avoided as much as possible.

Figure 1 shows the introduction to the Ponzo illusion, a perception phenomenon. It deals with the fact that we believe that the size of an object remains relatively constant even when its size on the retina varies with distance. The illusion is created by showing two horizontal lines on a background of oblique lines. The goal of the Ponzo illusion ZAP is to confront students with their own experience of the illusion.

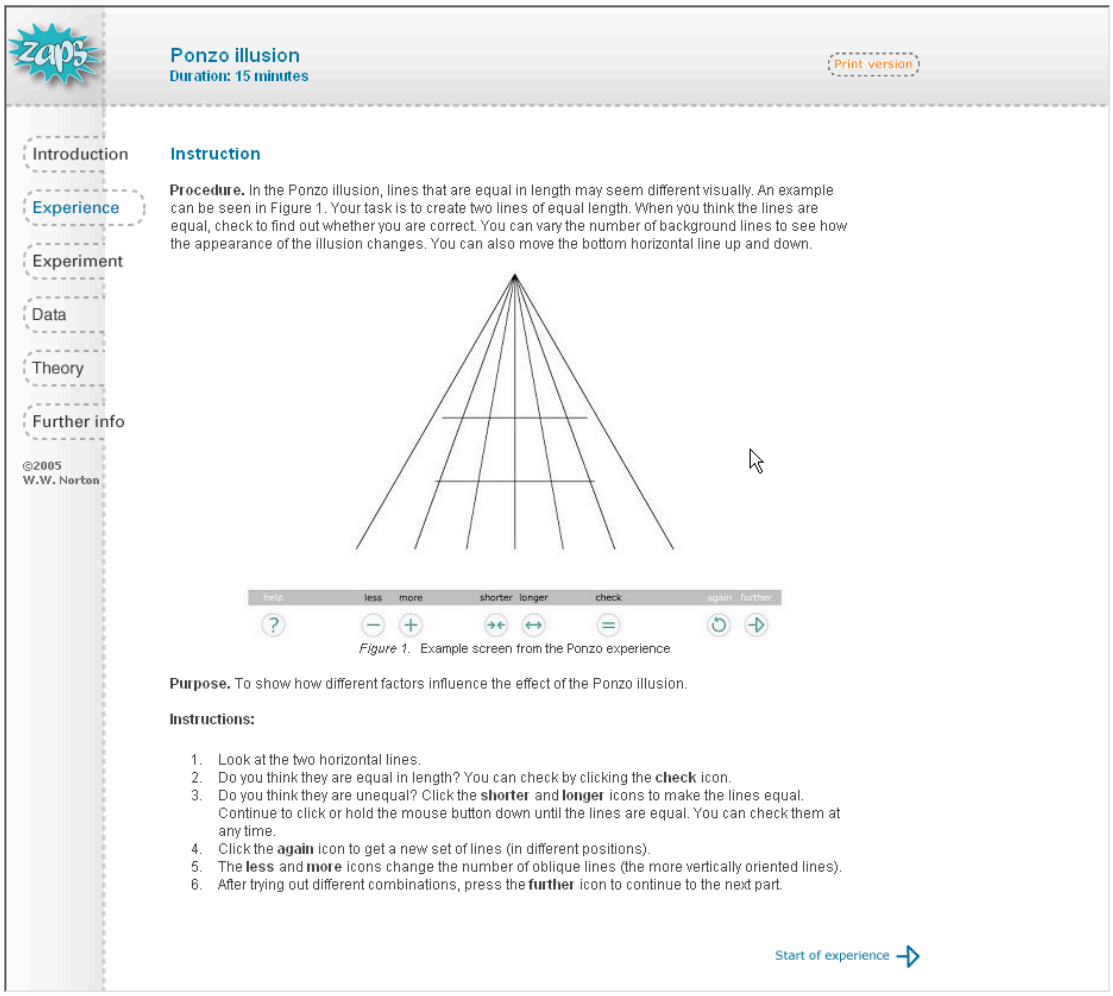


Figure 2a. The Activity page of the ZAP for the Ponzo illusion. In this special case students can realize an experience with the ZAP and participate in an experiment (hence the categories Experiment and Data).

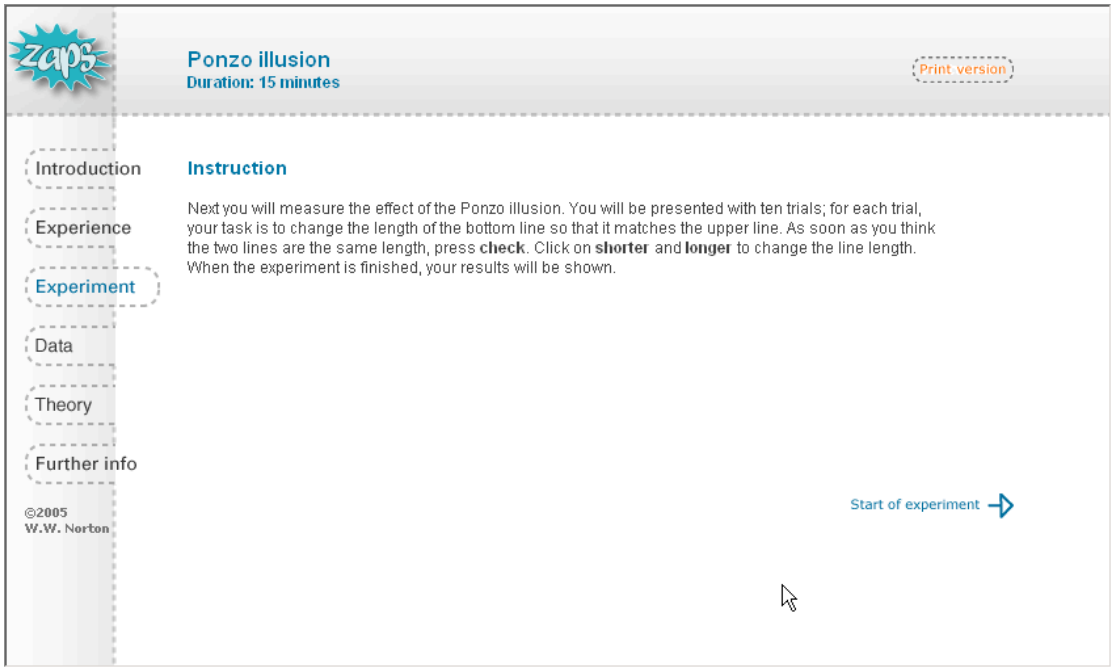


Figure 2b. The introductory page of the Experiment ZAP for the Ponzo illusion. After this instruction the student must complete a number of trials with the illusion.

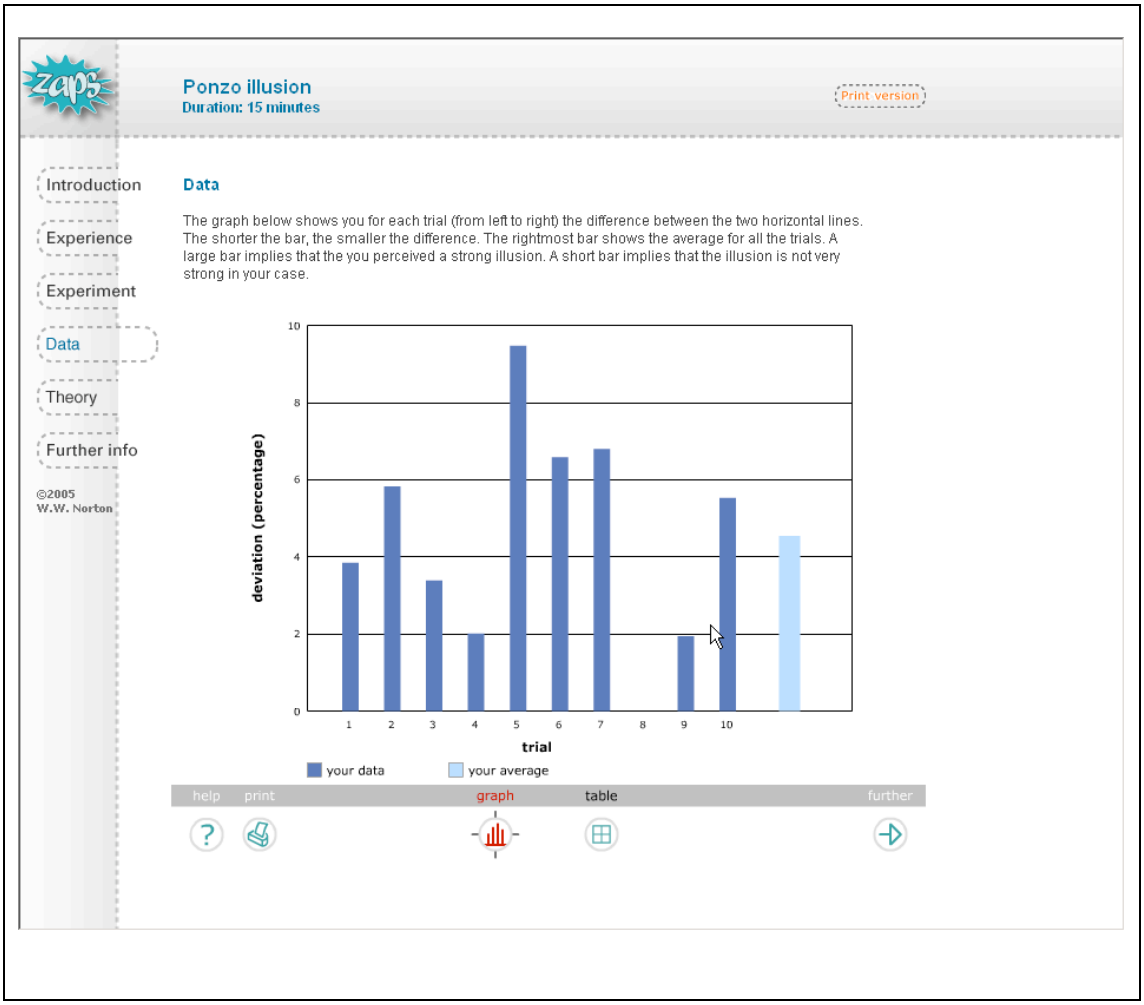


Figure 2c. The Data page of the Experiment ZAP for the Ponzo illusion. The data show the outcome of the student.

ZAPs are designed to be interactive as much as possible in the Activity component. Because ZAPs should stimulate students to actively explore phenomena the Activity component plays a pivotal role. In essence all information in all the other components is geared towards this component. The Activity component follows immediately after the introduction, even before the theory behind a phenomenon is discussed. In the course of its development the design team discovered that the students' activities varied somewhat across topics which led to a distinction between experimenting, experiencing and discovering actions. Accordingly, ZAP types differ from each other in the Activity component.

In the Ponzo ZAP, students can experience the perception illusion and engage in an experiment as well. They first are presented the experiential ZAP in which they must try to make both horizontal lines equivalent (see Figure 2a). To achieve this they can manipulate the length of the lowest horizontal line. When they think the two lines are equal they can check their answer and receive feedback on the length difference. The students can vary the properties of the illusion by modifying the number of oblique lines or by moving the lowest horizontal line upwards or downwards.

In the Ponzo experiment students are repeatedly confronted with two lines in various contexts. Their task is to make the two lines of equal length. After a number of experimental

trials they receive the results (Data) that give an impression of the extent to which they are sensitive to the illusion (see Figure 2b and 2c).

