e-teaching@university

e-teaching.org: Qualifying Academic Teachers for the Next Decade - A Pragmatic Approach.	
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Summary

1 Abstract

This paper presents the web educational portal e-teaching.org as the central part of a strategy to promote the effective use of technologies in academic teaching in Germany.

Since we see the qualifications and support of academic teachers as pivotal in the process of implementing new tools, the design and content of the portal start from teaching scenarios familiar to the lecturers and are guided by their different motivations and expectations. e-teaching.org addresses teaching staff of various levels of knowledge and experience. Thus the development of the content and structure of the portal takes into account that it should be integrated into a supervisory strategy of embedding e-learning and e-teaching in higher education.

In this paper we discuss the motivations, conception, and realisation of the online portal e-teaching.org as well as first results of evaluation research accompanying the project.

2 Introduction

There are many diverse possibilities of the new information and communication technologies (ICT) for information, learning, communication, and cooperation. For several years, this has been a challenge in all educational areas, and especially in higher

education. In the mid-nineties, a first survey on the organisation of media-based teaching in German higher education appeared (Lewin et al., 1996). This survey documented 979 projects using digital media for teaching. The authors recorded individual activities by enthusiastic people but very little cooperation between institutions. In most cases, the media were used to supplement traditional forms of teaching, but never to their full potential.

Ultimately, it is not astonishing that respected advisory boards have commented on the possibilities and consequences of the use of ICT in higher education, for example the *Wissenschaftsrat* (Science Council) (Wissenschaftsrat, 1998), the *Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung* (Federal-State Commission for Educational Planning and Research Promotion) (BLK, 2000), and the *Hochschul-Rektoren-Konferenz* (Association of Universities and other Higher Education Institutions) (HRK, 1997). They all agree that use of digital media will become a structural and competitive factor for institutions of higher education.

This leads to the question of what factors are essential for the successful and sustainable integration of digital media in higher education? Based on an evaluation of the extensive promotion of e-learning projects within the “New Media in Education” funding programme by the German Ministry for Education and Research (BMBF), Kleimann and Wannemacher (2004) offer guidelines for securing the long-term consolidation of e-learning initiatives. They detect nine dimensions that are responsible for a sustainable implementation of e-learning in higher education: strategy, technology, didactic and curricular embedding, organisation, financing, competence and acceptance, public relations, management of rights, and quality assurance. Similar factors for a successful introduction of technology in teaching and learning were detected by Wills and Alexander (2000). By naming numerous activities for different actors (such as projects and pioneers, universities, sponsors etc.), on each of these dimensions, Kleimann and Wannemache (2004) create a matrix of measures (p. 104). Within this matrix the teachers’ competence has a key position in order to break off the project character and transform the initiatives into a solid structure. At the same time it shows that staff development has to be integrated into a supervisory strategy and that it has to go beyond technical and didactical skills training.

These recommendations correspond with those made by Oliver and Dempster (2003) for the situation in the UK. They argue for an approach that focuses on staff development as a central strategy to embed e-learning. Though in the process of strategic staff development technical and pedagogical support is very relevant, for a sustainable development it is

crucial to take into account the “operational context” (p. 144) of institutional structures, disciplinary models of teaching practices, and individuals’ motivational situations.

The evaluation research accompanying the “New Media in Education” funding program (see above) done by Rinn et al. (2004) also determined academic media competence as a crucial factor to promote the adequate use of digital media. In particular they found an especially great demand in the didactical/methodological realm as well as a need for consulting and practical support. Similar results were found in an online survey of German higher education institutions (Lütke-Entrup, Panke & Tourlamain, 2003).

Considering the results of these analyses, appropriate concepts of teacher training and structures of consulting and support have to be developed. The major goal of the online portal e-teaching.org is to accomplish this task. It concentrates on the promotion of teachers’ knowledge about new media in education, but the development of the content and structure of the portal takes into account that the portal should be included into a supervisory strategy and that the teachers’ competence should cover didactical and technical skills as well as knowledge about strategic, organisational, and financial aspects.

As a measure to support the dimension of sustainability deemed “competence and acceptance”, Kleimann and Wannemacher (2004, p. 113) propose the development of an information portal that bundles up relevant information, introduces centres and activities of the university, offers discussion boards on relevant e-learning topics, and provides information about projects located at a certain university. The portal e-teaching.org goes one step beyond this recommendation while following an integrative strategy: it not only offers general contents in order to promote staff development but also provides the opportunity to add location-specific information such as support activities and projects. This enables particular universities to use the general contents and at the same time to include the portal into its specific strategy to embed e-learning activities.

