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E-Learning at German Universities

From Project Development to Sustainable Implementation

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Translated into English by Guy Moore

Preface

The growing and expanding use of digital information and communication technologies has not only led to radical changes in business work processes but is also having a decisive influence on changes to the university teaching system. The term currently used to describe this – "e-learning" – covers various scenarios for using learning-promoting software technologies, such as lectures held live at remote locations or downloadable recorded courses, virtual seminars with asynchronous guidance-counselling and supervision and synchronous group work phases, self-organised studies in web-based, highly-interactive and multimedia learning environments, the use of electronic presentation and collaboration techniques in classroom teaching, or preparatory experiments carried out in virtual labs – to name but a few examples.

Common to all these new and innovative forms of teaching and learning, whose development has been driven forward over recent years by extensive funding programmes initiated by federal government and the states, is the fact that they purposefully use advanced IC technologies to improve university teaching. Another common feature is that they give universities new challenges to face. The implementation of media becomes a strategic university development responsibility, the traditional image of teaching begins to change, new and innovative forms of university cooperation evolve, media expertise takes on greater importance as a key qualification for teachers and students alike, and, above all, resources and structures need to be made available for the task and need-oriented production and implementation of digital learning technologies.

The report at hand addresses the funding activities undertaken by federal government and the states and looks at specific examples of the central frameworks, development trends and impacts of media usage found at Germany's universities. The overriding goal is to provide impulses for the permanent, broadbased and resource-oriented implementation of the digital forms of teaching and learning that have been developed. This intention is based on the conviction that the potential which the new media have for the core academic responsibility of teaching has by no means been exhausted yet – even though some all too bold expectations may have been disappointed in the past. In this phase of extensive higher education reform, an astute, far-sighted handling of the electronic educational products and of the services which flank them is needed so that the innovation potential of the new media can be fully tapped and used resolutely for the future-focused continuing development of the higher education system.

In publishing the report at hand, HIS continues its intensive analysis of the conditions and impacts of the new media at universities already documented in a number of publications. The publication of this report gives me welcome occasion to thank the numerous people and institutions that assisted us for cooperating in and contributing to the production of this work. Their individual mention would extend the scope of this preface. Without their active and committed support, it would not have been possible to compile the information needed for this report.

My thanks also go to the Federal Ministry of Education and Research (BMBF), the project coordinator "New Media in Education" and the advisory committee "Building Use und Requirements in the Higher Education Sector" for assisting and supporting the study throughout.

Dr. Jürgen Ederleh

Director of HIS GmbH

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SUMMARY

The development, testing and implementation of e-learning applications at German universities (including universities of applied sciences) has developed decisively over recent years and thus has contributed considerably to the spread of digital forms of teaching and learning as attractive educational technologies. The expectations attached to these new technologies include the opportunities which they provide for opening up the market for new groups of students, for making Germany's universities more competitive in international markets, for raising the quality of university education and for offering, not least, a financial return on investment.

In everyday university life, many of the e-learning projects and project networks which have been the recipients of considerable government grants have faced and still face tough challenges in the fields of strategy, technology, didactics and curricular integration, marketing, rights management and quality assurance. The HIS-project "Application, Planning and Organisation of New Media in Higher Education" uses various research methods to analyse the support measures, the structural challenges faced by institutions as well as the solutions found to these.

The report at hand essentially offers an overview of the support strategies and their underlying goal of promoting the sustainable implementation of media in university teaching. The introduction (Chapter 1) is followed by an overview (Chapter 2) on the initiatives and programmes offered by federal government and the states to develop e-learning content and software tools. Chapter 3 presents the results of an representative situation analysis of e-learning programmes in higher education carried out among projects which received support from the Ministry of Education and Research's "New Media in Education" funding programme. Chapter 4 offers guidelines on the sustainable design of e-learning as input for the long-term consolidation of e-learning initiatives. Chapter 5, finally, briefly outlines selected e-learning support centres at German universities, documenting the present practice of providing advice and services for web-based teaching. The key results of the study can be summarised as follows:

❑ The many years of support and funding offered by federal government and state programmes have given considerable impetus at a number of levels (projects, project networks, universities, etc.) and have contributed significantly to increasing key qualifications in the sphere of e-learning at Germany's universities, accelerated the process of generating and distributing software tools and e-learning content and revealed a whole range of scenarios for implementing multimedia teaching.

❑ The active application of developed modules in the field of initial education and continuing training, as well as the provision of a stable framework and support services geared towards the implementation, production and development of digital forms of teaching and learning has proven to be a central activity field for the future development and consolidation of e-learning at German universities.

❑ Even though the high expectations regarding the cost-saving potential of e-learning applications have not been met, developments to date allow us to conclude that the new media have substantially enriched traditional university teaching. We can look forward with certainty both to a further differentiation of the programmes and services offered at the level of web-based interactive learning and teaching modules as well as to increasing demand for forms of e-learning on the part of the next generation of media-versed students and lecturers.

1   INTRODUCTION

1.1   Project phases

The HIS-project "Application, Planning and Organisation of New Media in Higher Education" (*Neue Medien im Hochschulbereich - Bestand, Nutzung, Entwicklung*, 2001-2003) addressed the structural, organisational and resource-based changes in the higher education sector resulting from the increasing use of computer and Internet-based learning arrangements. This development was initiated by new information and communication technologies which enrich traditional forms of teaching. At university sector level, the rise of new media has raised a number of questions, reflecting different interests and perspectives. HIS has focused primarily on problems relating to the sustainable implementation of digital forms of teaching and learning. This study focuses not least on questions relating to the strategic frameworks for using and developing new media (such as federal government and state support and funding programmes) as well as on the organisational and structural changes arising in the higher education sector from the complementary use of multimedia based learning arrangements alongside traditional forms of teaching. The study sought, on the one hand, to provide an overview of the current status of e-learning at universities on the basis of an online survey carried out among recipients of Federal Ministry of Education and Research project funding. On the other hand, particular attention was paid to concepts and strategies which, employed by the relevant parties (projects, research universities and universities of applied sciences, and ministries), would appear to offer the most promising chances for the sustainable evolution of (semi-)virtual teaching environments, their development, dissemination and use.

The first subproject was geared towards gaining an **overview of federal and state funding programmes in the sphere of new media** at universities in Germany. The background to the project is to be seen in the rapidly rising significance of new media in university teaching, currently fostered by extensive funding programmes both at a federal government and state level. The project sought to offer a comprehensive overview of present funding programmes and to identify course-setting strategies taken by universities and the states in fields such as reorganisation, infrastructural development, resource management and implementation. To this end, expert interviews were held with representatives of federal government, the states and selected universities, as well as structured interviews with advisers responsible for the implementation of media at universities in the state education ministries. The following report presents in extended and updated form the results of this project phase, which have in part already been documented in a HIS-publication (HIS-Kurzinformation B3/2002).

The second subproject on the **sustainable use of media in university teaching** is also to be seen against the background of extensive short-term funding programmes provided for media-based university teaching by federal government and the states. The project goal was to define the key factors for the sustainable use of media and to develop proposals to ensure the sustainable production, implementation and distribution of media. In this project phase, further expert interviews were held with representatives of the funding programmes, with university members and with project heads; HIS also hosted a workshop on "Strategies for the Sustainable Development of E-learning in Higher Education" (see HIS Kurzinformation B3/2003) and carried out a survey on sustainability concepts among current media development projects sponsored by the federal funding programme "New Media in Education." In this phase, HIS worked in close cooperation with

virtual university and education portal managers in the states and also held structured interviews at e-learning support centres.

1.2   Content of chapters

The project report is divided into five main chapters which reflect the results of the individual project phases completed between 2001 and 2003. To begin with, the introduction seeks to clarify the definition of the term "E-Learning". In addition, Chapter 1 discusses various forms of implementation and courses used in multimedia-based teaching involving interactive elements and e-learning tools.

Chapter 2 outlines the **federal and state initiatives and programmes** implemented since 1998. These programmes aimed primarily to promote the development of e-learning content, including the software tools required for the production and distribution of content and the results of this work. This compilation aims to characterise the relevant funding programmes and the organisational concepts and perspectives for the development of media-supported teaching at Germany's universities, without claiming to be exhaustive.

The third chapter offers a typical **situation analysis of e-learning projects**, focusing on undertakings funded by the Federal Ministry of Education and Research support programme "New Media in Education". In the course of 2002 and 2003 HIS carried out an online survey among these projects. Building on a model for screening project applications developed by a "project on the concepts and elements of virtual higher education" (*kevih*, Institute for Knowledge Media Tübingen – www.iwm-kmrc.de/kevih) as well as on success factor heuristics, two web-based questionnaires were developed, one of which was sent to all 100 cooperative projects of the funding programme "New Media in Education", the other to the 540 individual projects. These questionnaires primarily focused on the prospects of establishing virtual teaching programmes at German universities (under consideration of the sustainability-relevant factors resulting from their implementation in teaching, didactics, distribution and exploitation, financing, organisation, quality assurance, technology and rights management).

In view of the above-mentioned funding programmes aimed at supporting the development and use of web-based information and communication technologies in university teaching, HIS also concentrated on identifying measures with which the key players (projects, universities, ministries of education) can hope to achieve a sustainable, i.e. permanent, broadbased and financially viable mode of media-based teaching and learning environments. Within this context, Chapter 4 outlines **measures to ensure the sustainability of e-learning** in the individual fields of action and presents suggestions on the appropriate design and implementation of e-learning in higher education. Starting from the premise that many projects are insufficiently integrated into existing university structures, the paper highlights the obstacles to innovation and implementation and proposes ways to overcome them. To this end, the chapter offers a detailed presentation of relevant players, fields of action and measures.

The final chapter, **e-learning support centres at German universities**, analyses the present practice of offering advisory and support services as an elementary factor in promoting the sustainable development of web-based teaching at universities. E-learning centres of excellence at universities aim to nurture the e-learning skills and capabilities of interested lecturers and provide ways of transforming traditional teaching material into virtual forms by giving teaching staff the requisite support and advice. This chapter discusses in detail the fields of responsibility, resources and organisation of twelve such institutions, visited by HIS in the course of 2003. In structured interviews with these, HIS sought to gain general insights which allowed a suitable definition of the areas of responsibility for such service centres to be made and effective organisation models to be identified.

1.3   E-learning: An overview

By way of introduction, the following will first define the way e-learning is understood in this study and will then provide an outline of the e-learning scenarios which have been developed at individual German universities and which, albeit mostly very selectively, have established themselves. Finally, the primary tools needed in multimedia, interactive teaching are presented. Within the scope of this study, the introductory chapter will only be able to consider a few selected aspects. Literature offering a more detailed discussion of general introductory questions relating to multimedia interactive teaching is listed in the bibliography in the appendices (e.g. Schulmeister 2001, Kerres [2]2001 and others).

1.3.1 Definition of e-Learning

Since 2000, the phenomenon of computer-supported or web-based instruction, originally described by a plethora of terms such as computer based instruction, computer based training, computer aided learning, web based training, tele-teaching and others, has become commonly known as "e-learning". Electronic learning is a form of education supported and facilitated by the use of information and communication technologies which make it possible to record, process, use and present information. Digital learning environments mean that course contents can be presented in multimedia and interactive forms (text, pictures, graphics, audio and video sequences, animation, interactive components). Learning processes are usually handled via computer-based networks, ideally complemented by web-based forms of communication between individual learners, fellow students, tutors and lecturers and by collaborative working environments. Interactive tests check whether material has been understood.

E-learning builds on earlier forms of teaching such as distance learning and tele-teaching, educational television and audio-based learning programmes. It combines elements of these with digital authoring tools and learning platforms. Whereas the term "e-learning" was initially used to refer to computer based training (CBT), today it is usually employed to refer to Internet-based applications.

It is often claimed that e-learning has a didactic edge (added value) over analogue forms of learning. From the learner's perspective, e-learning offers the following benefits:

- ❑ flexible organisation of the learning process with regard to place, time, pace and content of learning,

- ❑ intensified learning motivation through new learning scenarios and intensive tutorial supervision,

- ❑ reality-based assessment exercises,

- ❑ the multi-faceted presentation of complex learning material (through simulation, visualisation, animation)

- ❑ access to extensive complementary knowledge resources, and

- ❑ opportunities for team-oriented learning.

These advantages partially offset the structural disadvantages of fully digital forms of e-learning. These drawbacks, when not complemented by traditional teaching forms, involve not least the loss of personal contact between learners and teachers and the lack of traditional intersubjective cognitive and communication routines. Successful e-learning scenarios integrate elementary didactic insights and authentic learning contexts and recognise the importance of multiple contexts and social factors in learning, as well as of instructional and tutorial support.

More recent technological developments in accessing digital networks mean that traditional personal computers are increasingly being superseded by mobile terminals (nomadic e-learning, m-learning) or by so-called augmented reality. The latter is a technology enabling the three-dimensional superimposition of computer generated information into the view of the user using an HMD (head mounted display) with a semi-transparent display; this creates the impression that virtual objects exist in the real environment. When the user moves, the virtual objects remain where they are; objects can be viewed from all angles and manipulated in the manner of ordinary objects. At present, the implementation of such new technologies remains confined to early prototypes; in the future, however, they could be used in the form of virtual laboratories or virtual tours, (providing added value factors such as shared scenarios and emphasised experience, intuitive interface design and haptic dimensions).

1.3.2 E-learning scenarios

Developments in the sphere of virtual instruction remain in an early phase, meaning that any effort to define a definitive and sufficiently differentiated typology for virtual teaching is necessarily of a temporary nature. No standard taxonomy currently exists. Rolf Schulmeister's categorisation, which distinguishes between 1) classroom courses (lectures, seminars) in conjunction with scripts on the web, 2) classroom courses (with scripts) in conjunction with communication platforms, and 3) classroom courses alternated with virtual tutorials or seminars and, finally, 4) purely virtual teaching scenarios (seminars or complete self-study), confines itself to sketching out rough scenarios.[1]

Given the difficulties of presenting digital forms of teaching with a sufficient degree of differentiation, the following section considers various characteristics of the most widespread forms of digital teaching, ranging from placing scripts and lecture materials on the Internet to entirely virtual forms of teaching.

Computer-aided offline teaching

The beginnings of computer-aided learning can be traced back to forms of virtual teaching which today are no longer considered to be e-learning in the narrower sense in that they fail to fulfil the criterion of web-based teaching; such early forms of virtual learning included teaching with offline teaching materials or computer based training (CBT), which generally used storage media such as disks, CD-ROMs and DVDs. In comparison to online procedures, offline teaching materials offer the learner the advantage that their use is not influenced by transmission rates (broadband network, ISDN or analogue modem). Compared to web-based learning methods, the greatest disadvantage of digital offline media is doubtless the lack of communicative interaction and collaboration, as well as the fact that technological upgrades and more up-to-date information necessitates the purchase of completely new versions.

Web-based teaching

Building on such offline-teaching procedures and as a paradigm offering greater options, online forms of teaching were developed under the heading of Web Based Training (WBT) and were either Internet or Intranet-based. The advantages of the various forms of web-based teaching are obvious. Web-based course modules enable the dynamic use of contents and can always be kept up-to-date. They enable various forms of interaction and communication between learners and teacher. Besides the interactive and multimedia based presentation of learning content, the opportunity for feedback between teacher and learner consolidates learning processes by raising

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[1] Wolfgang Ihbe (2001) offers a classification of scenarios on steering the learning process.

motivation and reducing the likelihood of course dropout. Moreover, web-based tutorials are better suited than purely computer-based tutorials at fostering soft skills such as communicative capabilities, team abilities and problem-solving skills; additional communication channels (e-mail, chat rooms and forums) offer opportunities for training these skills. Admittedly, WBTs carry a number of disadvantages in their wake in that learners need Internet access and, depending on the level of multimedia presentation of the learning content, require, on occasion, high data rates. In addition, further expense is often incurred by the need to employ commercial learning portals to realise and present content.

Blended learning

When discussing the basic forms of e-learning, it is necessary to distinguish between "hybrid learning arrangements" (Kerres 2001b, p. 278) and blended learning scenarios, on the one hand, and entirely virtual teaching scenarios, on the other. Blended Learning is the term used to describe the combination of classroom teaching with tele-media teaching elements and entails a complete methodological and didactic reorganisation of course contents, new qualifications on the part of lecturers and appropriate technological facilities. A whole range of blended learning scenarios have meanwhile developed; these combine elements of classroom teaching with virtual components, with both synchronous and asynchronous forms of organisation and cooperative and individual working phases in all manner of variations. One such form of blended learning is to be found in traditional classroom teaching activities which integrate digital elements into normal classes. Classroom teaching activities with digital elements adapt classical forms of teaching such as lectures, seminars, exercise courses, tutorials and laboratory classes and enrich these through the introduction of new computer-aided elements (such as hypertext dictionaries, small-scale animations, simulations, exercises) either during classes (*integrated scenarios*) or in course preparation and follow-up (*complementary scenarios*). To this end, a whole variety of new technologies are used, such as electronic boards (smartboard, whiteboard) and application sharing (joint, distributed editing of documents).

Another way in which real and virtual elements can be employed within the framework of traditional classroom courses involves alternating classroom activities with online activities (*alternating scenarios*). Such a sequential combination of classroom phases and online phases can contain synchronous as well as asynchronous online phases. Such blended learning scenarios are deployed, for example, where learning proceeds as follows: a period of self-learning (tutorial based self-study with teaching aids) followed by a classroom phase (seminars, workshops, coaching) and then a transfer phase (individual practice). Here, too, complex technical elements such as video conferences (e.g. Microsoft NetMeeting, via PC soundcard, webcam and headset) or audio con-ference systems such as Centra and InterWise (with headset and application sharing module) are employed. Combining periods of classroom teaching with virtual teaching periods has the key advantage that it facilitates communication between lecturer and students as well as the process of group formation, thus fostering student motivation (*collaborative, cooperative and workshop scenarios*). Since hybrid teaching activities often fall back on forms of teaching which are also employed in purely virtual based teaching, these warrant greater attention.

Exclusively virtual forms of teaching, online open distance learning

Teaching forms based entirely on virtual elements have evolved out of forms of distance learning and classical telecolleges. They build on traditional forms of teaching, but freely adapt them to the structural demands and potentials of the Internet. Content can be structured either in a linear or a non-linear form of learning progression. Expository, externally controlled instructional approaches in the sense of a new staging of traditional, ex-cathedra teaching are to be seen alongside explorative, self-controlled instructional approaches (individual information management in knowledge forums, etc.), the latter corresponding more closely to the reform-oriented educational

assumptions of constructivist didactics. The learner's opportunity to self-pace the course would seem to be of particular benefit where learners' previous knowledge levels vary widely.

Virtually moderated *seminars* (tele-teaching, open distance learning) are similar to traditional video conferences. They fall back on methods of two-way communication (chat, e-mails, video streams using web cams) and application sharing which make intensive exchange possible between learners and teachers. The improved means of communication offered by the Internet have led to such teaching forms developing as open and closed online discussions, online surveys (voting), role-plays, group reports and project-based learning cycles.

Virtual lectures are recorded and produced either during a live lecture using an "authoring on the fly" system or in a studio setting. In contrast to the classical "interaction metaphor" (Wolfgang Effelsberg) offered by the Internet with individual pages and hyperlinks, virtual lectures usually use a timeline model which enables the user to access the content at will using fast forward, rewind and pause buttons. Virtual lectures employ the technical options for transmitting video recordings or synchronised board pictures and slides/overheads (electronic board with thumbnail overview of individual slides). Lectures are shown either as synchronous video streams (transmission of tele-lectures via high speed net to geographically remote lecture halls, with the option for listeners to ask questions from their location using a response channel), or in asynchronous form via the local Intranet and with a repository. DVD provision of virtual lectures is not widespread at present. Virtual lectures are very popular among students as they make an individualised learning process possible and enable students to access lectures on the basis of their own time and place schedule; they are frequently used to refresh knowledge in the run-up to exams.

Typically, virtual group tutorials are arranged in the form of virtual project work as simulations such as planning games and role-plays or as case studies and system constructions (virtual museums, stock exchanges, company set-ups, excursions, etc.), as well as in the form of webquests (problem solving using information from the Internet). Such teaching methods have developed a dynamic of their own and employ new methods not possible in traditional forms of teaching. Guided and flexible tutorials, geographically dispersed learning groups with cooperative software (BSCW: Basic Support for Cooperative Work and CSCW: Computer-Supported Cooperative Work) as well as telematic and virtual laboratories (for example in physics, chemistry and music) are examples of the latest forms of activity and cooperation currently being developed. *Multimedia self-study courses*, many of which are of a high didactic quality and have an impressive interface design, are among the most important forms.

When e-learning takes place entirely in the form of virtual teaching activities, automated testing of knowledge assumes greater importance than is the case in blended learning. Incidentally, the importance of coaching and mentoring in virtual teaching means that the role of the teacher can either undergo a structural shift away from that of a traditional lecturer towards that of a tele-coach or tele-tutor or, alternatively, necessitate the employment of additional staff other than the course lecturers. The outlay necessary to implement teaching modules which rely solely on virtual modules is considerable. Estimates on the time needed to produce and adapt material for courses come to a factor of production time to user time for a course module of between 100:1 and 300:1.

Virtual courses can be employed either as individual study units or as entire degree programmes and find use at both traditional universities as well as virtual institutions, such as the "Virtual University of Applied Sciences" (Virtuelle Fachhochschule) or the Tele-Academy Furtwangen. They are used not just in higher education in general, but also and in particular in appropriately adapted university continuing training offered by many institutions for students, graduates and professionals. At this level, online teaching has the advantage that the travel and accommodation costs incurred by classical forms of training are saved and that the time and place of study in general can be managed flexibly.

1.3.3 Tools and media for Internet based teaching procedures

Finally, the study turns its attention to the technological foundations of web-based interactive learning processes. In discussing the tools necessary for virtual teaching, it is possible to differentiate between the software needed for portals, the management systems required for administrative functions (administration of staff and student records) and course management, learning platforms, authoring instruments as well as the tools needed for cooperative working on the Internet (see Schulmeister 2001, p.165). The following discussion concentrates above all on the basic tools needed by content developers to produce e-learning content and modules: authoring tools, and commercial and non-commercial learning platforms. Learning platforms serve to enter and present content on university and corporate networks; they do not usually have any independent function in generating learning content. This is why users additionally rely on external authoring systems, which are discussed in brief below.

Hardware elements and general technical infrastructural tools, such as static and mobile terminals (computer infrastructure, wireless networks, whiteboards, projectors, PDAs / MDAs, etc.), portal software, course management systems and any secondary software programs used to generate content (audiovisual production tools, DTP programs) or which have to be installed on learner PCs or available on learning platforms (browser, flash player, password protected workspace, cooperative environments, chat programs, discussion forums, etc.), will be factored out.

Authoring tools

Authoring tools are software systems used to generate digital objects and content in e-learning format. They include, in the broadest sense, software programs which can be used to produce other forms of multimedia content than e-learning content (DTP programs, web editors, graphics programs etc.). In a narrower sense, authoring tools are understood as specialist programs which focus exclusively on content production for WBTs. Authoring tools in the narrow sense and presently in use include ABVENT Katabounga, Bridge2thinK Web Course Builder, click2learn (Asymetrix) ToolBook, Cocoon Technologie CoachWare, Dynamic Media Power Trainer, EasyCBT InterActive Educational Software, HERAKLIT KHS Know How Systems, Macromania Authorware, Matchware Mediator, FTS MMTools, Scala Infochannel Designer and the teaching templates Tac-Software. Authoring systems use programming languages such as Macromedia Authorware, ToolBook II Instructor or, increasingly, XML.

The learning content authoring tools presently available can essentially be divided into the following groups: 1) professional tools originally developed for computer based training with integrated programming languages and often requiring considerable time for people to familiarise themselves with the program (e.g. Mediator pro, Click2learn's Tool Book Instructor, Macromedia Authorware); 2) standard HTML-editors extended with plug-ins to enable the generation of learning content (e.g. Macromedia Dreamweaver MX, Adobe Golive, Netobjects Fusion); 3) new generation authoring systems which lead to quick results with minimal training (e.g. the Austrian product Dynamic Powertrainer or Lectora Publisher, which is only available in English); 4) Content converters which enable the conversion of text documents into web-compatible format (e.g. imc's CLIX Campus); 5) live recording systems (e.g. Tegrity WebLearner, imc Lecturnity Suite, and 6) screen movie recorders (e.g. Turbo Demo, Camtasia Studio, Viewlet Builder) which enable lectures and presentations to be edited and shown as screen events.

Learning Platforms / Learning Portals / Learning Management Systems (LMS)

Learning platforms are software architectures which are based on the client/server model and integrate a whole range of subprograms needed for particular tasks into a central user interface, as well as supporting the functions necessary for the production and processing of complex web-based e-learning scenarios. They integrate a plethora of application programs and media

application programs and formats and hence belong to the most complex software architectures for e-learning solutions on the market, which can make finding the right platform for specific user contexts extraordinarily time-consuming. Given constant changes in the abilities of applications, the boundaries between authoring tools and learning platforms are becoming increasingly blurred. Alongside a large number of commercial learning platforms, a whole range of independent open source platforms have been developed, first and foremost by universities. These have their own presentation forum, the Internet portal www.campussource.de founded by the initiative of the same name "CampusSource", which brings together single university projects onto a joint platform.

Learning platforms at the level of higher education can either be integrated into the university IT infrastructure itself or can be outsourced using Application Service Providing. Aivet, Blackboard, CASUS, CLIX, Docent Enterprise, e-Learn, Glirarium, HYPERWAVE, IBT Server, ILIAS, IntraLearn, KP Learning Management System, LearningSpace, Legatus, Oracle Learning Management Suite, Saba Learning Enterprise, SITOS, the SouthrockLMS of the TELES WebLearning Platform AB, Tele.WIFI, To/oL, Web Course In A Box, WebAssign, WEbCT and the WIT Learning System can be counted among the more well-known learning platforms.

Content directories / Educational servers

Numerous university, subject-specific as well as nationwide and thematically open *Internet portals* are working on registering the (e-learning) contents presently available at universities and on improving access to them. These include, for example, the Internet portal www.studieren-im-netz.de operated by the Bund-Länder Commission for Educational Planning and Research Promotion (BLK) and the education servers in Thuringia and Saxony (see chapter 1). Other servers contribute to creating transparency by providing lists of links on existing initiatives, providers and programmes; these include the German Education Server (www.bildungsserver.de), an information portal to Germany's education system maintained by the federal and state authorities, and the educational software atlas provided by the Institute for Education in the Information Society (IBI, Berlin) and the Institute for Educational Media in Frankfurt (IfB, Frankfurt), (www.bs-atlas.de/ibi), which offers an up-to-date market overview and detailed product information on German-language educational software. The latter portal provides an example of another professional form of providing content being used by commercial e-learning *content providers* and brokers (continuing and adult education institutions, learning media publishers, etc.): the marketing of e-learning modules. In order to ensure that web-based educational programmes are easily accessible and can be critically appraised, common *metadata standards* are needed. Metadata standards describe all the specific elements of data and content relevant to the user, thereby considerably facilitating the utilisation of digital teaching content produced by other lecturers. At present, there are quite a number of various metadata standards on the market (e.g. AICC, Ariadne, Dublin Core, FGDC, IMS, LMML, LOM, PMML, RDF, XML DTD, SCORM).

Distribution channels

Distribution channels for e-learning tools fall into a non-commercial and a commercial sphere. At present, the international market for package solutions with the elementary *software tools* used in e-learning is dominated by US firms. The German market is dominated by domestic e-learning full service providers such as M.I.T. newmedia GmbH, imc and digital spirit. The market is in a process of continual concentration and consolidation, making it difficult to predict future developments at this level. Shortcomings in the target-group-oriented design and in the marketing of higher education *e-learning modules* by content brokers, in conjunction with the present lack of demand, would suggest, however, that the market for such products is by no means exhausted.

In addition to the market for such developments within the higher education sector, which is very much in an experimental phase, there is also a *commercial user market* for e-learning solutions, which is dominated first and foremost by professional continuing training programmes for company managers and employees ("corporate universities"). However, those programmes which might be

seen as particularly innovative and of high quality have largely arisen in the higher education sector, not least as a result of the extensive funding measures of recent years (see chapter 1). Even if e-learning at universities still only accounts for a small part of overall teaching, the general conditions for creating and exchanging know-how for e-learning players in higher education would seem to be very promising, not least since developers, operators and users have meanwhile managed to establish successful cooperative structures.

2 FEDERAL AND STATE INITIATIVES AND PROGRAMMES

Since the 1990s, federal government and the states have used a whole series of support funding programmes, initiatives and pilot projects in an effort to extend the potentials of new media in academic teaching and to establish these in university practice. A substantial factor of influence in this respect lay in the generally very high expectations placed in the eminent innovative force of new information and communication technologies. These expectations focused on e-business, while including general administrative procedures as well (e-government) and the learning culture (e-learning). However, expectations placed in the economic power of Internet-based business processes were massively dampened in 2001 in the wake of the New Economy crisis in whose course many dotcom companies experienced economic failure.

However, since the development of e-learning set in at a later point in time and the hope for radical changes in this field was not quite so ambitious, the media-based teaching sector, although not completely untouched by the Internet crisis, suffered to a much lesser degree than did the field of e-business. Moreover, measures and programmes aimed at strengthening media-based university teaching had mostly been designed for a medium-term period, which means that projects and innovation measures could be continued, despite economic losses.

Consequently, the situation in which university e-learning finds itself at the end of 2003 is characterised by a large number of initiatives and programmes which address the task of carrying forward the development of content, tools and frameworks relating to the implementation of new media in higher education in a wide variety of different ways.

The direction of thrust of these individual measures differs substantially. Nonetheless, looking back over the past five or six years, it is possible to say that besides improving the technical-infrastructural prerequisites at universities (primary, secondary, tertiary networks, computer workplaces for students and staff, wireless local area networks, media centres, multimedia labs, multimedia lecture halls and seminar rooms, etc.), the main thrust initially focused on promoting the development of e-learning content and of software tools required for producing and distributing content.

While most of the funding measures dedicated to achieving this goal differed greatly in their scope and specific structure, they did share a common feature. Namely, they provided grants for a time-limited period and so chose to follow a policy of financing time-limited innovation projects. Another characteristic feature is that they very generally invited applications for cooperative networks which offer the advantage of resource and knowledge sharing, are able to develop more products and services than smaller projects and, as far as the implementation of outcomes is concerned, promise a broader impact. This cooperative project concept was put into practice at cross-state as well as cross-university and cross-disciplinary level.

To complement the support for content and software platforms, accompanying initiatives were soon launched whose focus lay on the presentation, documentation, networking and dissemination of learning units in the field of academic education and continuing training. This resulted in setting up partly state-own, partly cross-state cooperative institutions which were not only expected to develop, but to implement the content modules – be it as complementary study materials for classroom teaching (blended learning or hybrid learning environments) or be it in the context of new, virtual web-based degree programmes.