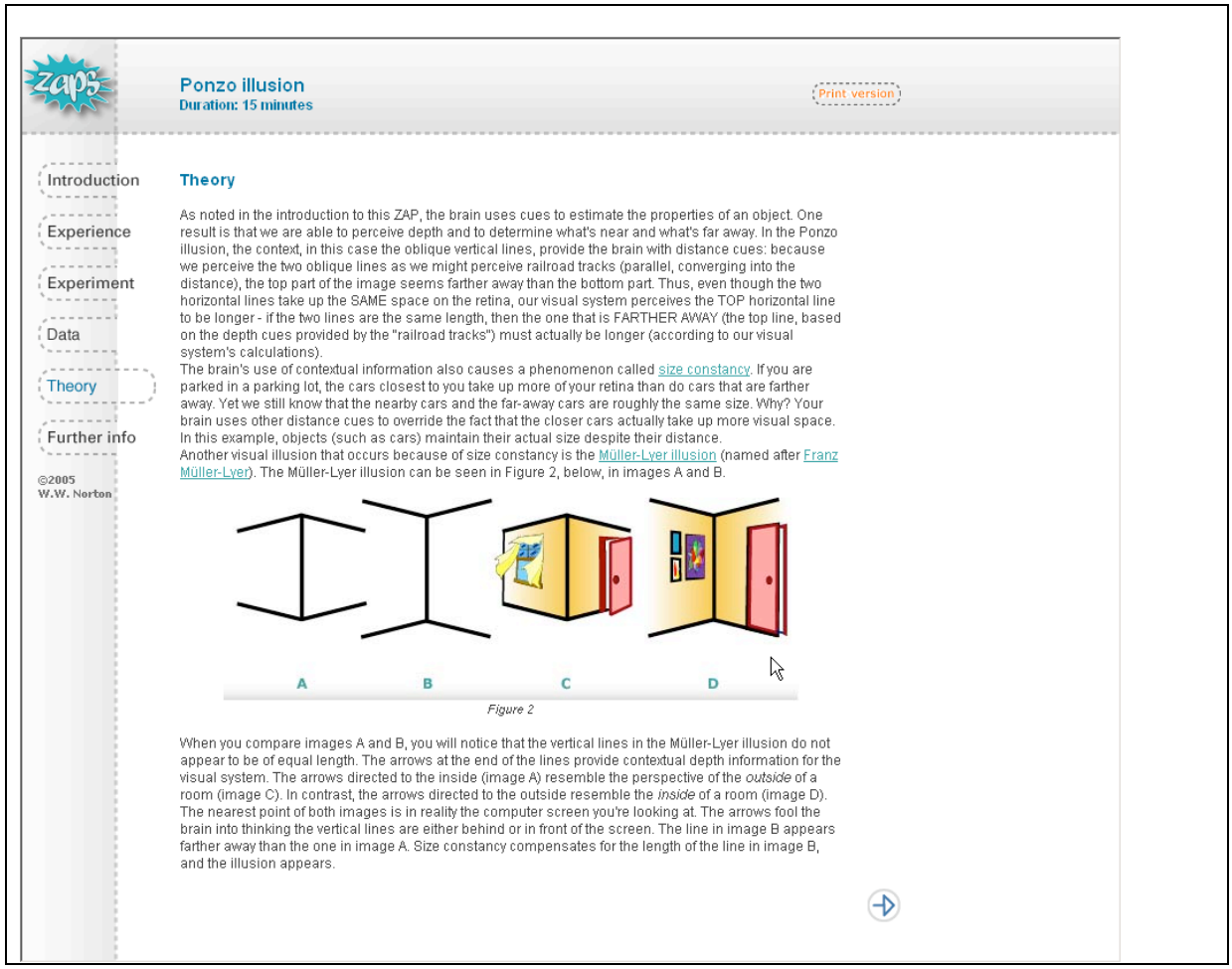


Figure 3. The Theory page of the ZAP for the Ponzo illusion.

The Theory component explains the phenomenon from the activity. It avoids elaborations of side issues to assist students in reflecting about their experiences. Pertinent notions of phenomena are briefly discussed. Besides a presentation of theories or explanations, there can also be a short description of a researcher.

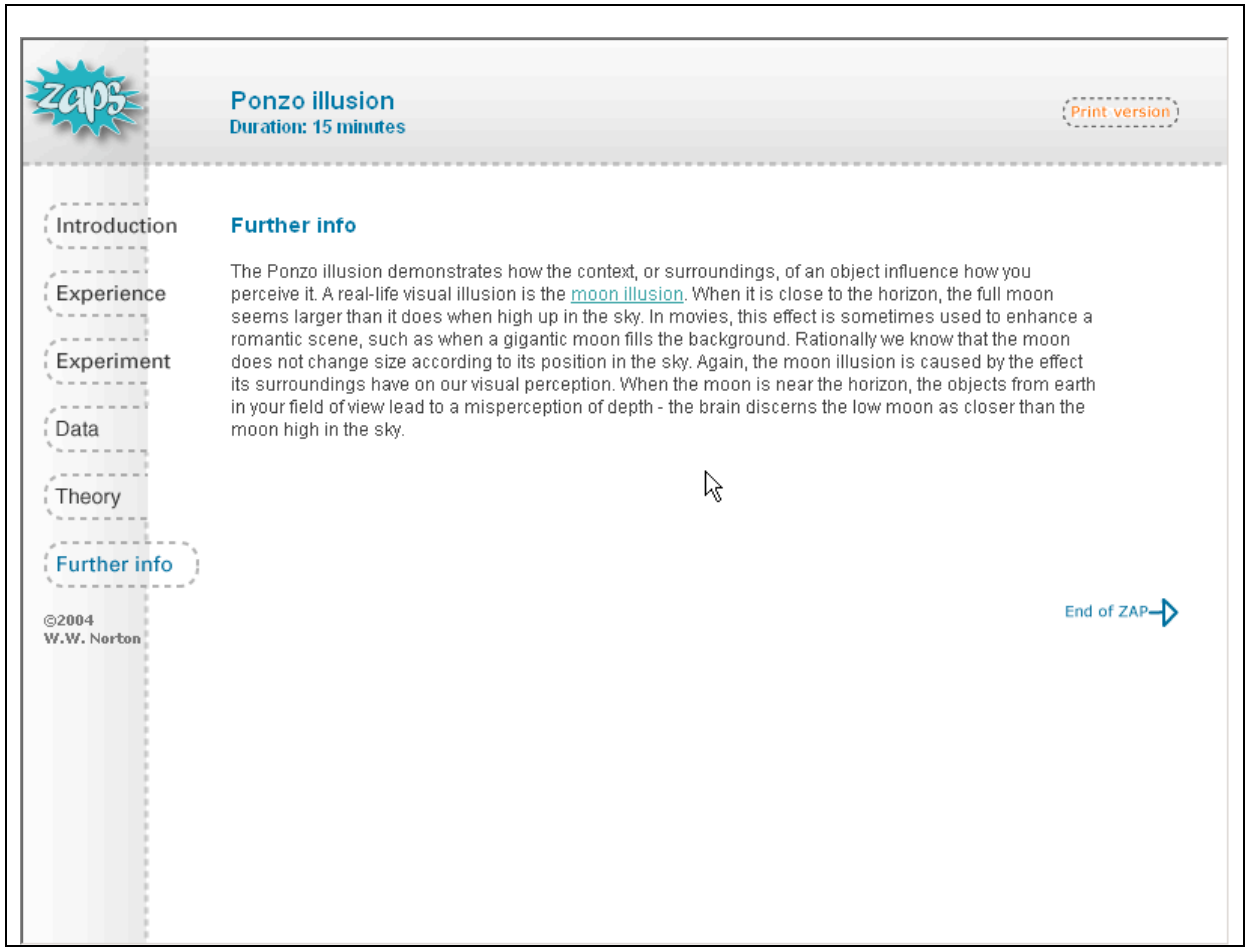


Figure 4. The Further info page of the ZAP for the Ponzo illusion.

The Further info component contains additional explanations or comments. Just as in the Introduction and Theory the component discusses relevant phenomena from real-life situations.

To accommodate to the specifics of the various fields of psychology and the domains therein, a distinction is made between *experiment ZAPs*, *experience ZAPs* and *discovery ZAPs*. These ZAP types differ from each other only in the Activity component.

In experiment ZAPs students are asked to react to a set of stimuli that represent a psychological phenomenon (e.g., Mental Rotation, Fan effect, Stereotypes). Students play the role of participant in the simulated experiment. The main difference with a real experiment is that ZAPs take much less time (e.g., include fewer trials). After task completion students can ask for feedback on their performance. In addition, they can compare their results with standardized data from the original studies.

In experience ZAPs students also react to a set of stimuli. However, here they are merely asked to undergo an experience of, say, selective attention, logical reasoning and cognitive dissonance. The main purpose is that the ZAP gives students a first-hand experience.

In discovery ZAPs students take on an entirely different role, namely that of experimenter in a irtual laboratory. They must set up and execute an experiment. For example, they can

replicate Pavlov's famous experiment on classical conditioning. Discovery ZAPs have an underlying model of input and output variables that students should get to know.

ZAPs pose very low demands on the processing capacities of the user's computer. Besides a Macromedia Flash plug-in, ZAPs do not require any special software. They are accessible through a web browser.

Each ZAP is a completely self-contained module; it uses no external links (e.g., resources on the world wide web). ZAPs are designed to take about fifteen to thirty minutes to complete. For all ZAPs together there is a glossary and index. The glossary offers additional information about special terms (e.g., definitions) and persons (e.g., a famous researcher in psychology). The index lists all available ZAPs.

5.2.2 The implementation of ZAPs

To evaluate the effectiveness and ease of use of these measures, several usability tests were carried out early on in the project. These tests involved teachers as well as students.

In the analysis phase of development, teachers were interviewed about the needs and requirements they wanted programs such as ZAPs to fulfill. The interviews focused on design issues for ZAPs. The outcome was a long 'wish list' that included calls like 'ZAPs should be universal so that they can be used with any book', 'ZAPs should run on the internet' and 'Explanations of phenomena should appear after the students have undergone their experiences'. About midway during production teachers were interviewed a second time. This time the interview focused on the various ways in which teachers foresaw the use of ZAPs in their courses. This led to a list of twelve requirements (e.g., 'It should be possible to access ZAPs from a learning management system').

In collective and individual sessions, first-year psychology students evaluated the usability of the different components of a number of ZAPs. One of the usability tests involved an analysis of the log-files from students who worked with several ZAPs. In another usability test students were asked to think-aloud while working with ZAPs. After each test students were asked for their opinions about the layout and content of each ZAP. The students were very positive about the ZAPs. They were motivated by them and processed all or nearly all of the components of a ZAP. In addition, they generally could give fair to good responses about the contents of the ZAPs.

There were also expert appraisals for the design of the user interface and the instructions to users. All these formative evaluations helped shape the ZAPs into their final form. Findings on the usage of the final ZAPs indicate that the interface is easy to operate upon and understand.