An analysis of contents and functions of 53 German and English-speaking portals that focus on education and virtual university showed that there mainly are three types of approaches: a) portals that concentrate on a specific topic (e.g. http://www.uni-lernstadt.de offers information specifically on copyright); b) portals that address a local target group (e.g. http://ltn.unibas.ch promotes a variety of information suit to members of the University of Basel); and c) portals that concentrate on building a virtual community of interested users (e.g. http://www.fnl.ch). In view of the profound arguments by Kleimann and Wannemacher (2004) and Oliver and Dempster (2003) - that staff development will only succeed as part of a supervisory strategy and that it has to go beyond technical and didactical skills training - we see a demand for an approach that consolidates these

specifications. The portal e-teaching.org offers practicable and broad information about using digital media in teaching and about how to solidify this use. In addition, specific functions of the portal allow certain institutions to add location-specific information and by that adapt the portal to the needs of a certain strategy.

Another unique feature of our approach is a close combination of online resources and local support activities. In cooperation with the Bertelsmann Foundation, the Ministry of Science and Research of the state North-Rhine-Westphalia established local *E-Competence-Teams* at the universities of Duisburg-Essen and Wuppertal. Within the qualification initiative e-teaching@university these teams support the universities' teaching staff integrating digital media by using the online portal as one important tool. A variety of portal functions providing general and local information enhance the possibilities of supporting the local E-Competence-Teams. The accompanying formative evaluation that aims to optimise the portal e-teaching.org as well as its fit with the local support activities is accomplished in close cooperation with members of these local E-Competence-Teams (see section 6.).

e-teaching.org is part of the initiative *Bildungswege in die Informationsgesellschaft* (educational pathways to the information society) funded by the Bertelsmann Foundation and the Heinz Nixdorf Foundation. Within the project, the online portal e-teaching.org is developed by the Knowledge Media Research Center in Tuebingen with the German Zope User Group at the University of Bielefeld as a partner.

3 Information Architecture

With the term "Information Architecture", Rosenfeld and Morville (2002) describe the organisation of information in a systematic way that allows the user to browse strategically through the information building and that information once found can be found again. The metaphor of architecture refers to the process from a blue print to a solid building that enables the user to navigate through a website. We describe the design of the portal by means of five basic aspects of designing web information systems detected by Löwenberg (2002): content, structure, function, navigation, and usability. Löwenberg (2002) stresses that each of these aspects has to be adapted to the specific needs of the internet.

3.1 Content and Structure

The content is structured along certain access sections. Through these access sections the user is able to find an individual way to the content based on specific interests, motivations, and different levels of knowledge. Numerous links between the sections build

a non-linear structure and offer the possibility of very individual access ways to the content. First results of log file data analysis suggest that due to a large range of variation of navigation paths, the identification of often-used “main trails” is hardly possible (see section 6.1.1).

In addition, the structure of the access sections refers to a multidimensional concept of media competence: Wedekind (2001) stresses that methodological, didactical, technical, design-oriented, and organisational knowledge of e-teaching and e-learning is crucial for an effective and sustainable use of technology in higher education.

Together with the factors for a successful introducing of technology mentioned above these dimensions led to the present content structure of the portal e-teaching.org with its access sections offered at the introduction level as “Teaching Scenarios”, “Media Technology”, “Didactic Design”, “Project Management”, “Best Practice”, “Material”, “News & Trends”, and “My University".

Teaching Scenarios
This section starts from teaching scenarios familiar to the lecturers. They can learn how to use technologies as educational tools through examples of everyday teaching situations at higher-education institutions (e.g. seminars, lectures, tutorials). This access section presents an overview of the wide range of possibilities in which multimedia and telemedia tools can be used to support student learning.

Media Technology
This section provides information on products suitable for e-teaching and e-learning. Due to the diversity and rapid changes in this sector and its complicated and broad spectrum of products, a process of filtering is very important. We do not only present the technical “state of the art” but also emphasise on effective solutions that are suitable to improve the quality of the learning processes.

Didactic Design
This section covers the development of learning environments from conception to evaluation. Media designed for educational purposes should be characterised by functionality, simplicity, and consistency (Ballstaedt, 1997). These principles are applied to developing and implementing steps of pedagogical concepts. Teachers get assistance on practical applications of media design and useful background information.

Project Management
This section describes how to plan the development and implementation of an e-teaching project effectively. E-teaching projects should not be realised as isolated activities but in

close cooperation with institutional, technical and content-related aspects. This access section portrays the professional accompaniment of implementing e-teaching.

Best Practice
This section shows how e-teaching can be a very rewarding experience by providing a variety of examples that make explicit the ways in which digital media can be used in different teaching scenarios. While “Teaching Scenarios” gives an overview of potential scenarios this section describes specific projects that had been realised at different universities and can work as ready-made models to use for teachers with little experience. We offer high-end examples as well as excellent pragmatic solutions to serve all levels of e-teachers.

Material
This section offers lists of literature, projects, and portals. The selection is not exhaustive, rather it concentrates on some high-quality examples and materials and provides descriptions for each entry.

News & Trends
This section informs users about technical and methodical developments in the field of e-teaching. Users can read up on current announcements for competitions and funding programs, and in the calendar of events, they can look for conferences, workshops, and fairs.