In Germany, it was above all the federal government and various states that pioneered these initiatives and programmes which were heterogeneous in terms of their strategic focus, core disciplinary areas, local integration and structural shape. Indeed, since the late 1990s, public

funding programmes and investments worth a total of several hundred million euros have been launched. The reasons behind this, probably, unique financial and political commitment in the history of educational and instructional technologies are to be seen in expectations like these:

☐ enable learning anytime, anywhere,

☐ use multimedia learning programmes to enrich the quantity and enhance the quality of higher education,

☐ attract new student groups (professionals, parents, etc.) by offering web-based distance teaching and to improve the structure of subjects facing declining student interest,

☐ relieve the teaching burden in mass subjects by replacing dysfunctional course forms with media-based forms of teaching,

☐ reduce costs (e.g. of staff or buildings) for university teaching,

☐ develop new forms of teaching and instruction which positively influence the quality of traditional classroom teaching,

☐ raise the appeal of universities in order to increase the rate of students entering higher education,

☐ accelerate studies by offering more intensive guidance and supervision and attractive opportunities for self-study,

☐ reduce student drop-out rates via the motivational effects of high-quality digital learning environments,

☐ accelerate and facilitate work processes for university teachers and students by making it easier to access up-to-date information,

☐ extend and expand university activities in the continuing training sector (opening up new sources of income by offering fee-charging study opportunities),

☐ improve the German universities' competitive edge in the international education market,

☐ help to integrate computer-aided and web-based processes into the fields of administration, research and teaching.

It is generally well known that it was not possible to meet all of these expectations. In particular, hopes relating to saving resources could not be turned into reality because of the occasionally substantial expenditure required for the production of digital forms of teaching and learning. The structure-changing effects of new media on the organisational development of universities also fell clearly short of expectations.

Despite this, however, the enormous breadth of support initiatives and programmes set a development in motion which, extending beyond the circle of pioneering universities, has motivated more and more research universities and universities of applied sciences to actively examine and analyse the potentials which media-based teaching offers and to drive forward their own strategic position in this field. In fact, competitive pressure between universities plays a central role in this respect due to the foreseeable demographic development in Germany and the consequent falling number of students entering higher education. Universities wanting to use an attractive profile to claim location advantages will be well advised to familiarise themselves with the opportunities and requirements which the new educational technologies provide and to make far-sighted strategic decisions. In any case, the programmes and initiatives described in this chapter clearly show the extent to which measures have already progressed in various fields of content and software development and in the dissemination and use of digital forms of teaching and learning.

Three aspects need to be addressed before the various measures aimed at promoting media-based teaching are presented.

Firstly, this chapter aims to characterise the relevant support funding programmes and structural development measures run in the field of e-learning at Germany's universities. This is not concerned with activities in the field of information and communication infrastructure, but rather with content and software development as well as with the procurement and provision of digital learning objects. The aim is to provide a concise general overview of all the existing measures and organisational forms. Each section lists the website for each initiative so that it is possible to contact the persons in charge and obtain further information.

Secondly, the various measures, projects, programmes and initiatives are listed in alphabetical order, sorted by their specific financial sponsor, i.e. federal government or respective federal state. Such a structure seemed most appropriate because the heterogeneity of the individual measures in respect of their objective, amount of funding, (key) players, geographical scope, course areas and organisational structure does (not yet) allow any other kind of typology.

Thirdly, the report makes no claim to cover *all* the relevant media initiatives taken at federal government or state level. In fact, this is hardly possible due to the study's wide range of issues as well as due to the rapid development of this educational sector. Nevertheless, it may be assumed that the principle projects and programmes of recent years have been considered in this report. The information presented here reflects the development status as per the copy deadline for this report in December 2003.

2.1 German Flagship Project: Virtual University of Applied Sciences (Virtuelle Fachhochschule)

The BMBF funded flagship project "Virtual University of Applied Sciences" (VFH; www.oncampus.de) is one of five such projects to have emerged from a competitive selection process run by the German Federal Ministry of Education and Research (BMBF). A total of 251 projects originally applied with proposals on how best to use the worldwide availability of knowledge for initial education and continuing training and innovation processes. The VFH project involves a consortium of 12 universities of applied sciences and two research universities (Lübeck University and the University of the Federal Armed Forces Hamburg) from eight states plus other partners. With support funding totalling €21.6m, the VFH project very probably represents the largest e-learning initiative to involve German universities of applied sciences. The project, which began on 1 September 1998, is scheduled to close at the end of 2004 and is coordinated by the Fachhochschule (FH) Lübeck as the lead institution, aims to develop three online degree programmes (a Bachelor's and a Master's programme of digital media engineering/Media Computer Science – in a two-cycle study format – and a Bachelor's programme in industrial engineering). The motives for the project initiated by the FH Lübeck include the intention to recruit new students, to improve Lübeck's international competitiveness and to develop a strong position in the growth market of lifelong learning.

The VFH's target group consists above all of people whose employment status, parental (child-raising) responsibilities or other circumstances prevent them from taking a classroom taught course. The VFH aims to give them the opportunity to complete a programme of high-quality, forward-looking education on a largely virtual basis (80% of the studies being completed via the Internet).

Structure of the VFH

The university network (VFH) was founded on 30 April 2001 by the higher education institutions involved in the project. The members of this cooperative network are: the universities of applied sciences FH Lübeck, TFH Berlin, FH Brandenburg, FH Braunschweig/Wolfenbüttel, FH Bremerhaven, FH Oldenburg/Ostfriesland/Wilhelmshaven and FH Stralsund. The universities involved in the network are responsible for running the VFH's academic operations in the appropriately developed degree programmes (above all, for providing the resources required for online and classroom supervision). A particular challenge for the network was posed by the need to agree the study and examination regulations for participating universities which were based in various states as well as the need to agree uniform examinations. Two of the modules for the online programme in digital media engineering have meanwhile been adopted by the distant learning university of applied sciences in Brig (Switzerland) as well. In fact, Brig plans to adopt the whole programme in 2005/06. While there are also plans for other partners to adopt the degree programme in 2004.

Fig. 1: Universities in the VFH Network

Project leadership and management are based at the FH Lübeck. The management is responsible for coordinating the overall project (finances, reports, dates, planning) and, working with the project's management office, for questions of project controlling, marketing and public relations. All in all, some 100 staff are employed by the VFH project at various campuses, plus 45 professors. The VFH's largest project campus is at the FH Lübeck, with 45 staff (plus 17 professors).

The project has been divided into five work areas:

- Structure and organisation, conception and management
- Forms of teaching and learning, research and development
- Technical realisation, research, development and operation
- Conception and development for the digital media engineering programmes
- Conception and development for the industrial engineering programme

In turn, these work areas are subdivided into a total of 62 work units, each headed by a professor.

Academic operations

Since the winter semester 2001/2002, the six universities of applied sciences in the VFH have been running the accredited, six-semester Bachelor's degree programme (appropriately longer in the part-time study format) in digital media engineering (*Medieninformatik*). 174 first-year students took up their studies in the winter semester 2001/2002. The 2002/2003 winter semester saw 477 students enrol for the online programme in digital media engineering. While, the second student cohort are studying the eight-semester programme in industrial engineering (*Wirtschaftsingenieur-*

wesen) in the 2003/2004 winter semester (appropriately longer in the part-time format). This programme is run by three of the VFH universities and aims to have gained its accreditation by the end of 2003. 114 students applied for a limited capacity of 100 university places. The VFH expects to have more than 1000 students enrolled in 2004.

Particular importance is attached to student supervision and guidance (with some students living abroad). While professors supervise the on-campus phases, a mixture of specially trained mentors and professors share the supervision and guidance of online phases via web-based communication channels. E-mail inquiries, for example, are answered within a maximum of 24 hours in order to ensure that programmes maintain reliable contact with their students. The VFH calculates a total supervision and guidance workload of 15 minutes per student and week; the departments at the provider universities pay for this student supervision and guidance on a semester basis.

Most of teaching (80%) is web-based in order to provide students with as much time flexibility as possible during their studies. Attendance is only required for a few courses and for examinations (the latter being held simultaneously on all campuses).

Module development and quality assurance

Content modules, made available to the programmes via the learning platform Blackboard, were developed in a distributed approach across the various VFH campuses. A special production process was established at the FH Lübeck for this specific purpose. A script is first produced (module concept) by the work unit leader and is then turned into a storyboard. This in turn forms the basis for the module's multimedia realisation by a production team. In the first stage, part of the module is developed as a prototype which implements all the module's specific features and functions (assignments, animations, simulations). Once the prototype has been accepted, the production team carries out the subsequent step (completion of the storyboards, multimedia realisation) within the scope of a fixed schedule. Before the module can be released for teaching, it must pass a detailed functional and practical test.

In total, the VFH's course portfolio consists of 75 various modules, each of which is a self-contained teaching/learning unit and can also be combined with other courses (possibly also complemented by further course units). A content module covers around 150 learning hours respectively 350 HTML pages and corresponds to 5 ECTS credit points. The extensive multimedia features (animations, simulations, graphics, audio and video sequences) resulted in the development costs per module running to around €200,000 at the start of the project term, with maintenance and administration costs at around €50,000 per annum. While development costs are paid from the project budget, the costs for maintaining and updating the modules have to be paid by the provider universities. Consequently, provider universities charge students a media usage fee of €65 per module. However, it was also possible to lower the development and maintenance costs by around half in the course of the project. The student supervision/guidance costs, which also have to be borne by the provider universities, are not included in these sums.

The task of assuring the quality of course content in each module is carried out in a multistage acceptance process; before they are released for course teaching, modules are evaluated by didactic experts involved in the project, as well as by the so-called "peer group" (head of the relevant work unit and another work unit head, plus one other colleague) as well as by the relevant academic network (university teachers from the subject in question at the VFH universities). In the pilot phase, students carried out regular evaluations (VFH students and external students from around Germany). Teaching is constantly evaluated in the running academic operations (by online students and mentors). A style guide and an ergonomic manual additionally served to ensure that a constant quality level was maintained during the development of modules. The success of these quality assurance measures can be seen in the fact that the media computing programme has

been unconditionally accredited year after year. The industrial engineering programme has yet to be accredited.

Future developments

Using its own financial reserves the VFH project will close in 2004 with the production of the final modules and the presentation of a final report. Regardless of this, the permanent continuation of teaching in the online programmes, offered by the provider VFH universities, has been confirmed. In addition, a European Social Fund financed portal called "*Portal nach vorn: Wissenschaftliche Online-Weiterbildung für Schleswig-Holstein*" (providing advanced academic online training in the state of Schleswig-Holstein) based at the FH Lübeck aims to carry forward the development of the VFH modules as part of its continuing qualification activities for job-seeking academics and to prepare modules for the international market by translating them into English. Moreover, the FH Lübeck established the limited company Oncampus GmbH at the end of 2003 which will market Lübeck's VFH modules in the field of continuing training. The other network universities can opt to join the limited company as partners.

2.2 German Flagship Project: Networked Studies in Chemistry (Vernetztes Studium Chemie)

Besides deciding to fund the Virtual University of Applied Sciences (VFH) as described above, a BMBF organised competition on how best to use the worldwide availability of knowledge for initial education and continuing training and innovation processes also decided to fund the Networked Studies in Chemistry Project (www.vs-c.de). This project network is scheduled to receive support for five years up to 2004 and aims to support various kinds of instructional models in the field of chemistry (Bachelor's, Diplom, Master's) by providing a web-based, interactive learning platform. The XML-based modular system aims to enable lecturers to compile networked, freely-scalable course units and so to contribute to a method of exploratory, problem-solving focused learning in chemistry. The model for a reformed system of chemistry studies (the so-called "Würzburg Model") developed by the Society of German Chemical Scientists (*GDCh*) serves as the structural basis. The project's target group is made up of students taking chemistry as a major or minor, postgraduates holding a degree in chemistry or neighbouring fields, as well as people from outside the field of chemistry interested in using a knowledge of chemistry as part of their professional and private continuing training. At the same time, the project aims to use the innovative design of chemistry studies to make Germany's universities more attractive to foreign students.

The network employs 16 professors and 180 staff in 29 subprojects located at 16 universities in Germany, Britain and Switzerland.

Fig. 2: Subject areas and project partners in the Networked Studies in Chemistry project

Subject Areas	Project Partners
General Chemistry	AK Schubert (University of Paderborn) AK Ziessow (TU Berlin)
Analytical Chemistry	AK Salzer (TU Dresden) AK Gauglitz (University of Tübingen)
Inorganic Chemistry	AK Steinborn (University of Halle-Wittenberg)
Biochemistry	AK Maelicke (University of Mainz)
Chemistry for Medical Doctors/Physicians	AK Gasteiger (University of Erlangen)
Chemoinformatics	AK Gasteiger (University of Erlangen) AK Zass (ETH Zurich)
Macromolecular Chemistry	AK Nuyken (TU Munich)
Mathematics	AK Ziessow (TU Berlin)
Microbiology / Molecular Biology	AK Kröger (University of Giessen)
Organic Chemistry	AK Fels (University of Paderborn) AK Herges (University of Kiel) AK Gasteiger (University of Erlangen)
Physics	AK Heuer (University of Würzburg)
Physical Chemistry	AK Gauglitz (University of Tübingen) AK Ziessow (TU Berlin)
Engineering Chemistry	AK Papp (University of Leipzig) AK Rößner (University of Oldenburg) AK Nuyken (TU Munich)
Theoretical Chemistry	AK Bögel (University of Halle-Wittenberg)
Other Project Partners	
Prof. James L. Alty	LUTCHI Research Centre, Loughborough University, UK
Dr. Phillip Rastall	University College Scarborough, UK

The whole project is coordinated by the Chemistry Information Centre in Berlin (http://www.fiz-chemie.de/de/).

The content of these chemistry courses, enriched with multimedia elements and designed for time and place independent study, includes 3D molecule structures, process animations, simulations of reactions and the virtual handling of instruments, devices and equipment.

The system's flexible didactic methodology means that it can also be used by upper secondary classes, by university students taking chemistry as a minor as well as by vocational training providers. In addition, the course content has a modular structure which makes it possible to combine content in a target group specific way and so to produce didactically meaningful more

multifaceted course units (Valid Learning Units) from which, in turn, complete learning paths can be generated. A particular advantage of the multimedia technology lies in the visualisation of chemical structures and reactions (e.g. CAVOC: Computer Aided Visualization of Chemical Reactions). Examples of course units that have been completed can be viewed on the VSC website (http://www.vs-c.de/beispiele/index.html) after filling in a free-of-charge registration form.

2.3 Federal Funding Programme: New Media in Education (Neue Medien in der Bildung)

With the Federal Funding Programme "New Media in Education", the Federal Ministry of Education and Research (BMBF) devised one of the world's most ambitious and comprehensive funding measures for developing course contents and software tools for media-based university teaching. The primary goal of this programme, which is part of the University and Science Programme (HWP) launched by federal government and the states at the end of 1999, lies in achieving the permanent and broadbased implementation of new media in the field of initial education and continuing training. To this end, federal government will make around €554m of funding available between 2000 and 2004, of which €70m will go to the schools sector, €200m to the vocational training sector and €284m to the higher education sector (cf. Fig. 3).

Fig. 3: BMBF Funding Programme "New Media in Education" (Neue Medien in der Bildung)

Federal funding programme "New Media in Education" (2000 - 2004)

€70m
€200m
€284m

☐ Schools
■ Vocational training
☐ Higher education
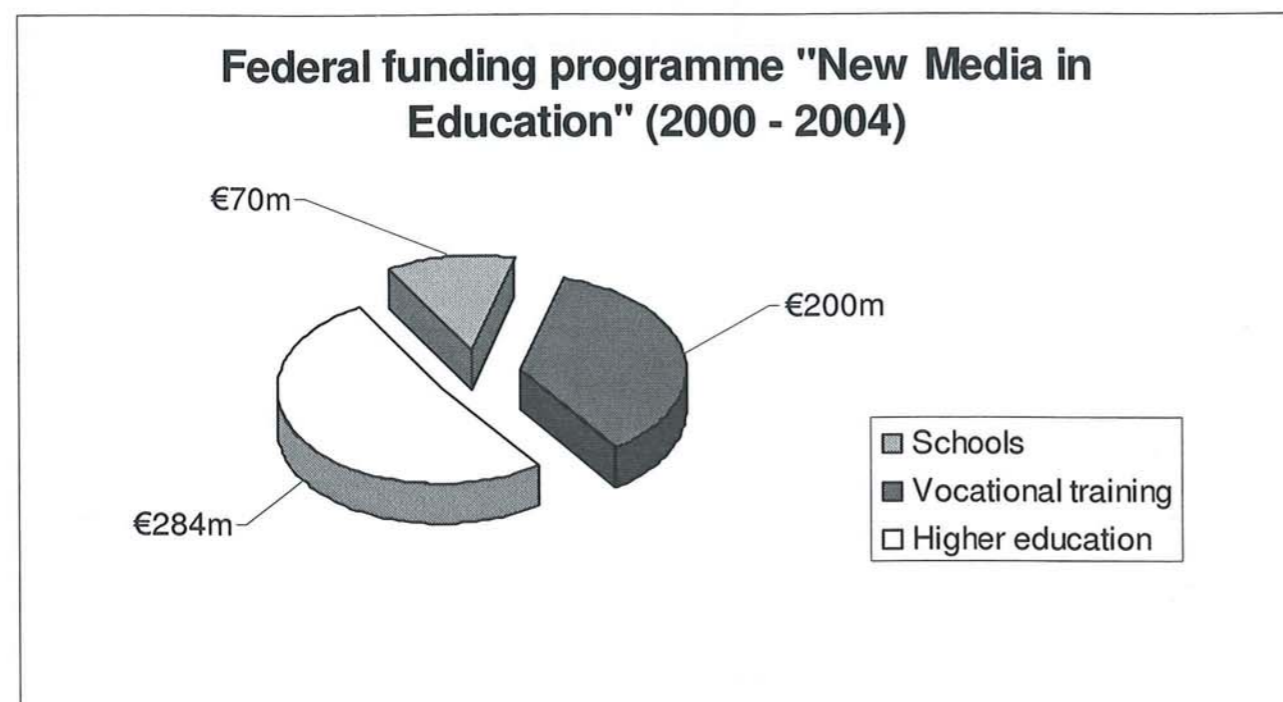
The core intentions of this large-scale support include improving quality by using computers in the field of teaching and learning, driving forward the structural change in the education sector that has been induced by globalisation and the new information and communication technologies, consolidating the market for educational software, and promoting an independent national learning culture in the multimedia sector.

Funding for the development and use of new media, specifically in higher education, aims to improve the quality of teaching by devising and implementing high-quality educational software, to raise the proportion of students learning through guided or supervised personal study, to develop new distance learning programmes and new combinations of sections of classroom teaching and personal respectively distance study, and to make new programmes and services available in the

field of continuing training. Additionally, funding aims to support universities in the development of marketable products for the education market and in the initiation of efficient cooperation agreements and projects with each other as well as with other partners.

The programme funds allocated to the higher education sector are distributed across four support areas: around €36m go to flagship projects, some €11m to the support area "Distance Learning", approx. €25m to the support initiative "Notebook University" and around €211m to the development of educational software (cf. Fig. 4).

Fig. 4: Areas of higher education related support in the BMBF programme "New Media in Education"

Funding to promote the use of new media at universities

Flagship projects €36m
Distance learning €11m
100 cooperative projects €211m
Notebook university €26m
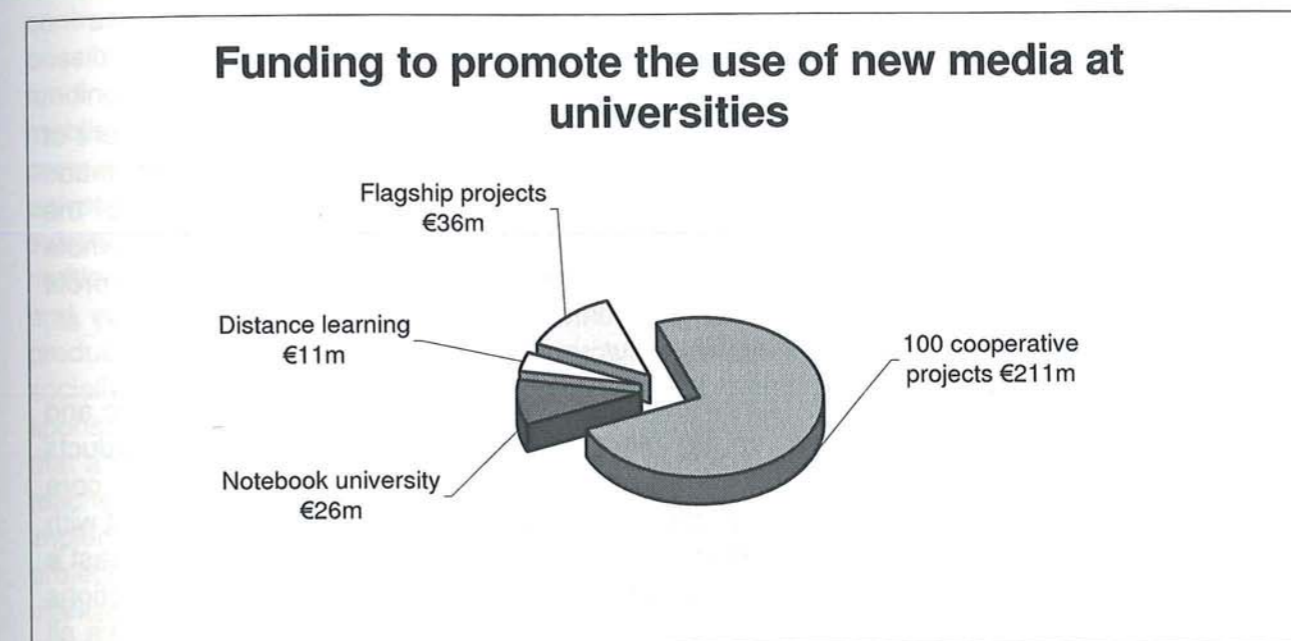
Academic and administrative support for the higher education related funding programme

The higher education topics in the BMBF programme are overseen by an advisory council made up of state representatives nominated by the BLK (Bund-Länder Commission for Educational Planning and Research Promotion) and of academics, scientists and researchers nominated by the German Rector's Conference (Hochschulrektorenkonferenz) and the German Science Council (Wissenschaftsrat). The advisory council provides the programme with academic support aimed at ensuring its efficient and successful implementation, decides on the selection of reviewers, checks the results of announcements and calls for proposals, advises the BMBF respectively the Government Programme Management Agency „New Media in Education" on questions of content, evaluates the results of the programme and draws up recommendations on how to develop respectively continue the funding initiative.

The Government Programme Management Agency „New Media in Education" at the German Aerospace Research Center (DLR) supports the funded projects both administratively as well as in terms of content. Consequently, the project sponsor organised a number of workshops on topics of current interest (e.g. e-learning platforms, rights management, standardisation in e-learning, didactics and evaluation, gender mainstreaming, notebook university, EU funding, and other areas) and provided projects with an opportunity to exchange experience. An Internet portal (www.medien-bildung.net) was set up to enable the various projects to present activities to the public; the website provides general profiles on the projects, information on project-own websites, along with a list of contact partners, events plus other relevant information on the topic of e-learning. Since the portal's activation in March 2002, the number of users accessing the site has risen from around 3000 to around 9000 per month in spring 2003.

Besides intensive contacts at working level, continuous communication between the Programme Management Agency and the individual projects is ensured by means of a newsletter which publicises current developments and initiatives. In addition, relevant documentary reports are produced for the specialist public, such as a directory published at the end of 2003 in which the 100 funded network projects presented themselves and their products. The funding programme is also supported by accompanying projects which are responsible for documenting the impact and progress of the project work and for assisting projects, for example, in how to draw up business models or in carrying out measures aimed at ensuring sustainability. The Programme Management Agency additionally set up a number of work groups in which experts dealt with subjects such as legal aspects or the sustainability issue.

Support for 100 cooperative projects

The largest proportion of the higher education related funding is dedicated to the development of learning software (tools and content). A review process selected 100 cooperative projects, made up of 540 individual projects, as participants of the federal funding programme. The size of the cooperative projects varies from between 2 and 17 individual projects. The breadth of the whole support line becomes clear in the number of universities that it involves: 138 universities profit throughout Germany from this funding, including 42 universities of applied sciences. All in all, around 2000 staff are employed in the cooperative projects.

The award criteria specified in the call for applications included a fully-matured media-didactic and media-technical concept, practicable ideas on the integration of media teaching/learning products into everyday university operations (including the allocation of funds from the university's core budget to ensure the permanent use of these products), cross-state cooperation in agreement with the relevant academic community, the requirement to provide a full degree programme or at least a study section, provisions for the maintenance and distribution of the product as well as conceptions on how to arrange the fields of quality assurance and evaluation. The approval decision above all considered projects which focus on developing degree programmes for larger numbers of students, integrate the specific interests of women, can be expected to transfer course contents to other institutions, and have a modular and user-friendly structure.

In respect of the distribution of projects across the various subject groups, it was found that all the major disciplines were more or less equally represented in the support programme: the arts and humanities were able to claim a share of 11%, economics/business administration and social sciences accounted for 19%, mathematics and science had 16%, engineering 15%, medicine claimed 11%, computer science and media studies made up 17%, while all other subject areas had a combined share of 11%.

Funding for a large part of the projects ends in 2003, although some projects will be continued until 2004. For the products and services that have been developed so far, this raises the question as to how their sustainable implementation and use in initial education and continuing training can be ensured (for more on this, see also Chapter 4). During a meeting of experts held at the offices of the Government Programme Management Agency, a checklist with recommendations for measures and provisions in various action fields was drawn up which can support projects in the planning and execution of appropriate measures. Moreover, international experts carried out a programme evaluation as part of a project audit. Working on the basis of the insights and information gained, the evaluation aims to generate input on which courses are required when drawing up and designing further support funding measures.

Notebook universities

Following the BMBF's earlier support of €3.1m in total in 2001 for the creation of wireless networks at 41 universities as part of its *Wireless Local Area Networks* support initiative, the development of implementation scenarios for mobile, wireless-networked computers in university studies received funding totalling around €25m in the period from 2002 to the end of 2003. Of the 100 applications received, 25 universities (including five universities of applied sciences) succeeded in getting funding. These universities had set themselves the goal of setting up or extending practicable information and communication services for everyday use based on wireless networks respectively campus networks and notebooks which can be utilised independently of the users' location. In contrast to virtual universities, "notebook universities" concentrate on the mobile and, as far as possible, ubiquitous use of current IC technologies at traditional campus universities. In particular, funding was provided for learning arrangements which can either not be implemented without mobile computers or, if so, only with inadequate quality. In addition, such funded projects must promise innovative potential for an integrated mobile learning conception at the respective university. Involving the participation of at least two departments and working on the basis of existing wireless networks or location independent campus data networks plus an existing range of multimedia and telemedia educational programmes, the funded universities develop organisational and management concepts on how to provide work-shared and sustainable support for the production of content, technical infrastructure and didactic back-up. In addition, they devise socially-compatible user concepts (provision of computer workplaces, innovative leasing, sponsoring or public private partnership arrangements for the purchase of notebooks) and ensure that a reliable security management system is in place. Furthermore, the programme aims to train teachers and learners in the use of mobile computers and to support them in the development and implementation of multimedia course contents. These measures were flanked by professional project management involving milestone planning, quality management and evaluation plus a marketing concept that aims to ensure the continued implementation and maintenance of course materials and infrastructure once funding comes to an end.

2.4 Virtual University Baden-Württemberg (Virtuelle Hochschule Baden-Württemberg)

The Ministry of Science, Research and the Arts of the State of Baden-Württemberg launched the support programme "Virtual University Baden-Württemberg" in 1998 – a state-wide funding programme for the development and implementation of new media at universities. The programme's portal, which meanwhile not only documents the group of funded projects, but also other projects carried out at universities in Baden-Württemberg, was able to secure the high PR value domain name www.virtuelle-hochschule.de. However, the Virtual University Baden-Württemberg is not an independent, self-contained university, but rather operates as a state-wide network of projects, experts and activities.

The support funding began with 17 applicants initially being chosen on the basis of 68 pre-proposals with a total application value of DM240m. Eventually, six network projects were chosen for funding which began to flow in the 2nd quarter 1998, while the programme was extended by the addition of a support project (ViKi) responsible for knowledge management and knowledge networking between the cooperating projects. The programme was divided into two phases (Phase 1: 3 years, Phase 2: 2 years) and scheduled to run for a total of five years. The support provided from the state budget – including €2.5m from the initiative on multimedia-based degree programmes, which received matching funds from Deutsche Telekom and supported five projects – ran to a total of €25m. In the second support phase, the network projects were required to generate counter-financing totalling 15% of their respective support sum.

The programme's final conference was held in Stuttgart on 28 November 2003 and saw three of the funding recipients assessed as best practice projects by conference participants; these projects received prizes worth €18,000 in total.

Goals

Support for the Virtual University Baden-Württemberg pursues the education policy goal of maintaining and raising national and international competitiveness as well as of extending the quantity and quality of the courses and programmes offered by the state's universities. In educational-didactic terms, the programme focused on improving learning success and learning motivation by making it possible to engage in self-directed, place and time flexible study. In structural terms, the programme not only endeavoured to support transferable solutions, but above all to ensure sustainable project developments. Finally, and in respect of project economy, the programme aimed to initiate promising solutions for producing and distributing multimedia, web-based learning systems, to develop suitable business models which make it possible to generate revenue and to optimise the use of resources.

Structure

The six successful projects were networks involving several universities or – in the case of VirtuGrade – projects with participants at various locations. This focus on cross-university cooperation projects aimed specifically to push ahead synergetic and knowledge transfer processes. The individual cooperative projects are:

❑ ViKar – *Virtueller Hochschulverbund Karlsruhe*. ViKar stands for the Virtual University Network Karlsruhe and is an association of the following institutions which are all located in the city of Karlsruhe: University of Cooperative Education (*Berufsakademie*), University of Applied Sciences (*Fachhochschule*), State College of Design (*Hochschule für Gestaltung*), State College of Music (*Hochschule für Musik*), University of Education (*Pädagogische Hochschule*) and the University of Karlsruhe; Term 5/1998 to 4/2003; http://vikar.ira.uka.de/): ViKar aims to make it possible to use the networked knowledge available in the region by providing a shared campus portal. ViKar e.V. was established as a registered association on 15 November 2003 to continue the work after the funding's scheduled end. The association initially supports students, graduates and members of the universities located in Karlsruhe in their learning and work processes.

❑ Docs 'n Drugs – *Die Virtuelle Poliklinik*: Docs 'n Drugs - The Virtual Policlinic is jointly run by the University of Ulm and the FH Ulm University of Applied Sciences (Term: 7/1998 to 6/2003; www.docs-n-drugs.de) and aims to develop a web-based, multimedia teaching system for medical and medicine-related degree programmes.