ZAP has received several signs of recognition. ZAPs won a European Academic Software Award (EASA) in 2004. This award is granted every two years to 10 European programs of exceptional quality for education and research in all academic disciplines. In 2004 ZAP also won the National ICT Award of the Netherlands in the category government/non-profit. This award is granted every year to organizations that have realized a prominent position in the application of ICT in its business with an innovative new product. Finally, ZAP has been nominated as the Dutch entry for the World Summit Award 2005. Another sign of recognition comes from the fact that the ZAPs have been bought by the American publisher Norton &

Company as an accompaniment to its psychology textbooks (see http://www.wwnorton.com/zaps).

To further facilitate the varied usage of ZAPs in education the team has also developed ZAP Lites and a ZAP Monitor. ZAP Lites consist of only the Activity component of a ZAP. They are especially useful for demonstrations during lectures and discussions. The ZAP Monitor is an extension of the registration of single students in an experiment ZAP. It combines the outcomes for a group of students. Among others, the ZAP Monitor can give students feedback on their position vis-à-vis their fellow classmates. In addition, it can illustrate that the performance of a group is likely to fit the general profile even when that of an individual from that group may deviate.

5.2.3 The impact of ZAPs on students' motivation and learning

The impact of a technological innovation on teaching and learning in real life can validly be assessed only after its completion. Studies that examine the claims of the designers therefore always lag behind the development processes, if they are conducted at all. ZAPs form no exception. Only one study systematically examined its impact on students' learning (Hulshof, Eysink, Loyens, & De Jong, 2005).

The study was an experiment in which the role of the Activity component of the ZAP was examined. Participants in the experiment were confronted with 6 ZAPs, two of each main type. One group of subjects worked with ZAPs as they were designed. That is, they were seated behind the computer and could use the ZAPs in whatever way they wanted. The control group received all information from the ZAPs except that from the Activity component. In this read-only condition, the Activity component was modified. It afforded no interactivity. All these users saw was a short description of the original experiment on which the ZAP was based. These subjects too were seated behind the computer, but they could only read the information that was presented in the ZAPs. A restriction imposed on the processing of the ZAPs was that subjects could stop working with a ZAPs only after a minimum of 3 minutes. Data were gathered from a pre-test, post test and retention test. Each test measured the subjects knowledge on key aspects from the phenomena discussed in the ZAPs.

The findings did not reveal any special benefits for students who could actively experience, experiment and discover psychological phenomena. The outcomes on all tests were essentially identical. On both the post test and the retention test students in the control condition scored as high as did students working with the complete ZAPs. For time on task, also no difference was found. If anything, the students in the control condition spend more rather than less time reading about the phenomena of a ZAP (excluding the time for the Activity component).

The authors did find an interaction effect, namely a stronger decline for the control group from post test to retention test. This finding is seen as a signal that the two groups may have differed in the kind of knowledge that they acquired. Thus, the study concludes that future studies are needed to 'more clearly illustrate the added value of ZAPs in existing curricula' (Hulshof et al., 2005, pp. 53).

5.3 Stretching the mold of educational technology teaching and learning: Teletop

The Faculty of Educational Science and Technology has an international reputation in the fields of telematics applications in education. One of its core issues in research is to examine

the role that information and communication technologies (ICT) in education. The widespread application of ICT in teaching and learning is likewise an important characteristic that sets it apart from other Dutch universities. In response to demands for flexibility on dimensions of time, content and instructional approach, the course management system Teletop was developed. Its construction was characterized by repeated cycles of iterative development. Teletop now consists of three main components, namely Content creation and delivery, Course organization and Communication.

5.3.1 Why was Teletop developed?

One could say that Teletop was developed to facilitate a 'teach as you preach' approach. The faculty's pervasive focus on technology in its educational research also stimulated a move towards an integration of technology into its own educational approaches. The primary goal was to make available to students "the unique educational technology curriculum in a flexible way" (Collis, & Moonen, 2001, pp. 143). In addition, Teletop should enrich the courses and make them more efficient. The idea was further that Teletop should not lead to the typical delivery of distance education with a parallel courses for regular and distance students, but rather that it should stimulate a re-design of the pedagogical approach of the faculty in which all students – on and off campus – should have more flexible access to resources for learning. Teletop should afford more student input. In addition, it was to serve as an electronic workbench for teachers in this educational reform.

At the start of the development of Teletop in 1997 competing course management system were found to be lacking in affordances for student contributions. For Teletop this was to be a key component that could enable its usage within constructivist approaches such as anchored instruction, goal-based scenarios, and problem-based learning. These approaches invariable place a heavy emphasis on active and cumulative learning. To achieve that, students tend to be given authentic tasks or realistic problems that often require teamwork between students for their completion. Examples of student activities within such a contribution-oriented pedagogy aimed for by Teletop are (see Collis, & Moonen, 2005):

- Students work in groups and create a report on a course-related topic. That report can then be used as a learning resource for all participants.
- Students create test questions plus a scoring key and feedback for key topics in the course. All questions combined then yield a test-bed for students to assess their comprehension.
- After groups of students have created their own solutions to an assignment, the best designs are displayed for all groups to study and use as point of departure for re-designs.
- Groups of students use a collaborative workspace to store and share temporary products created for the course. All members of the group can access the products of their group at any time and place.

5.3.2 What are the main characteristics of Teletop?

Teletop is a course management system. Such a system can be defined as "a comprehensive software package that supports some or all aspects of course preparation, delivery and interaction and allows these aspects to be accessible via a network" (Collis, & Moonen, 2001, pp. 78). In Teletop flexibility is a key consideration. This raises the question of what flexibility means.

De Boer (2004) examined the concept of flexibility from a theoretical perspective and validated the various views with a sample of instructors to see whether they recognized the

flexibility dimensions of time, content and instructional approach distinguished in the literature. Flexibility in time concerns time for starting and finishing the course, and time for submitting assignments and for interactions within the course. Flexibility in content includes choices for course topic, theoretical or practical orientation of the course and assessment. Flexibility in instructional approaches is a broad rubric that includes course assignment, grouping, language and learning resources, among others.

The validation showed that instructors recognize two main dimensions of flexibility, namely one for Planning and one for Interpersonal. In conjunction with the three components of course management systems (i.e., Course organization, Communication and Content creation and delivery) this led to a well-defined framework for the development of Teletop (see Figure 5).

CMS component	Tool functions	Planning Flexibility	Interpersonal Flexibility
Course organization	Course updates	- Updates placed and read anywhere and -time	
	Course information	- Varieties in descriptions	- Accessible anywhere and -time
	Course planning	- Fewer face-to-face sessions - Expanded sessions by having activities before and after	- Student at different locations in one course/session
	Activities	- Have different activities to choose from - Activities can be place- and time-independent	- Own experiences can be used as input - Materials from activities can be used as new learning materials
Communi-cation	Sessions	- Plan fewer face-to-face meetings - Have new forms of contact sessions - Capture sessions as digital audio and/or video and link to the course WWW site for later study - Let students who were not at the session review notes	- Use chat facilities/real-time communication tools via the Internet for students in different locations
	Communi-cation	- Add a communication centre to the course WWW site so that groups of students, or individuals, can be easily contacted via e-mail	- Stimulate students to interact with each other via different activities involving collaboration and peer review and discussion
	Group-work	- Plan that group members work collaboratively on projects without needing to be physically together, use shared workspace tools along with other communication and reporting tools	- Have opportunities for students to use relevant contexts and authentic problems - Have options for those students that have to or want to work alone
	Discussions	- Make use of a discussion board for discussions about course topics as a major activity in the course; - Let students moderate - Plan to involve experts from outside the course	- Simulate CMS-supported discussions among students, if they see each other regularly or not
	Feedback	- Choose from different forms of feedback: i.e. peer feedback, automatic feedback; model answers	- Have peer-support and feedback opportunities
Content creation and delivery	Web-resources	- Make use of the options in resources - make paper materials also available via the web	-Use the Web as a resource for all sorts of resources (i.e. multimedia/reports/examples) and let students contribute during the course
	Activities	- Materials from activities can be used as new learning materials	- Facilitate students using each others' submissions as learning resources once these are available as part of the CMS environment

Figure 5. Matrix with Course Management System (CMS) components, Tool functions and the two main Flexibility Dimensions.

Teletop is now a mature product that has evolved into a commercially successful program. Besides its core, the course management system that is focal here, Teletop now holds three additional modules. At the University of Twente the sixth version of Teletop is now in use for

the courses of 2005-2006. Illustrations from Teletop presented here are taken from this latest version.

Teletop consists of a back-office and front-office. From its back-office only the user interface for the instructor will be illustrated. Instructors need no specific computer skills to handle this. A little bit of HTML is handy to shape up its appearance but this is no requirement. The front-office part of Teletop is what instructors and students see when they open a course.

Three important elements of Teletop will be illustrated, namely the Home page, the Roster and the Archive. For each there is a display of both the back-office and front-office. After logging into the Teletop system and selecting a course, the Home page for that course appears (see Figure 6a).

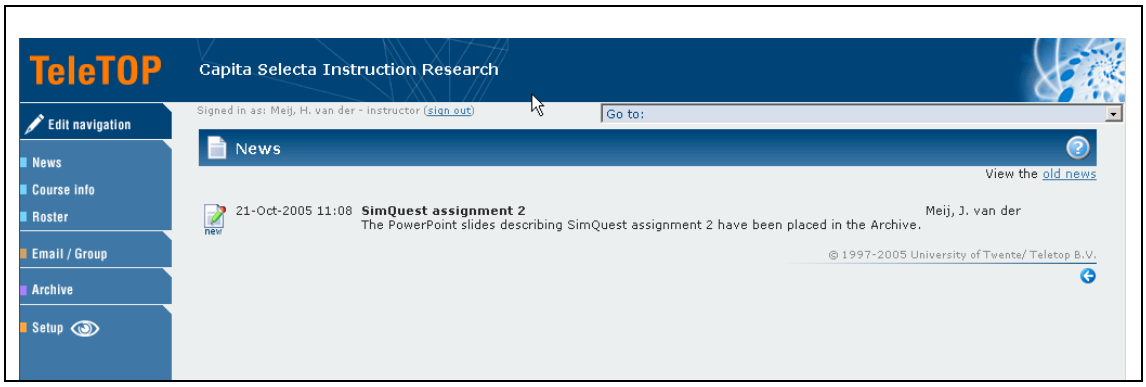


Figure 6a. Home page of Teletop as visible for all users (front office part).

Screen real estate on all Teletop screens is divided into two functional areas. The left- hand side displays the components that the instructor has chosen for the course. To facilitate this set-up instructors are asked to answer Yes-No questions ordered under the following section headings: Organization (5 questions), Communication (3 questions), Collaboration (2 questions), Resources (9 questions) and Extra (3 questions). Sections are divided from one another by a thin white line (see Figure 6a). In this particular course three elements from course organization have been chosen (New, Course info and Roster), one from communication (Email/group) and one from resources (Archive). With the Setup option the instructor can modify this structure.

Upon opening a course users generally see the News first. News is used to attend students to last minute changes in meeting time or room, materials and so on. News also often hosts messages that suggest where students can find newly added materials. Instructors can modify the News by clicking the Book-and-Pen icon ( ) which will bring them to the back-office shown in Figure 6b. For every News message, whether it's a new one or a modification, the instructor inserts the text and ticks the appropriate boxes after which he or she can submit the information. The information is then automatically saved and brings the instructor back to the renewed News page. After such a change, the Book-and-Pen icon is marked with the word "new" to signal the presence of a change to its users.