My University
This section gives access to specific local information edited by associated universities. Details of the local interface concept are described in section 4.

In addition to these access sections the portal offers a problem-oriented access through FAQs that lies across the structure described above. Details of the problem-oriented access is described in section 6.2.2.

3.2 Function

Content-related functions such as search forms as well as additional functions such as contact forms should be defined (Löwenberg, 2002). A database-oriented information retrieval approach complements the options of exploring the information structure described above. e-teaching.org offers a full text search function that allows to search the content, assigned key words, descriptions and other meta-data. In focusing on the verification of the search results as part of the information retrieval process, Marchionini (1995) stresses the way these results are presented as important for an effective valuation. The results of the search function of e-teaching.org come with short descriptions of the documents to support the verification process. In addition, the portal offers common functions such as a contact form, a print option, a send option, a help option, a sitemap, a

breadcrumb trail, and a glossary. The further development will include community functions, e.g. discussion boards.

3.3 Navigation and Usability

The navigation of the portal e-teaching.org has to be non-restrictive to motivate a explorative and self-directed use. Hence we chose a hierarchic structure that in some cases is combined with a cluster structure (for details on hierarchic and cluster structured content see Sullivan, 2003; Gerdes, 1997). The hyper textual organisation represented in the menu allows different access ways to the content based on individual interests and preferences. The cluster structure is a result of cross-references between certain segments of the hierarchic structure and provides a non-sequential selection of contents.

Löwenberg (2002) stresses that with regard to improving usability, colours, forms, labels, positions, and behaviour of the functional elements, e.g. the navigation, have to be plain and recognisable. The design of the navigation of the portal e-teaching.org takes these considerations into account. To avoid confusion the depth of navigation is limited to four levels. Navigation levels three and four are presented at the right side of the screen to allow direct access of parallel sections and sub-sections. In addition, we use colour as an important aid to support the users orientation. The systematic use of colour can stress important concepts and highlight differentiations (Hooper & Hannafin, 1991). At e-teaching.org every access section and its appending sub-sections are represented by the same colour to simplify orientation. After choosing an access section this colour can be found in the navigation menu as well as in the key visuals on the entrance sites of each access section.

Since November 2003 only 11% of the users entered the portal at the homepage www.e-teaching.org. With regard to usability it is of primary importance to offer a clearly arranged navigation system at every level. The navigation of e-teaching.org allows the majority of users that enter the portal (at deeper and deepest navigation levels) not only to determine their position within the portal easily but also to move to higher navigation levels (e.g. entrance pages of the access sections, homepage) with one click.

4 Location-specific Information

A unique feature of the portal e-teaching.org is a combination of general and location-specific information. The portal may not only be used by individual lecturers but can also be integrated in local support initiatives. It offers a technical infrastructure that allows

editors at associated universities to add location-specific information to the general content and thus designs a local interface for the user.

This feature allows associated universities to use the portal within their specific strategy to embed digital media into teaching and learning. For example, editors at these universities may inform users about their specific technical equipment and present the existing consulting possibilities at their institution. When “logging-in” to a university at the menu, the location-specific content is dynamically integrated into the portal navigation. The editorial system of e-teaching.org (see section 5.) offers three ways of adding location-specific information: designing an autonomous location-specific access section (“My University”), adding location-specific links to documents of the general content, and adding location-specific information to documents of the general content. Users can get access to the local interface by choosing a university from a pull-down menu at the access section “My University”.

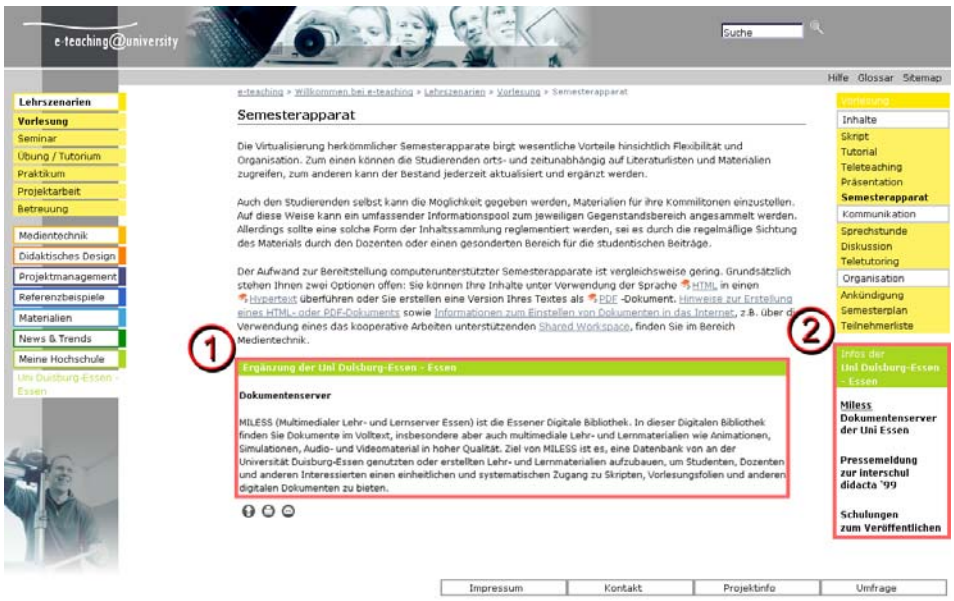


Figure1:Local information added to a global site in e-teaching.org (1. location-specific information; 2. location-specific links)