❑ VVL – *Verbund Virtuelles Labor*: The Virtual Lab Network involves five universities of applied sciences (FH Aalen, FH Heilbronn, FH Konstanz, FH Ravensburg-Weingarten, FH Reutlingen) plus the University of Tübingen (Term 3/1998 to 3/2003; www.vvl.de): The main work areas in this project involve the development, evaluation and implementation of study modules involving multimedia and telematic experiments in the fields of automation engineering, robotics, machine tools, image processing, computer science and communications technology. The experiments at the heart of the study modules are performed by remote control in real laboratories and are carried out and remotely observed as real processes.

❑ Viror – *Virtuelle Universität Oberrhein*: The Virtual University of the Upper Rhine is an association made up of the Universities of Freiburg, Heidelberg, Karlsruhe and Mannheim (Term 7/1998 to 6/2003; www.viror.de): Besides the development of course modules, a

project focus lies in preparing and distributing course contents (for seminars and lectures) for spatially dispersed use in various subjects and at various university campus locations.

❑ VirtuGrade – *Virtuelle Graduiertenausbildung*: This Virtual Graduate Training project is based at the University of Tübingen (Term: 6/1998 to 5/2003; http://www.virtugrade.uni-tuebingen.de) and focuses on the conception, pilot realisation and evaluation of media-based teaching and learning for advanced students and graduates of psychology, mathematics and computer linguistics.

❑ VIB - *Virtualisierung im Bildungsbereich*: Virtualisation in Education is a network project involving the universities of education (PH Ludwigsburg, PH Freiburg, PH Heidelberg, PH Schwäbisch Gmünd and PH Weingarten) in Baden-Württemberg (Launched 9/1998; www.vib-bw.de/). The project researches the cross-disciplinary potentials and impacts of using information and communication technologies in higher education. Working in seven subprojects, Baden-Württemberg's universities of education have developed didactic concepts on the specific use of virtual techniques at universities. The project above all aims to raise the media skills and expertise of future teachers.

The virtual cooperation and information network ViKi (*Virtuelles Kooperations- und Informationsnetzwerk zum Medieneinsatz in der Hochschullehre*; http://www.virtuelle-hochschule.de/index2.html?102) is based at the Fraunhofer Institute for Industrial Engineering in Stuttgart and serves as an expertise platform for the Virtual University Baden-Württemberg. This centre of excellence aims to establish a network of experts in the "virtualisation of teaching", to concentrate the experience and knowledge acquired in various projects and to make this generally accessible via a knowledge portal. The responsibilities of the three-person project team include, above all, organising workshops on topics of current interest in the field of e-learning. In addition, the team maintains an FAQ list covering all aspects of virtual teaching in Baden-Württemberg and uses the platform WebGenesis to administrate the portal for the Virtual University.

Baden-Württemberg transferred programme control, individual project monitoring and evaluation, multimedia strategy development for the higher education sector to an external advisory council for the programme chaired by Prof. Müller-Böling (Centre for Higher Education Development – CHE). December 2001 saw the advisory council publish media development guidelines for universities in Baden-Württemberg: "*Leitlinien für die Medienentwicklung an den Hochschulen in Baden-Württemberg*" (www.che.de/Intranet/upload/AP33.pdf).

Accompanying measures

Besides the funding programme for the Virtual University, the state of Baden-Württemberg used various other measures to support the integration of new media into everyday university operations.

In order to meet the changing requirements found in modern university teaching, for example, Baden-Württemberg created three regional university didactics centres (at Mannheim, Stuttgart and Freiburg) in a pilot project scheduled to run for a maximum of five years and with funding totalling €475,000. The centre is above all expected to assist first-time teachers with the design and development of their courses.

To further improve media skills and expertise, three media didactics centres were also established with funding worth €1.8m as a joint institution of the universities and universities of education in Freiburg, Heidelberg and Weingarten. These centres have been charged with providing initial education and continuing training for teachers from all school types in the field of media didactics, with advising public and private institutions on media didactic questions and with developing electronic study materials for use in school.

Experience gained in the VIB network project (Virtualisation in Education) led to the establishment of the VIP funding initiative. The goals of the virtual network of universities of education in Baden-Württemberg (VIP - *Virtuelles Netz der Pädagogischen Hochschulen*) include, not least, the realisation of an efficient and modern ICT infrastructure in the academic and research field of the universities of education. In particular, VIP is expected to improve the conditions for general office applications, Internet applications as well as for developing applications within the VIB. A key condition for this relates to minimising the human resources required for maintaining and supporting IC technologies. Measures to achieve this include an end-to-end user administration system as well as the implementation of a management framework. At the same time, an access and security concept is being developed which is expected to have a model character that can be transferred to other universities in the state. The initiative will receive support funding worth €4.75m over a period of two years (starting 2003).

Results and challenges

Two visits (after the first support phase and during the second support phase) determined and identified the strengths and weaknesses of the projects funded by the Virtual University Baden-Württemberg. This revealed that the structure of everyday studies had been made more flexible, that the internationally oriented training of students had become more efficient, that the quality of teaching had been raised, that cooperation between universities had been intensified and that the distance taught courses had improved the competitive position of Baden-Württemberg's universities. On the other hand, it became clear that digital study programmes had not yet been sufficiently integrated into the university curriculum and that deficits existed as far as the recognition of academic achievements produced in a virtual context were concerned. The concessions made by the university management bodies in respect of the permanent implementation of project results proved as yet to be inadequate. Moreover, concepts still focused too much on individual projects rather than on networked or cooperative structures, while project self-evaluation also still left much to be desired, since projects sometimes tended to concentrate more on testing methods rather than on generating evaluation results on teaching and learning successes.

Future development

In the future, Baden-Württemberg intends to shift the support focus towards the fields of continuing training, infrastructure building and media development planning. And so, for example, an initiative called *Master Online* (with funding worth €12.78m) will support the development of career-integrated online graduate degree programmes which lead to a Master's degree.

2.5 Virtual University Bavaria (Virtuelle Hochschule Bayern - vhb)

The Bavarian State Ministry of Science, Research and the Arts established the Virtual University Bavaria (*Virtuelle Hochschule Bayern - vhb*) by decree on 4 May 2000 to provide state-wide support for the development and implementation of new media in teaching at Bavarian universities. The vhb is an institutional network involving all of the state universities and universities of applied sciences in Bavaria. It aims to make digital, web-based teaching and learning programmes available to students enrolled at Bavarian higher education institutions via a single portal (www.vhb.org). The vhb intends to enrich and extend on-campus, classroom teaching in Bavaria by enabling students to use web-based courses for time and place flexible studies. Moreover, the vhb plans to actively use web-based learning systems to deliver key qualifications in the field of modern IC technologies.

The funds used for the vhb up to the end of 2002 came from the state's privatisation revenue provided as part of the Bavarian High Tech Campaign. Between May 2000 and December 2003, these grants amounted to around €11m. Since 1 January 2003, the vhb – as the first such initiative in Germany – has been given a firm place in the state budget; the effective value of this funding amounts to around €3m per annum.

Organisation

In organisational terms, the vhb is not an independent university, but rather a network run by nine public research universities and 17 public universities of applied sciences. Since its foundation, applications from nine other universities wishing to join the vhb have been accepted by the Science Council (*Wissenschaftlicher Rat*) (see below). In total, this means that 35 Bavarian universities are now associated under the umbrella of the vhb network.

Fig. 5: Geographic distribution of the universities involved in the vhb

Fig. 6: Universities participating in the vhb

Public Research Universities	Public Universities of Applied Sciences (Fachhochschule)	Other Universities
University of Augsburg	Fachhochschule Amberg-Weiden	Augustana-College Neuendettelsau
Otto Friedrich University Bamberg	Fachhochschule Ansbach	Protestant Fachhochschule Nuremberg
University of Bayreuth	Fachhochschule Aschaffenburg	
Friedrich Alexander University Erlangen-Nuremberg	Fachhochschule Augsburg	Fachhochschule for Public Administration Studies
Ludwig Maximilian University Munich	FH-Branch of the University of Bamberg, Department of Social Work	Munich Academy for Television and Film
Technical University of Munich	Fachhochschule Coburg	Würzburg College of Music
University of Passau	Fachhochschule Deggendorf	Munich Institute of Higher Education for Politics
University of Regensburg	Fachhochschule Hof	
Bavarian Julius Maximilian University Würzburg	Fachhochschule Ingolstadt	Catholic Foundation Fachhochschule Munich
	Fachhochschule Kempten	Catholic University of Eichstätt-Ingolstadt
	Fachhochschule Landshut	University of the Federal Armed Forces Munich
	Fachhochschule Munich	
	Fachhochschule Neu-Ulm	
	Georg Simon Ohm Fachhochschule Nuremberg	
	Fachhochschule Regensburg	
	Fachhochschule Rosenheim	
	Fachhochschule Weihenstephan	
	Fachhochschule Würzburg-Schweinfurt	

As a network institute, the vhb has a decentralised structure. The organisational and decision-making structures were set by the founding decree on the vhb, which provided for the following decision-making bodies (cf. Fig. 7).

Board of Directors

The Board of Directors (*Direktorium*) sets the vhb's general programme, draws up the pre-applications for the state budget and decides on the distribution of the funds received by the vhb.

Scientific Council

The Scientific Council (*Wissenschaftlicher Rat*) decides on the planning for the continuing development of the vhb. 28 members sit on the council (professors, academic staff, non-academic staff and student representatives from research universities and universities of applied sciences as well as one women's affairs officer).

Advisory Council

The vhb Advisory Council (*Beirat*) is made up of eight public figures. It advises the vhb's decision-making bodies and tables suggestions on how to raise the vhb's profile and to set core focuses. It also supports and advises the Board of Directors on all important questions, including aspects of knowledge and technology transfer, and makes recommendations on the range of teaching offered by the vhb.

Fig. 7: vhb organisation chart

Departmental Councils

A Departmental Council (*Fachrat*) has been set up for each subject group which already provides or plans to provide courses for the vhb. Departmental councils are responsible for preparing and coordinating the content of their courses and programmes and for ensuring that programmes and courses run properly. Furthermore, they assure the quality of the web-based courses and organise and coordinate the supervision of the teaching and learning elements developed by member universities.

Commissions

The Board of Directors has established three Commissions (*Kommissionen*) on the following areas: "Programmes and Recognition Procedures", "Structural Planning and Quality" and "Technology". These commissions plan, execute and supervise fundamental roles of the vhb and also prepare decisions to be taken by the Board of Directors.

Director

The Director (*Geschäftsführer*) is in charge of the vhb office located in Hof and Bamberg. The vhb office performs administrative duties, for example, announcing funding awards and inviting

applications, running the student administration and supporting the work of the vhb decision-making bodies. The office promotes the development of courses and programmes by means of a central project management system. A corresponding coordination office for the research universities is located in Bamberg, with the coordination office for the universities of applied sciences based in Hof.

A total of around 150 people work on the decision-making bodies and at the various institutions in an honorary capacity. The vhb office has 16 permanent positions, of which 13 had already been filled by 30 November 2003. Besides general management duties, the vhb office is also responsible for the fields of project management, budget and finances, student registry, internal and external communication, as well as technology.

Project funding

One of the vhb's core responsibilities lies in promoting the development of web-based, multimedia study opportunities at Bavaria's universities. To this end, the vhb has launched three calls for applications since 2000 which were open to its member universities. The applicant – and in the event of approval – the recipient of the support funding is always the university at which the project leader is employed; in the project proposal, the applicant university must specify how it intends to contribute to the project funding. The decision on which projects receive support is made by the Board of Directors on the basis of expert and departmental council recommendations. When funding for a project is approved, the rights of use and the exploitation rights to the course or programme produced by the funded project pass to the vhb.

A total of around €8.5m was approved for around 100 projects in the course of two application rounds held in 2000 and 2001. A third application round ended on 15 October 2003. Most of the 97 incoming project proposals met a central award criterion – projects must ensure that the academic achievements gained in the to-be-developed study course or programme will be recognised by at least two Bavarian universities. Around 35 projects will probably be approved for funding.

Range of studies

The Bavarian funding does not aim to develop whole degree programmes, but rather to prepare individual courses with multimedia elements. In order to be able to ensure the permanent implementation of the developed educational courses, funded projects will be expected to offer the course units they have produced for a minimum of five years. At present, course units are available at the vhb in the following subject groups.

- Computer science
- Engineering
- Medicine
- Law
- Key qualifications
- Social work
- Economics and business administration

Other courses are in preparation in these disciplines as well as in the subject group "Teacher training".

The catalogue of courses available at the vhb is divided into four course unit categories: A courses, B courses, teaching and learning modules, plus tools (cf. Fig. 8).

Fig. 8: Kinds of courses offered at the vhb

A courses	B courses	Teaching and learning modules	Tools
• offered on a regular basis • supervised by tutors • approved by the departmental council • meet the examination regulations • enable students to gain credit points	• complementary and extension studies offered by Bavarian universities • courses (Beta version) from the vhb's development programme	• cover part of the course • serve to complement and extend on-campus courses • open to use by university teachers or students	• dictionaries, specialist information catalogues • material collections • simulations • glossaries • test systems

The vhb registered around 2700 enrolments for the 63 courses/study units that were offered in the 2003 summer semester. These were distributed across various subject groups and types of study units. In the 2003/2004 winter semester 86 A and B courses are offered. The approximately 4500 enrolments come from about 3000 students.

Fig. 9: vhb courses by subject groups

Subject Group	Number of Courses
Computer Science	20
Engineering	16
Teacher training	1
Medicine	39
Law	1
Key qualifications	24
Social work	1
Economics/Business adm.	26
Other subjects	5
Total	**133**

Compared with the previous semester, the winter semester shows a pronounced increase in the number of students enrolling for courses. This increase can probably be attributed to the extended range of studies offered and to the intensified public relations work done by the universities.

IT compact course

An "IT compact course", which is offered in a career-integrated study format in the field of Business Computing and leads to a Bachelor's degree or is offered as a continuing training course with an FH certificate, is closely connected with the vhb. This course is a cooperative product involving the universities of applied sciences FH Deggendorf, FH Ansbach and FH Augsburg, as well as BR-Alpha, the educational channel operated by Bayerischer Rundfunk, the Bavarian broadcasting corporation. This course aims

❑ to use around 50% of the virtual course materials (also from the Virtual University Bavaria) to provide career-integrated studies in the Bachelor's Programme "Information Systems and Management" for undergraduates beginning from the 1st semester (IT basic study stage) or for mid-programme entrants beginning from the 3rd semester, and

❑ to offer television viewers a course of certified, virtual continuing training in 20 areas taken from the fields of business administration, business computing and computer science.

Since the course started in the 2000/2001 winter semester, around 50 students per year have taken up the opportunity to study. The first graduates, who completed their studies in March 2002, were probably the first German university graduates to have completed around 50% of their studies in a purely virtual format. May 2003 saw the organisers of the "BayernOnline International" conference award the course the BayernOnline Prize in the category "e-learning".

Academic operations

To qualify for admission to a vhb programme, students must be matriculated at a Bavarian university. Students with auditor status are also entitled to enrol for a course offered by the vhb. Registration and course attendance are free of charge for fully matriculated students.

Students initially register by filling in and submitting an online form. This entitles them to 20 days of unlimited trial use of the course. To enrol for the full course, students have to print out the registration form and send it by post along with the matriculation certificate to the vhb. As soon as this application has been received, their access will be converted into normal access. The mandatory re-registration process for each semester is also paper-based.

All courses offered in the vhb's curricula include tutorial support and supervision so that students have a communication channel through which they can verify and improve their academic performance. The vhb offers free-of-charge participation in tutoring courses for vhb course providers and their staff.

Many of the vhb's courses enable students to complete the course with an examination, which is generally carried out by the course providing university. So far, recognition of these academic achievements has been governed within the vhb by courses having guaranteed recognition by the provider university. In addition, the transfer of credits for academic achievement is subject to a case-by-case examination by the student's home university. In order to advance a broader system of academic achievement recognition, the third call for applications for project funding included the award criterion that academic achievements had to be recognised by at least two universities (see above).

In addition, the vhb is endeavouring to have the Bavarian Higher Education Act amended so as to reverse the burden of proof in such a way that academic achievements produced as part of a vhb course are recognised as standard practice. Refusal of such recognition would have to be specifically justified by the relevant university. A further relaxation of the study rules is additionally planned in terms of the user-friendly organisation of examinations; at universities with high student numbers, at least, students are to be allowed to have their own examination session on campus, so that the time and financial burden of travelling to an examination no longer applies.

Quality assurance and incentive structures

The quality of courses offered by the vhb is assured in a two tier system: firstly, the departmental councils assess the individual courses and, secondly, students are encouraged at the end of the semester to take part in an anonymous evaluation of the course they have taken.

An incentive to raise university teacher commitment in the field of developing and using new media in teaching was launched in 2001 by the published amendment of the teaching load regulation. This now makes it possible for the development and supervision of digital courses to be credited to the workload up to a maximum of 25% of the overall teaching requirement. However, since resources are not automatically made available for a replacement teacher when this ruling is invoked, the effects of this incentive structure have remained limited.

Cooperation

Even though the vhb concentrates on supporting digital teaching in Bavaria, it nevertheless is working on developing networks with other partners. And so a first process of exchange started with the Virtual University Baden-Württemberg in the summer semester 2002. Under this cooperation, Bavarian students get access to study opportunities offered by the Virtual University Baden-Württemberg, while, in return, the vhb makes a limited number of places available in its courses. In addition, cooperation agreements have also been concluded with universities outside

Bavaria on the production of courses and programmes. Cooperation with external partners is governed on a case-by-case basis by cooperation agreements.

Future development

Various changes to the concept of the vhb are planned for the future. With the growing number of students (10,000 enrolments are planned for the winter semester 2005/2006), these changes aim to facilitate the strategic and operational work of the vhb. And so the support funding term for producing 2 semester credit hours (SWS) of teaching was reduced to 16 months in the third call for applications to accelerate a development process which had previously taken two years on average.

Furthermore, the complex organisational structures of the vhb, drawn up in line with the decision-making structure of an on-campus university, are to be made as lean as possible. Conceivably, the main decision-making body could be a real annual general assembly attended by the member universities.

In 2003, the vhb undertook the first steps towards extending the range of courses it offers to include the field of continuing training. Consequently, individual vhb courses will be used in fee-charging degree programmes offered by other providers. In addition, academics and non-academics will offer courses which aim to provide continuing training in a student's practised profession or vocation or to provide continuing training in areas of personal or professional interest. These activities will be backed up by the vhb taking on responsibility for the operation and administration of the Bavarian postgraduate training campus www.cwwb.de (Campus wissenschaftliche Weiterbildung Bayern), which will open up the (largely on-campus) continuing and postgraduate training programmes offered by Bavaria's universities.

2.6 Multimedia University Service (Multimedia Hochschulservice Berlin GmbH)

In response to an initiative by the state conference of Berlin's university rectors and presidents, the Multimedia Hochschulservice Berlin GmbH (www.mhsg.de) was founded on 29 June 2000 as a German limited company. The company aims to support Berlin universities in the development and marketing of high-quality multimedia educational programmes. Nine Berlin universities are partners in the limited company:

- Free University Berlin (FU)
- University of Applied Technical and Business Studies Berlin (FHTW)
- Humboldt University Berlin (HU)
- University of Arts Berlin (UdK)
- University of Applied Technical Studies Berlin (TFH)
- University of Applied Business Studies (FHW)
- University of Applied Administrative and Legal Studies Berlin (FHVR)
- Technical University Berlin (TU)
- Alice Salomon University of Applied Social Work and Social Education Studies Berlin

The company was managed in an honorary capacity up until November 2002, since when it has been headed by a full-time manager.

Besides supporting the universities in the development of marketable e-learning products (see Fig. 10 for details), the company's portfolio includes full-service activities in the field of learning management systems, project consultancy, product marketing and exploitation, quality assurance and evaluation as well as participation in federal government and EU funded programmes. In its work, the MHSG cooperates with various partners from business and industry.

Fig. 10: How the MHSG cooperates with Berlin's universities in generating content

In the field of learning management systems, the MHSG already provides its first university customers with access to the CLIX 4 platform in return for an annual fee. This service includes the support and maintenance of a high-performance database, provision of the platform's content and web servers, data backup, installation of the platform, shared software licences, updates for the base system, software updates, online support and telephone hotline with

assistance on using the learning platform in everyday operations and support for platform clients. The MHSG also maintains contacts with the software manufacturers.

The MHSG offers content in the form of eight CD-ROMS that contain interactive educational software and were developed at Berlin's universities. A single CD-ROM costs between €24.05 (for students) and €98.95. The target groups for these products are teachers, students in the basic study stage, secondary II level pupils and teachers, trainees, hobby researchers and e-learning practitioners. At the end of 2003, eight CDs with various topic focuses (The Earth, Interactive Physics, Open Economy, Process Management, Communication Training, Internet Law, Statistics, Multimedia Engineering) were already or were soon to be available.

2.7 E-Learning Consortium Hamburg / Multimedia Kontor Hamburg

In Hamburg, the state's activities in the field of implementing new media at universities is characterised by three parallel measures: the support programme "E-Learning and Multimedia", the independent university body "E-Learning Consortium Hamburg" and the "Multimedia Kontor Hamburg". This three-way initiative was drawn up and contractually fixed in an agreement which the Ministry of Science and Research concluded with Hamburg's universities (University of Hamburg, Hamburg University of Applied Sciences, Technical University Hamburg-Harburg, HWP-Hamburg University for Business and Political Studies, the Hamburg College of Music and Theatre, and the Hamburg College of Fine Arts) and the State and University Library. This agreement explicitly provides for the establishment of the E-Learning Consortium Hamburg (ELCH) and the Multimedia Kontor Hamburg (MMKH) and specifies the following general goals:

- to draw up a strategy for Hamburg's universities on the development and implementation of multimedia educational programmes,

❑ to use synergies and avoid isolated solutions and double developments,

❑ to share resources, including between the various kinds of universities,

❑ to prepare cooperation projects with media centres of excellence and media networks located in other states as well as to make international contacts, and

❑ to initiate cooperation projects between universities and business and industry – particularly with Hamburg's media companies – including Public Private Partnerships.

Support programme

A special programme called "Project Support for E-Learning and Multimedia" on the implementation of digital media in university teaching was launched in 2002 to provide flanking measures for ELCH and the MMKH. In total, this programme has a budget of €7m allocated to it for the period up to the end of 2004. The programme aims to bring together the excellence and skills which exist in the field of media and web-based teaching at Hamburg's universities and at the State and University Library (SUB) to create an overarching strategy. The aim is to support the development of prototypal e-learning environments and applications for proven project focuses in order to create structures of a model character which are able to encourage the longer term reform processes at the universities and the SUB. The goals associated with the programme are specifically

❑ "to use the opportunities provided by e-learning and multimedia to enhance the quality of teaching,

❑ to improve access to educational and knowledge media and to optimise the communication potentials for teaching, studies and continuing training,

❑ to intensify cooperation in the development of media-delivered specialist information, communication and teaching,

❑ to develop sustainable concepts and structures for e-learning and multimedia in teaching,

❑ to promote young academics, scientists and researchers." (Source: www.mmkh.de/)

The E-Learning Consortium Hamburg decides on which projects are funded, making its choice on the basis of the criteria "project quality and degree of innovation", the "appeal of the course catalogue for students" and the "degree to which programmes relieve the workload on lecturers". Applications could be submitted by university teachers, departments and scientific or research institutions at public universities in Hamburg, by these public universities themselves as well as by the State and University Library (possibly together with respective partners). Cooperation projects and networks were given preferential consideration in the selection process. The targeted group of funded projects included, in particular:

❑ projects on the development of teaching/learning programmes with defined e-learning platforms,

❑ innovative e-learning initiatives and activities by Hamburg's universities,

❑ content production projects, and

❑ e-learning transfer and complementary research projects.

In the first phase, some 25 projects from various disciplines and from all institutions participating in ELCH were accepted for support funding. A total of around 40 larger projects will receive support up to 2004. A list can be accessed via the MMKH website (http://www.mmkh.de/projekte/index_0.html).

To complement this funding with its goal of producing high-quality applications, an initiative called "Courses on the Net", which focused on lower-level developments, was launched in 2003 to introduce as many teachers as possible to the new educational technologies. Members of Hamburg's universities and of the State and University Library who make their course materials (background texts to lectures, or scripts and presentations) available on the learning platforms of Hamburg's universities can receive grants of up to €5,000. In November 2003, 30 of these intentionally low-level projects had been approved for funding.

E-Learning Consortium Hamburg

The "E-Learning Consortium Hamburg (ELCH)" (www.e-learning-hamburg.de) is a cross-university group of experts made up of 12 specialists from Hamburg's universities and from the State and University Library (four members from Hamburg University, two each from the Hamburg University of Applied Sciences and the Technical University Hamburg-Harburg, one each from the HWP-Hamburg University for Business and Political Studies, the Hamburg College of Music and Theatre, the Hamburg College of Fine Arts and from the State and University Library (SUB)). The consortium members and their representatives are appointed for a term of two years by the Senator for Science and Research on the basis of nominations put forward by the universities and the SUB. The Multimedia Kontor (see below) runs the ELCH office.

Decisions on the allocation of ministry funds to the universities, to the SUB and to the Multimedia Kontor are based on transparent goals and criteria. The universities and their institutions submit their applications for support funding simultaneously to the consortium and to the respective university management; statements by the latter are to be considered by the consortium. The consortium reaches its final decision by consensus, respectively in exceptional cases, by absolute majority vote.

A target agreement to coordinate the overall development was reached between the Ministry of Science and Research and ELCH which is revised every year and which specifies the following points:

❑ the level of funds to be awarded by the consortium,

❑ the goals to be pursued by these funds in the topic field e-learning and multimedia,

❑ the level of operational funds for the Kontor, and

❑ the accountability and reporting duties of the consortium.

Multimedia Kontor Hamburg

Working on the basis of the agreement mentioned above, the Multimedia Kontor Hamburg (MMKH) was established in 2002 as a non-profit limited company (www.mmkh.de) for the purpose of supporting e-learning activities at Hamburg's universities and at the State and University Library. Hamburg's universities are the shareholders of the Kontor, which employs five people, including its manager. Besides serving as an office for ELCH, which allocates funds on the basis of an annually revised performance agreement and which sets the work focuses and content, the responsibilities of the Kontor essentially lie in the following five areas:

❑ administration and project management for Hamburg's funded projects,

❑ information and training measures on the implementation of multimedia technologies (e.g. learning management systems, multimedia development, didactics, copyright issues, business models),

❑ initiation of cooperation with business and industry and marketing for emerging projects (e.g. preparing the ground for Public Private Partnerships),

❑ ideas for and organisation of communication processes for experience exchange (workshops, roundtables, etc.),

❑ advice for business and industry and for political bodies in respect of various aspects relating to the successful and sustainable use of media in academic initial education and continuing training.

The close cooperation between ELCH and the Multimedia Kontor aims to ensure that selection of and support for e-learning projects is accompanied hand-in-hand by the requisite project management, comprehensive advice and the specifically-targeted product marketing required for a successful development. In addition, the Kontor encourages resource sharing by bringing together and coordinating tasks carried out in a similar manner by all the academic institutions involved in the Multimedia Kontor. In the field of contact-building and establishing cooperative relationships (for example, PPPs) between Hamburg's universities and interested companies, particularly from the ICT industry, the Kontor has already managed to contact numerous well-known companies and to integrate these into appropriate work contexts.

Fig. 11: Organisation of e-learning support in Hamburg

The Kontor has additionally created a support website for Hamburg's e-learning platforms. This acts as a central contact point for teaching and academic staff, tutors and research staff on questions relating to e-learning (http://support.mmkh.de). Besides offering an info pool and a list of FAQs, the site includes, for example, information on the planning, production and execution of projects, courses and seminars. Furthermore, it provides a supported e-mail hotline. Introductory events on the learning platforms which have been centrally deployed in Hamburg – WebCT Campus Edition and CLIX Campus – are announced in a calendar of training events.

A website specially produced for students (www.eStudent-Hamburg.de) provides information on the learning platforms and offers addresses, downloads, FAQs and a hotline on all questions about e-learning in Hamburg. Finally, an information portal called MODELS (Monitoring E-Learning Strategies and Multimedia Projects at Hamburg's Universities) is currently being set up. MODELS will collect, compile and present all information relevant to students on Hamburg's e-learning projects and on the institutions and persons involved in these.

By organising the conference "Campus Innovation Hamburg" from 29 September to 1 October 2003, the MMKH held the first major conference on e-learning at Hamburg's universities. This conference particularly aimed to publicise current projects and activities and to initiate contacts between science, education and research, on the one hand, and business and industry, on the other. During the conference, Federal Minister of Education and Research Edelgard Bulmahn received a "Hamburg Statement" from the 400 or so participants attending the conference (http://www.mmkh.de/upload/dateien/artikel/hamburg_erklaerung1.pdf), containing suggestions and ideas on the sustainable development of media-based teaching at Germany's universities.

2.8 E-Learning Hessen

Since the late 1990s, the state initiative *Hessen media* has supported the development, production, introduction and dissemination of new information and communication technologies and multimedia services in business and industry, in private households and in the public sector. The initiative's support focus "Telematics in Education and Science" concentrated on the funding of e-learning projects in the educational field, including numerous university projects. The education-related support focus is divided into the fields of media education/school, digital library information, virtual university, culture and media, and telemedicine (cf. http://www.hessen-media.de/projekte/inhalt/inhalt.htm).

To guarantee, in particular, the sustainability of university e-learning activities, a policy of establishing multimedia centres of excellence has been pursued at five universities in Hessen since 2001. The funding for this measure is provided within the scope of the University and Science Programme (HWP) established in 1999 in an agreement between federal government and the states. Up until the end of 2003, HWP funds worth around €100,000 were available per university to pay for two posts each. Hessen's Ministry of Science and Art has promised continuing funding of these centres for three years as part of the extension of the HWP programme to 2006.

Members of the media centres of excellence have been meeting at regular intervals for just under three years now to exchange experience and identify synergies. In order to present and make transparent the activities of the centres in the field of supporting e-learning at Hessen's universities, the portal www.e-learning-hessen.de was put online on 1 September 2003 – in agreement with the Ministry of Science and Art. The website, which is based on a specially programmed content management system, presents the work of the five media centres of excellence in Hessen and documents some 159 e-learning projects at Hessian universities in a project database. The information on these was decentrally collected by the media centres of excellence and is searchable using a range of criteria. Furthermore, the website contains information on seminars and workshops, online courses which can be started immediately as well as guidelines, reports and tools ready for downloading. The target group for this information service not only covers students, but rather all those active in the field of e-learning who want to find information on projects and sources of support. They can additionally subscribe to a newsletter that appears once every two months. The long-term plans are to extend the portal by including information and programmes offered outside Hessen. A more detailed presentation of the Hessian media centres of excellence can be found in Chapter 5 of the report at hand.