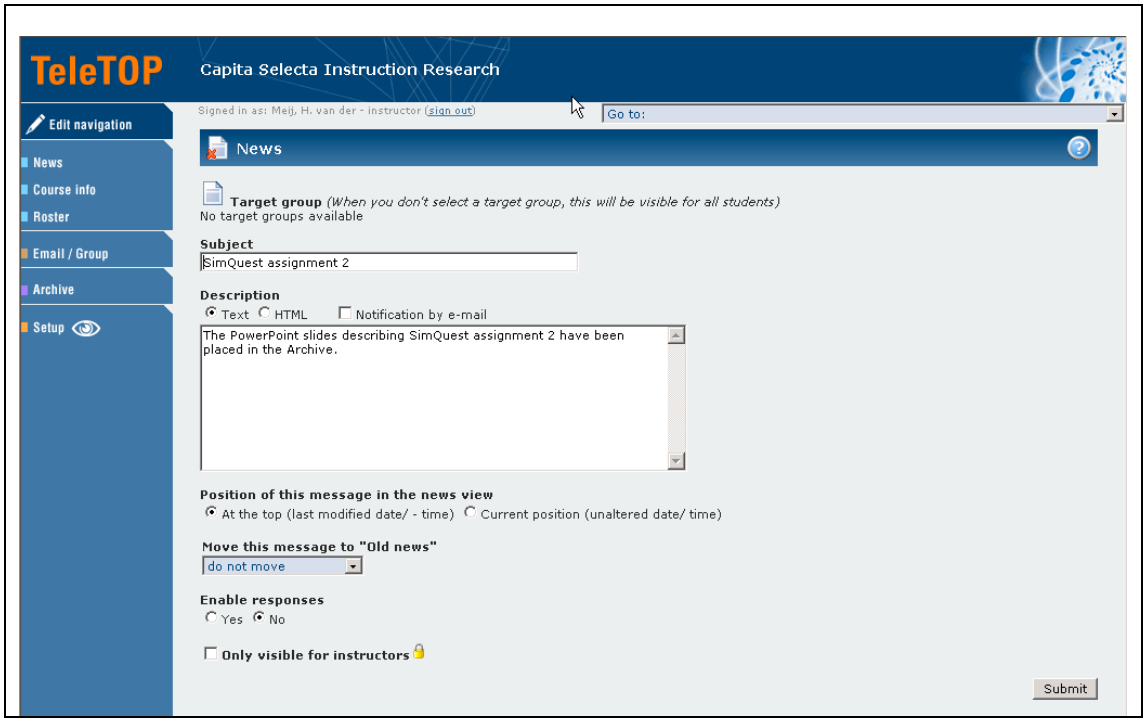


Figure 6b. News page of Teletop for instructor modifications (back office part)

The Roster page is the most frequently chosen option in Teletop. In many courses it is the key element around which all others are organized. Instructors can link all other elements in a course to this Roster. Just as in regular websites such links are underlined to show their presence. In this course, students are linked to important documents for the "During the session" and "After the session" column.

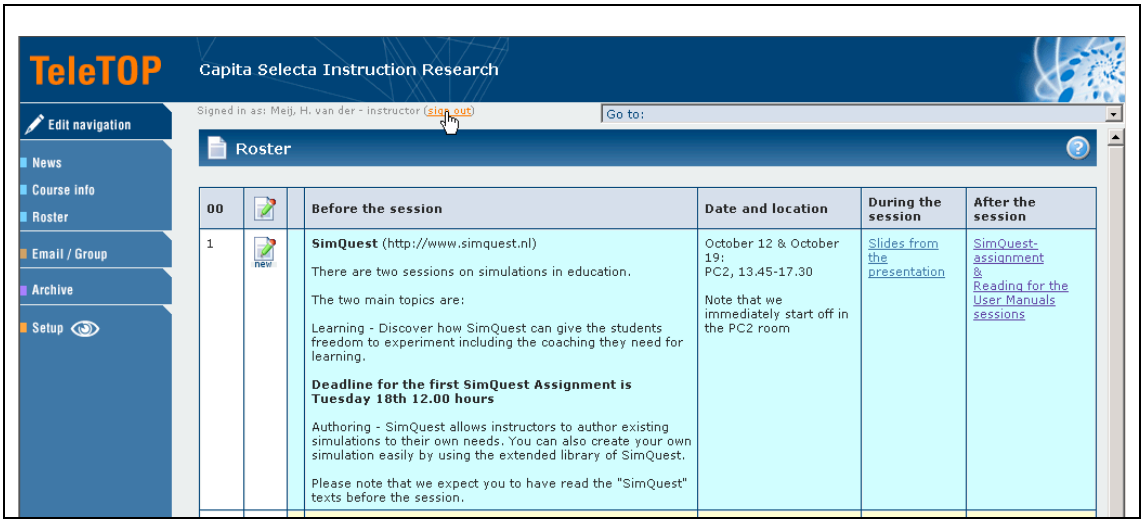


Figure 7a. Roster page of Teletop that all users can see.

The back-office of the Roster works in a similar way as for the News. Instructors can type or insert text in the appropriate cell and tick the relevant boxes. After completion they press Submit and Teletop does the rest. By filling in a number under the 'nr'-column the instructor

can determine the sequence of that information in the Roster. The color palette beneath the number makes it possible to make certain rows stand out in a particular color (see Figure 7b).

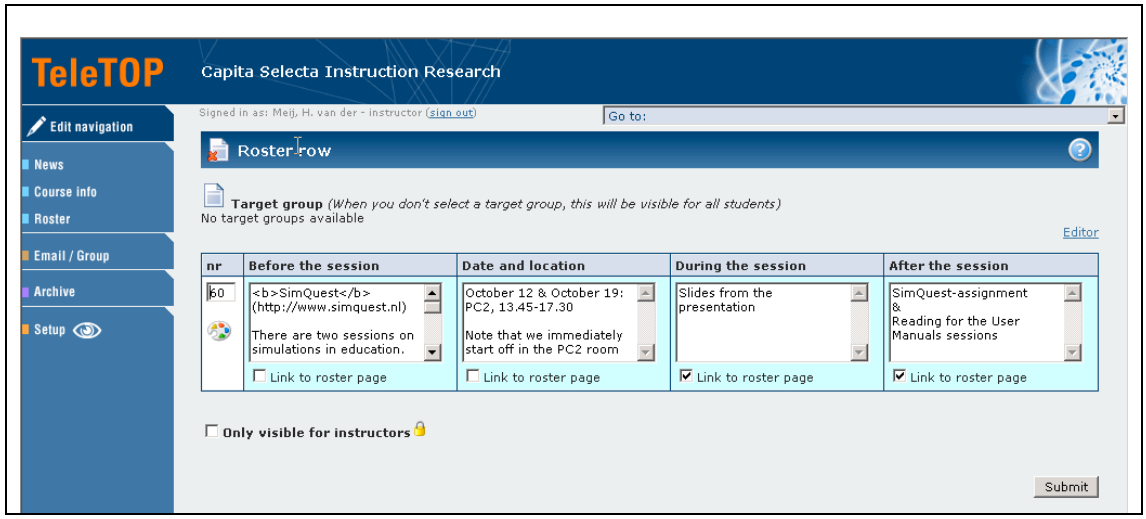


Figure 7b. Roster page of Teletop for instructor modifications.

The Archive is a repository for all kinds of information needed in a course. Typically, the information that is available is briefly described after which a list of available resources follow. These resources can be web-links as well as all kinds of files (e.g., Word, pdf, Power Point). Just as in the News, Teletop also displays who placed information in the Archive

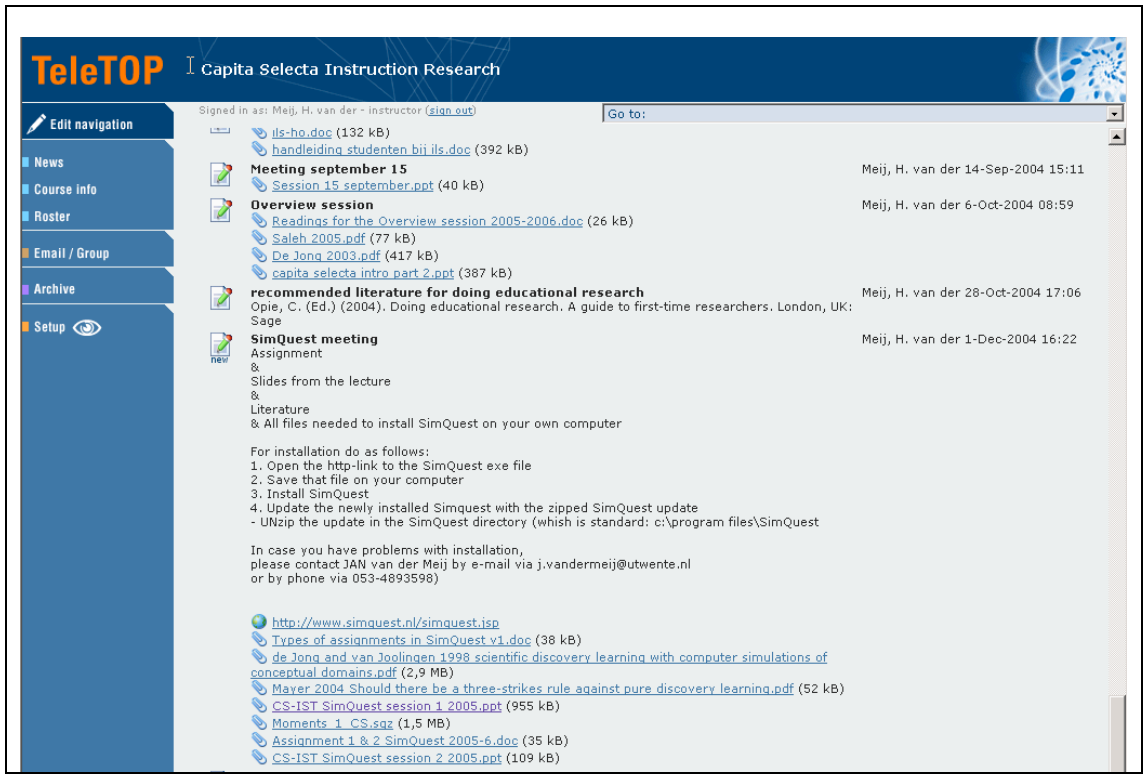


Figure 8a. Archive page of Teletop that all users can see.

The back-office of the Archive works the same way as the other elements. All available resources (i.e. Attachments) can be deleted in one swing by ticking all the boxes for attached files and pressing Submit. In contrast, resources can be added only one after the other. All attachments appear in a list one after the other in the order in which they have been submitted.