5 Technical Infrastructure

The editorial system of e-teaching.org is based on *Plone*, an open source content management system (CMS). *Plone* provides workflow support, pre-configured roles and editing status, a set of content types, keyword management, a search engine, and forums. The “rapid prototyping” concept (Connell & Shafer, 1989) gives a framework for further development. In this concept, a prototype is provided at an early stage in the course of a

project. This prototype conforms to the basic requirements and is evaluated and modified if necessary.

Plone is constantly adapted to the needs of the editorial staff. In the course of a project, gradual extensions of the prototype are implemented and each one continuously re-evaluated. The technical realisation of the portal is accomplished in close co-operation with the open-source community “German Zope User Group”. Software developments from the project are integrated into the open-source CMS *Plone*.

6 Evaluation

Comprehensive evaluation studies conducted at the Knowledge Media Research Center in Tuebingen accompany the development and implementation of e-teaching.org. Firstly, we continuously analyse data from log files and online surveys. The results provide initial indicators of the approach’s acceptance. During the developmental stage and in the context of a formative evaluation we collect data to optimise the portals design and contents. Furthermore, the formative evaluation aims to adapt the portal to local support strategies at the associated universities.

A summative evaluation will focus on the use of the blended learning arrangement and its effects on the target groups. As a theoretical framework, the model by Friedrich, Hron and Hesse (2001) will be used, which describes the relation between inputs (prerequisites of learners and learning environment), processes (interaction of learners with the technology, individual learning processes, interaction with other persons), and outcomes (individual and collective results of learning). The data will give clues as to how intensively and regularly the portal is used by individual learners. Furthermore, the data will show the results on media-specific attitudes and behaviour of the target groups. Both use and effects will be used to assess the acceptance of the portal e-teaching.org.

6.1 Initial Indicators of Acceptance

Although the portal e-teaching.org is in a developmental stage and the previous experiences are limited at the present time there is evidence that suggests initial successes in achieving main targets of the approach. We use log file analysis to find out about the total extent of usage as well as to gain information about how the portal is used. In addition, we continuously analyse the user valuations that we receive from online surveys.

6.1.1 Log file analysis

Because of the limitations of log file data, statistics based on log files should be scrutinised closely and interpreted very cautiously (compare Heindl, 2003). The main problems are a) to distinguish individual users and b) the incomplete picture of use because of caching. Multiple users may have the same IP address (e.g. because they sit behind one proxy server) and appeayr to be a single user. At the same time single users may appear as multiple users because of dynamic IP assignment (used with dial-up internet accounts). The caching of browsers and proxy servers reduces the quantity of use recorded by the server.

However, considering these limitations log file data can still provide some meaningful statistical indicators of web site usage. Because of the difficulties of identifying single users, and because there has not yet been systematic marketing to popularise the portal, we do not concentrate on absolute but on relative quantities. As Figure 2 shows, the amount of users and sessions per day indicating the total extent of usage increase continuously. Indices that refer to how intensely the portal is used such as average session duration, average session per visitor and percentage of sessions by repeated users decreased in January and February 2004 and have increased since then. In January and February university teachers in Germany usually are very busy with exams and student support activities because it is the end of the semester, this may explain why the portal was used less intensively in this period. To give more evidence for this a long-term observation of log file data is needed.