Fig. 12: Multimedia Centres of Excellence at universities in Hessen

2.9 E-Learning Academic Network Niedersachsen (ELAN)

On 21 June 2000, the Lower Saxony state parliament adopted a resolution on a "Virtual University in Lower Saxony – Multimedia Opportunities for Teaching, Research and Studies". Working on the basis of this resolution, the Strategic Multimedia Consultants Group (SBMM) drew up, in agreement with the Lower Saxony Ministry of Science and Culture and the Science Commission Lower Saxony, a draft concept on an e-learning support programme called "E-Learning Academic

Network Niedersachsen" (ELAN), which the Science Commission of Lower Saxony recommended for implementation on 15 October 2001. The SBMM is a group of fifteen experts established by the state conference of university presidents and rectors in March 2000 which advises the Lower Saxony Ministry of Science and Culture and the universities on strategic questions relating to the funding and implementation of multimedia in teaching, studies and continuing training (www.sbmm-niedersachsen.de). The state uses this support programme to support the development of digital learning environments and to provide corresponding services for universities in Lower Saxony. The support programme builds on two infrastructural support measures which, at the end of 2001 and in 2002, funded initiatives to create and extend the technical-infrastructural prerequisites for multimedia teaching.

ELAN objectives

ELAN aims to support universities in the state of Lower Saxony in the construction and adaptation of structures needed for the implementation of new media in teaching, studies and continuing training. To this end, the state budget will provide up to €25m for the period from 2002 to 2006. The support programme involves two stages which aim to support the successive creation of broad-ranging structures for media-based teaching. The first phase will fund so-called *net pilots* (university networks playing a pioneering role). These pilots are responsible, not least, for creating the network, a portal, and distributed services centres. The second phase provides support for partner universities. These produce content, in addition to that which comes from the pilots. This multistage, gradually-introduced support serves to create a state-wide network of infrastructure, excellence and knowledge. The sustainable use of digital, multimedia forms of teaching/learning – both in initial education and continuing training – is a declared funding goal.

Fig. 13: Network of ELAN pilots
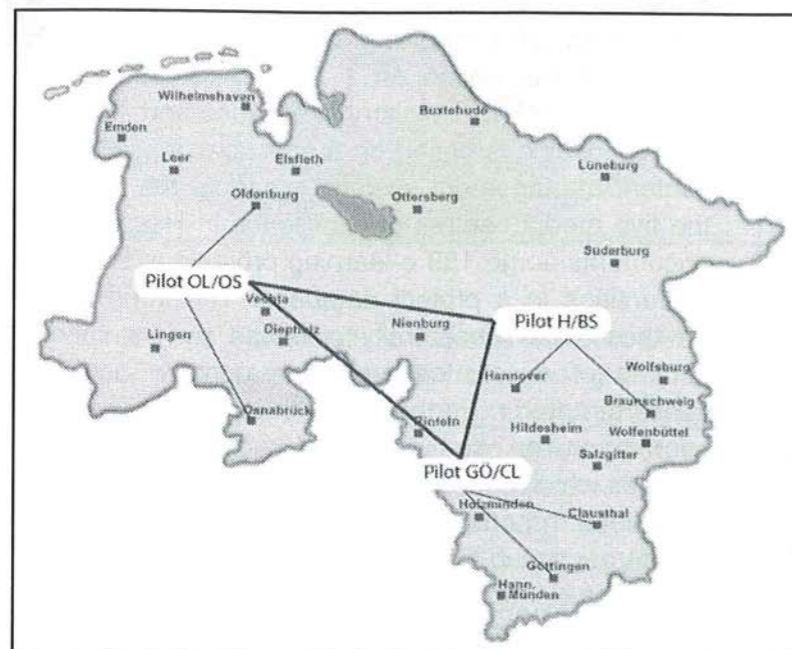
ELAN pilots

The main players responsible for setting up ELAN are the three ELAN pilots chosen on the basis of a state-wide call for proposals and an evaluation by external reviewers in 2002.

These pilots are:

❑ Carl von Ossietzky University Oldenburg / University of Osnabrück ("epolos")

❑ University of Hannover / Hannover School of Medicine / Technical University Carolo-Wilhelmina Braunschweig

❑ Georg August-University Göttingen / Technical University Clausthal.

Fig. 14: Work focuses for the ELAN pilots

The three university networks each set various, complementary focuses in their activities. The Hannover / Braunschweig pilot focuses on two target dimensions. Firstly, it aims to establish a appropriate infrastructure for the sustainable technical and organisational incorporation of multimedia teaching and learning (learning platforms, e-learning portal for Lower Saxony, economically feasible business models, multimedia engineering, hardware and software tools, didactic design, scalable digital library for to-be-developed contents). Secondly, this pilot simultaneously plans to implement a wide-ranging, demand-oriented, content-based development programme covering the following content fields: computer science/information technology, building and planning, initial and continuing teacher training, medicine.

The Göttingen / Clausthal pilot concentrates above all on the creation of a "computer science teaching network" which brings together the capacities and resources of the two universities on the basis of agreed inter-university curricula in this field. The knowledge and results produced by this approach will then be made available to comparable projects carried out within the scope of the Lower Saxony network and are also to be used in the field of continuing training.

The Oldenburg / Osnabrück pilot (epolos; www.epolos.de) pursues the goal of providing technical and organisational infrastructures as well as advisory and supervisory services. The centrepiece of the overall project, which involves three subprojects, is CELab (Laboratory for Content Engineering, Oldenburg; www.celab.de). CELab's task is to perform content engineering in the sense of a systematic approach to the production, dissemination, use, administration, reprocessing and archiving of electronic educational materials.

Fig. 15: Epolos: Focuses and subprojects
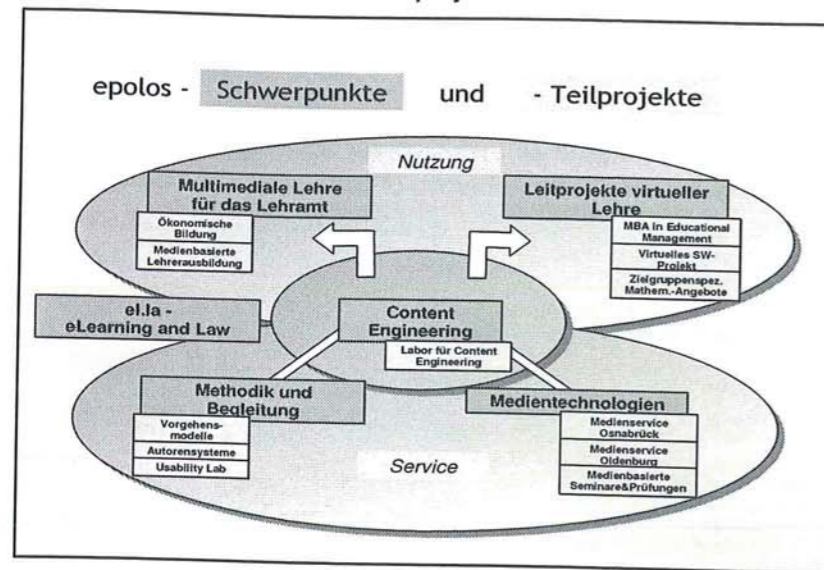
To this end, CELab has been institutionally integrated into the CDL (Center for Distributed eLearning; www.cdl-oldenburg.de) and cooperates with virtUOS (University of Osnabrück Support Centre for Virtual Teaching; www.virtuos.uni-osna-brueck.de). Further subprojects are affiliated to the fields of multimedia teacher training, lead projects for virtual teaching in initial education and continuing training, methodology and monitoring, as well as media technologies (see Fig. 15).

ELAN management

The overall project management for the ELAN initiative is performed by the so-called ELAN management board whose members are representatives from the universities involved in the three pilots. In 2003, the management board established cross-pilot and cross-location work groups whose findings help the management board reach its decisions. Examples of topic areas for the work groups are metadata, authentication, archiving, learning platforms, multimedia engineering, business models and continuing training, or didactics and usability.

The ministry established the ELAN Advisory Council (formerly supervisory board) as a supervisory and evaluation body whose members are representatives of the Ministry of Science and Culture and of universities located in other states. The ELAN Advisory Council, the Management Board and the Strategic Multimedia Consultants Group (SBMM) are supported by the SBMM office in administrative matters concerning the implementation of the ELAN concept.

Future development

The second call for proposals held under the E-Learning Academic Network, announced on 17 December 2002 and inviting potential partner universities to submit applications, was modified due to new framework conditions (university structure concept). Its realisation will largely commence as of 2004. Working on the basis of the ELAN concept, partners in the ELAN network will specially develop content modules that can be used state-wide. These modules will be maintained in the infrastructure established by the ELAN pilots. The goal is to achieve a systematic, broadbased extension of the educational modules and services made available by the pilots in the context of cross-university collaboration. An evaluation of the overall state of the support initiative is planned by the ELAN Advisory Council for the end of 2004; its results will be used to plan the programme's ongoing design and development.

2.10 Learning Lab Lower Saxony

The Learning Lab Lower Saxony (L3S; www.learning.lab.de) in Hannover has been operational since 2001 and is a research and cooperation centre for the study and development of innovative learning technologies. Its goal is to investigate the application and use of new techniques and technologies in the educational field and to support their implementation at universities as well as

in companies. Founded in 2000 as a member of the Wallenberg Global Learning Network (WGLN, see below), the L3S attaches particular importance to international research projects which address areas such as the use of web-based teaching materials, semantic web technologies for the shared use of information materials, real-time capable control systems for lab equipment, synchronous tutoring, and new methods and designs for project learning in spatially remote, web-based lectures and courses. A research and cooperation environment with a highly-developed infrastructure was made available to support the work of the various projects and schemes located at the L3S involving scientists and researchers from Hannover, Braunschweig, Karlsruhe and Mannheim. The core work fields for the L3S include the following research areas:

- ❑ cooperative knowledge management and semantic web technologies,

- ❑ cooperative learning spaces and distributed teams,

- ❑ university learning and process development,

- ❑ continuing training.

Activities

The L3S focuses on research work. In addition, it carries out measures in the fields of advice / consultancy and technology transfer as well as providing infrastructure and support in the field of innovative teaching and learning technologies. While the funding for transfer and research activities is very largely provided by external funding, multimedia engineering work and services provided for Lower Saxony's universities and evaluation are financed from the core budget jointly provided by federal government and the state of Lower Saxony.

> **Fig. 16: An example of the practical work done by the L3S**
>
> "Some professors at the L3S began transmitting courses to various other locations several years ago. Meanwhile, this has almost become routine. Some students are in Hannover, while others are in Bolzano, Chichester or Magdeburg, for example. The course is transmitted onto two large screens. One acts as a board, while professors use the other to present their lecture in English. All students have a microphone and can put questions at any time. Although participants are based at various locations, a kind of academic community develops. They can synchronise their work and cooperate regardless of location." (Source: http://www.learninglab.de/deutsch/ presse/faq.html)

The overriding goal of the work performed at the L3S relates to ensuring the sustainable introduction and implementation of innovative learning technologies in initial education and continuing training. International research projects examine the use of web-based learning materials, semantic web technologies for the shared use of information materials, real-time capable control systems for lab equipment, synchronous tutoring, and new methods and designs for project learning in spatially remote, web-based lectures and courses, whereby the integration of mobile learners will also be supported.

At present, around 20 research projects of varying content are running at the L3S (cf. http://www.learninglab.de/deutsch/projekte/projektuebersicht.html), such as:

- ❑ PADLR: search for and exchange of learning materials in a worldwide peer-to-peer network with personalised course units and intelligent indexing;

- ❑ MACS: cooperation between distributed teams in the course room of the future and via personal PDAs (part of a project on mobile learners);

- ❑ I-Labs: learning via the web in the university's mechatronics lab and in the private physics lab;

- VASE: interactive 3D environments and digital film for case-based learning in the future;
- MoRob: flexible and modular robotics platform for applications in university teaching and research;
- ELAN: the Hannover Braunschweig web pilot in the E-Learning Academic Network (Lower Saxony) on the sustainable and economically feasible development of e-learning services and programmes;
- UbiCampus: development and introduction of mobile multimedia technologies (e.g. notebooks) for interactive on-campus teaching at the University of Hannover;
- ELENA: smart learning spaces as educational service mediators which facilitate the use of heterogeneous learning services based on dynamic learner profiles;
- KoALA: creation of web-based educational elements in IT for vocational school teachers and pupils;
- iL2: the iL2 (interactive Learning Lab) is a multimedia room specially designed to meet the requirements of e-learning courses.

As from 2004, the L3S will be the lead institution in the PROLEARN project which won EU funding worth a total of €6.3m over four years. 19 core and 100 associated partners are working to advance innovations in the field of professional learning for small and medium-sized enterprises.

Fig. 17: iL2 at the L3S Hannover
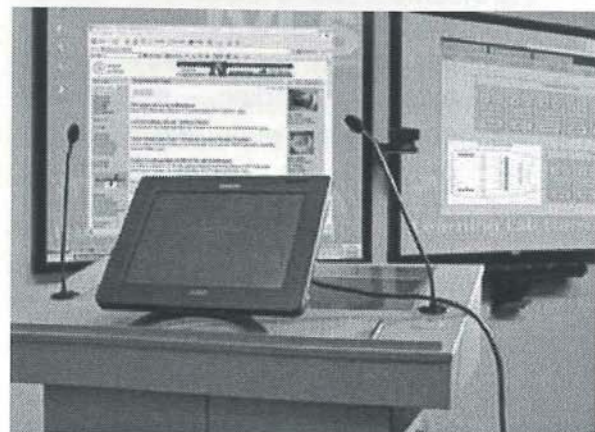
The requirement that at least two researchers from two WGLN labs must cooperate within individual projects serves to ensure the international nature of the research done at the L3S within the WGLN. The Scientific Commission of Lower Saxony is responsible for evaluating the work of the L3S (http://www.wk.niedersachsen.de/).

As far as the provision of infrastructures is concerned, the L3S provides high-quality technological learning and research infrastructures, such as the multimedia course room for holding video conferences, making high-quality audio and video recordings, teleconferences, group communication with shared applications, 3D stereo presentations or teleimmersive applications, and the interactive Learning Lab (iL2; see Fig. 17), which involves the central control of more than 50 individual technical components and so makes it possible to retrieve previously-defined complex e-learning scenarios at the touch of a button.

Structure

Hannover University, the Technical University Braunschweig (TU), the Braunschweig School of Art (HBK), plus the Universities of Karlsruhe and Mannheim work together in the L3S network. The following university institutes are involved in these activities:

- Institute for General Communication Engineering (Hannover University)
- Institute for Systems Engineering, Department of Real-time Systems (Hannover University)
- Institute for Information Systems, Department of Knowledge-based Systems (Hannover University)
- Teaching Unit for Computer Networks and Distributed Systems / Regional Computer Centre for Lower Saxony (Hannover University)

- Institute for Media Research (HBK Braunschweig)
- Institute for Telematics (Karlsruhe University)
- Institute for Communication Engineering (TU Braunschweig)
- IWF Wissen und Medien gGmbH (Göttingen) / Media Studies (TU Braunschweig)
- Institute of applied informatics and formal description methods
- Department of Computer Science IV (University of Mannheim)
- Institute for Operating Systems and Computer Networks (TU Braunschweig)

Besides universities, companies can also use the infrastructures and findings of the L3S to provide their staff with continuing (professional) training.

January 2002 saw 10 professors and 25 research staff working at the L3S. By September 2003, the number had already risen to 16 professors and 50 research staff (from 10 countries; largely computer scientists).

While the L3S was fully funded by federal government and the state of Lower Saxony with a total budget of around €7.67m in 2001 (70% federal government, 30% state), 35% of the budget was already covered by external sponsors (EU, DFG, business and industry, etc.) by 2003, which made it possible to pay a further 25 research staff. For the future, the L3S plans to further increase the proportion of third-party funding in the total budget.

In January 2002, the L3S moved its offices into the German Pavilion on the Expo Plaza in Hannover. The close proximity to CeBIT ensures that this location will receive a great deal of international attention in the business world. The L3S's immediate neighbour is Nord Media – a start-up centre for multimedia applications and the umbrella organisation for film promotion activities in Lower Saxony.

Wallenberg Global Learning Network

As a member of the Wallenberg Global Learning Network (WGLN), the L3S cooperates closely with the Stanford Center for Innovations in Learning (SCIL), which is responsible for coordinating the network, and with the Swedish Learning Lab (SweLL).

The Wallenberg Global Learning Network (WGLN; http://www.wgln.org/) is a research association that was founded in 1999 on the initiative of Stanford University and the Swedish Wallenberg Foundation. The LS3 joined the Swedish Learning Lab and the Stanford Center for Innovations in Learning as a member of this international collaborative network in September 2000. The network aims to improve learning processes at all levels of university education and training and to provide the requisite technologies. New media techniques and technologies aim to facilitate the exchange of knowledge, experience, technologies, methods and research findings. All WGLN projects are defined and executed in collaboration with partner universities.

The Stanford Center for Innovations in Learning (SCIL; http://scil.stanford.edu/) was founded in 2002 as an independent centre of excellence at Stanford University. This led to the integration of the Stanford Learning Lab, which had been in existence since 1997, into the SCIL. In terms of content, the SCIL focuses on research questions relating to advancing the development of science and technology in respect of learning and teaching from earliest childhood through to continuing (postgraduate) education, in so doing covering aspects such as visualisation and modelling, reasonably-priced ubiquitous computing, multimedia research tools, test and evaluation models, e-learning tools, learning environment design, and the further development of teaching activities and classroom teaching. September 2002 saw the SCIL move into Wallenberg Hall, a state-of-the-art research facility for innovations in the field of teaching and learning whose interior fittings were

completely redesigned for research purposes with a $15m grant from the Knut and Alice Wallenberg Foundation.

The Swedish Learning Lab (SweLL) is a joint venture involving the University of Uppsala, the Karolinska Institute and the Royal Institute of Technology in Sweden. The goal is to establish a national and international partnership in the use of new classroom technologies. Focuses emphasise context-related and self-determined learning and the integration of new technologies into university teaching (e.g. interactive learning environments for case-based learning in medicine). Cooperation projects involving various departments and universities play an important role here.

2.11 MultiMedia University Network North Rhine-Westphalia (Universitätsverbund MultiMedia Nordrhein-Westfalen - UVM NRW)

The network of excellence called "MultiMedia University Network" (www.uvm.nrw.de) represents an important construct in the support and coordination of digital teaching and learning offered in the state of North Rhine-Westphalia (NRW). As a joint initiative of the state of North Rhine-Westphalia and the universities represented in the NRW conference of university presidents and rectors, the MultiMedia University Network (UVM) additionally acts as a project sponsor for the state's own support programmes. Its network design supports exchange between universities and makes it possible to coordinate the overall development in the field of media-based teaching with the North Rhine-Westphalia's Ministry of Science and Research (MWF). The UVM aims to provide the infrastructure required for media-based teaching, to facilitate economies of resources by making project developments transparent and avoiding double developments, to concentrate interdisciplinary skills and expertise, to initiate cross-disciplinary and cross-university development and application partnerships, and to ensure the sustainability of media usage.

Activities

In its capacity as project sponsor for the state's own support programmes, the UVM defines how support funding is awarded and selects projects for funding. It also maintains a web-based database to document the e-learning projects running at universities in North Rhine-Westphalia, offers information on all aspects relating to the use of new media in teaching and, by means of topic-centred or user-specific discussion forums, facilitates a process of exchange on the acquired experience that has been gained. Thematically relevant workshops present the frameworks and fields of application of university e-learning to interested parties from the university sector. In addition, the UVM is responsible for advising the NRW Ministry of Science and Research on questions relating to the new media in university teaching.

Organisation

The heart of the network is made up of a Joint Working Group (Gemeinsame Arbeitsgruppe) which acts as a scientific advisory council, and an Administrative Office (Geschäftsstelle) in Hagen. The Joint Working Group is made up of 15 university teachers from member universities of the state conference of university presidents and rectors (Landesrektorenkonferenz) and of representatives from the science and

Fig. 18: Structure of the University Network MultiMedia
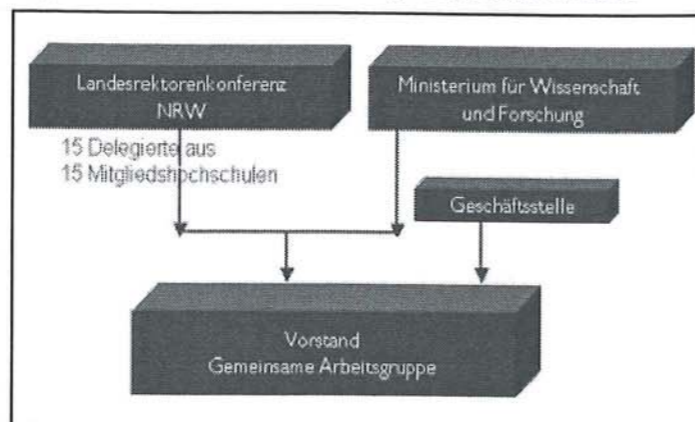
research ministry (Ministerium für Wissenschaft und Forschung). These select a five-person board (Vorstand) which represents the UVM externally. The responsibilities of the Joint Working Group include the following activities:

- preparing cooperation agreements between NRW universities on the development, production and use of digital, multimedia educational software,

- defining funding focuses and setting criteria for the appropriate calls for applications,

- organising selection procedures and selecting projects for funding,

- defining quality standards,

- carrying out specialist scientific reviews of project proposals, and

- developing target group and topic specific events.

The office, headed by a director, is administratively supported by the distance learning FernUniversität/University of Hagen and is responsible for the following activities:

- advising and supporting applicants and funded projects,

- performing the project management, including financial management,

- maintaining the UVM's information and services server,

- providing relevant information and advice on legal questions relating to copyright and exploitation rights, and

- public relations.

Project funding

Between 1997 and 2002, North Rhine-Westphalia, with support from the UVM, ran various funding measures to expand multimedia teaching at universities. In this process and with the goal of raising the study success rate and of ensuring a high-quality educational standard, a particular focus was placed on cross-departmental and cross-university model developments for undergraduate / first degree studies in high-demand disciplines which can be transferred to other fields of teaching. Other award criteria specified in the calls for applications included the following:

- a concentration on the development of teaching / learning software for undergraduate / first-degree studies,

- cross-university and cross-faculty project execution,

- the degree of innovation of projects,

- modularising the content and technical platform to guarantee product transferability, updatability, extendibility and long-term integratability,

- project compatibility with the technical frameworks at the universities.

Decisions on project proposals not only considered the usual academic criteria but also specialist didactic aspects and the degree to which projects used multimedia technology. Responsibility for evaluations lay with the members of the Joint Working Group and external experts.

A number of support rounds were run between 1997 and 2002 with various focuses. The overall value of funding in the specified period ran to around €10.5m, supporting a total of 75 projects. Besides funding for content and software development projects, grants were also given to cooperation projects involving schools and universities (eight projects) and a further seven projects

in the field of effectiveness research. Fig. 19 shows the percentage proportions to which the various subject areas were involved in funded projects.

Fig. 19: Share of funded projects by subject areas in the various UVM application rounds in NRW

UVM Application Rounds
1997 - 2002
Projects by Subject Areas

Economics and business administration / law 8%
Sport 3%
Effectiveness research 9%
Mathematics and natural sciences 22%
Humanities and social sciences 23%
Engineering 35%
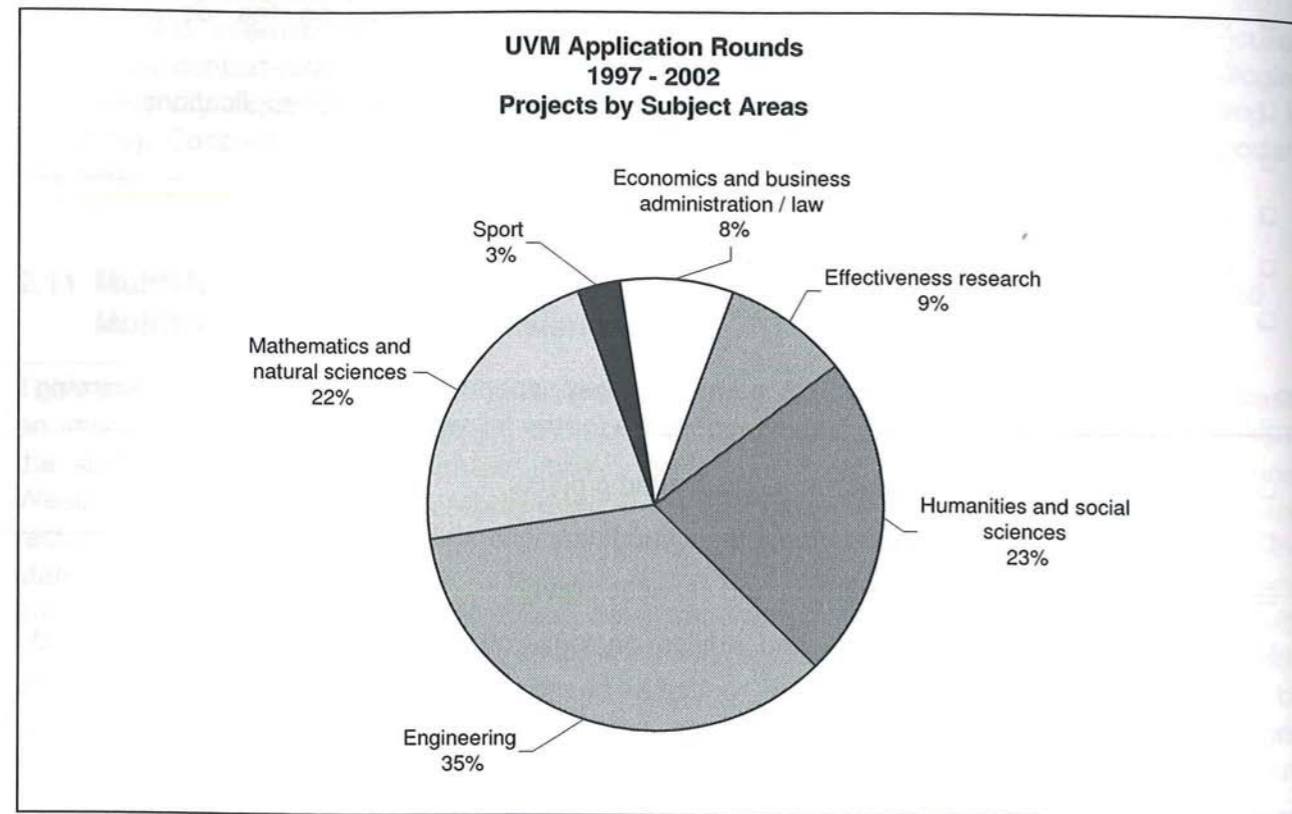
Universities of applied sciences in NRW were also eligible to apply for funding under the call for proposals for the "New Media in University Teaching" programme in 2000. This round required project proposals to be submitted jointly by at least two higher education institutions. As from January 2001, around €2.1m was made available to 15 projects to run for two years.

Sustainability

According to the UVM, 80% of the funded projects were used to complement and enrich classroom, on-campus teaching (http://cbl.fh-hagenberg.at/events/groten2003.pdf). The preferred media deployment scenario for funded projects consequently corresponds with the paradigm of blended learning. By contrast, 9% of the projects partly aim to substitute existing on-campus, classroom courses. As far as the sustainability of the implementation of developed materials and technologies is concerned, it is interesting to note that 30% of the project results were also used beyond the university scenario. The question as to how the product was exploited reveals quite a differentiated picture. The products of seven projects are sold via publishers, five products are marketed by the universities themselves, one project has become part of the Digital Library NRW, another has become a spin-off, two projects are integrated into the CampusSource-Initiative, and one project set up a cross-university database. In 41 projects, the development of the media-based learning environments is being continued beyond the funding term; of these 41 projects, 18 are being financed from the budgets of the respective universities, three by the state, 19 by federal government within the scope of the support initiative "New Media in Education", and one by industry.

ExaMedia NRW

The year 2003 saw the Ministry of Science and Research (MWF) and the Ministry for Schools, Youth and Children (MSJK) in NRW jointly announce the ExaMedia call for applications for the second time. It ended on 15 November 2003 and awarded prizes to students who as candidates for a teaching position had produced final theses for their state examinations in 2002 and 2003 which addressed questions of using new media in the schools sector. A total of €6.000,- was available in prize money for this. The prizewinners received their awards at the *didacta* education and training fair held in Cologne in February 2004 (http://www.didacta-koeln.de/).

Education Quality Forum

The "education quality forum" (http://www.education-quality.de/), organised jointly by the Ministry of Science and Research and the UVM, was held in Dortmund on 21 and 22 November 2002. The conference focused mainly on the topic "Impact and Effectiveness of New Media in Education" and was well attended. The keynote papers have been published in the conference proceedings by Keil-Slawik / Kerres, Waxmann Verlag 2003. The next "education quality forum" will be held in Autumn 2004.

Current challenges

The current challenges which the UVM faces include the question of how to ensure sustainable project developments (not least by universities making a stronger financial commitment), of how to establish e-learning as a strategic responsibility for the university management, of how to determine the structural and economic effects and potentials of new media (e.g. substituting basic courses with corresponding, web-based courses), and of how to consolidate and to optimise support and competence structures as well as to ensure competitiveness. The introduction of global budgets for universities in NRW, planned for 2006, means that these responsibilities need to be addressed now.

This is why no further funding is envisaged in NRW for the time being in the field of content development after the end of the last funding round in 2002. Rather, the focus will be on changing the strategy towards the systematic and sustainable integration of digital media at universities in NRW (e.g. making media use a strategic responsibility of the university management, consolidating and optimising competence and support structures, ensuring the competitiveness of NRW's universities).

2.12 E-Teaching@University (NRW)

E-teaching@university (www.e-teaching.org) is a joint qualification initiative launched by the NRW Ministry of Science and Research and the Bertelsmann Foundation / Heinz Nixdorf Foundation and scheduled to run until 2005. Its goal is to deliver media expertise for university teachers in the form of key qualifications needed to make successful use of new media in teaching. The concept is based on two pillars: on the one hand, individual face-to-face advice for teachers on campus at two chosen pilot universities in NRW, on the other, a web-based, nationwide information and autodidactic learning portal for e-learning (www.e-teaching.org). Both subprojects jointly pursue the following goals of:

❑ advising teachers who wish to give their teaching an innovative structure,

❑ supporting decision-makers who want to implement sustainable digital media in everyday university operations,

- presenting best practice experience from successful pilot projects,

- contributing to the sustainable incorporation of qualification and support in the field of university media deployment, and

- supporting an overarching system of information and experience exchange between experts, advisers, decision-makers and teachers.

Besides improving the media skills and expertise of university teachers, the state of North Rhine-Westphalia also aims to set up advisory structures within the central services centres located at the two pilot universities to ensure the provision of a system of support that precisely meets the requirements of university teachers.

Individual advice by E-Competence-Teams

The NRW Ministry of Science and Research is funding three so-called "E-Competence-Teams" at the Universities of Duisburg / Essen and Wuppertal until mid 2005. These teams provide universities with individual advice on using media in teaching. Teams are responsible for providing teachers at the above-mentioned universities with demand-oriented, low-level and practical support on all matters relating to e-learning (technology, didactics, organisation, etc.) in order to prepare them for active involvement in designing, using and integrating digital courses for university teaching. Their advice also draws attention to the availability of the www.e-teaching.org portal to facilitate quality assurance of both individual on-campus advice and online services. The three pilot universities link up to the portal via a local interface which enables teachers to submit higher education specific content. A detailed description of the advisory concept is contained in Chapter 5 of the report at hand.