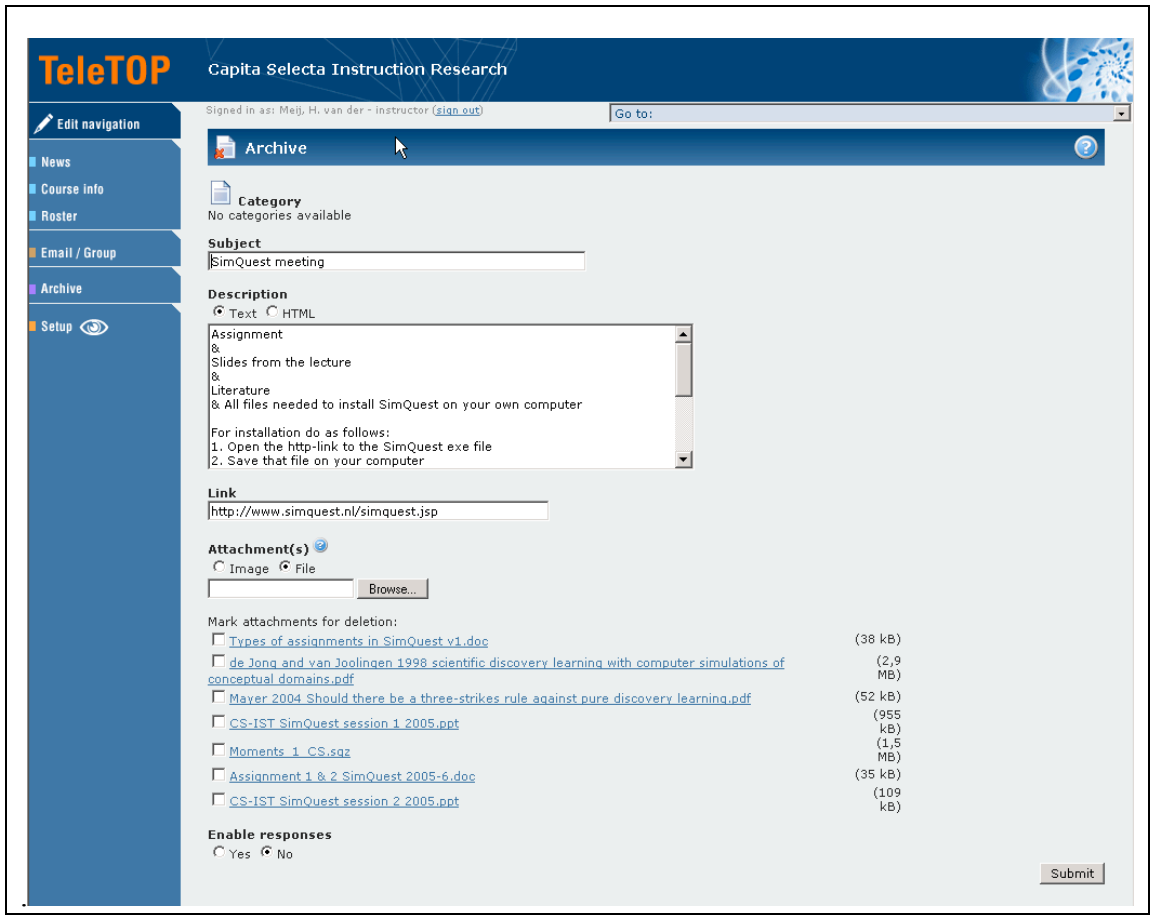


Figure 8b. Archive page of Teletop for instructor modifications.

5.3.3 The implementation of Teletop

The development of Teletop began in the school year 1997-1998. The aim was to have all first-year courses in the curriculum of the Faculty of Educational Science and Technology redesigned for September 1998. This goal was achieved thanks to a well-articulated implementation plan and a considerable effort of the Teletop team in realizing that plan. The six elements of the implementation plan clearly illustrate the breadth required in undertaking such an enterprise.

The first element contains the mission or *educational philosophy*. This was summarized into three main goals: (1) Teletop should extend, not replace, instructor and textbook, (2) Teletop should increase student participation and communication, and (3) Teletop should stimulate a re-design of courses with fewer lectures and more student activity and instructor feedback before, during and after contact sessions.

The second element is the strategic principle for *'multiple uses'* of courses. Courses should be designed in such a way that they afforded adaptations to individual differences through reusable units of learning materials.

The third element consists of an *educationally-grounded approach* for course redesign. This approach is exemplified in a 6 x 3 Component – Adaptation matrix. The Components dimension is subdivided into six parts. It is a translation and an extension of the three components in course management systems. Instructors can easily recognize these components in their courses (e.g., General course materials & organizational information, Assignments & student work, Testing). The Adaptation dimension is divided into three sections each reflecting an important goal of the innovation: Efficiency improvement, Enrichment improvement and Flexibility increase.

The fourth element consists of a *Decision Support Tool* (DST) for instructors. This tool consists of a questionnaire with over 65 questions on course design. The questions are all of a closed format (e.g., "Do you want your students to participate in group discussions where they can enter their reflections at a time convenient to them?"). The answers to these questions were linked to Teletop. That is, they showed the instructor the consequences of these choices for the course set-up.

The fifth element describes the *design approach*. In Teletop a rapid-prototyping approach was chosen in which instructors could receive guidance through all stages of course development.

The sixth element concerned the choices for the *technical realization*. Teletop is based on the integration of a Domino server, a Domino database engine and a HTTP server. Jointly, they generate a user-friendly web-based user-interface.

In later years of implementation the main question was how to scale up to independent use. The extensive guidance for instructors was diminished as they were expected to be able to move forward on the basis of their own experiences. Teletop team members also no longer provided a cognitive walkthrough for course set-up. Instead, the Decision Support Tool for instructors was integrated in Teletop. Just as before, it automatically generated the course design after completion of the questionnaire.

Several years of experience in working with Teletop revealed that instructors often made only limited use of its options for increasing flexibility. This prompted the development of a *Flexibility Support Tool* (FST) which was integrated in Teletop in the year 2002-2003. Its creation was based on Carroll's (1998) minimalist design philosophy, which advocates the provision of use-centered and user-centered information. The information in the Flexibility Support Tool is therefore organized around the kind of support that instructors seek from an advisor or fellow tutor. In addition, there are numerous examples (also in multimedia presentation formats) and templates that instructors can easily access, understand and use.

The quality of the Flexibility Support Tool was systematically evaluated in a series of steps (De Boer, 2004). First, a group of student course designers were asked to work with Teletop plus Flexibility Support Tool in setting up a course. After having done so, these students evaluated the usability of the Flexibility Support Tool for that job. Next, the tool was submitted to an expert walk-through. In this evaluation an experienced instructor commented on the Flexibility Support Tool. Three other design experts, also instructors, were then asked to engage in a think-aloud walk-through of the Flexibility Support Tool. Both rounds of expert appraisals yielded information about the overall appreciation or quality of the

Flexibility Support Tool. In addition, the study gave input for revisions. The final round of testing involved a complex design experiment. The main research question of that study was "Do instructors use Teletop with an integrated Flexibility Support Tool differently than before?" Participants were 32 instructors in the experimental condition and 26 instructors in the control condition. In both conditions the researchers looked at courses created in 2001-2002 with the regular Teletop and courses created in 2002-2003 with regular Teletop in the control group and Teletop plus Flexibility Support Tool in the experimental group. This experimental set-up afforded comparisons within groups as well as across groups.

5.3.4 The impact of Teletop on course delivery modes and students' learning

A unique feature of Teletop is that it is extensively tested and that the results from these tests have been well-documented. Testing has concentrated on documenting the usage of the system by teachers and students. Evaluation studies reveal that instructors generally include the following elements in their courses: News, Roster, Course information and Email/Group. Instructors new to Teletop are therefore advised to build their courses around these basic elements.

Usage of Teletop in the Faculty of Educational Science and Technology quickly became widespread. One year after its initial launch not only all first-year courses but also all second-year courses were using Teletop. A further indication of the success of Teletop is its rapid spread across campus. Already in its third year, in 1999-2000, Teletop became the default course management system for all courses from the whole University of Twente. To facilitate a broadening set of users, Teletop became managed by a university-wide support center. This center also commercialized the system and started to handle licensing with external parties.

Teletop played a key role in the faculty-wide change in course management that took place in 1997-1998, as shown in the figures for the number of first year courses using Teletop. Evaluation studies also revealed that initial usage focused on organizational matters. Flexibility brought into the courses was rather limited for Teletop with its integrated Decision Support Tool.

Ironically, this outcome may very well be a consequence of what distinguished the Teletop initiative most from that of other course management systems. Teletop focused on activities and processes whereas other approaches focused on content (e.g., forcing its delivery in digital mode). Also, Teletop set out "not to try to change too much at the same time" (Collis, & Moonen, 2001, Lesson 12, pp. 161). It started where instructors were at that time.

The design experiment revolving around the Flexibility Support Tool made it clear that it was *not* simply a matter of time and experience for instructors to benefit from Teletop's options for flexibility. More was needed to make that happen. The development of the Flexibility Support Tool was found to be a good move in that direction. The presence of that tool stimulated instructors to use the communicative possibilities of Teletop more often.

But usage of the Flexibility Support Tool alone was not enough to lead to dramatic changes. In all, the changes instructors made in their courses over the years were found to be relatively small. Regression analyses revealed that course flexibility (also) depends on other factors such as class size, years of usage of Teletop and teacher experience. Not surprisingly then, De Boer (2004) ends his dissertation on the development of Teletop with the note that both integrated performance support (such as a Flexibility Support Tool) and human support will be needed to bring about changes.

Nowhere is there any mentioned of the impact of Teletop on learning outcomes. One could argue that this is to be expected from a system that concentrates on course management. However, along with the use of the course management system other aspects of the teaching/learning approach also inevitably change. For example, it is quite likely that instructors are stimulated to reflect more about their design decisions when they are confronted with the set of questions posed by the Decision Support Tool.

5.4 Discussion and conclusion

There are several clear and important signals of the merits of both innovations. First, evaluations of the two products show that they are being used by the target audience to a considerable extend. Students attend to most of the information presented in the ZAPs and also have expressed very favorable opinions about the ZAPs. Similarly, Teletop has been widely adopted by instructors in higher education settings. Second, both innovations have evolved into a commercially viable product. ZAP has been sold to an important textbook publisher in the United States. And from a faculty specific product, Teletop has first evolved into the preferred course management system for the whole university and then turned into a product that is now being licensed to a considerable number of educational organizations in the Netherlands. Third, ZAPs have received important national and international awards.

But for both innovations perhaps the most critical question of all has yet to receive a positive answer. That question is, "Has the innovation changed students' learning?" In both projects this is still a highly resilient question.

For ZAPs there was the expectation that a positive answer could be found in the comparative study that was conducted. However, the experiment of Hulshof et al. (2005) did not yield the expected benefits of the hands-on activities in ZAPs. The absence of empirical support for such a claim signals that it is probably necessary to delve deeper into the various ways in which experiencing a phenomenon, as opposed to simply reading about a phenomenon, changes students' learning. The issue here is probably not whether the students learning differs. Rather the critical questions seem to be "Wherein does the student's learning vary?" and "How many trails or practice is needed for some learning effects to appear in tests?"

For Teletop the issue seems to revolve around getting the funding for such an investigation and handling its complex methodology. Obtaining the funding for conducting such a study is likely to be a challenge because arguments against funding such an enterprise can easily be generated. For example, they could be given in the form of rhetorical questions such as "Who would want to pay to find out whether something is a success or a failure when it is hard to avoid its presence?" and "Is there any reason to assume that instructors who use Teletop are not optimizing its use for their own courses, and thus improve student learning within that context?" A more optimistic stance would be that we need to have some answers to questions like "For what domains and what kinds of learning outcomes can Teletop afforded flexibility substantially increase student learning?"