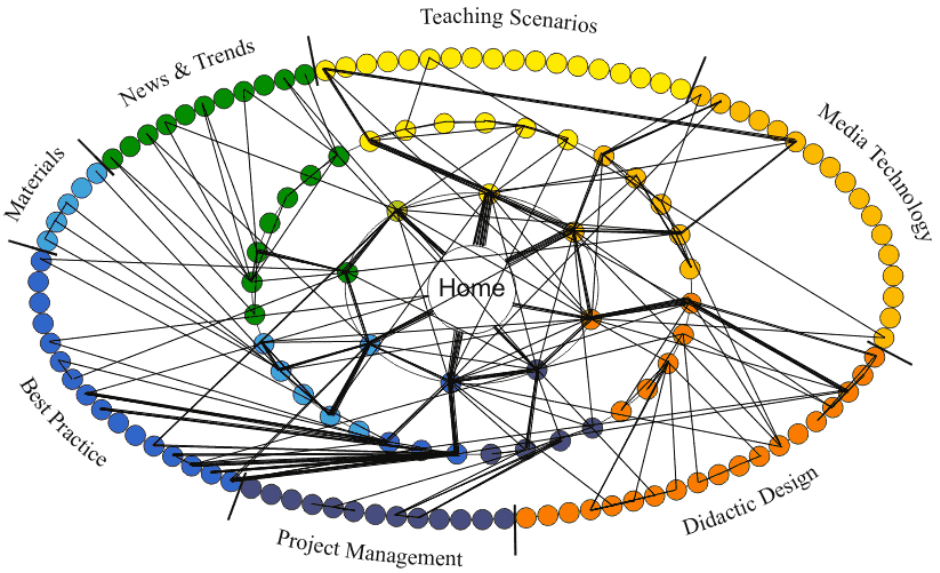


Figure 2: Log file analysis: total extent and intense of usage

We also use log file data to learn about how the users move through the portal. The tracking of navigation paths gives clues about frequently used main trails as well as about how the different content levels are used. Figure 3 depicts the navigation paths of 66 users that entered the portal at the homepage on February 18th and 19th 2004. The three ellipses

represent the first three navigation levels. Each circle on these ellipses represents a content element in the navigation menu. Even when a very short arbitrary period is analysed, the results give valuable hints about main trails and content use. As the figure shows, very few main trails can be detected. One of these main trails refers to first steps of a linear sequence starting at teaching scenarios. In essence one more main trail emerges from the figure: many users that started at the homepage then moved to the access section “best practice” and then browsed systematically through the examples. Altogether the tracking of navigation paths results in a picture of very differentiated use: there are a lot of individual ways through the content and broad areas of the contents were visited.

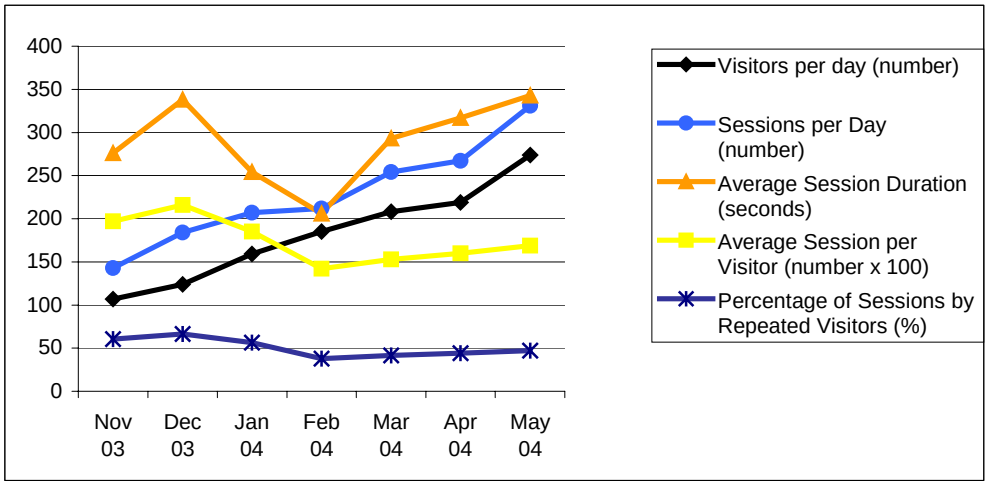
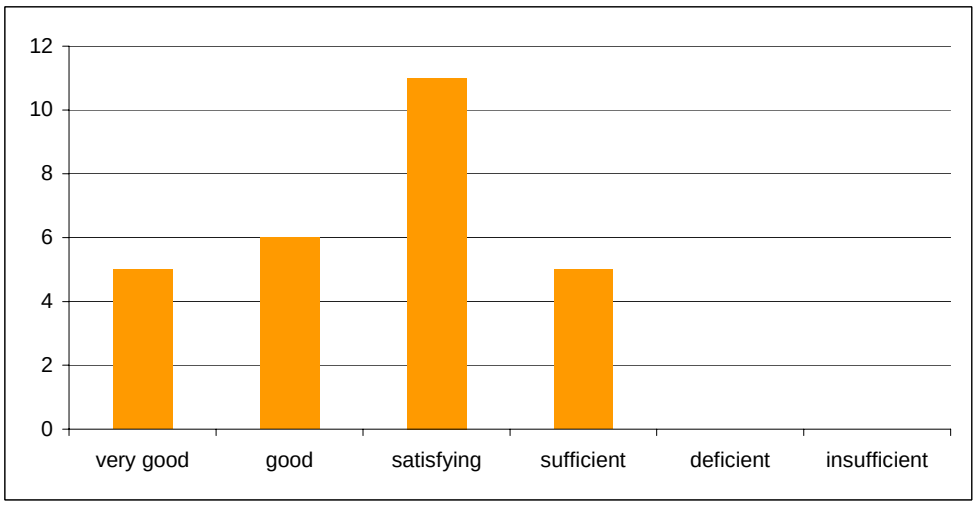


Figure 3: User’s navigation paths on February 18th and 19th 2004; every session that started at the homepage www.e-teaching.org is pictured (total number: 66)

6.1.2 Online Surveys

First results of online surveys of anonymous users and of participants of an online seminar using the portal as a working tool (about basics of e-learning in higher education, realised in the context of staff development at the University of Stuttgart) draw a positive picture of user feedback. We asked the users to assess the portal by means of German school grades. As Figure 4 shows, a clear majority of users evaluated the portal as “very good”, “good”, or “satisfying”. In addition, the users were asked to assess certain statements on a five-level rating scale (1=”absolutely correct”, 5=”incorrect”). As Figure 5 shows, a majority of users complied largely with positive statements about the portal.