Information portal

The second pillar on which the initiative is built is the information portal www.e-teaching.org, which has been in trial operation since August 2003. The main target groups for the portal are

- university teachers who have hardly gained any or only a little experience in the use of new media,

- lecturers with a specific need for advice and support,

- any other visitors looking for information.

The portal deliberately has a low-level approach in order to provide newcomers in the field of e-learning, in particular, with a structured, easily understandable entry. Its practice-related, implementation-oriented provision of information represents the focus of this application. The portal's individually configurable user interface (personal files, etc.) is under development. Discussion forums and newsletters support experience and information exchange as well as community building. Moreover, the portal also offers individualised access to knowledge resources via various entry categories so as to cover the various "perspectives" of digital teaching. These categories are (see next page):

Fig. 20: Start page for www.e-teaching.org
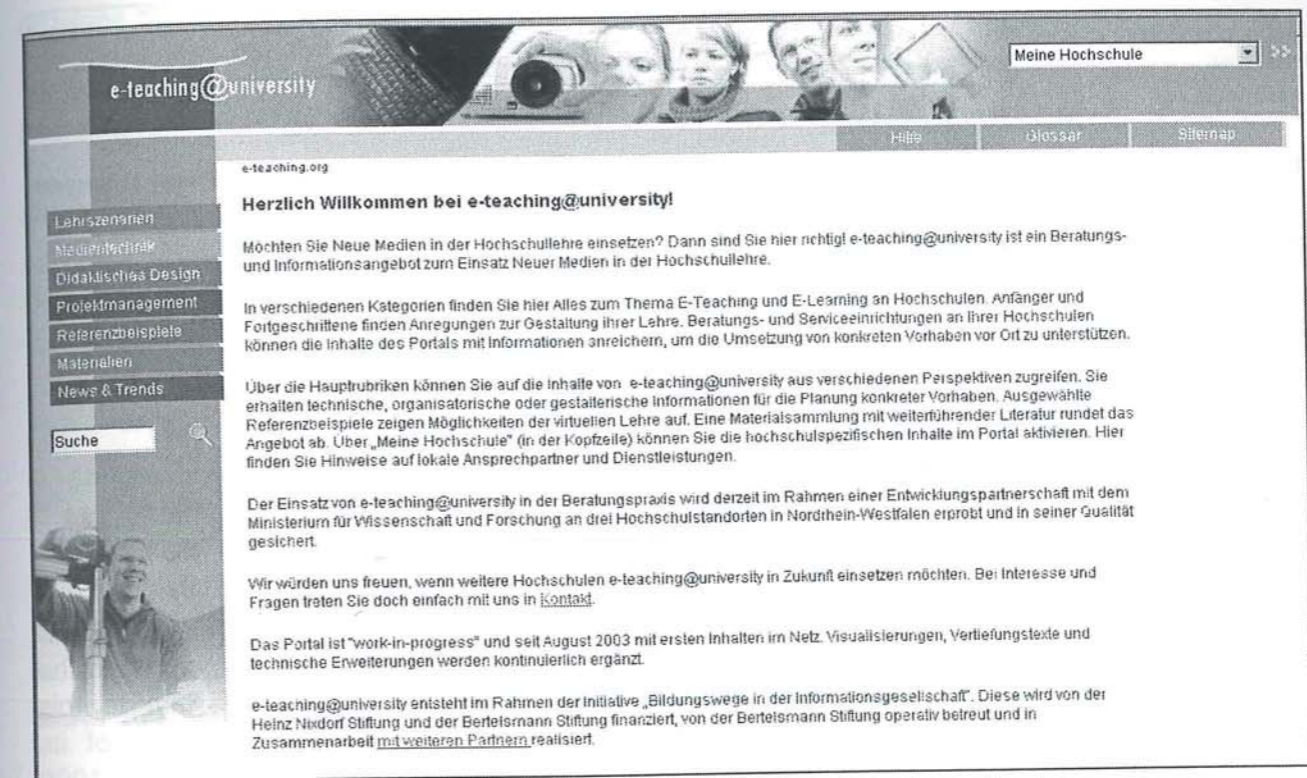
- Teaching scenarios: lecture, seminar, exercise / tutorial, practical course, project work, supervision and guidance,

- Media technology: processing, distribution, communication and cooperation, learning management systems, products from A to Z,

- Didactic design: conception, research, media design, quality assurance, theoretical background,

- Project management: product selection, rights and exploitation, sustainability, organisation,

- Reference examples: teaching scenarios, media use, departments,

- Materials: online literature, portals,

- News & trends: new developments in e-teaching, events, announcements and calls for applications, media politics, contact addresses,

- My university: access to the E-Competence-Teams at the three pilot universities.

A project team at the Institute for Knowledge Media in Tübingen (headed by Prof. Dr. Dr. Friedrich W. Hesse) is responsible for concept development, realisation and content production. All content is continually updated and extended to drive forward the creation of a comprehensive e-learning information portal. The programme plans to consult decentral experts from the universities in the future and to make their expertise available to the universities.

Structure of the initiative

The two subprojects – E-Competence-Teams and Information Portal – are being carried out within the scope of a strategic alliance between NRW and the Bertelsmann Foundation / Heinz Nixdorf Foundation. A steering committee is responsible for coordinating the subprojects, additionally backed-up by defined work arrangements between the pilot universities and the Institute for Knowledge Media.

Fig. 21: Structure of the E-Teaching@University

The state of North Rhine-Westphalia, the Universities of Duisburg / Essen and Wuppertal and the Bertelsmann Foundation / Heinz Nixdorf Foundation have allocated a total of €3m to this programme until 2005. For the Bertelsmann Foundation, this project marks the end of its "Educational Paths in the Information Society" programme, carried out in two phases since 1996 and co-financed by the Heinz Nixdorf Foundation. The programme funded pilot projects in the first phase (1996-2000), while in the second (2001-2004) it concentrated on inner-university structural initiatives aimed at ensuring the sustainable implementation of media via appropriate qualification and support measures.

From the perspective of NRW, the project is a building block of the state's *e-competence.nrw* programme which aims to achieve sustainable digital media usage at universities in the fields of research, teaching and administration and intends to make media development and implementation a strategic responsibility for the university management. Besides the e-teaching@university project, other building blocks in the programme include training courses for multipliers and disseminators, support in the use of media for selected study phases, creation of integrated virtual study and work rooms as well as the expansion of service-oriented, institutional infrastructures (digital library, university publications server).

Future developments

The portal content will be expanded successively by adding in-depth knowledge services and programmes on specific topics. As from 2004, other universities and states will be able to use the portal during the pilot phase as a building block for media development strategies. As from 2005, a federal and state transfer model will be set up so that, as from 2008, user fees can be used to finance the portal.

2.13 Virtual Campus Rhineland-Palatinate (Virtueller Campus Rheinland-Pfalz-VCRP)

The Virtual Campus Rhineland-Palatinate (VCRP; www.vcrp.de) was established by a resolution of the state conference of university rectors and presidents in the Rhineland-Palatinate on 24 January 2000. The state's four research universities and seven universities of applied sciences make up the VCRP. The VCRP is not a university, but rather provides an information and exchange platform

for e-learning projects and activities at the various universities in the Rhineland-Palatinate. It provides students and teachers with information, services and advice on all aspects of studying and gives the general public access to the electronic study units already available at the Rhineland-Palatinate's universities. One of the VCRP's main goals consists of supporting the sustainable implementation of e-learning in everyday university operations.

Activities

In order to advance the coordinated development of web-based study opportunities in the Rhineland-Palatinate, the VCRP concentrates on three core fields of activity, namely

❏ supporting lecturers in e-learning courses: providing learning platforms and authoring systems, including the appropriate user tutorials, user conferences, legal advice, organisation of workshops, recommendations on content production,

❏ creating administrative structures: maintaining the Internet portal, academic self-governance (online matriculation / dematriculation, course catalogue including online events and courses, database of web-based study programmes in the Rhineland-Palatinate), student self-governance, self-organisation of university groups,

❏ developing incentive systems for media-based teaching: cooperation agreements with partners in and outside the Rhineland-Palatinate, assisting the production of course modules, combining modules into (part)degree programmes, developing marketing strategies for university teachers, marketing and dividend payouts, supporting the acquisition of funding, distributing web-based programmes and services via the portal website, providing limited funding for projects to consolidate e-learning infrastructures.

It is currently possible to access 563 multimedia learning objects for 460 courses from 14 universities in the Rhineland-Palatinate via the VCRP portal, which has been online since 25 January 2001. However, only those study units are considered which have their own website and which, apart from merely providing basic information, also offer documents, graphics, slides, applets, link lists, interactive sequences or videos. Entries can be searched by various criteria; keyword, degree programme, kind of provider and kind of course. Furthermore, the VCRP website refers to institutions and directories offering Rhineland-Palatine, German and international continuing / postgraduate training opportunities and gives links to freely-accessible online learning opportunities which have been arranged into subject areas by the VCRP team. The portal also offers various kinds of information on study, teaching and research related aspects in the Rhineland-Palatinate (degree programmes, university laws and decrees, examination regulations, doctoral degree regulations, habilitation regulations, addresses of the student representations and unions, etc.), presents the work of the VCRP, announces events and points to new developments, and, via a login, enables users to access the learning platform WebCT, which was chosen by the steering committee and the universities in an evaluation process. The platform is hosted by the Regional University Computer Centre at the University of Kaiserslautern. In cooperation with the Centre for Distance Learning and University Continuing Training (ZFUW) at the University of Kaiserslautern, introductory courses on using the platform were held at practically all Rhineland-Palatine universities in the summer semester 2002.

The VCRP continues to hold workshops on current topics in the field of media-based teaching (e.g. in 2002 on placing theses and dissertations on the web, media-based advisory skills, authoring tools, teleteaching systems, and other areas) and produces collections of materials and documentary works which are made available to university teachers at no charge.

Structure

The universities of applied sciences FH Bingen, FH Kaiserslautern, FH Koblenz, FH Ludwigshafen, FH Mainz, FH Trier und FH Worms, the research universities at Kaiserslautern, Koblenz-Landau, Mainz und Trier as well as the German University of Administrative Sciences Speyer joined forces to form the Virtual Campus Rhineland-Palatinate.

A steering committee took on strategic responsibility for the overall development. This committee, which decides on the strategic direction of the VCRP, is made up of executive board members from the state conference of university presidents, a representative of the research universities, a representative of the universities of applied sciences, the head of the Regional University Computer Centre at the University of Kaiserslautern, a representative of the Ministry of Education, Science, Continuing Training, Research and Culture of the Rhineland-Palatinate, and the head of the VCRP office. The office (consisting of a director, two research staff, a secretary) was originally based in Mainz and is now located in Kaiserslautern from where it coordinates the projects and puts the resolutions and decisions of the steering committee into practice.

Fig. 22: Organisational structure of the VCRP
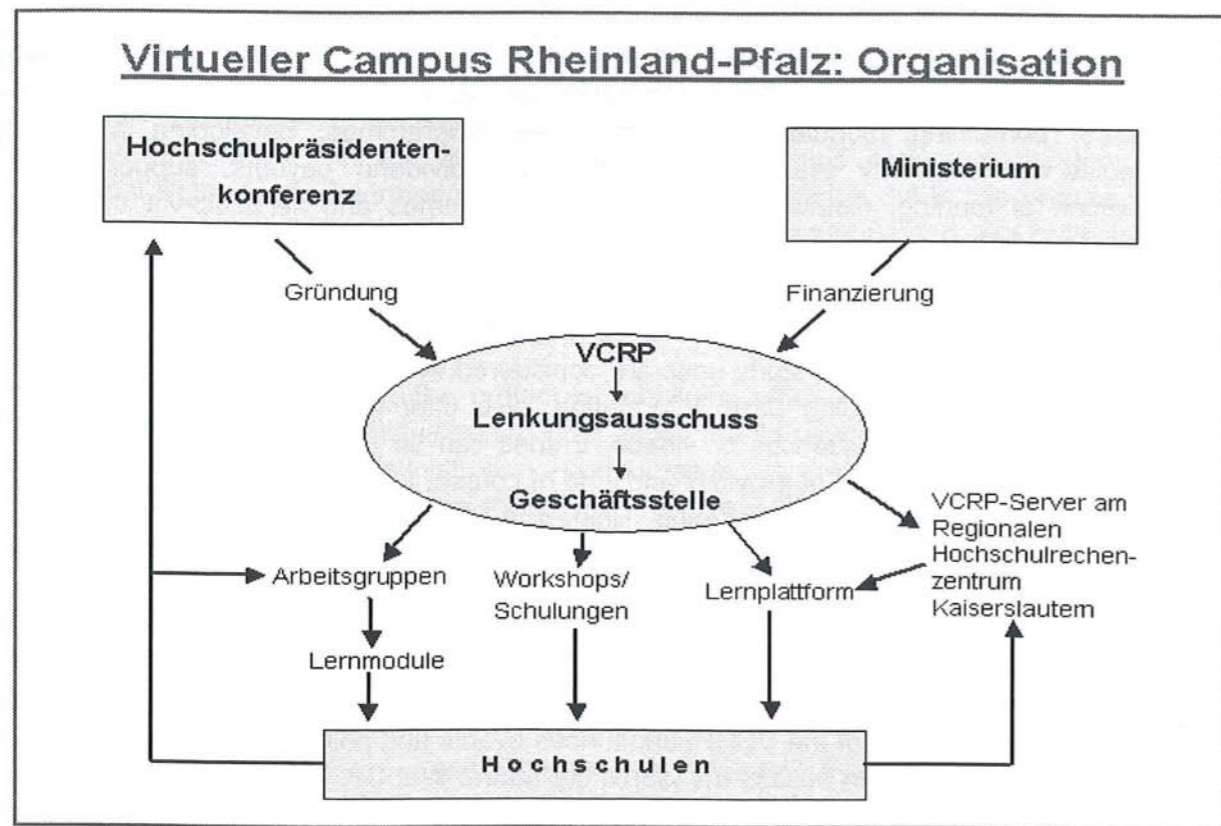
Nominated representatives of the universities maintain contacts between the universities and the VCRP and introduce the universities' interests into the VCRP and conversely inform the universities of the activities of the VCRP.

In addition, there are work groups made up of university teachers and academic staff. Cross-disciplinary work groups aim to address fundamental questions in the context of implementing new media (network and portal structures, authoring systems, didactics, copyright), while subject-specific, cross-university work groups examine specific topics in the context of digital teaching (business administration as a minor, computer science as a minor). Finally, the technical platform for the VCRP is administrated and run by the Regional University Computer Centre at the University of Kaiserslautern.

2.14 Virtual Saar University (Virtuelle Saar Universität - VISU)

The year 1999 saw the Virtual Saar University (VISU) founded as a network for using new media in education and research at the University of the Saarland. VISU's goal is to bring together all university activities in the sphere of media usage, to make relevant information available and to act as a forum for cooperation, knowledge and technology transfer. To this end, it set up a website (http://visu.uni-saarland.de) which reports on the work and structure of VISU and which documents the current e-learning projects run at the University of the Saarland in the field of university initial education and continuing training as well as development and research. Furthermore, the website maintains link lists to e-journals and publications, information on conferences and symposia, as well as the latest news and other information.

A number of events on media-based teaching have been held under the VISU programme since 1999 (e.g. Dies Universitatis 1999, an information conference on "New Media in Education" 2000, a workshop on "Virtual Universities Networked" 2001). In the winter semesters 2000/01, 2002/03 and 2003/04, VISU was able to award a support prize called "New Media in Teaching" for achievements of students and young scientists and researchers.

To provide the work of VISU with a more institutionalised structure, a centre of excellence, the "Competence Center Virtuelle Saar Universität" (CC VISU), was additionally established by order of the Executive Board of the University of the Saarland in June 2002. The statutes of the CC VISU govern its legal status and responsibilities, its decision-making bodies (see below), and its management and evaluation of the "Competence Center". In 2003, and on the initiative of the CC VISU, a number of inter-university continuing training events, workshops, panel discussions and lecture series were held on various aspects of virtual university teaching. Since November 2003, a newsletter has also been published on a regular basis reporting on current developments and the work of the team at the "Competence Center".

Activities

The activities of the Virtual Saar University include the concentration, strategic planning, support and advice of e-learning projects, above all in the field of university research and teaching. Focuses here are on the topic areas of information infrastructures, media didactics, evaluation and quality assurance, law, distance teaching and continuing training, translating and interpreting, and business models. In addition, VISU advises the university's executive board on decisions in the field of the new media, supports projects in their conception and application phases, provides information on sources of funding, participates in evaluations and quality assurance measures and organises information and continuing training events and courses. A further focus area for the work lies in supporting the 12 BMBF funded projects based at the University of the Saarland as these migrate into everyday academic operations.

Structure

Along with the "Competence Center", other decision-making bodies are also involved in shaping and structuring the Virtual Saar University. The Advisory Council, constituted in June 2003, and made up of well-known figures from politics, education, science and research, business and industry (e.g. Saarland's ministers of economics and science), is above all responsible for strategic planning. To provide support on specialist issues, VISU additionally appointed seven expert commissions, again involving representatives from politics, education, science and research, business and industry. These commissions address the following topics:

❑ Evaluation and quality assurance

❑ Distance teaching and continuing training

❑   Information infrastructures

❑   Media didactics and research

❑   Rights management

❑   Translation and interpreting

❑   Business models

The chairs of these commissions are simultaneously represented on the Advisory Council.

The VISU Plenum unites all the relevant initiatives, projects, institutions and activities relating to the use of media and serves as a forum for information exchange as well as for publicising current developments inside and outside VISU. Finally, the "Competence Center" is responsible for supporting the VISU management in the operational implementation of its duties. This centre is scheduled to run for five years. Before this deadline, the activities, performance and results achieved by the "Competence Center" will be reviewed, and the results will serve the executive board as a decision-making basis on whether to continue these activities. Since the implementation of new media is to be made into a key element of the university's development planning in the coming years and since corresponding target agreements are planned between the state and the university, VISU will take on strategic importance in the future.

2.15 Education Portal Saxony (Bildungsportal Sachsen)

The Education Portal Saxony (www.bildungsportal.sachsen.de), on the Internet since 28 March 2002, is a joint portal for 15 Saxon universities which provides information on the media-based initial education and continuing training programmes which they offer. At the same time, the education portal, by means of a commercial learning management system (LMS), serves as a platform for using virtual study opportunities online and provides the universities with advisory and other services. The portal's development is coordinated by a cooperative project involving Leipzig University, the TU Dresden, the TU Chemnitz and the Hochschule Mittweida (a university of applied sciences) which has been running since March 2001 and, in the first phase, is scheduled to run until the end of 2003. A second funding phase is planned from 2004 through 2006. The project aims to increase the e-learning activities of Saxony's universities and seeks to achieve the sustainable operation of the study opportunities which have been placed on the website. The cooperative project is funded by the Saxon State Ministry of Science and Art (www.smwk.de).

The cooperative project aims to drive forward cooperation between the universities in the development, use, advancement and maintenance of digital study units. The shared learning management system and the available infrastructure also make it possible for smaller universities to publish e-learning programmes for students via the portal and to run studies under the LMS. At present, programmes distributed by the education portal focus on the training of first-time students / undergraduates. The cooperative project team also offers the universities support in the creation of attractive programmes for career-integrated continuing training and simultaneously enables them to market these via the Internet.

In terms of structure, the Education Portal Saxony has been conceived as an association of Saxony's universities aimed at promoting and coordinating the development of virtual academic initial education and continuing training and so of successfully selling emerging products on the (international) education market.

Following a detailed evaluation of various software products, "Saba Learning Enterprise" was chosen as the learning management system to be used throughout Saxony and to be made available via the education portal (for information on the list of criteria used in the selection process, see the description contained in Schulmeister 2003, p. 38 and 58ff.). According to the project team, the

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system offers a number of advantages – besides its interesting price: it is client capable, can handle a large number of users, can be adapted to university processes and business processes in the field of commercial continuing training, can support XML interfaces as well as international metadata standards and has already been installed at numerous institutions around the world. Besides the function of providing information on courses, the learning platform Saba is above all responsible for supporting authors as well as tutors and learners and for reflecting the organisation of teaching/learning processes in the field of virtual study opportunities. The courses and modules that can be accessed through the Education Portal Saxony can be used via the learning platform, although they can also be decentrally hosted at the universities themselves.

Goals and target groups

The education portal essentially pursues two goals: on the one hand, it aims to set up and further expand a website for the initial education and continuing training programmes offered by Saxony's universities which enables interested parties to obtain information and to take part in virtual study programmes. On the other hand, it seeks to create a joint organisational structure for Saxony's universities in the field of media-based university teaching. In view of this background, the intention is to develop place- and time-independent, virtual study programmes which promote media skills and expertise as key qualifications, develop suitable educational and didactic concepts, create a range of programmes for postgraduate continuing training, and organise the value added process for virtual educational programmes (i.e. inter-university cooperation in devising, using, evaluating and certifying programmes). The cooperative project consequently performs the following core tasks. It

❑   creates and operates an appropriate e-learning infrastructure,

❑   creates a broad-based, modularised range of e-learning programmes,

❑   reduces the costs of developing and producing e-learning modules,

❑   develops cooperation between universities to achieve a sustainable structure and procedure.

Target groups for the education portal are students who want to use study opportunities online, potential continuing training customers wishing to gain further qualifications in a career-integrated format and to make use of advisory services, teachers who develop content modules in their in-class use the portal's support services to this end and want to deploy available modules in their in-class courses, teachers and pupils who may be interested in the programmes placed on the website, and, finally, cooperation partners from higher education, business and industry seeking to extend and exchange their study programmes.

Fig. 23: Proportion of funding received by each academic field in the 2001 and 2003 application rounds in Saxony

Funding

Academic field	Applications 2001	Applications 2003
Engineering	33%	39%
Natural sciences	28%	18%
Humanities	20%	18%
Economics/Business admin.	15%	14%
Social sciences	2%	7%
Medicine	2%	4%

The cooperative project has so far carried out two application rounds (2001 and 2003) to distribute funding to university projects which develop digital educational programmes. In the first round (2001), a total of €1m was provided to support 46 subprojects at 15 universities in Saxony between July 2001 and December 2002. Projects were selected in a two-phase

process which actively involved the universities. The maximum funding levels were set on the basis of the number of students enrolled at the universities. Fig. 23 shows how the various academic fields were involved (in percentages) in the programme.

The 2003 application round attracted a total of 75 project proposals from all of Saxony's universities. As a result, the Saxon State Ministry of Science and Art approved support for 27 subprojects over a period of 10 months. In 2001, the funding amounted to €570,000.-. The university executives had to approve co-financing worth 25% of the funding application for each project (in the form of university grants, additional human and material resources or funds from third parties in business and industry). Projects were selected in a two-stage process: firstly, universities (i.e. the Vice-Rectors responsible for Research and Education or another authorised body) preselected candidates from among all incoming applications, then a selection committee for the cooperative project recommended funding recipients to the ministry. The award criteria in this application round included the requirement

- to reproduce complex teaching/learning scenarios,

- to aim for the cooperative development and cross-university implementation of the study programme,

- to have a modular structure and a high degree of multimediality and interactivity,

- to offer a system that is capable of running under common browsers without the need for additional licensed software,

- to support knowledge transfer in research and teaching, and

- to follow the objectives of the university and science programme (HWP) by recruiting at least a 40% share of women.

Range of studies

The education portal provides access to 83 (as per 8 January 2004) study opportunities offered by Saxony's universities. More than 60 authors and over 2,000 learners from throughout Saxony were involved in the development of these programmes. Most of the online courses offered by the Education Portal Saxony are intended for students enrolled at a university in Saxony. Besides these, however, fee-charging continuing training programmes are also offered for interested students outside the university sector.

The work of the cooperative project succeeded in raising the interest of university teachers in developing modules, which can be seen from the increase in proposals between the first and the second application round. The projects from the 2001 application round have meanwhile reached a high development level and have been integrated into the curricula. Some of the courses are already offered as prototypes and are successfully used as part of a student's studies in combination with classroom courses.

Structure

The cooperative project run by the four Saxon universities and the Saxon State Ministry of Science and Art is headed by a Project Council made up of one university teacher from each of the participating universities and a project manager. The project team for the cooperative project is made up of eight staff, of which two are placed at each of the four project universities. The project team staff are responsible both for the on-campus support of the projects (e.g. helping to place content onto the platform) as well as for the stability and service quality of the education portal's technical infrastructure.

The production of e-learning units is carried out by the Saxon universities themselves, thereby using university centres of excellence, such as the Media Design Center at the TU Dresden, the

WI-Medialab at the TU Chemnitz, the Centre for New Forms of Study at the West Saxon University Zwickau or the Centre of Excellence for New Media in Education at the Hochschule Mittweida (FH).

Future development

Beyond the scope of the initial three year term for the project, the cooperative project will very probably be financed for a further three years from HWP funding. Plans for the future aim to migrate the project into a central and a decentral component. A joint organisation will act as a central service provider in which a smaller part of the previous project team will be responsible for providing the infrastructure (hosting the platform) which all universities can access. While, the larger part of the project team will consolidate the decentral, on-campus support for players at the universities as far as development, application and marketing of e-learning programmes is concerned and will be involved in setting up structures of excellence at the universities.

2.16 Baltic Sea Virtual Campus (Schleswig-Holstein)

Following a number of preparatory steps (such as a feasibility study), the state of Schleswig-Holstein and the region of Skane (Sweden) signed an agreement in 2001 on setting up an academic education network involving the countries bordering the Baltic Sea. 2002 then saw the project "Baltic Sea Virtual Campus" (BSVC; www.bsvc.de) launched in which 13 project partners from eight Baltic countries as well as seven associated partners from business, industry and administration (e.g. Volkswagen AG, Teknopol AB, various chambers of trade and commerce and trade unions) are putting four work units into practice to create such an education network (developing a technical platform to sell online education, a transnational organisational and legal framework for the joint online degree programmes, an online degree programme called "Transregional Management" and a business model for the BSVC). The close connections with partners from business and industry serve to ensure that the training can be adapted dynamically to take account of the rapidly changing requirements of the international job market.

Fig. 24: Project partners for the Baltic Sea Virtual Campus
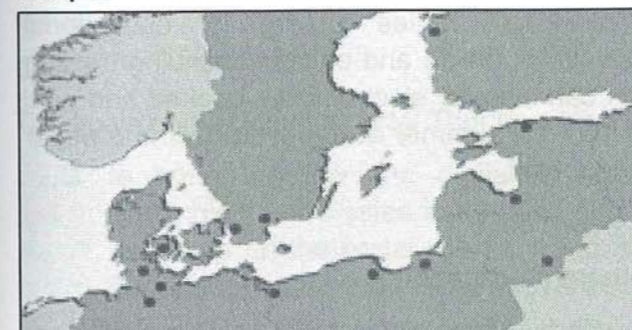
Project partners:

Sweden: Lund University; Region Skane; Kristianstad University

Germany: University of Applied Sciences Hamburg; FH Lübeck (lead institution); FH Kiel

Denmark: Tietgen Business College

Finland: University of Vaasa

Latvia: Riga Technical University

Lithuania: Vilnius University

Poland: Gdansk University; West Pomeranian Business School

Russia: Kaliningrad State University

The BSVC aims to encourage balanced regional development in the partner regions by creating sustainable e-learning structures in the Baltic Sea region. To this end, the BSVC will use the three-year project term to set up an appropriate transnational institutional and legal framework, to create a technical platform for the sale and distribution of online education, develop an appropriate business model, produce an online degree programme called "Transregional Management", and offer this in a pilot phase. It further plans to compile future-compliant continuing training programmes and to expand the project to

cover the whole Baltic Sea region. Its integration of Eastern European partners already anticipates the enlargement of the European Union. The overall project is run by a six-person steering committee made up of representatives of Swedish and German universities.

The project is financed by the partners, the regions and by the EU under its European Regional Development Fund (BSR INTERREG III B). A total of €2.85m is available for the three-year project term. Target groups for future BSVC programmes and services include students working towards an academic degree, professionals wishing to gain additional academic training, and companies interested in the continuing qualification of their staff in virtual programmes.

As far as content is concerned, the BSVC will develop first degree (undergraduate) programmes and continuing (graduate and postgraduate) education programmes in fields such as industrial engineering, business informatics, health care management or transregional management in the future and offer these via the Internet in a modular form. The portal is already available in nine European languages (English, Swedish, German, Danish, Finnish, Latvia, Lithuanian, Polish, Russian).

2.17 Education Portal Thuringia (Bildungsportal Thüringen)

The Education Portal Thuringia (http://www.bildungsportal-thueringen.de)[2] was launched as a project in September 2001 and commenced its online operations on 5 June 2002. It acts as an education broker for continuing training programmes offered by Thuringia's universities. The portal aims to provide information on Internet-based continuing training courses and projects in the field of media-based studies offered by universities in Thuringia. However, the education portal is not limited to virtual forms of study. Thuringia's university teachers can place metadata as well as traditional in-class or digital continuing training programmes or course contents onto the portal and draw the attention of companies, institutions and people privately interested in education as well as students to these programmes and services. Interested parties looking for educational programmes will be able to use the portal to find a wealth of online and offline continuing training programmes offered by Thuringia's universities which can also be electronically booked and paid for in the future. At present, 157 programmes (period from the summer academy 2002 to the winter semester 2003/2004) are available in the following categories:

- continuing training programmes supported by new media,

- established or traditional continuing training programmes, and

- multimedia projects which may represent a source for future continuing training courses.

The education portal contains programmes offered by the research universities at Jena, Ilmenau, Erfurt and Weimar, and courses offered by the universities of applied sciences in Jena and Erfurt. The intention is to successively include the programmes and courses offered by all of Thuringia's universities on the portal in order to develop it into an education broker with a state-wide catchment area. To do this, the portal has been conceived as a pure exchange platform in which course contents offered on the portal are not maintained or administrated by the portal operator, but rather by the providers of the modules themselves. The advantage of this solution lies in the fact that it avoids copyright problems and allows programmes and courses to be easily updated by those

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[2] Sources used in the following description, besides the website (www.bildungsportal-thueringen.de), are:
K. Schmidt et al.: Eröffnung des Bildungsportals Thüringen am 5. Juni 2002 in Weimar, Kompetenz Heft 35, IFA-Verlag, Berlin/Bonn.
H.-D. Wuttke, K. Schmidt: Metadaten für das Bildungsportal Thüringen (BPT), 16. Internationale Wissenschaftliche Konferenz an der Hochschule Mittweida (FH), 06. bis 07. November 2003, Tagungsgruppe Bildungstechnologien, No. 6, 2003, ISSN 1437-7624

responsible for them. The project will be funded by the Thuringian Ministry of Science, Research and Art for the period from 2001 to 2006.