For both projects attempts to finding out whether students' learning changes probably require a series of investigations along the lines of design research. That is, there is probably a need to align a few closely controlled experiments with carefully orchestrated implementation efforts that closely monitor teacher and student processes and products. Such studies will never materialize if we adhere to the belief that education inevitably changes continuously and therefore such studies would always lag behind current states of affairs. While it would

be foolish to deny that (higher) education is in an almost continuous state of flux, this is, in my view, not a sufficient argument against conducting such badly needed research. With already some strong arguments pleading in favor of these innovations, there seems to be every reason to go all the way and examine in great detail how these innovations affect teachers and students' actions and outcomes.

6 Discussion

The previous sections have provided a series of cases that illustrate both the complexity of the relationship between technology, roles and practices, and the feasibility of applying the research methods proposed as suitable for the study of impact. In this section, an attempt will be made to draw together some of the themes that emerged.

The research question about the complexity of association between technology, use, context of application and the outcomes of use has been left aside since, to some extent, all other questions contribute to this.

6.1.1 What assumptions are made in policies, and how do they achieve their effect rhetorically?

The previous literature review identified the prevalence of policies to stimulate use of technology in Higher Education, but called into question the assumptions that such documents were based upon.

With only limited study of policies, it is hard to generalise across national contexts. However, some commonalities emerge, such as the continuing desire to promote the use of technology in Higher Education and the application of market discourses. This seems equally true across all partner countries. The idea of "reform sickness" is a useful one in capturing some academics' response to this ongoing sequence of policies.

Within Bulgaria, the primary concern is on promoting use, and use is only possible once access has been provided. As such, these policies remain concerned with technical provision, rather than on the roles of teachers.

The increased sophistication of accounts of teaching with technology within UK policies is a positive step. Nonetheless, the persuasiveness of this account rests on framing current practice as inadequate – a portrayal that practicing teachers may wish to resist.

Similar policy drives are visible at institutional levels – however, these work through the control of resources (financial and time) rather than by the rhetorical positioning of academics. In other words, they influence on roles is one of legitimation, rather than social construction – particular practices are valued, instead of simply providing persuasive accounts. This can be described as a technology 'push', in that particular ways of working are promoted (such as teaching using one sanctioned virtual learning environment), although the case of Teletop illustrates how a suitably-designed centralised tool can be customised for use in a variety of contexts.

Such processes are complicated by the way in which work with technology spans a number of different organisational areas within the institution – something reflected in the way that the development of policies and initiatives can be both centrally directed and involve representation of numerous departments and services. However, it should also be noted that these large-scale, centralised initiatives are only part of the picture; they are complemented by small-scale, often personal initiatives ('projects').

The case of Kark also shows how technology itself can be implicated in policy developments, 'carrying' particular positions – for example, by instantiating procedures that are supposed to improve quality, and thus requiring teachers to engage with them.

6.1.2 Hype versus reality

Previous research (e.g. Conole, 2004) has highlighted the gap between peoples' experiences of technology and the discourses that are often used to promote it. Specifically, questions have been raised about the framework of values used to judge whether or not a particular application is successful.

Decisions to develop, purchase or promote particular systems do not seem to be evidence-based; instead, they reflect the beliefs and attitudes of those involved. This is particularly clear in the example of the ZAPs, but was also visible in the promotion of VLEs on the basis of their feature list (rather than on the *quality* of their features), but can also be seen in the way that virtual learning environments were advocated based on a list of features rather than an appreciation of ways of using them.

6.1.3 The adoption of technology

It became clear from the initial literature review that although there was great interest in adopting technology, the *process* of adoption has not been well described. 'Barriers' are often identified, but there has been a lack of attention to the perceptions and experiences of teachers who are being expected to take on the use of technology.

It was interesting to see in the UK context that familiarity with comparable technologies can be a mixed blessing to teachers. Whilst familiarity eased the process of learning to use a new resource, any losses (such as functionality absent from the new tool) were acutely felt, leading to an overall negative impression. In Bulgaria, by way of contrast, it was the problems reliability or of adapting applications designed for other cultural context (e.g. designed without support for the Cyrillic script) that caused frustration. This situation is not helped by the piecemeal purchasing of technology across institutions, complicating the process of sharing resources.

A simple account of the adoption process was also provided, moving from need, through the identification and weighing up of gains and losses, to effective use. There was also evidence that such cycles may be technology-specific, so that someone can have fully adopted one technology but then have another pass them by. Interestingly, a similar issue was identified within the Kark study, concerning the way that familiarity with existing tools influences reactions to new ones:

> Intuitive... That is a funny expression. Because nothing is really intuitive. You need to get to know a tool, right? And you get accustomed to it. You get used to it when clicking such and such icons, this and that happens. And it usually works out, because it usually isn't difficult, right? But the result is that as soon as they try to use a tool that is a little bit different, they say that "This isn't intuitive!". Then the expression only means that the tool is not exactly the same as they tool they were accustomed to first. However, we have aided people that have used Luvit, Classfronter, It's Learning... When switching tools, and making small adjustments... The new is never intuitive. But the previous one was. Rather, the first one was. No matter which particular system that was. Those who used Luvit found that intuitive. Those who used Kark found that intuitive...

All this complicates accounts of technology adoption, making it clear that people are not neat 'types' (e.g. "early adopters" or "luddites") but need to be studied in terms of personal histories and narratives.

Importantly, tensions around adoption were also identified. Many academics seem to find technology adoption an ambiguous experience, bringing the potential for (and even the experience of) both efficiency and inefficiency simultaneously, in that certain tasks are automated but new expectations are also imposed that may distract from other activities. There is a link between technology and the intensification of work, leading to a feeling of being pressurised.

There was confirmation (for example, in the follow-up study on the use of electronic resources) that familiar technologies do become taken-for-granted, which has implications for how they can be studied.

6.1.4 Staff development/professionalisation

The constant emergence of new technologies (and the revision of existing applications) implies that staff need to be engaged constantly in the development of their understanding and skills. However, many forms of staff development have proved ineffective and unpopular, raising the question of which forms are the most appropriate as interventions.

What these studies revealed was that whilst formal input may be valuable in terms of learning how to operate the technology, this works best when complemented by a process of learning how to use technology effectively *in practice*. In this respect, pilots, trial periods and experimentation (cf. "opportunities to play", as described in the follow-up study on the use of electronic resources) were seen as particularly helpful; the phrase "guided implementation" is particularly helpful in describing how formal support can still lead to common procedures, but without the imposition of directive training. (In the case of Classfrontier, this was seen as the only viable approach.)

The Teletop study reveals a related but distinct approach: rather than providing one-to-one support, a range of tools was developed (e.g. the decision support tool) and provided alongside the technical system. Provision of the flexibility support tool, for example, seems to have been useful in developing teachers' pedagogic approaches, but not sufficient in itself. Thus tool-based approaches to development seem valuable, but primarily as a complement to personal support.

Differences were also seen in students' information literacy between the initial acquisition of technical skills and the subsequent acquisition of sophistication in the *use* of the resources that can be identified. Administrators may develop sophisticated uses of technology, but this was not visible in these studies; instead, they seem likely to receive directive training and other areas of development are yet to be discerned.

6.1.5 Emergence of team-based approaches

The complexity of producing technical resources for teaching suggests that, increasingly, academics will need to collaborate with other specialists – especially if economies of scale are to be achieved. This industrialised model has been explicitly advocated in some policies, raising the question of whether it has begun to influence practice.

As has already been noted, the complexity of implementing policies about technology for learning and teaching often results in cross-institutional teams being developed. Similarly, the mixing of administrative and pedagogic work within virtual learning environments highlights the way in which different staff (or at least, staff roles) are brought together. The description of outsourcing in relation to virtual learning environments shows how such complexity may extend beyond the institution, as well as across it.

There are also developments within the context of teaching – for example, the Kark study revealed specialisation and a consequent division of labour (e.g. between lecturers, orchestrators and assignment commenters).

One further complicating factor, illustrated by the Studentportal study, is the tendency to centralise technical support. Where technicians are distant from the context of implementation, establishing coherent teams (or even simply consistent relationships) will be harder. By contrast, the 'shepherds' involved in the Kark study show how local support can be closely integrated with existing roles in a positive and successful way.

However, although there is plenty of evidence about the inter-relationships around teaching and learning, there is no evidence here to suggest that formalised teams are becoming more prevalent. (The exception to this may be outsourcing, where formal contracts are required.) There appears to be both more interaction with others and also more people (including new roles) that teachers have to interact with, but this intensification of networking around teaching remains informal.

A different kind of team-based approach can be seen in the development of ZAPs, which involved various groups during the process – teachers to provide the specification, users to test the success of resources and technical staff to undertake the development, all working in a structured way.

6.1.6 Models of learning and models of teaching

There is a tendency for technology to focus upon tasks that are relatively easy to implement – such as managing and distributing information. This often implies a transmissive model of pedagogy, which can be quite inconsistent with the constructivist values that many teachers (and developers) espouse. This raises the question of whether involvement with technology changes the way teachers teach, or talk about teaching.

Whilst it has been suggested that moving teaching online totally changes the role of the tutor, analysis here suggests that the situation is more complex. Certainly, many of the teachers do not *perceive* their role as being radically different, or in some cases, even as having changed at all.

The purposes and values that shape teacher may remain unchanged; the tasks undertaken to implement these might differ (in terms of the tools used, for example); and the operations involved (the fine-grained actions that constitute the activities) were radically different. Whether teaching changes or not thus depends on the perspective taken.

However, the perception that learning can (and should) be made more flexible does seem to be common, and has implications for both how learners and teachers organise their work.

Also important here are academics' perceptions of what particular resources can be used to achieve. The idea of 'the world' being brought into the classroom, and the associated issues around regulation, show how important these artefacts can be, both as source material but also as a form of pedagogy (as practice for scientific skills, or by requiring students to engage with "potentially dangerous" sources in an appropriate manner, for example).

Another issue is that particular resources can be associated with specific pedagogic positions. The ZAPs, for example, were created to provide an active learning alternative to the often-didactic resources that preceded them.

Prosser and Trigwell's phenomenological account of teachers' conceptions remain helpful in this area. However, within these studies, it has proved useful to contextualise discussions of teachers' roles and practices within disciplinary contexts, as these appear to influence the way staff think about teaching and learning.

7 Conclusions

The purpose of this report was threefold, in that its purpose was to show:

- That the questions previously identified are amenable to research;
- That the methods proposed for the study of impact are feasible and revealing; and
- Some preliminary extension of our understanding, relative to the position described in the previous report.

The previous review of the literature on technology and the changing role of teachers in Higher Education had identified the complexity of this topic, but did little to answer the questions raised. Progress towards this goal has been achieved through the studies described here.

The primary outcome of this work has been to validate the usefulness of the three-part model for studying impact. The division into anticipated, ongoing and achieved impact was helpful both in organising the work and in terms of the selection of research methods. Moreover, the findings generated from each of the case studies demonstrate the appropriateness of the approaches selected. This has been helpful not only in advancing the work of this project, but more importantly, in laying the groundwork for follow-on studies which can now use this model and the associated methods to frame new work.

Not all of the questions that had been identified are amenable to research, however. The process of synthesising findings from the studies revealed that two questions were unusual. The question about research methods was, perhaps unsurprisingly, a meta-question; it could only be addressed by reviewing the answers provided to the other questions. The other unusual question concerned the complexity of association between technology, use, the context of application and the outcomes of use. This also seems to be a meta-question, in that all the other questions contribute to answering it.