Figure 4: User's assessment of the portal by means of German school grades (n=26)



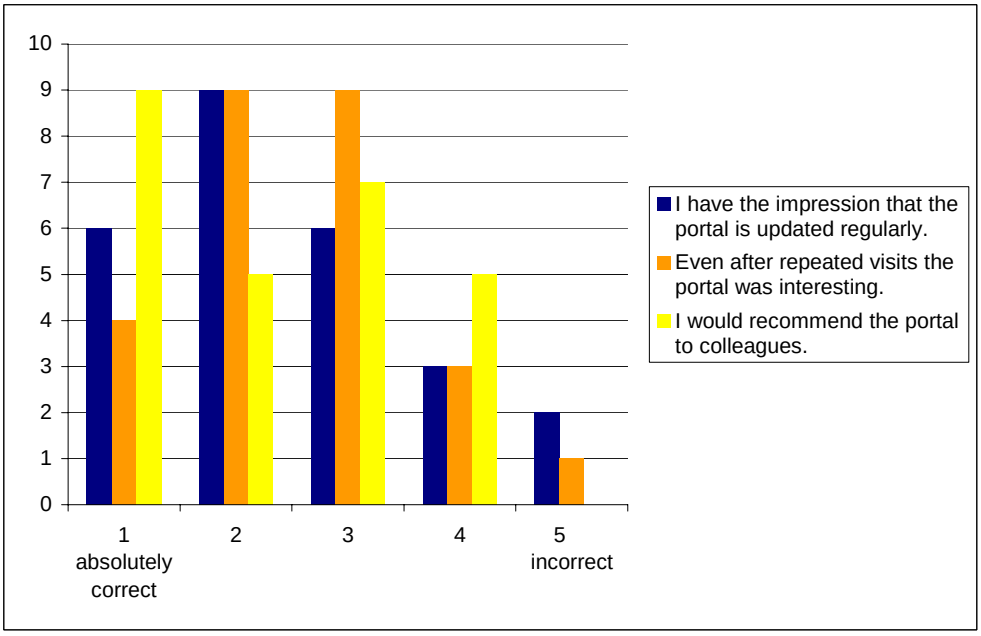


Figure 5: User's assessment of the portal by means of positive statements (n=26)

Since the online survey started in May 2004 the number of users that replied to the questionnaire so far is small. Nevertheless these results provide a first impression of a positive user feedback, and the analysis of further records will be necessary to improve their relevancy.

6.2 Formative Studies

In addition to the continuous data analysis that elucidates user feedback we focus on formative studies that aim to optimise the portal. In this vein we address different groups affected by the portal such as external experts, consultants using the portal as a tool to

support their work, participants of local support activities, and anonymous users of the portal. This procedure takes into account different perspectives on the portal in order to improve the validity of the results. Within this model a mixture of different research methods is used such as written assessments, qualitative interviews, online surveys, systematic documentation of local support activities, and log file analysis. It is crucial that each of these methods addresses the same dimensions of the portal so that the results of each survey can be integrated into an overall scheme. The formative evaluation of e-teaching.org concentrates on the central dimensions design, navigation and functions, quality and relevance of the content, and the fit of the portal with local support activities.

Quantitative data, e.g. rating scale answers, may indicate that there *is* a weak point, but not what its characteristics are and how it could be improved. For this reason, in the phase of formative evaluation we complemented quantitative data with qualitative data. We found that a small number of intensive qualitative surveys produced a core of critical points, and that further surveys did not make substantial contributions.

The analysis of the qualitative data indicates weak points of the portal and gives specific clues about how to improve them. Presently three surveys have been completed (written assessments by experts (n=7), interviews with consultants (n=6) and with clients (n=4) of the E-Competence teams) and three surveys have been started and will be analysed continuously (documentation of the local support activities, log file analysis, online survey of users). In a continuous feedback process these clues lead to the development of concrete steps of realisation. The following examples illustrate this feedback process. Since the detected problems refer to questions of content validity and content accessibility which has a key position within general considerations on portal development (see section 3) we believe that the solutions presented can have relevance for other portal developers.