Fig. 25: University towns in Thuringia
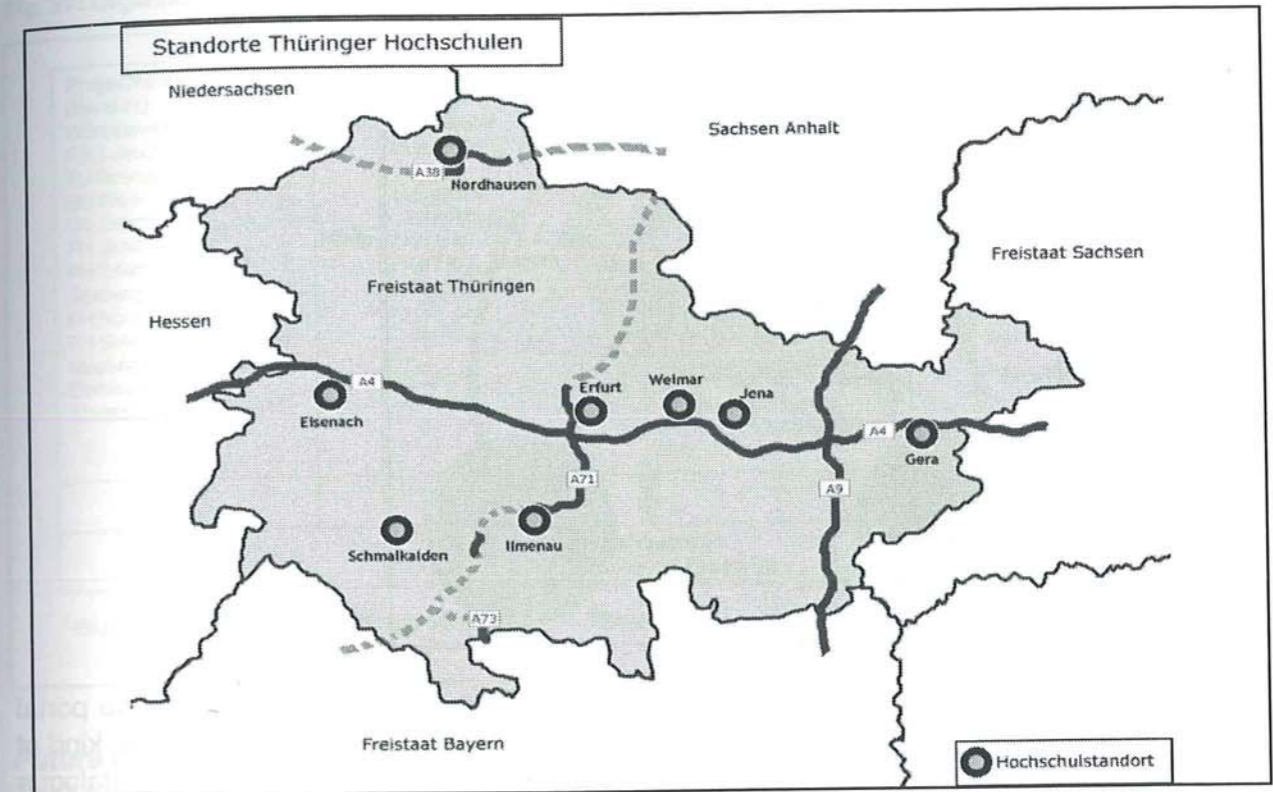
Goals

The goals of the Bildungsportal Thüringen lie in the following action fields:

- to bring together the digital or traditional continuing training measures offered by Thuringia's universities in the field on classroom teaching; this involves placing a course's metadata on the portal. Content and rights remain with the providers to guarantee a high degree of quality and topical relevance,

- to network existing skills and expertise; topic-specific workshops aim to open up and pass on the knowledge and experience of Thuringia's university teachers in respect of continuing training and media-based teaching. In addition, the portal's start page has a "Who's Who" list with details of lecturers offering continuing training and of project representatives,

- to provide a uniform marketing campaign for the continuing training programmes by cooperating with those responsible for this field at the universities; this includes support with exhibiting programmes, products and services at regional and nationwide shows in the form of short lecturers, presentations as well as the gradual integration of other media, such as newspapers, magazines, specialist journals and publications, radio, TV, etc.,

- to assure quality; an academic advisory council made up of university teachers from the fields of computer science, interface design, new media and didactics, on the one hand, and of representatives from Thuringia's ministry of science, research and art and from the Thuringian ministry of culture, on the other, work to assure the quality of programmes offered via the education portal. Observance of metadata standards represents a second quality assurance pillar which simultaneously facilitates the exchange of material. The education portal uses IEEE LTSC standard data fields complemented by information on

how the continuing training programmes are organised and on the relevant skills and expertise available in the state of Thuringia (e.g. information on those responsible, contact partners and study counsellors).

Fig. 26: Mediating role of the Education Portal Thuringia
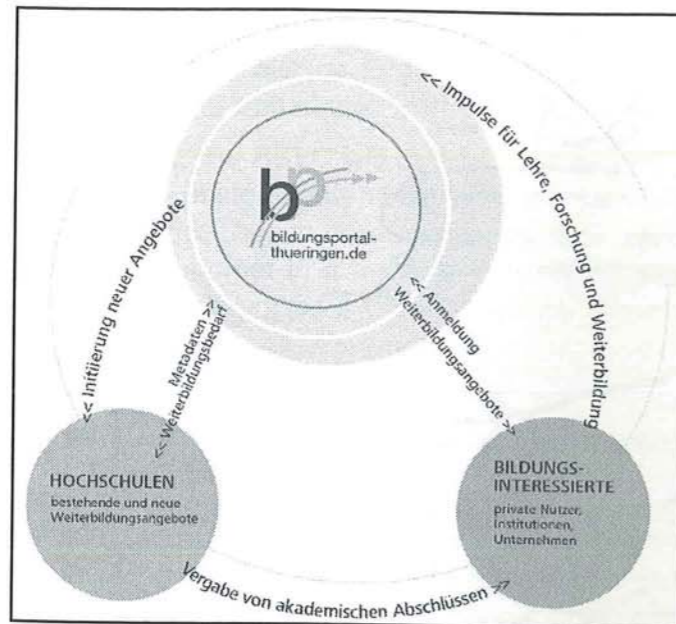
- [ ] to completely catalogue programmes; continuing training programmes placed in the portal can be found both by means of full text searches, a filtered search (by subject area, kind of studies, university, start date, fees, proportion of online teaching), via the course catalogue (search by subject area, kind of studies, and specialist skills and expertise) and finally via "News/Latest Entries"

- [ ] to adapt the continuing training programme to the needs of companies and public institutions; any demand-oriented focus of the continuing training must include a modular design of shorter study units which can be used more flexibly. This is achieved by integrating customers more strongly into the development process for continuing training programmes, for example, by giving companies or public institutions the opportunity to use the portal to register their demand. This demand could then be picked up on by project representatives of the education portal respectively by those responsible for continuing training at Thuringia's universities and passed on to the relevant university teacher. This lecturer would then have the opportunity to develop a programme that is attractive to both sides - without any undue delay and after coordinating the resources. The portal plans to develop a comparable option for private customers,

- [ ] to provide suitable incentives for an active commitment in the field of media-based continuing training; these incentives, above all conceived for university teachers and arising from using the education portal, include, for example, recruiting new students for continuing training courses, reducing the marketing and administrative burden, as well as ensuring the uniform development of certification and quality standards. A key point in this respect is that the providers of content must be able to place products on the portal at no cost.

Structure

The Bildungsportal Thüringen is designed in line with the principle of a virtual organisation. There is a "lean" office located in Erfurt and a coordination body, called the "*Sprecherrat*", which makes full use of modern forms of distributed working and communication to head the project work. A

project manager at the portal's office coordinates the wide range of responsibilities and activities, or, respectively, passes theses on (as work and services contracts) to external (as well as to specialised assistants. Fig. 27 shows the responsibility levels.

Fig. 27: Organisational structure of the Education Portal Thuringia

Projektvertreter	Sprecherrat	Projektbüro Erfurt	Hilfskräfte
(Beratung, Wissensvermittlung) FSU Jena*, TU Ilmenau*, BU Weimar*, Uni Erfurt*, FH Jena*, FH Erfurt*. Studienzentrum Erfurt, FH Nordhausen, FH Schmalkalden, Musikhochschule Weimar, Berufsakademie Eisenach, Gera.	(Leitung, Präsentation) Projektleiter Herr Dr. H.-D. Wuttke (Steuerung, Unterstützung,) Herr Prof. Dr. T. Köhler Herr Dr. A. Unkroth Herr J. Martens	(Strategie, Kommunikation, Marketing/Vertrieb, Finanzen) Projektmanager Herr K. Schmidt _____ (Informationstechnologie, Content-Betreuung) Information Broker Frau S. Fincke _____ (Tagesgeschäft, Veranstaltungen, Organisation) Technische/r Angestellte/r N.N.	(Datenerfassung, Support) TU Ilmenau, BU Weimar, FSU Jena, Uni Erfurt, FH Erfurt, FH Jena, FH Nordhausen, FH Schmalkalden, MH Weimar _____ **Externe Auftragnehmer** (Werkverträge)
Fachbeirat (Qualitätskontrolle, Expertise)			

* Bildungsangebote im Portal, Stand: Jan. 2004

Future development

As from 2004, the work will focus on presenting the continuing training programmes offered by Thuringia's universities on the portal and in a relevant brochure. The data required for this will be collected by the education portal and subsequently forwarded to the universities' own institutions. This is done to avoid doubling the data acquisition process. In addition, a shop system responsible for delivering the programmes will be gradually introduced. This calls for the requisite distribution and accounting processes to be put in place at the partner institutions.

Furthermore, staff are currently identifying the education portal services which can be expected to be in strong demand and which should therefore be made available with priority. These services constitute the basis for a business model and must follow in line with the new frameworks in the field of initial education and continuing training. Those responsible for continuing training at the universities, the computer centres and the scientific libraries in Thuringia will work together to draw up a concept which will serve to secure the continuation of the Education Portal Thuringia beyond the project term.

3 SITUATION ANALYSIS ON UNIVERSITY E-LEARNING PROJECTS

3.1 BMBF Funding Programme "New Media in Education" (*Neue Medien in der Bildung*) – Higher Education Line

Universities have received substantial funding since the end of the 1990s in the form of various programmes and measures run by federal government and the states to support the development of innovative, web-based forms of teaching and learning (see Chapter 2 for more details). One of the most important initiatives in this field is the federal funding programme "New Media in Education", one of the world's highest valued initiatives to support the development and implementation of IC technologies in university teaching. The programme itself is divided into a number of support lines, with the largest and most ambitious of these in terms of funding value – "New Media in Higher Education" – focusing on the development of digital, web-based course contents and the corresponding software environments at German universities.

Under this funding focus, 100 cross-university and cross-state cooperative projects received support between 2001 and 2004 with funding of around €185m provided to produce high-quality content and software for use in university teaching and continuing training. Other funding spotlights in the federal initiative aimed to create and expand university wireless networks (€3.1m), to support e-learning at universities through the use of mobile computers (notebook university – €25m) and other measures with grants totalling another €8.9m.

A fundamental problem faced by all e-learning support programmes of recent times turned out to be the question of how the broadbased and financially-viable use of software and content in standard university operations could be secured long term, i.e. in the time after the original support funding had come to its scheduled end. The general concentration of these support initiatives on project-like development structures organised along the lines of research funding placed financial and organisational responsibility for the long-term implementation of the developed e-learning modules on the universities. However, many universities found that they were unable to cope with the challenges this produced in terms of ensuring the stable implementation of outcomes evolving from the originally time-limited and funding-limited projects.

The problem of securing the permanent, broadbased use of e-learning project outcomes is currently being intensively discussed under the general heading "sustainability of e-learning" in many relevant publications and at education technology conferences (on sustainability see especially Chapter 4). The precursors to this problem simultaneously served as the decisive reasons for establishing a HIS subsidiary project under which an online survey was used to determine what factors of influence and obstacles exist as far as ensuring the sustainability of BMBF support projects is concerned so that, working on the basis of a situation analysis, suggestions could be tabled to help consolidate project results.

3.2 Online survey among projects funded by the New Media in Education programme

The survey carried out at the turn of the year 2002/2003 among the cooperative projects and individual projects which the BMBF support programme "New Media in Education - Higher Education Line" had funded aimed to provide information on the current status of these projects at participating higher education institutions (research universities and universities of applied

sciences). In particular, the survey asked about the prospects for permanently establishing media-based study programmes (under the heading: sustainability). To ensure that the survey results could be made available without undue delay, they were presented at conferences in several steps (Learntec and ICNEE 2003; see reference in the appendix) before an analysis of the key results is finally presented in context.

The following will take a closer look at the 100 cooperative projects in the funding line "New Media in Higher Education" in respect of their planned and implemented sustainability strategies. In most of the project networks, involving a total of 540 funded individual projects, support funding came to its scheduled end on 31 December 2003; a few projects continue to be financed until the second quarter 2004.

Two of the federal funding programme's subsidiary projects, which generally served to support the development projects, were responsible for drawing up and carrying out the survey. Besides the HIS project on "New Media in Higher Education" (*Neue Medien im Hochschulbereich*), which, in the context of the survey, mainly dealt with strategic, financial and organisational aspects, the subsidiary project on "Concepts and Elements of a Virtual University" (*kevih – Konzepte und Elemente virtueller Hochschule*) carried out by the Knowledge Media Research Center, Tübingen was involved in drawing up the questionnaires and also took on responsibility for analysing the didactic question blocks. *kevih* published the results of the media-didactic questions in a special collection of facts and figures (kevih 2003; Rinn, Ulrike u.a. 2004). The following presentation of the survey findings consequently concentrates only on the other aspects of the questionnaire.

Methodology

The survey was carried out in the form of two online questionnaires, the first for the 100 coordinators of the cooperative projects, the second for the heads of the 540 individual projects. Both questionnaires were based on kevih's analysis of the project proposals and on a heuristic list of the action fields in which projects and universities would have to operate well in order to ensure that the teaching/learning environments which they had developed could operate long term. These action fields include

☐ strategy development,

☐ financing,

☐ staff/human resources,

☐ organisation,

☐ curricular integration,

☐ quality assurance,

☐ rights management, and

☐ technology and infrastructure.

Soon after the survey had been announced, URLs and passwords were dispatched with which the projects could access the questionnaires – with the start date set at 17 December 2002. The survey ended on 17 February 2003. At this point in time, 65 per cent of the coordinators and 42 per cent of the subproject heads had responded. Both questionnaires – for network project coordinators and for the heads of the individual projects – are available in the appendix.

The report at hand will first present the key results from the coordinator (cooperative project) questionnaire. The response rate of 65% produced a data stock which allowed information to be reliably deduced on how the cooperative projects tended to develop trends in each of the various actions fields. Where percentages are given for individual answers, readers should please note

that all questions allowed multiple answers, unless otherwise stated. This explains why percentages may total more than 100% when added together.

3.3 Results: Cooperative project coordinators

The main contentual aspects in the questionnaire for the coordinators of the 100 cooperative projects funded within the "New Media in Education" programme were divided into the following six topic blocks:

☐ General information,

☐ Product,

☐ Use in teaching,

☐ Distribution and exploitation,

☐ Quality management,

☐ Final remarks.

3.3.1 Product

Target subject group

The first contentual question for the cooperative projects to answer under the "product" topic block (course module, software tool, learning platform, etc.) applied to the subject group which their project outcome aimed to serve.

This revealed that computer science/mathematics (29%), engineering (29%), natural sciences (22%), psychology and education (22%), and law and economics/business administration (25%) were the main subjects or subject groups for which projects had designed their teaching/learning environments. Projects working in the medical-pharmaceutical field were also able to claim 15% for their group. By contrast, other subject groups (languages, cultural studies, humanities with 14%, sociology and social sciences again with 14%, art, design and media studies with 9%, agricultural and forestry sciences with 5%, and sports sciences with 3%, along with other smaller subjects with a total of 17%) did not attract any priority interest in the development of telemedia forms of learning.

Of course, we need to note that this trend actually only applies to those projects which answered the questionnaire. The distribution of all projects across the various subject groups as documented by the project sponsor can be used for comparison, although this does not necessarily have to agree with the subject distribution of the *user disciplines* which the projects had targeted. In terms of the subject group distribution across all projects, the humanities can claim a share of 11%, economics/business administration and the social sciences 19%, mathematics and natural sciences have 16%, engineering 15%, medicine 11%, computer science and media studies 17%, while all other subjects account for a share of 11%.

Fig. 28: Target subject group

65 answers
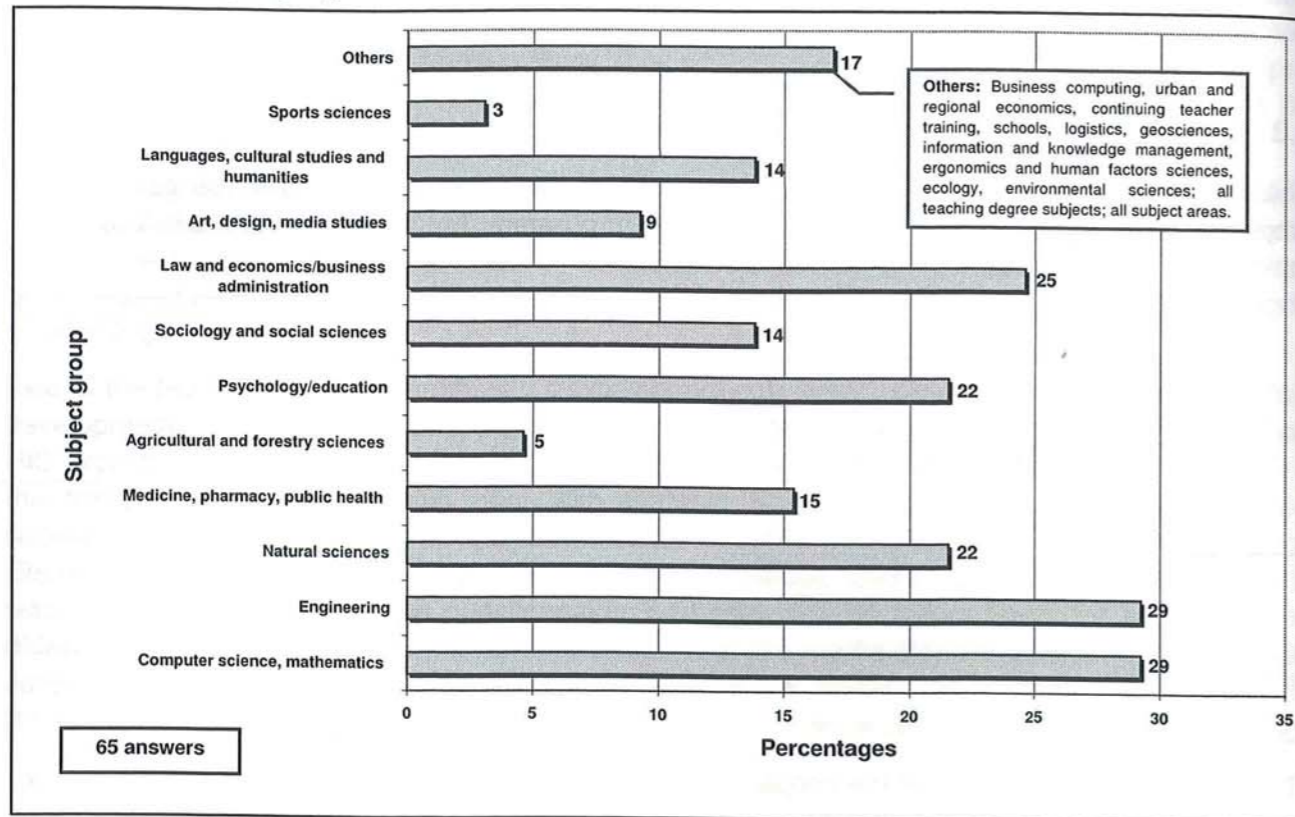
Type of product

In accordance with the terms of the call for applications, the production of content for virtual learning environments constituted the focus of project activities (98%). Besides this, the development of software tools requiring informational skills and expertise also played a significant role (48%), since certain added values of virtual teaching could only be achieved with innovative programs (e.g. XML editors for publishing content in various data formats).

Fig. 29: Type of product

65 answers
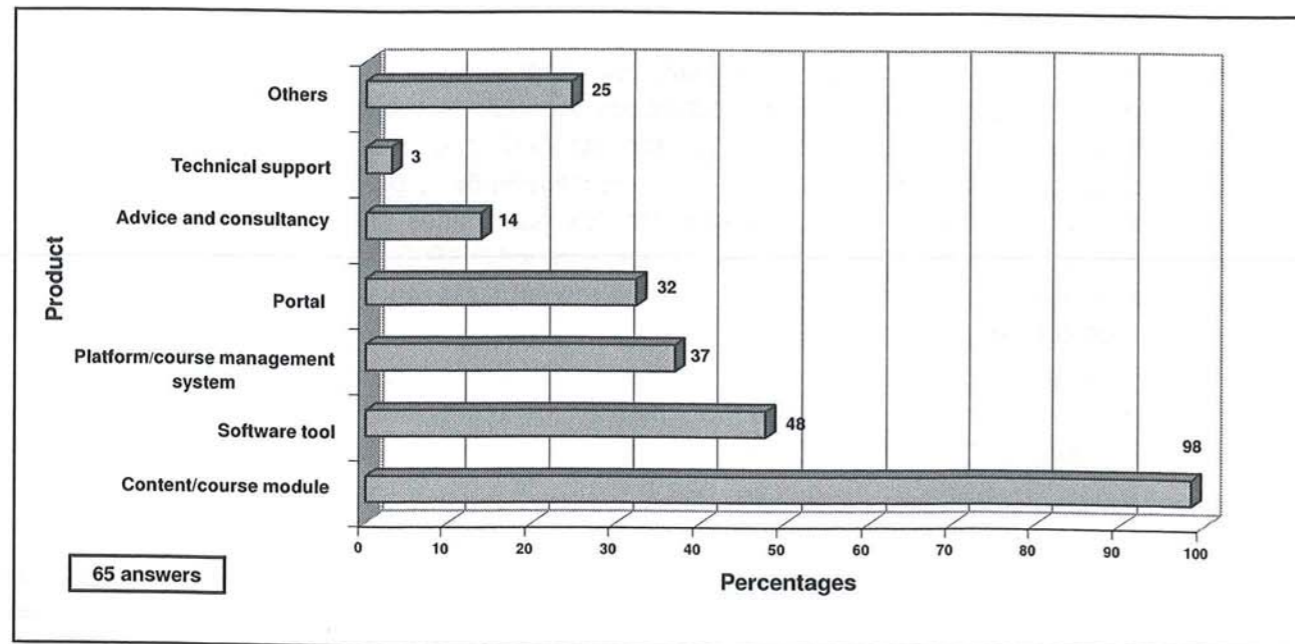
The relatively large number of responses from learning platform and course management system developments (37%) allows us to presume that the available commercial and open source products were found to be inadequate or were not used for other reasons (e.g. licence costs too high). For the portal solutions (32%), we can assume that these were generally project-specific platforms rather than general distribution platforms. Only 14% of the projects provided advice and consultancy, while technical support was only provided by a small minority (3%).

The category *other products* was defined as follows: multimedia learning material, knowledge management systems, e-learning systems, remote experiments (telematics), training modules, learning information systems, interactive, multimedia information forums, repositories for course content, learning environments, systematised collections of links, didactic concepts for project-oriented learning and teaching, guided web-based courses, learning environments for cooperative studies, educational networks, database brokers, partly-virtual practical courses/training for students, advanced platform developments, didactic conceptions.

Value-added aspects

The question – "To what extent have the following *value-added aspects* been implemented in the product developed by your project network?" – relates explicitly to the projects' prospective self-assessment and is not based on any substantiated findings from completed evaluations. Consequently, it records the projects' intentions and not their actual effects.

Fig. 30: Value-added aspects

65 answers
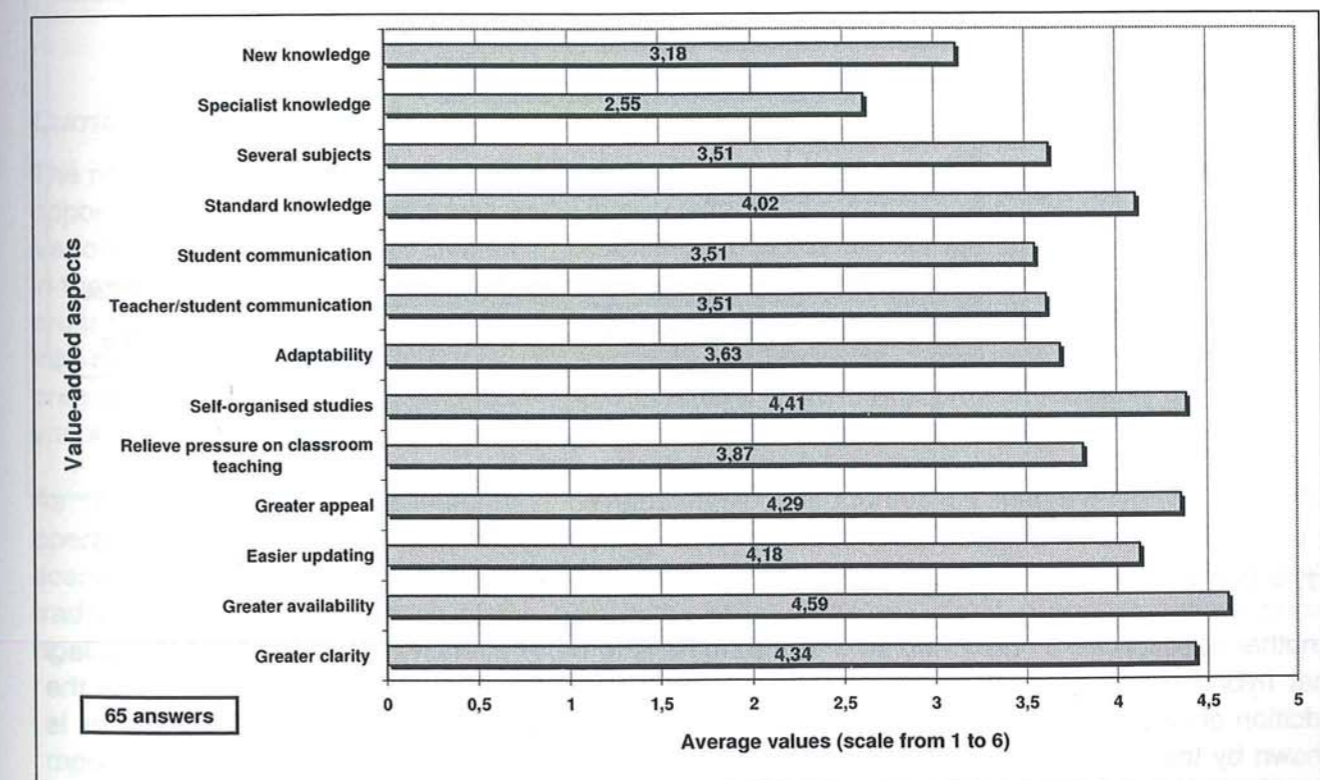
The goal of using new media to facilitate access to knowledge resources forms the main focus of many projects. In addition, many virtual courses and programmes aim to encourage and support self-organised studies by raising the appeal of the study materials in that they make the knowledge presented clearer and more attractive. Improving the availability and accessibility of knowledge also involves easing the updating of course contents (in contrast to a script or book). Nevertheless,

access to standard knowledge takes primacy over the presentation of new or specialised knowledge. The relatively high priority attributed to easing the classroom teaching workload fits in well with the goal of supporting self-organised studies. While only relatively few projects considered adaptability, facilitating communication processes or offering several subjects.

3.3.2 Use in teaching

Use in educational fields

Most of the projects designed their developments for use in undergraduate courses offered during the basic study stage (83%) or the main study stage (85%). Besides this, around half of the projects also targeted the academic continuing training market (54%) and the professional continuing training market (46%), which will become particularly important in the future for demographic and qualification-based reasons (lifelong learning); the 35% given to postgraduate studies also fits well into this picture. Neither the research-related educational field (research: 22%, graduate studies: 26%) nor the schools sector (22%) were seen as priority areas.

Fig. 31: Use in educational fields

65 answers
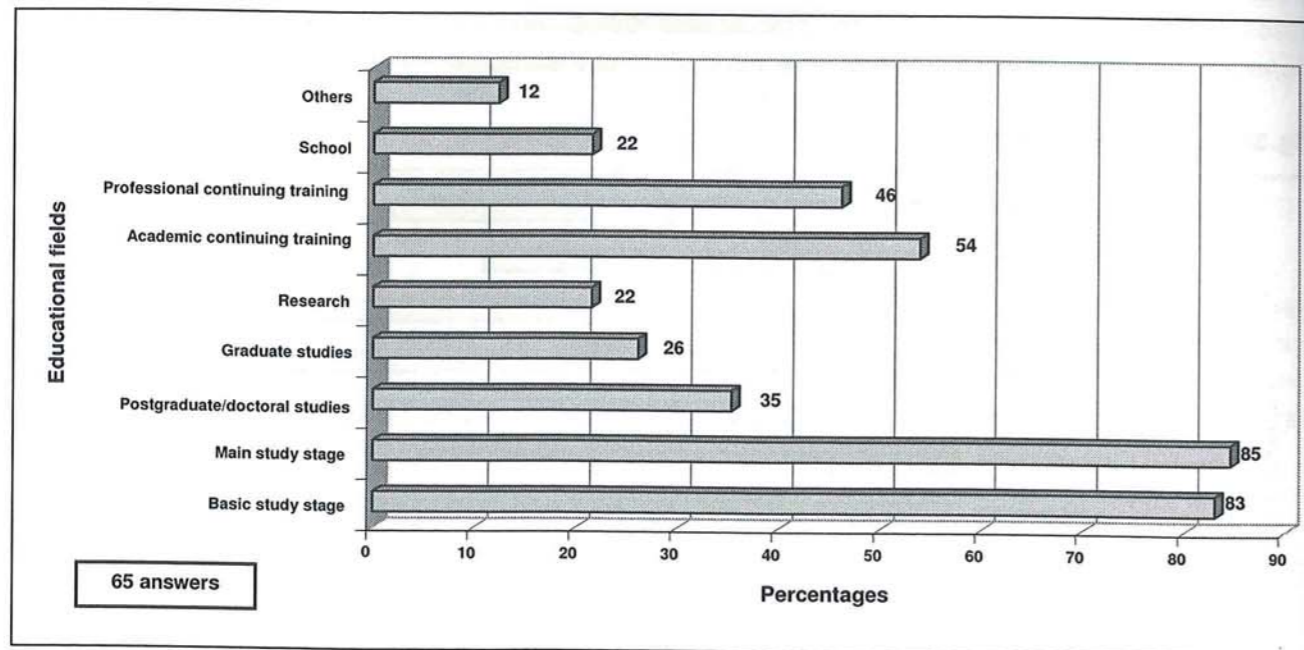
Type of study opportunity

Another question asks how a course or programme is to be or actually is taught or learnt. The fact that hybrid learning arrangements (blended learning, enrichment of classroom teaching by the addition of virtual elements) represent the main trend in e-learning developments at universities is shown by the high percentage (85%) of complementary course materials produced for classroom teaching (lectures, seminars, etc.). Besides, these study modules which can be combined at will (66%) and stand-alone courses (62%) are suitable for use in multiple contexts. By contrast, the far-reaching or even complete virtualisation of university teaching (18% respectively 9%) only plays a secondary role – doubtlessly also due to the considerable time and cost required for such projects. This is why the main project focus is clearly on the complementary enrichment of classroom teaching rather than on virtual distance learning.