The other questions that were raised, however, have all been shown to be suitable for further study, as demonstrated by the development of partial answers, new perspectives and additional insights, discussed above. The question concerning approaches to staff development confirms, but adds little, to what was revealed in the initial review; this suggests that this particular question may be less of a priority than the others for further research. Instead, the guidelines already developed could be implemented to test their efficacy in practice. Equally, the lack of clear evidence about the emergence of formal teams around learning and teaching suggests that this may not be as widespread an issue as was expected. It may be worth pursuing contrasting cases where industrialised teaching does take place, but this is unlikely to be a widespread concern.

Some modest progress has been made in relation to the rhetorical effect of policies and the discrepancies experienced between hype and reality. Although specific instances have been studied here, further work in these areas would clearly be of benefit to understand the representativeness of these cases more generally. Perhaps least secure, however, are the answers developed in relation to the process of adoption or models of learning and teaching. Some tentative steps have been taken here, and proposals for possible frameworks for study

offered (the steps in adoption, for example, or the Prosser and Trigwell phenomenographic categories), although potential issues have also been identified for each. More fundamental work is required here if these questions are to be advanced.

Given the widespread relevance such research would have for practice, the timeliness of studying the process of adoption and the relationship between models of learning and teaching and subsequent practice is clear.

8 References

Becher, T. (1994) The Significance of Disciplinary Differences. Studies in Higher Education. Vol 19, No2 pp151-161.

Clarke, L. (2005) Virtual learning environments (vles) in initial teacher education - no more use than a quill pen? In proceedings of *British Educational Research Association Conference 2005*, Glamorgan, UK.

Collett, J. P., (1999) *Historien om Universitetet i Oslo. [The Story About the University of Oslo]*. Oslo, Norway: Universitetsforlaget.

Collins, M. and Berge, Z. (1996) Facilitating Interaction in Computer Mediated Online Courses FSU/AECT Distance Education Conference, Tallahasee FL, June, 1996.

Collis, B., & Moonen, J. (2001) *Flexible learning in a digital world. Experiences and expectations.* London, UK: Kogan Page.

Collis, B., & Moonen, J. (2005) *An On-going journey: Technology as a learning workbench.* Reflection document. Faculty of Behavioral Sciences of the University of Twente, Enschede, the Netherlands.

Cornford, J.R. & Pollock, N.P. (2003) *Putting the University Online*. Open University Press

Cowan, P. (2005) Merrily moodling along or in a muddle? An evaluation of the experiences of PGCE students using a moodle environment. In proceedings of *British Educational Research Association Conference 2005*, Glamorgan, UK.

Crowston, K. & Malone, T. W. (1993) The Interdisciplinary Study of Coordination. *ACM Computing Surveys*, 26 (1), 87-119.

Cuban, L. (1986) Teachers and Machines. The Classroom Use of Technology Since 1920. Teachers College Press: New York.

De Boer, W. (2004) *Flexibility support for a changing university.* Doctoral Dissertation. Twente University, Enschede, the Netherlands.

Ei arbeidsgruppe. (2003) Studentportal for UiB, Rapport frå ei arbeidsgruppe. (Unpublished report from "a working group").

Fjuk, A. (1998) *Computer Support for Distributed Collaborative Learning. Exploring a Complex Problem Area.* Dr. Scient. Thesis 5. Dep. of informatics. University of Oslo.

Fjuk, A., & Ludvigsen, S. (2002) The Complexity of Distributed Collaborative Learning: Unit of Analysis. In P. Dillenbourg, A. Eurelings, & K. Hakkarainen (Eds.) *Proceedings of the European Conference on Computer Supported Collaborative Learning* 2001, pp. 237-244. Maastricht McLuhan Institutt.

Forland, A. & Haaland, A. (1996) *The History of the University of Bergen*. University of Bergen: Universitetsforlaget.

Guribye, F. (2005, submitted) *Infrastructures for Learning: Ethnographic inquiries into the social and technical conditions of education and training*. PhD Thesis, Department of Information Science and Media Studies, University of Bergen, Norway.

Haagensen, R. (2003) Opplæringssystemet Rabilda : evaluering av et e-læringssystem for radiologistudenter ved Haukeland Universitetssykehus. Unpublished Hovedfag Thesis. Department for Information Science. University of Bergen.

Håland, C. (2004) Monitoring the usability of the Student Portal as an evolving ICT-artefact. Unpublished Master Thesis. Department of Information and Media Studies. University of Bergen.

Hammond, M. and Wiriyapinit, M. (2004) Carrying out Research into Learning Through on-line Discussion: Opportunities and Difficulties. *Proceedings of the Networked Learning Conference* University of Lancaster, UK.

Hannan, A. & Silver, H. (2000) Innovating in higher education: teaching, learning and instructional cultures. Buckingham: Society for Research into Higher Education and The Open University Press.

Havikutvalget (2000) Fleksibel Læring på den Virtuelle Campus. (Report from the Havik committee). [Available October 2005 from]: http://www.uib.no/dak/iktl/

Henkel, M. (2000) *Academic identities and policy change in Higher Education*. London: Jessica Kingsley.

Hill, S. (1988) *The Tragedy of Technology,* London: Pluto.

Hulshof, C.D., Eysink, T.H.S. & De Jong, T. (in press) *The ZAP project: Designing interactive computer tools for learning psychology*.

Hulshof, C.D., Eysink, T.H.S., Loyens, S., & De Jong, T. (2005) ZAPs: Using interactive programs for learning psychology. *Interactive Learning Environments, 13(1-2),* 39-53.

IKTL-Reference Group. (2000) Report. Internal report. Appendix to Havikutvalget (2000).

Jones, C., Zenios, M and Griffiths, J. (2004) Academic use of digital resources: Disciplinary differences and the issue of progression. In Banks, S., Goodyear, P., Hodgson, V., Jones, C., Lally, V., McConnell, D and Steeples, C. (Eds.) *Networked Learning 2004: Proceedings of the Fourth International Conference on Networked Learning 2004.* Lancaster: Lancaster University and University of Sheffield pp 222–229.

Jones, C., Zenios, Z., and Markland, M. (2003) Digital Resources in Higher Education: Pedagogy and Approaches to the use of digital resources in Teaching and Learning. CAL '03 8-10 April, Queen's University, Belfast, Northern Ireland.

Koch, C. (2001) Enterprise resource planning. Information technology as a steamroller for management politics? *Journal of Organizational Change Management*, 14(1), pp. 64-78.

Kuutti, K. (1996) Activity theory as a potential framework for human computer interaction research. In Nardi, B. A. (Ed.), *Context and consciousness: Activity theory and human-computer interaction,* 17-44. Cambridge, MA: The MIT Press.

Larsen, R. (1996) The story about a university. In Magazine for the University of Bergen, No. 1-2/96.

Latour, B. (1987) *Science in Action.* Cambridge, MA: Harvard University Press.

McDowell, L (2002) Electronic information resources in undergraduate education: an exploratory study of opportunities for student learning and independence. *British Journal of Educational Technology* Vol 33 (3) pp 255–266.

Mick, G. D. and Fournier, S. (1998) Paradoxes of technology: consumer cognizances emotions and coping strategies, *Journal of Consumer Research* 25(September): 123-142. Available at: http://gates.comm.virginia.edu/dgm9t/Papers/Mick%20and%20Fournier%201998%20Paradoxes%20of%20Technology.pdf Last visited 7.11.05.

Ministry for Church, Education and Research Affairs (1997) Notice to the press, Nr. 102-97. The Evaluation Award 1997: Department of History at The University of Bergen wins first prize. (http://www.nettbasar.no/odinarkiv/norsk/dep/kuf/1997/pressem/014005-070211/dok-nn.html 17.10.2005)

Mjøsutvalget: http://odin.dep.no/ufd/norsk/publ/utredninger/NOU/014001-020004/index-dok000-b-n-a.html

Norgesuniversitetet. (2005) Utredning om digital tilstand i høyere utdanning. Om forhold knyttet til bruk av IKT i undervisningssammenheng. [Report available October 2004 from:] http://norgesuniversitetet.no/Skriftserier/1118136973.46

Oliver, M. (2003) Looking Backwards, Looking Forwards: An Overview, some conclusions and an agenda. In (ed) J. Seale, *Learning Technology in Transition: From individual enthusiasm to institutional implementation*. Swets and Zeitlinger, Netherlands p. 147-160.

Pollock, N. & Cornford, J. (2004) ERP systems and the university as a "unique" organisation. *Information Technology & People*, 17(1), pp. 31-52.

Potter, J. and Wetherell, M. (1987) *Discourse and Social Psychology: Beyond Attitudes and Behaviour*. London: Sage.

Price, S., Oliver, M., Fartunova, M., Jones, C., van der Meij, H., Mjelstad, S., Mohammad, F.,, Nikolov, R., Wake, J. & Wasson, B. (2005) *Review of the impact of technology-enhanced learning on roles and practices in Higher Education.* Kaleidoscope project deliverable 30-02-01-F.

Prosjektgruppen for implementering av Classfronter. (2005) Utprøving av Studiestøttesystemet ClassFronter ved UiB. Unpublished final report.

Prosser, M., & Trigwell, K. (1999) *Understanding Learning and Teaching: The Experience in Higher Education.* Buckingham: SRHE and Open University Press.

Rogers, E. M. (1995) *Diffusion of Innovations* (4th Edition). The Free Press.

Salmon, G. (2004) *E-moderating: The Key to Teaching and Learning Online* (2nd Edition). New York: Routledge Falmer

Seale, J. (2003) Enthusiastic Implementation. In (ed) Jane Seale, *Learning Technology in Transition: From Individual Enthusiasm to Institutional Implementation*. Swets and Zeitlinger, Netherlands p. 1-16.

Sevik, K. (2003) RadioWeb : the design, development and formative evaluation of web-based learning material for radiology. Hovedfag Thesis. [Available October 2005 from:] http://www.ub.uib.no/elpub/2003/h/704002/

Smith, H. & Oliver, M. (2002) University teachers' attitudes to the impact of innovations in ICT on their practice. In Rust, C. (Ed), *Proceedings of the 9th International Improving Student Learning Symposium,* 237-246. Oxford: Oxford Centre for Staff and Learning Development.

Sørborg, Ø. & Strømme, A. (2004) Læringsplattformenes inntog i skolen. [Available October 2005 from:] http://www.itu.no/Dokumenter/Tekster/1084439988.37/1084515833.44/1093004085.08/view

Sørensen, E. K. (1997) Learning in Virtual Contexts. Navigation, Interaction and Collaboration. Ph. D. Thesis, Department of Communicaton, Aalborg University.

Stortingsmelding nr 27. (2001) Gjør din plikt, krev din rett. Kvalitetsreform av Høyere utdanning. [Available October from:] http://odin.dep.no/ufd/norsk/publ/stmeld/014001-040004/index-dok000-b-n-a.html

Thue, F. W. (1996) Three Stages of Development of Humanities in Bergen. In Magazine for the University of Bergen.

Tolo, A. & Dysthe, O., (2004) *Digitale mapper og responspraksis i eit tradisjonelt universitetsfag*. [Digital Portfolios and Feedback Practices in a Traditional University Course; in Norwegian] Report from the project: The Student as a Resource. University of Bergen.

Utdanningsavdelingen. (2003) Handlingsplan for IKT-støttet læring i de nye studieprogrammene.(Plan of action document, from the Department of Education). [Available October 2005 from:]http://www.ub.uib.no/felles/organ-styr/styre/2003/S09-2003-h.doc

Utdanningsavdelingen. (2004) Prosjektplan for implementeringen av Classfronter. (Project plan for the implementation of Classfronter at UoB) [Available October 2005 from:] http://www.uib.no/ua/informasjon/lms/Prosjektplan.htm

Weller, M. (2002) Delivering Learning on the Net, the why, what and how of on-line education. Kogan Page Ltd. UK.