6.2.1 Matching the Content to the Needs of Users

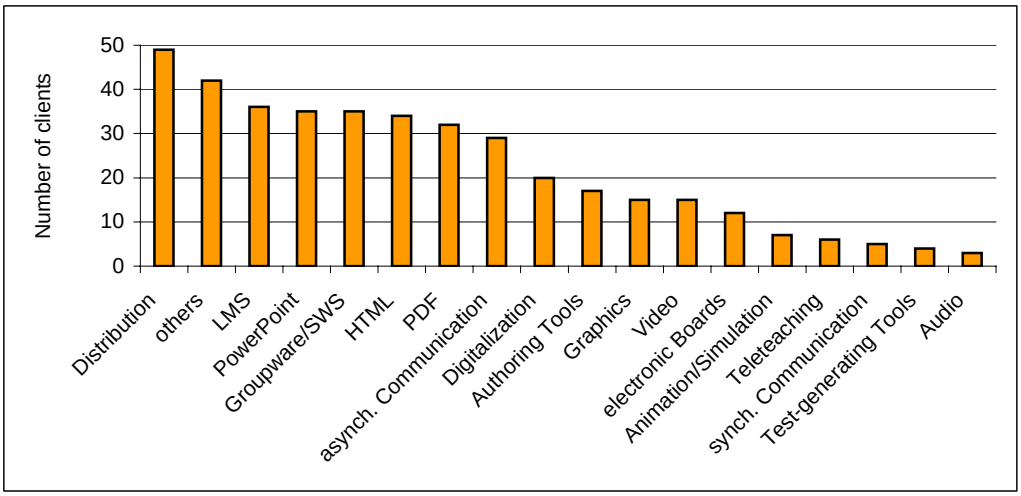
A central goal of the formative evaluation is to ensure that the content of the portal matches the user's needs (content validity). The documentation of support activities has a key position within this process.

The E-Competence teams systematically document their consulting services. The documentation scheme was developed by the evaluation team at the KMRC in close cooperation with the E-Competence teams. The documentation collects data about the clients (sex, position, discipline), the subjects addressed in the consultation (structured along the content spectrum of the portal), and the way of including the portal into the consultation. For adapting the portal to the face-to-face consultation we concentrate on the question of how the portals content and structure coincide with the topics addressed in the consultations. Within the process of improving the development of the portal this analysis

results in an order of priority of the access sections and specific contents that should be extended or added.

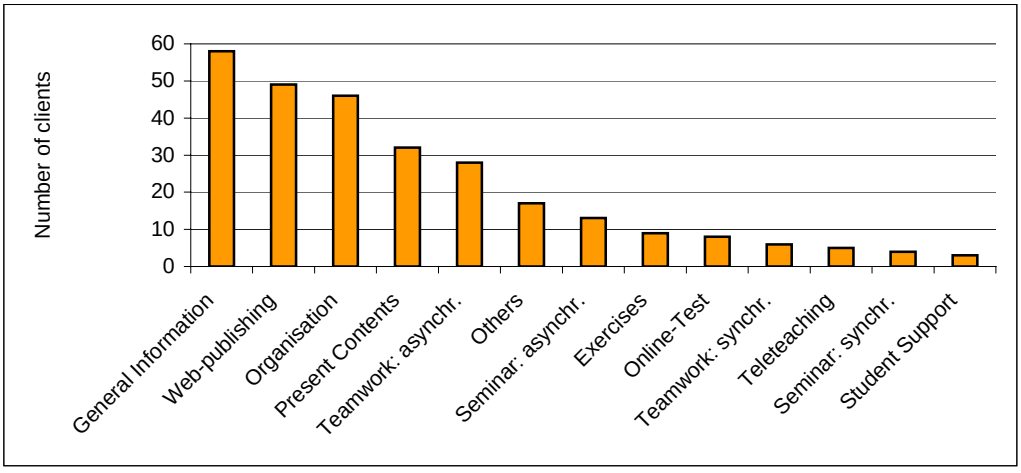
The following analysis is based on the data of 202 clients and represents the period from October 15th 2003 to June 15th 2004.

Figure 8: Media Technologies



As Figure 8 shows, the clients frequently addressed the following media technologies represented in the portal: distribution of materials, learning management systems, presentation (PowerPoint), groupware/shared workspaces, HTML, PDF, and asynchronous communication. The number of clients that were interested in media technologies not represented in the portal ("others") is worth mentioning, many of them addressed very specific technologies such as programming languages or specific issues on databases. As a result of this analysis the editorial team decided not only to improve the most frequently addressed aspects but also add addressed contents not yet represented in the portal such as Tablet PCs and the upload process.