Fig. 32: Type of study opportunity

Others: current course contents, continuing training, blended learning modules, lab exercises, information on the full clinical picture, teaching up to the intermediate examination in psychology for teachers, distance studies material, complete continuing training programme.

65 answers

Type of study opportunity
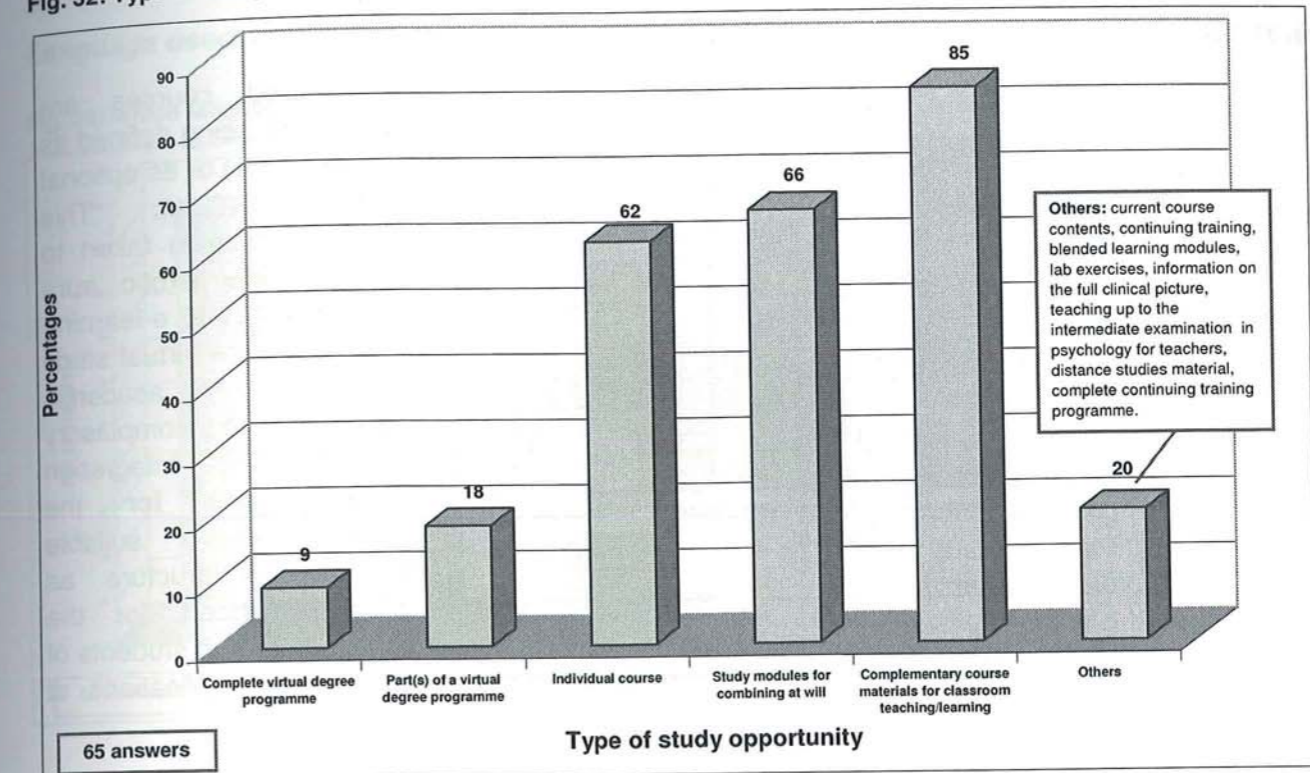
Curricular integration of study opportunity

The next question allowed respondents to enter text at will as a means of finding out how the study opportunity (module, unit, etc.) was to be integrated into the curricula of participating universities. Various action options and strategies for preparing and achieving such integration were mentioned in the answers – including, above all, the advance analysis of the university training requirement in order to identify what the "market" for the study opportunity actually was; to integrate a module/unit into required courses; to substitute required on-campus courses; to create new undergraduate programmes and new continuing training programmes; to make the product available as a part of various additional modules/units and to use a product in a research training group.

As far as the question of integrating developed study opportunities into everyday university operations is concerned, the projects' strong focus on an enrichment and complementation scenario in the sense of hybrid learning arrangements which combine the strengths of the traditional with the advantages of the new forms of teaching and learning was confirmed once again.

Course attendance policy

Fig. 33: Course attendance policy

65 answers
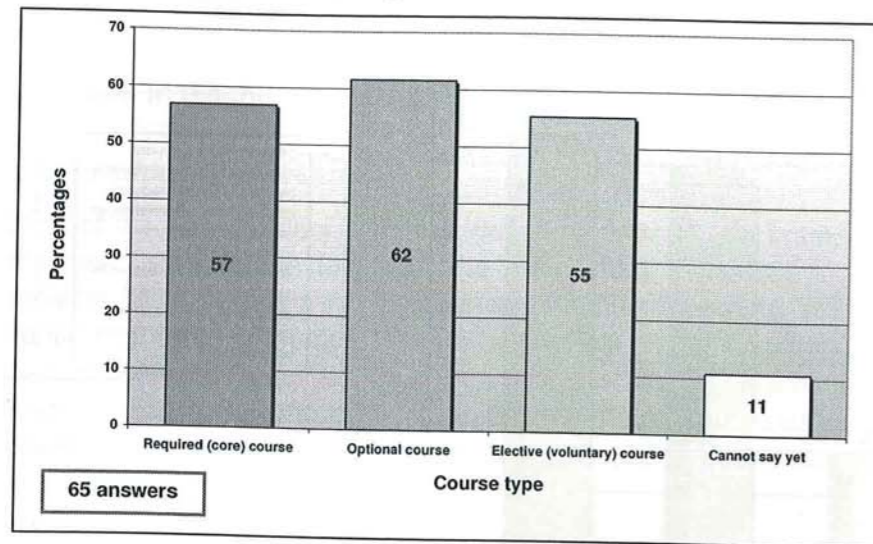
Media-based courses are increasingly being defined as required (57%) or as optional elements (62%). This approach is being taken to overcome the exotic aura which attaches to e-learning and to integrate virtual study elements into the academic operations as compulsory elements. This integration scenario calls for the existence of a suitable technical infrastructure as well as support for the teaching skills and expertise of teachers and students alike. Successful instructors and students of such courses can then become multipliers and disseminators of e-learning applications at universities.

55% of the projects already run or plan to use such elements in elective courses, while 11% were unable yet to provide any definite information on their course attendance policy for study units.

Where projects plan to market their products geographically

Fig. 34: Where will the product be used?

65 answers
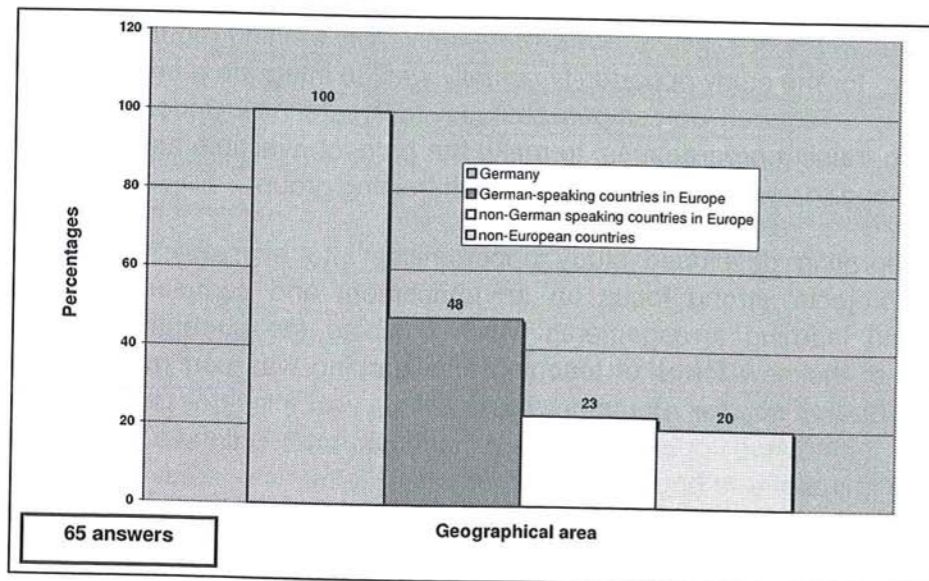
All projects from the funding programme aim, in accordance with the terms of the call for applications, to design their products for use at German universities. Their main focus of attention is therefore clearly on improving the national learning culture. Over and above this, however, almost half of the projects (48%) also plan to transfer their products to other

German-speaking countries (Austria, Switzerland). The lack of translation costs means that this represents an attractive option for the transnational use of developed study modules. A remarkable 23% of the projects are even considering establishing their courses and programmes beyond the German-speaking area, with 20% actually looking at implementations outside Europe. This clearly shows that numerous projects give their outcomes good chances in the international education market.

3.3.3 Distribution and exploitation

Language used

Fig. 35: Which language?

65 answers
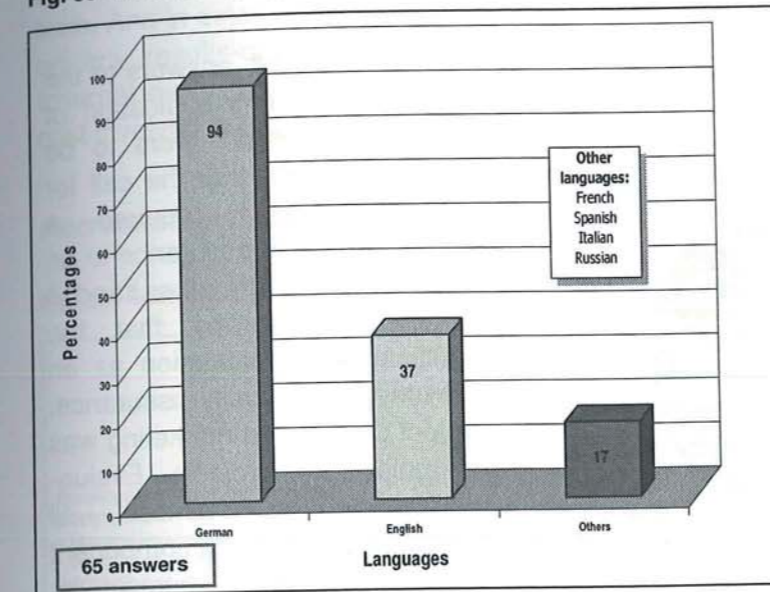
From their priority choice of geographical market it follows that most of the products will be made available in German (94%). Interestingly enough, some products will actually dispense with a German version; rather these projects prefer to refer immediately to English as the international language of science and research. All in all, the proportion of English-language programmes is very high at just over a third (37%). By contrast, other languages – French, Spanish, Russian and Italian were all named – tend to play a secondary role only (17%).

Problems with commercial exploitation

The section on the distribution and exploitation of the product allowed respondents to enter text at will and ended with the request that they provide information on expected or experienced problems with the commercial exploitation of their products. The question aimed to find out what experience projects had gained, or – in most cases – what their prospective assessments were, as far as the for-profit-oriented distribution and sale of the contents and tools they had produced was concerned; this open question approach means that the answers received do not allow us to differentiate between experience reports and assumptions or to carry out any clear quantitative categorisation of the individual answers.

The problems mentioned in the answers included legal difficulties (copyright, licence rights, liability questions, data protection), weaknesses in the field of business-oriented performance (e.g. market analysis, pricing, professional marketing, accounting and invoicing, revenue-sharing systems), general economic problems (lack of potent markets, high production and operating costs) and a lack of funding perspectives for migration to a self-financed status.

Further problems mentioned included incompatibilities between the public and the private sectors (differences in mentality, differing legal freedoms, different conceptions as far as mission/self-image, addressees or performance are concerned), the loss of know-how through staff leaving, the difficult transformation of complex networks into lean structures as well as the cost- and time-intensive adaptation of the product to target groups in the field of commercial continuing training (on the question of commercial exploitation see also Figs. 46-47).

3.3.4 Quality management

Evaluation of the cooperative project

Fig. 36: Has the cooperative project been evaluated?

Not clear yet
9%
No
6%
Yes
85%
65 answers
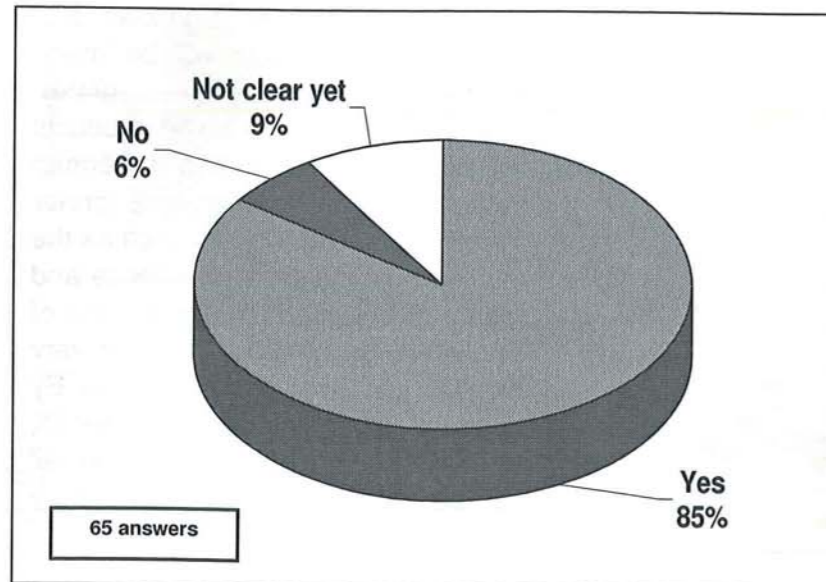
On the one hand, answers to the question regarding evaluation of the project network were to be seen in the light that the call for applications had required a system of quality assurance to be put in place. On the other hand, it is to be assumed that the significance of evaluation as an instrument of quality assurance, project control and marketing was recognised by projects. Evaluation is seen by – almost – all projects as an integral component and used as an instrument for improving their products.

Kind of evaluation

Fig. 37: How is the project evaluated?

Yes = 85 %
No = 6 %
Not clear yet = 9 %

65
44
85
51

55 answers

Percentages

Summative, project-internal evaluation | Summative, project-external evaluation | Formative, project-internal evaluation | Formative, project-external Evaluation

Evaluation

Of the four kinds of evaluation, the formative, project-internal evaluation (i.e. an evaluation carried out by project staff or partners) probably takes pride of place at 85% because evaluators are integrated into the project right from the start and the process-integrated measurement of quality made it possible to refocus the project even during the development phase. Besides this form, the summative project-internal evaluation of outcomes (65%) is also carried out during the project term. And in external evaluation, the focus is also more on process-integrated (51%) methods than on any results-oriented quality measurement methods (44%). The fact that, overall, project-external evaluation was chosen less often can probably be explained by the increased time and cost involved in consulting external experts.

Accreditation / Quality Assurance

Fig. 38: Accreditation / Quality Assurance

Cannot say yet
29%

Yes
28%

Quality assurance institutions,
such as:
- Universities/university institutes
- Disciplinary societies
- Accreditation agencies
- Virtual university
- Language centre

65 answers

No
43%
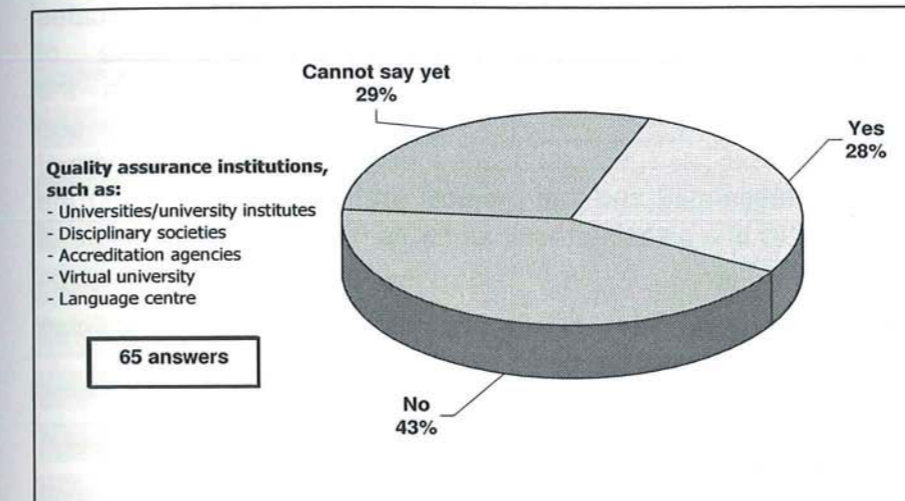
While accreditation, in the narrower sense, relates only to Bachelor's/Master's programmes and is only carried out by accreditation agencies which have been approved by the German Accreditation Council, survey participants partly understood the question in the wider sense as asking about quality-assurance measures in general. The information provided on quality assurance institutions proves this. Since many projects did not produce any full degree programmes or Bachelor's/Master's programmes and the accreditation of virtual degree programmes is not yet very widespread due to their small number, the 43% share of "No" answers allows no conclusions to be made as to the low significance of quality assurance (cf. also the high significance of evaluation, Fig. 36). The answers tend rather to give rise to the assumption that further development work is needed in respect of a system of quality assurance with a quality seal function for partly virtual and fully virtual study opportunities.
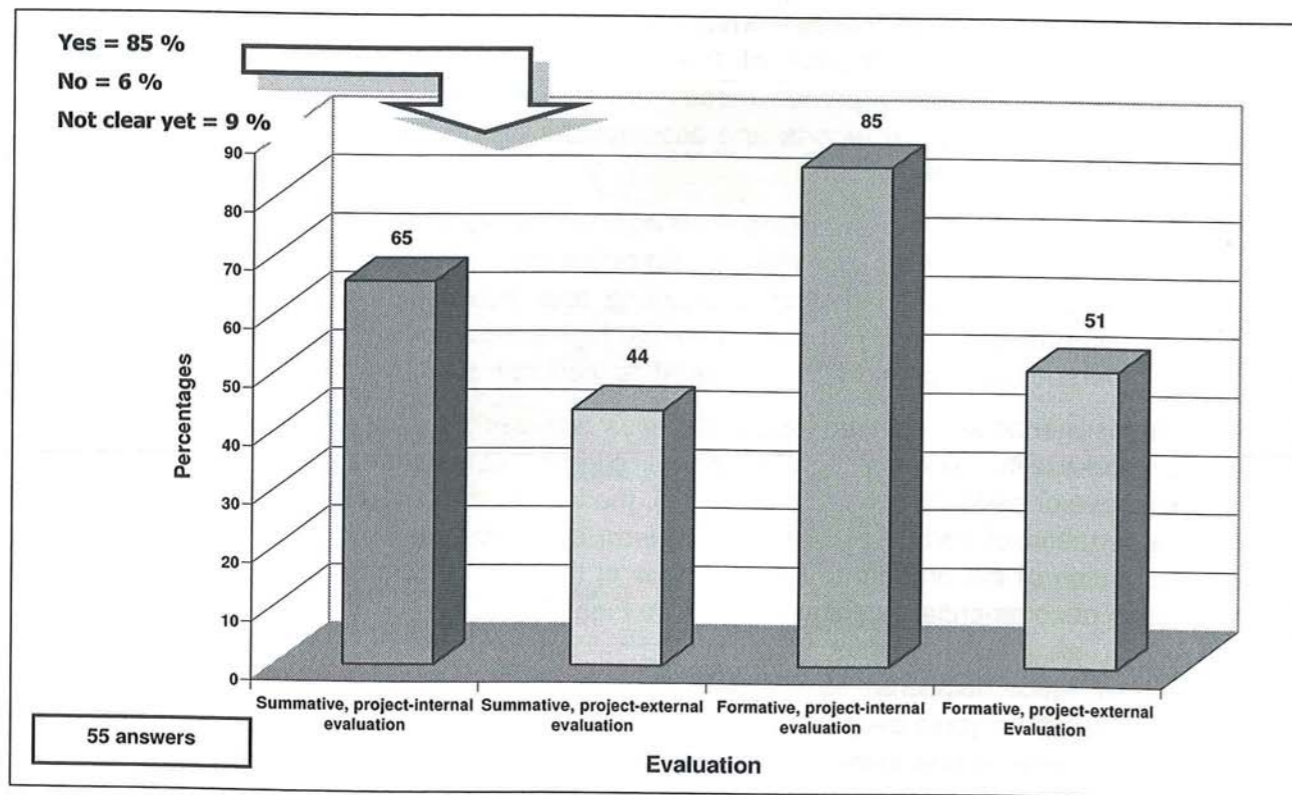
The contentual-didactic continuing development of project outcomes

Furthermore, another open question asked how the contentual-didactic continuing development of project outcomes could be ensured. As far as *staff and human resources* are concerned, the respondents named scientists paid from other third-party sources, for example, or project-related staff, students and tutors, authors, users as well as editorial teams. In *financial* terms, projects hoped that the continuing development could be achieved with follow-up project funding (e.g. from the EU), with research projects and earnings produced by academic continuing training. From an *institutional* point of view, projects thought that their continuation was to be guaranteed by means of continual evaluations, continuing teacher training centres, communities made up of software companies and universities, corporate bodies (i.e. registered associations) established to continue projects, media and university didactics centres as well as external software companies. And, in terms of *technology*, aspects such as easy-to-operate, user-friendly authoring tools and learning platforms were considered to be beneficial to the upkeep and administration of the content as well as for its long-term use (cf. here 3.4.8 *Final remarks*).

User training

Fig. 39: Is any user training given?

Cannot say yet 34%

Yes 44%

No 22%

Training providers, such as:
- Project staff
- University didactics centre/other centre
- Universtiy institutes
- Product developers
- Software company
- Media centre
- Authors
- Fraunhofer Institute
- Manual, guided tour
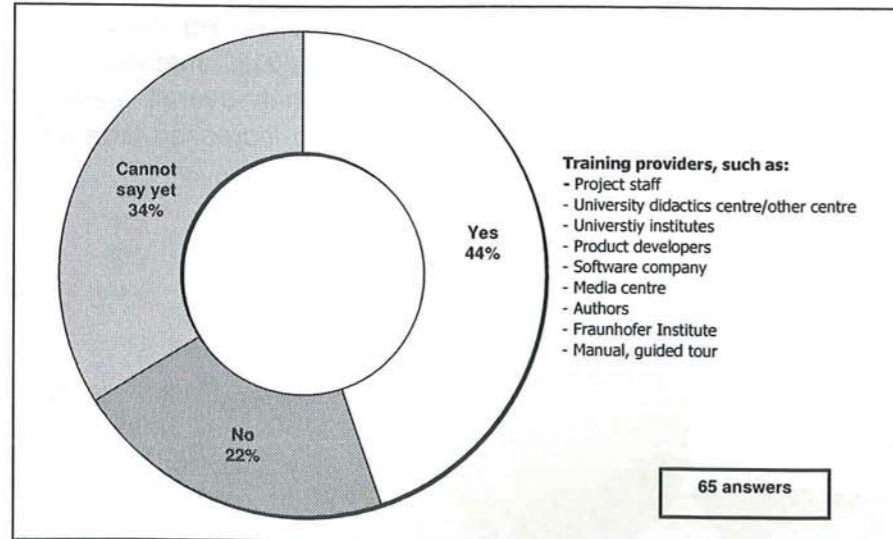
65 answers

The question as to the provision of user training did not differentiate between teachers and learners. All the same, 44% of the projects stated that such training courses exist or are planned. The relatively high proportion of open answers (34% stating that they "Cannot say yet") indicates that the importance of support for users in the implementation and dissemination of virtual learning environments is not to be underestimated and that projects are at least considering the introduction of such training measures. This is a pleasing result as far as raising the acceptance of virtual learning environments is concerned.

Answers differed in respect of who actually provides existing or will provide planned training measures: project staff as well as university institutes are being considered here.

3.4 Results: Heads of the individual projects

The subproject questionnaire was sent to the 540 individual projects funded by the BMBF programme. The response rate of 41% was lower than for the coordinator questionnaire (65%), which may be attributed to the fact that

- responsibility for the overall project context was not as strongly developed in the individual projects,
- some individual projects did not feel the same degree of responsibility for answering the questionnaire as the coordinators of the project networks had done,
- individual projects without project management responsibilities lacked the time for questionnaire surveys.

The questionnaire was fully completed by 223 of the 540 individual projects. The corresponding response rate of 41% provides, even though it is not possible to completely rule out a bias in respect of subject group membership, a reliable database for assessing the development status at the level of the individual projects at the time of the survey.

In the following, the most reliable results of the subproject questionnaire in which the heads of the individual projects were asked about the following eight topic blocks, will be presented:

- General information on the project,
- Use in teaching,
- Didactics,
- Distribution,
- Financing,

- Rights management,
- Technology,
- Final remarks.

3.4.1 General information

Grant-financed staff

Fig. 40: What BMBF grant-financed staff were involved in your individual project?

223 answers	Positive answers out of 223	Positive answers as a percentage of all answers	Average number of staff among the positive answers	Average number of staff among all answers
Research staff	210	94%	2,5	2,3
Research assistants with a degree	54	24%	2,7	0,7
Research assistants without a degree	124	56%	3,8	2,1
Technical-administrative staff	35	16%	1,7	0,3
First-year resident	4	2%	1,3	0,0
Tutors	11	5%	2,6	0,1
Contract lecturers	11	5%	3,6	0,2
Authors	21	9%	10,2	1,0
Others	34	15%	3,3	0,5

This question only considers BMBF-financed staff; this means that the answers need not necessarily correspond with the actual number of people participating in the project (for example, unpaid Diplom candidates or students integrated into the project development work). So the results cannot be used to determine the absolute number of staff; they can only be used to gain an insight into the project staffing structure supported with public funds.

The question was designed so that each answer field (research staff, research assistants with a degree, etc.) was followed by a text field into which the number of staff in the respective category was entered. The results columns are to be understood as follows:

- *Positive answers out of 223:* Number of projects which ticked this field;
- *Positive answers as a percentage of all answers:* percentage relation between the first column and the total number of answers (223);
- *Average number of staff among the positive answers:* average number of staff from the respective category per project related to the number of projects which ticked the field;
- *Average number of staff among all answers:* average number of staff from the respective category per project related to all 223 projects.

Most staff funding went, as Fig. 40 shows, to paying research staff (94%). Besides these, research assistants account for the second largest staff group funded from BMBF grants (24% with a degree respectively 56% without a degree). This means that we can assume that the main workload in the projects was carried by these two groups.

Individual project's activities performed for the network

Fig. 41: Which activities did your individual project perform for the network?

223 answers
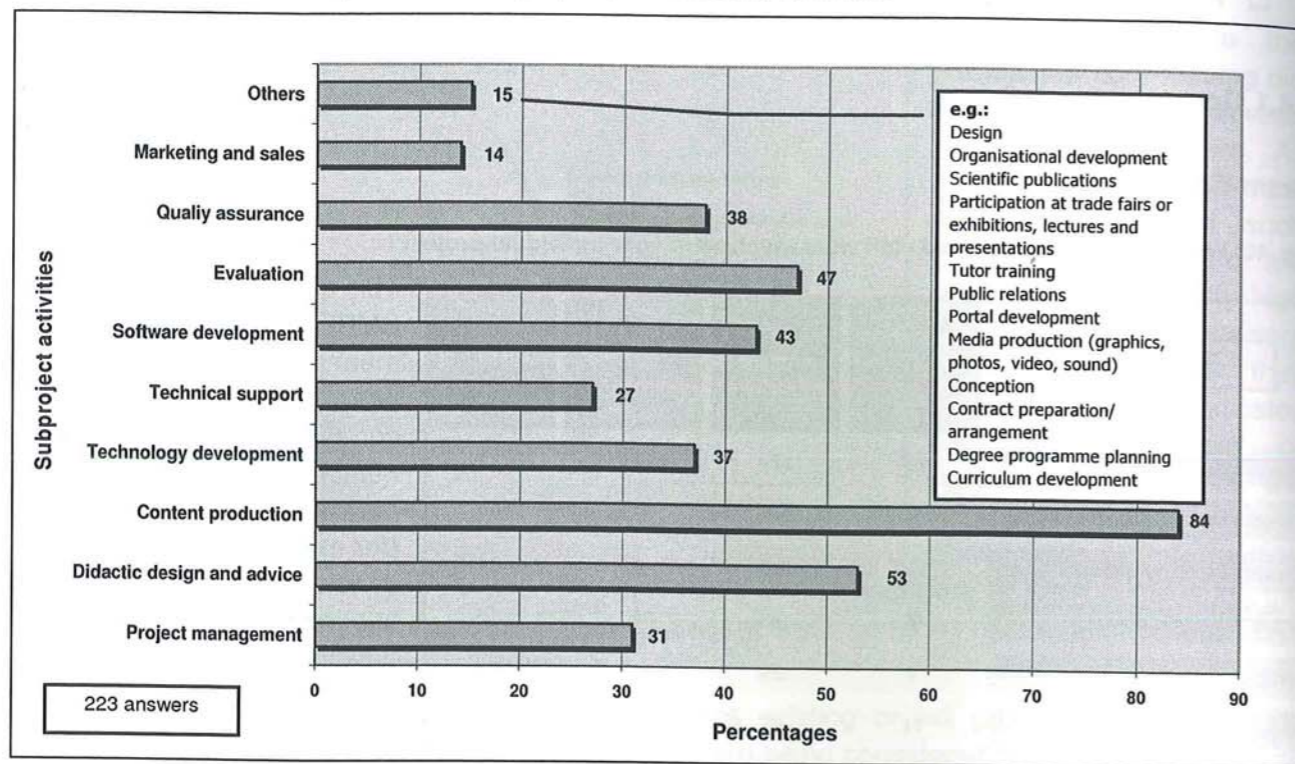
The main activity for individual projects clearly lay in the field of content production (84% of projects). It is interesting to note that didactic design and advice took second place (53%), which confirms the high significance given to the development of a state-of-the-art didactic design in funded projects. As already revealed by the coordinator survey, evaluation (47%) and quality assurance (38%) also took a prominent position. Software and technology development only follow some way behind (and at a further distance, technical support), which allows us to conclude that projects by no means had a primarily technology-driven focus. It is very likely that those projects were entrusted with project management activities which were run by the heads of the cooperative projects. Marketing and sales, in comparison to the other activities, are much less present in the portfolio of activities performed by individual projects.