Wenger, E. (1998) *Communities of practice: learning, meaning, and identity*. New York: Cambridge University Press.

Winner, L. (1994) "Three Paradoxes of the Information Age," in Culture on the Brink: Ideologies of Technology, Gretchen Bender and Timothy Druckey, eds., Dia Centre for the Arts, Discussions in Contemporary Culture, No. 9 (Seattle: Bay Press, 1994), pp. 90-98.

9 Appendix A: research questions arising from the review

9.1.1 Policy change

- Are policies justified empirically?
- What assumptions are made in policies, and how do they achieve their effect rhetorically?

9.1.2 Hype versus reality

- What is the value of affordances in understanding how technology can be used?
- What values (or rhetoric) influences judgements about the success or failure of instances of technology implementation?

9.1.3 Complexity of association

- What is the relationship between technology, use, context of application and the outcomes of use? (Should one of these be a priority for research?)

9.1.4 The adoption of technology

- Can we adequately describe the process of adopting technology?
- How can we account for the integration of technology in a way that recognises 'forgotten' successes?
- How do academics perceive technology, and how do these perceptions affect their subsequent practice?

9.1.5 Staff development/professionalisation

- How can academics be encouraged to engage with staff development? (Are particular forms of intervention or topics important to promote?)
- How can academics be supported in carrying out evaluations of their practice?
- Can academics and/or support staff be encouraged to become researchers of their own practice?

9.1.6 Emergence of team-based approaches

- How does the formation of teams affect academics (and their relationship with others)?
- What is their role within such teams?
- Does it include all academics or will certain academics emerge as the 'technology team' experts?
- Does this have an impact on accreditation?

9.1.7 Models of learning and models of teaching

- What models of learning do teachers hold and can these be changed?
- To what degree does the teacher 'impart' knowledge?
- How does a teacher facilitate learning, for example in helping the student to undertake appropriate activities?
- How can learning objectives and forms of assessment be reconceived to reflect this broader understanding of what it means to teach and learn?

9.1.8 Research methods

- What are the appropriate research methods for studying this area?

10 Appendix B: the collated discourses about teachers in Higher Education from the 2005 UK e-strategy

10.1 Social networks of teaching

Teachers are part of social networks. Teachers are already part of professional online support networks, which can be an invaluable source of support and information.

ICT provides easy and efficient ways of keeping in touch, so if there is a unified approach to technology, teachers will be able to collaborate more easily with colleagues in other institutions to collaborate, share ideas and practices and offer wider curriculum choice. However, professional communities must be able to plan for these integrated ICT systems, which will work better when networks and systems are 'interoperable', i.e. they are designed around a common framework and use open standards for information, data and resources.

Such networks are often subject-based. Because there is sufficient commonality in the pedagogical challenges at different levels of subject teaching, cross-sector networks based on subject areas will be encouraged.

10.2 People whose practice is limited by their context

Various pressures make innovation difficult. They may need help making the most of technology in everyday work, because they might want anything, from a library of video clips to use in presentations, to management tools to reduce paperwork.

Staff often find themselves working against the grain of the organisation as they try to introduce more ICT. They cannot do this without the support and leadership of their senior managers. Clear strategic leadership in ICT is essential. Even the most technologically literate staff can only perform at their best when senior management understand the strategic role of ICT for their organisation. The government must also ensure that teachers, lecturers and practitioners are motivated by their managers to make professional use of ICT. Recognition and rewards for effective e-learning work, appropriate career development opportunities and better accreditation of good practice will provide the right environment for teachers, lecturers and support staff to feel confident about developing their skills in this direction.

As well as supportive leadership they need effective training; time to experiment and refine their practice; opportunities to share ideas and experiences with other practitioners, and to adapt them to their own work; and sufficient support from experts in online library skills, learning technologies and learning design.

Teaching staff will be supported through the Higher Education Academy (HEA, www.heacademy.ac.uk) which is designed to support the development of courses and policies which improve the student's experience of UK higher education. Common collaborative development support will be provided for institutions offering remote e-learning opportunities, beginning with a joint HEA/JISC e-Learning Advisory Service set up within the national e-learning advice centre for 2006.

10.3 People in need of training

Training and professional development are crucial in a field that is constantly evolving. The government will provide initial training, professional development, support and appropriate access to make sure that all staff have the basic grounding, and are able, throughout their working life, to upgrade their skills and knowledge in the use of ICT and e-learning. Good practice should be recognised through accreditation.

Online learning will be incorporated into courses for new staff and other staff development programmes. To assist in raising the profile of this kind of professional capability, a national professional development framework is needed that includes credit for innovation and effective practice in the use of ICT in education and work-based learning. The government will encourage the development of proposals already under way in QCA, the Teacher Training Agency (TTA) and Lifelong Learning UK (LLUK).

10.4 People who need things to improve their own skills and knowledge

Teachers wish to improve their own skills and knowledge about technology use. Those wishing to do so should have access to flexible courses, with advanced support for those seeking to specialise further.

As well as having effective training, teachers need time to experiment and refine their practice; opportunities to share ideas and experiences with other practitioners, and to adapt them to their own work; and sufficient support from experts in online library skills, learning technologies and learning design. Teachers should be given the means to experiment discover their own ways of using their time better, and good practice in ICT should be rewarded.

10.5 Using ICT to bring their lessons to life

ICT can be used to transform teaching and learning, and can help to improve outcomes, through shared ideas and more exciting lessons. It can be the difference between learners who are unmotivated, and a class that wants to participate; new technologies are capable of creating real energy and excitement. ICT also allows a new relationship with learners to develop. Personalisation changes how practitioners work. Staff must be sufficiently confident, they must have the right skills and they must have access to the right technology, if they are to use ICT to transform front-line services.

ICT takes them beyond the confines of the traditional classroom enriching lessons by taking pupils, through online conferencing or web-cams, to authentic environments from wildlife parks and museums to overseas classrooms. It can also blur traditional boundaries between teaching and research.

However, the teacher who makes his or her subject come alive for their class is more effective than a computer programme that is merely an electronic page-turner. The familiar and effective teaching methods of listening, reading, writing and class discussion will of course remain important. Traditional teaching methods and e-learning can and should complement each other.

Consequently, we need a new understanding of the pedagogies appropriate for a 21st century education system. This is essential if we are to succeed in innovating and transforming teaching and learning. Traditional methods have not achieved enough. The wider availability

of new technology means that we have both the opportunity – and the responsibility – to explore new approaches to teaching and learning. Our teaching institutions ought to be advancing beyond the traditional formats that are still so prevalent. There is a lot of change already under way, but used in a spirit of exploration, ICT can encourage us to think afresh about teaching and learning.

Engaging educators in improving teaching, learning and assessment through more innovative e-learning resources and activities is a priority. To make this happen, we must provide the means and motivation for teachers and practitioners to use ICT well, enabling all staff to become effective ICT users and innovators.

10.6 Teachers as people who will be able to assess differently using ICT

ICT supports assessment playing a more formative role – assessment for learning, not just for judging. It can be used to give feedback on students' progress, and for managing marking and assessment.

Using technology to streamline assessment procedures and enable online assessment on-demand is a long-term objective. Development work is beginning now, focusing on lower-volume qualifications.

10.7 People who make (partial) use of resources

Teachers, lecturers and tutors may have different approaches to teaching, but they increasingly want easy access to a common set of digital libraries' assets and commercial educational software so that these new resources can be brought into their teaching. The government must ensure wider use of existing resources across the sectors and get better value from our earlier investment.

But we are not yet deploying existing resources effectively, nor exploiting the full capability of the technology. We have to address several critical problems in the provision of e-learning: the quantity and range of resources available to teachers and learners; the quality and degree of innovation of those resources; and the embedding of e-learning and ICT across the curriculum. E-learning products should be based on robust evidence of effective learning and teaching. Additionally, for technology to work well, we need good teachers and tutors making good use of it

Improving the quantity and quality of e-learning is irrelevant, however, if it is not done within the context of curriculum development. In HE, the quality of ICT use often falls behind the quality of provision. It is crucial that we fully examine the potential for technology to modernise the curriculum and its assessment. Educational resources are usually developed for a particular curriculum subject and age range. This is appropriate for the traditional media of print and video, less so for digital media because the latter are much easier to recombine for different purposes. We now have a range of digital resources for education, but their usage is typically confined to the one curriculum area or age group for which they were designed, and have rights clearance. We need a much more open approach to such resources to make best use of them.

As they gain confidence, they will want more flexible resources they can adapt to fit their learners' needs. Design flexibility for teachers should be a focus. Flexible learning design

packages would enable teachers in all sectors to build their own individual and collaborative learning activities around digital resources. This would promote innovation, by enabling practitioners to create, adapt, re-use and share resources through common access to digital resources for e-learning.

10.8 Ensuring standards

Teaching staff work to the standards set by the inspectorates, who therefore play a critical role in driving reform. These have each begun to develop their approach to evaluating the quality of ICT practice. We want to achieve a common understanding of what counts as high quality provision and support for students as they move through the system, and will encourage the training of inspectors in all sectors to focus on improving practice. A common evaluation framework, with associated training for all education inspectorates should be in place by 2006. This should be developed by encouraging the transfer of good practice in evaluating the use of ICT to improve learning and teaching across the education inspectorates.

A minimum level of ICT competence for teachers and other practitioners, will be defined, and new ways of working will be promoted. The use of e-learning will be incorporated into the accreditation framework of the HEA for new staff courses by 2006, leading to the embedding of e-Learning into all new staff courses.

Intensive user trials and rigorous testing within the end-user environment will be needed to ensure that products improve learners' understanding of their subjects and their wider practical and cognitive skills.

10.9 Researching ICT in teaching

Research is essential to make the most of ICT in teaching. Although teaching staff are encouraged to experiment and innovate, research institutions and research councils need urgently to develop research in pedagogy and e-learning. This research should reflect how teachers teach and learners learn. As we research and develop more innovative pedagogical methods, we should look for ways to deliver them more effectively through e-learning. The government must ensure that this research in e-learning and the pedagogy of subject teaching is given full recognition.

Our priority is to build a professional workforce which can both collaborate and innovate. Staff, together with their unions and professional associations, are well placed to help us discover the most effective ways of improving support for children and learners through ICT. We must give them the means and the motivation to do this.

11 Appendix 3: Interview schedule

Blackboard INTERVIEW 1

Question	**Possible prompts**
Why are you changing from FirstClass to BlackBoard? What are your views on the policy?	Why was this policy made/ this technology chosen? What arguments/ rationales were given?
How do you think this technology will support/impede your existing approach to teaching Do you think it will improve learning?	Lesson content What you teach? How you teach How? In what ways?
What concerns you most about implementing this technology? Why?	What pitfalls do you envisage? Why?
Describe a lesson where you envisage using BlackBoard and explain how you will use it	Why? How? How might this affect 'x'?
Do you envisage having to work with others to do this? How familiar are you with this technology? Do you think you will need expert help? How do you envisage getting it?	Collaboration? Training? Why? What in particular?
How do you think you will evaluate this? What will guide your evaluation of whether this is successful	