Figure 9: Teaching Scenarios

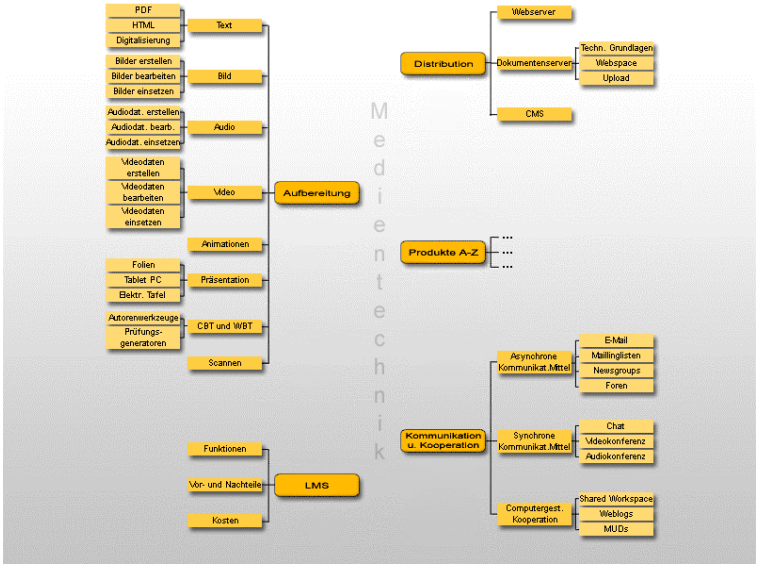


As Figure 9 shows, the teaching scenarios represented in the portal that were addressed most frequently in the consultations were publishing lecture scripts in the internet, providing the organisation of teaching, presenting contents, and supporting team work with asynchronous technologies. Again these aspects will be improved within the further developmental process. In addition, many clients asked for general information about e-teaching. This can be taken as a first indication that the decision to design the main access to the portals contents in a way that allows users to browse through it individually, instead of creating a fixed curriculum, fits with the users' needs.

6.2.2 Improving Navigation by Visualisation

A majority of experts and of advisors and clients of the E-Competence teams were critical that the users will have difficulty grasping the portals structure because of its complexity and that too many clicks are needed to reach deeper navigation levels where more specific contents are located. The analysis of these critical points lead to the idea of visualising the structure with hierarchic maps, these maps can support the comprehension of complex content structures (Potell & Rouet, 2003). The result is a final concept that offers a direct way to the deeper navigation levels, as the branches of the maps are clickable and linked to particular segments of the portal (see Figure 6). These maps are developed for each access section and offered on the entrance pages of the access sections since one map for the whole website can not be illustrated in a meaningful way. We are implementing these clickable maps at present time.

Figure 6: Clickable hierarchic map of the access section "Media Technology"



6.2.3 Supporting a Problem-oriented Access

Also, a majority of experts and of consultants and clients of the E-Competence teams stressed that in addition to the access sections in the navigation menu a problem-oriented

access to the content is crucial for an effective use of the portal. Since specific problems address contents located in different access sections we had to create a new access hatch across the given structure. With assistance of the advisors we drew up a list of frequently asked questions (FAQs) such as “How do I publish my text in the internet?”. For each of these questions we created a flow sheet in which each step is linked to the corresponding content within the portal (see Figure 7). As a result, in addition to the opportunity of free browsing we offer a trail through the content that lies across the content structure and turns it into a form of curriculum.

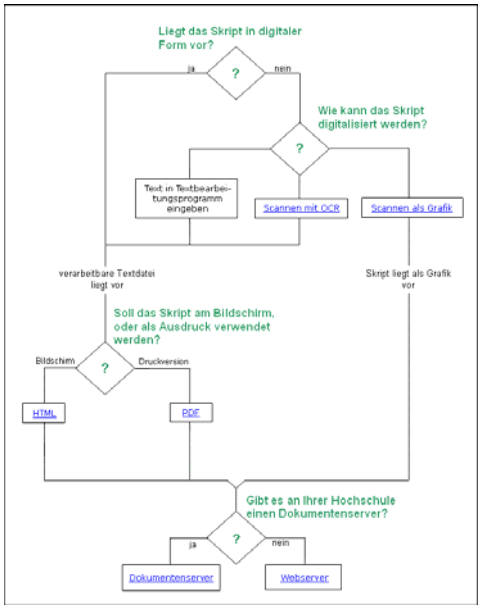


Figure 7: Clickable flow sheet of the FAQ “How do I publish my text in the internet?

7 Outlook

A first version of e-teaching.org was launched in August 2003. The experiences with the qualification portal are limited at the present time. This paper only presents an interim perspective on its realisation and evaluation.

The further development of e-teaching.org focuses on functions and editorial techniques that can provide the building of a community of e-teachers. Within the qualification initiative e-teaching@university we see the initiation of an autonomous virtual community as a challenge.

Since the combination of online resources and local support is a unique feature of our approach we aim to gather further experiences with the integration of the portal into different local support services. This will enable us to develop generic concepts of

consulting that allow the adaptation of the portal with different support strategies at several universities.

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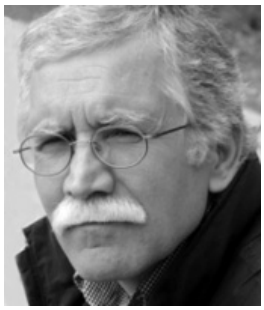

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