3.4.2 Use in teaching

University management support for the project

Seen against the call made, for example, by the Federal-State Commission for Educational Planning and Research Support, that e-learning had to be turned into a "matter for the senior university management" (BLK 2002, p. 1), this question generally inquired into an assessment by a project as to whether the respective university management had actively supported it. This means that the question does not discuss the facticity of this support, but rather how the degree of support provided by those responsible for the project was perceived. This is why it is not possible to draw any conclusions as to the degree and the effectiveness of the support. It was positive to see that 38% of the projects actually state that support had already been given, which shows that the project work was positively perceived and appreciated by the management of many universities. The proportion of "No" and "Cannot say yet" answers (22% respectively 23%) conversely reveals that e-learning activities are by no means receiving active support from university management bodies everywhere.

Kind of support

Fig. 42: Is the project actively supported by the university management?

In response to the question as to the kind of support they received, some projects stated that the university management had provided financial support. Further details on the extent and kind of this financial support were not provided, however. Support in the form of making the requisite infrastructure available was mentioned relatively often. Another focus in the support provided also consisted of the integration and coordination of projects in other university facilities (existing or to be established) and in the field of providing administrative services as a way of reducing the project management workload.

Integration into media development strategies

Fig. 43: Was the project integrated into the media development strategies?
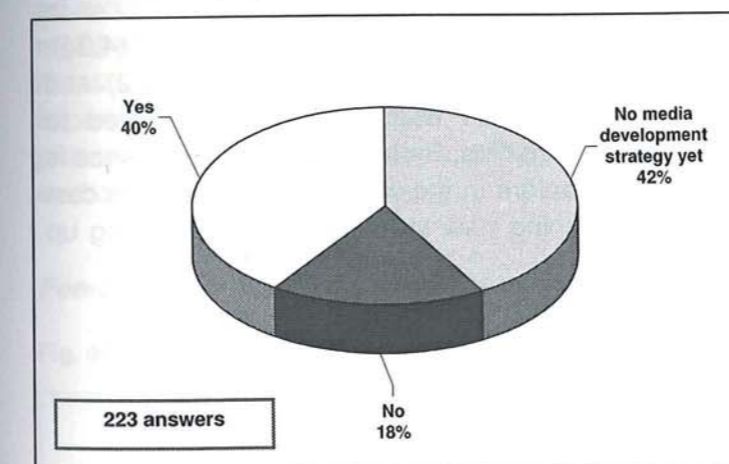
A relatively high proportion of projects (40%) stated that their project had already been integrated into the media development strategies, be it in the department, be it in the university. This circumstance is important because the strategic orientation of universities in respect of e-learning sends out an important message for the broadbased development and the wide-ranging implementation of products. Conversely, the number of projects which stated that no media development strategy existed yet (42%) shows that much still needs to be done by many universities and faculties as far as the field of strategy development and strategic positioning is concerned.

How was the project integrated into the media development strategies?

Answers to the question as to how projects are integrated into the media development strategies of the university/department showed that those projects which had actually been integrated into the media development strategies were, on the one hand, integrated into existing measures and plans, while, on the other hand, they were not seldom themselves the driving force behind these strategy development processes. Over and above this, projects are given strategic consideration through their curricular integration, their cooperation with central university bodies and networking with other funded projects as well as through cross-university initiatives.

Status of project goals

Fig. 44: Status of project goals

223 answers

Average values (1 = not important, 5 = very important)
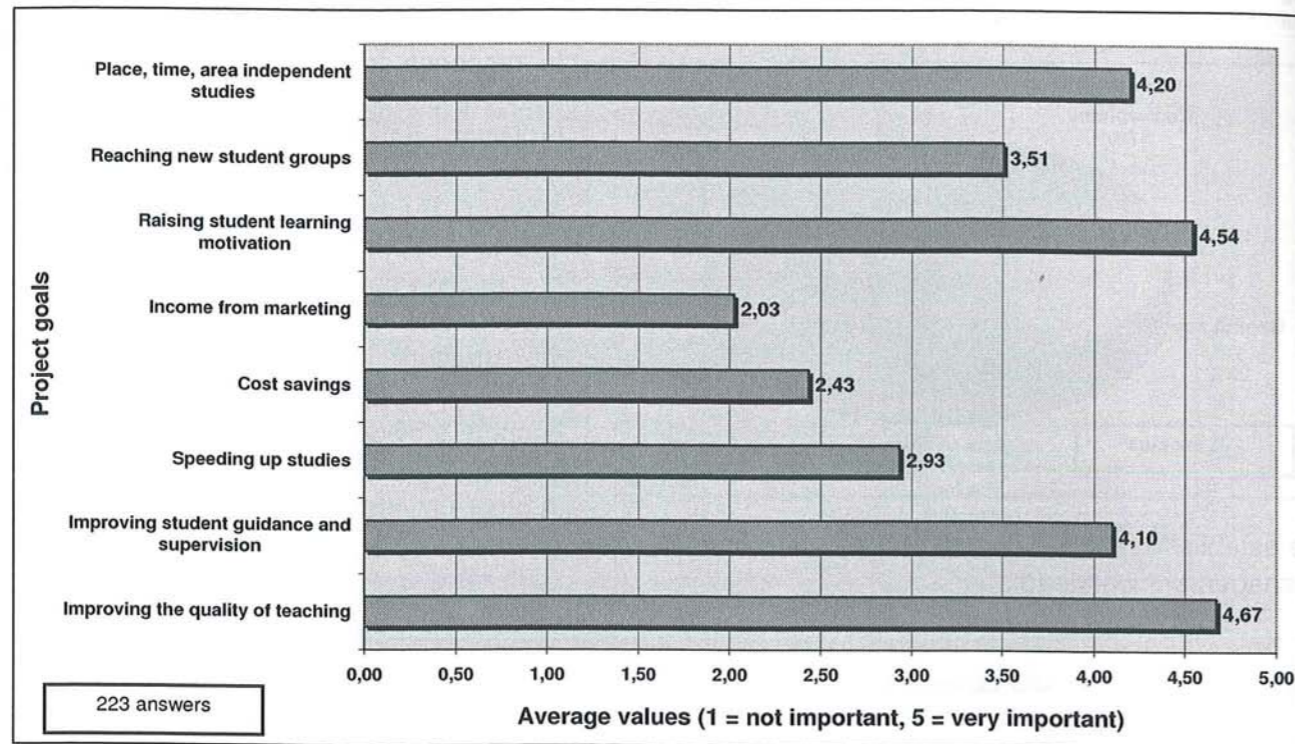
As far as the projects see the status of the various project goals, particular importance attaches to the goals "improving the quality of teaching" (4.67), "raising student learning motivation" (4.54), making more flexible studies possible – "place, time and area independent studies" (4.2) and "improving student guidance and supervision" (4.1), i.e. goals which are directly related to improving the academic situation and the academic level of studies. By contrast, less importance is attached to a strategy which focuses more on economic factors in the widest sense, such as cost aspects, market opportunities and career prospects (reaching new student groups, speeding up studies, cost savings, income from marketing).

3.4.3 Distribution and exploitation

How products are presented to the public

The fact that public relations and networking are important factors in the success of an e-learning programme in the sense of making it known and getting it accepted in the scientific community and beyond is well-known to the projects, as the answers to the question "How is your individual project's product presented to the public?" show. Projects use a large number of communication channels to bring themselves and their products to the attention of the specialist and wider public. In this process, PR approaches commonly used in the academic sphere clearly predominate (trade fairs, exhibitions, shows, conferences, workshops, university PR activities, cooperation agreements with other universities). Projects also widely use personal contacts (handing products to multipliers/disseminators) and appropriate databases and portals. Only a small number of PR measures are carried out among the institutionalised disciplinary community (faculty conferences, disciplinary societies), with cooperation agreements and alliances concluded with non-academic institutions tending to be used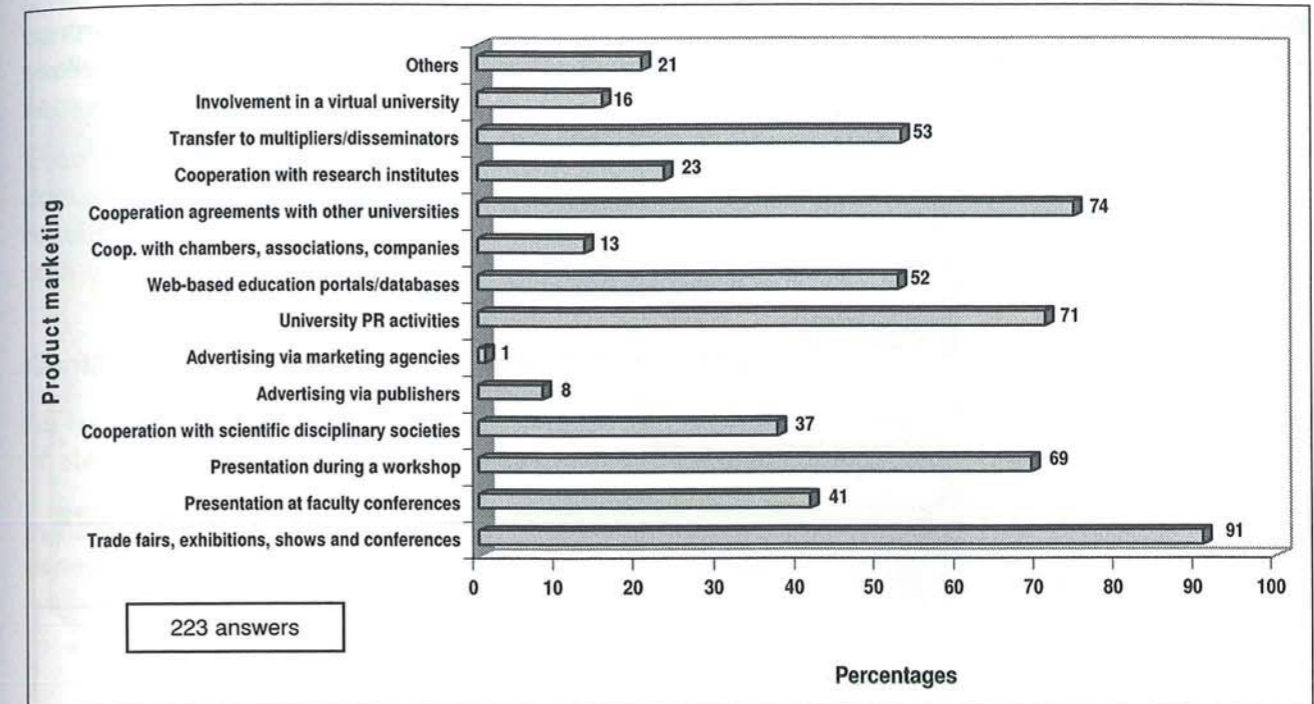 least frequently. At present, the main focus of the public relations activities consequently involves targeting the university environment and its surroundings by using their specific communication structures.

Fig. 45: How is your individual project's product presented to the public?

223 answers

Percentages

University-specific and university-targeted communication channels also predominate clearly among the PR activities cited under "others" (such as, classroom use / course catalogue / advertising in courses / homepage / own Internet portal / online journal / search machine registration, and so on). It remains to be seen how successful the projects' public relations measures will generally be. In the current development and implementation phase, particular importance certainly attaches to personal contacts of the kind that conferences, lectures, presentations, etc. offer as a means of maintaining contacts and engaging in information exchange.

Fee-charging use of the product in continuing training

Fig. 46: Is the product offered in continuing training courses at your university against payment of a fee?

223 answers

The fact that projects do not primarily aim to market their products commercially and that the profitable sale of their products presents problems due to a lack of know-how which first need to be solved is made apparent by the answers given to the question "Is the product offered in continuing training courses at your university against the payment of a fee?" In particular, the high proportion of answers which state that a fee-charging exploitation/sale of the product in the field of continuing training cannot be foreseen yet (54%) clearly demonstrates the uncertainty felt by projects in this field.

Product providers/suppliers in the continuing training sector

Fig. 47: Who will offer the product in the continuing training sector against the payment of a fee?
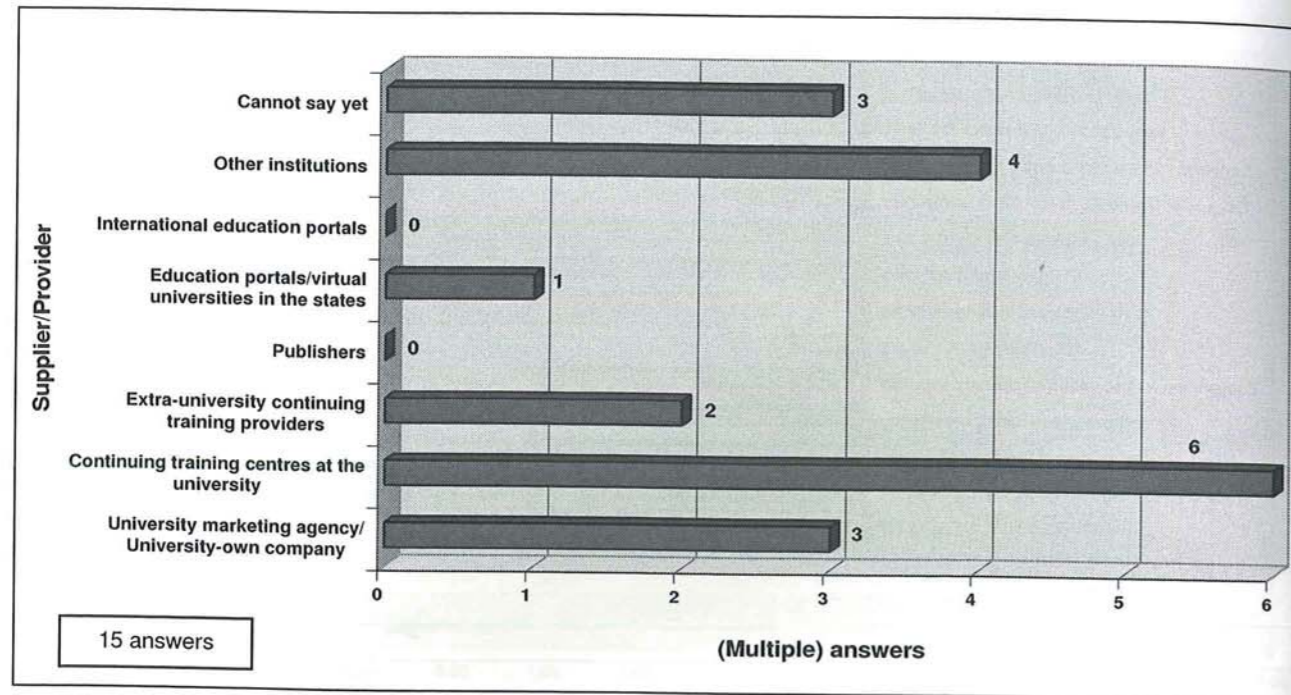
Of the 7% of the projects which definitely intend to sell their products commercially in the field of continuing training, most (6) will use existing continuing training units at their university. Besides these, some are also considering using their university's marketing agency respectively a university-own company (3), extra-university continuing training providers (2), education portals respectively virtual universities of the states (1) and other facilities (4) to market their product. It is interesting to note that none of the projects which answered this question are considering selling their products in cooperation with publishers.

3.4.4 Financing

The question "How much annual funding do you estimate is needed for your individual project to continue after the end of the BMBF funding?" offered a field in which projects were free to enter their text answer. This produced a substantial range of responses. While one project stated that no additional funds were needed, four projects alone stated that their funding requirement amounted to half a million euros. The arithmetic mean of the answers lay at around €82,000, with the most frequently named amount being €50,000. If we assume for the moment that the question was not answered with particularly large amounts out of strategic considerations, then we can generally conclude that the financial requirements differ greatly and are, in some cases, substantial. The range of answers can very probably be explained by the very different kinds of business models and the various development statuses achieved in the projects.

Type of financing for the continuation of the individual project

The question "How can or will the continuation of the indidvidual project be financed after the end of the BMBF funding (e.g. by other third-party funding programmes)?" aimed specifically to find out about the existing arrangements for the continuing financing as well as prospective plans and op-

tions in order to identify the financing models considered by projects. No concrete details were given which indicate the current existence of continuing financing opportunities. In many cases, by contrast, projects specifically referred to the planning status. It was very noticeable that 93 projects explicitly stated that the way in which they would continue to finance their project had not yet been settled.

Even though some of the answers may have been of a strategic nature, the information does document the fact that measures and agreements on the continuing financing had, if at all, only reached the planning stage by spring 2003 and that many projects hoped to receive continuing support from public sponsors.

Continuing financing of project staff by the university

As far as the question "Has your university made any promises regarding the continuing payment of staff in your individual project?" is concerned, it is also not possible to completely rule out the possibility that some of the answers were of a strategic nature or were based on a lack of knowledge as far as existing arrangements were concerned. Nevertheless, it can clearly be seen that the willingness on the part of the universities to continue financing staff from the BMBF projects leaves much to be desired. If this finding is compared with the information provided in response to the question as to the kind of support provided by the university management bodies (cf. Fig. 42), then we can conclude that the financial support given by the university management, which
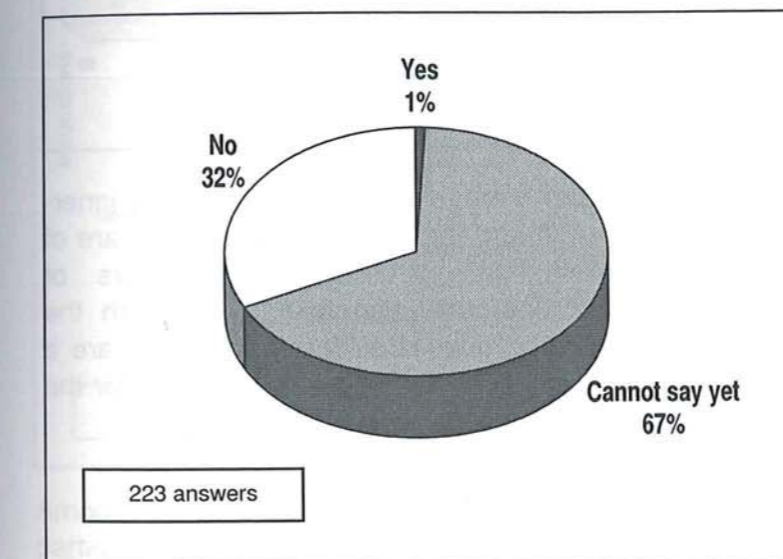
Fig. 48: Has your university made any promises regarding the continuing payment of staff in your individual project?

only a few of the projects mentioned, does not refer to the continuing payment of project staff, but rather to other resources (including, in particular, infrastructural components).

The information given by the two projects regarding staff for whom a promise of continuing payment had already been made (projects stated promises for one research staff position each) roughly concurs with the modal value of the answers to the question as to the funding requirement for the continuation of the projects (€50,000 per annum, cf. above details).

Cooperation with university institutions

Fig. 49: Which university institutions does your individual project cooperate with?
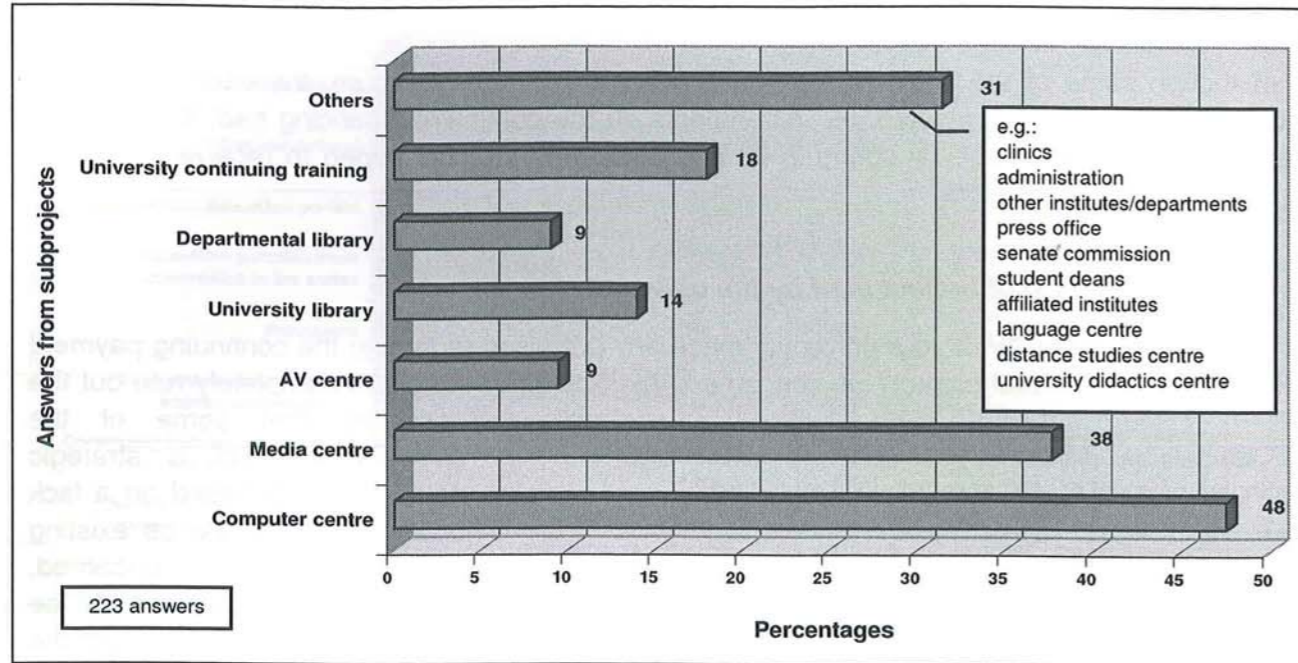
The following group of questions looked at how projects were organised. In terms of inner-university forms of cooperation, the computer centres (48%) and the media centres (43%) are of great significance to projects as operators of learning platforms and providers of advice/consultancy, training and production services. Cooperation also takes place with the continuing training centres and the central or departmental libraries. Besides these, there are a number of other institutions which perform various services and forms of preparatory work for the projects (administrative services, public relations, curricular integration, etc.).

Services provided for the project on a commercial basis

Fig. 50: Which services are performed for your individual project by companies or individuals working on a commercial basis?
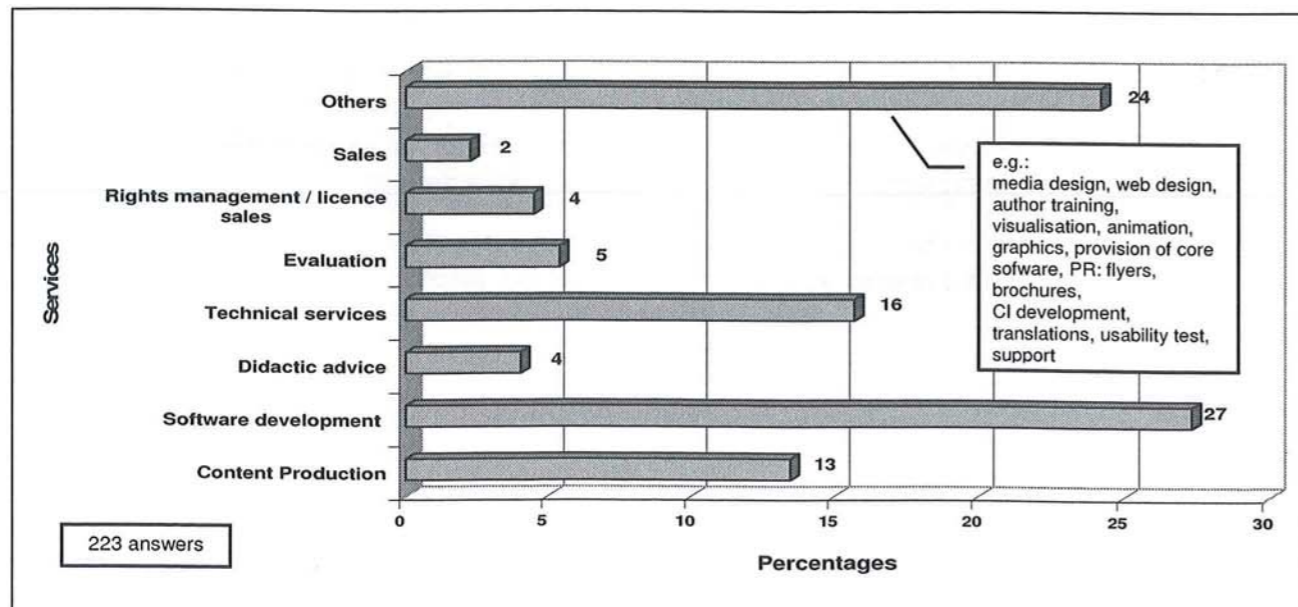
Commercial services provided by external suppliers mainly involve technical work (e.g. software development, technical services). In addition, there is a large range of other services which are bought in from external suppliers. Content production is also occasionally performed by third parties (authorship against payment, and so on). It is noticeable that more evaluation and didactic services are used on a commercial basis than services in the field of rights management and sales, which are predestined for outsourcing.

3.4.5 Organisation

Cooperation with non-project institutions on a non-commercial basis

Fig. 51: Which non-project institutions does your individual project cooperate with on a non-commercial basis?
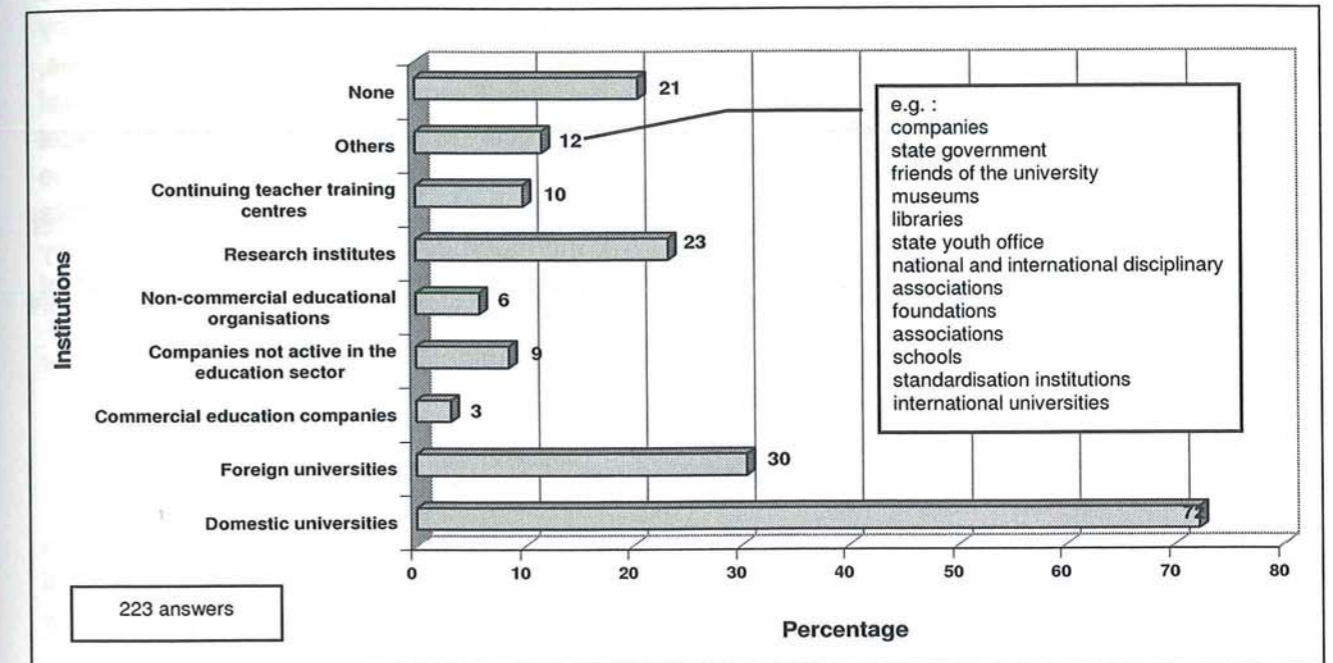
Among the non-commercial forms of cooperation, collaboration with other universities plays a particularly strong role (72%). This high figure could, of course, be explained by the fact that when answering this question, projects also took account of cooperation with other universities involved in the network project, although the question specifically asked about non-project cooperation partners.

Projects also maintain quite intensive working relations with foreign universities (30%) and research institutes (23%). By contrast, cooperation with other institutions (continuing teacher training, non-commercial education organisations, companies not active in the education sector, and commercial education companies) tends to play only a secondary role. 21% of the projects had no cooperation agreements with non-commercial partners that extended beyond the scope of the network project.

3.4.6 Rights management

Individual project responsibility for managing rights

The fact that the question of managing rights has meanwhile been understood as an important factor for the trouble-free progress of a project and is now performed with the requisite intensity is clearly shown by the high percentage of individual projects which address this area of responsibility on behalf of the networked projects with a work-sharing structure. While – as Fig. 50 shows – only 4% of the projects have the management of rights carried out by external partners on a commercial basis, a good quarter of all the individual projects are involved in settling legal questions for the network. It may be presumed that the field of rights management is mostly carried out by individual projects for which the head of the cooperative project is responsible.

Fig. 52: Is your subproject responsible for managing the rights for the network project?

No 73%
Yes 27%

223 answers

However, nor can it be ruled out that several individual projects might take on joint responsibility for the rights management within a cooperative project.

Responsibility for managing rights within the individual project

In most cases, it is an individual project's staff who are responsible for settling legal questions relating to their projects. In addition, legal support is also provided by the university's legal department, by other university institutions and by bodies outside the university (cross-university institution, lawyers, etc.).

Fig. 53: Who is responsible for managing rights?

Responsible for rights management

Nobody (yet)   9
Others   10
Cross-university institution   1 — University's continuing training company / Publisher / Law faculty / Computer science department / Lawyer / Network project management / Media excellence centre
Marketing agency   0
Media centre   0
Personnel department at the university   0
Legal officer/university law department   10
Project staff   46

0   5   10   15   20   25   30   35   40   45   50

(Multiple) answers

60 answers

Legal support and advice by third parties

Fig. 54: Did your individual project obtain legal support or advice?

Times mentioned

No 24
Yes 36

60 answers
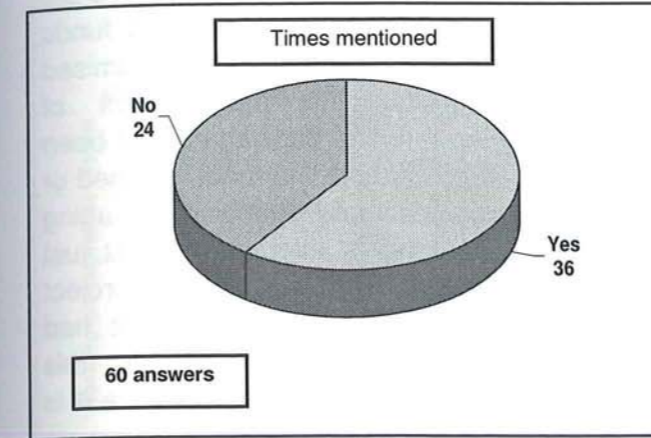
Most of the individual projects entrusted with the management of rights decided to obtain legal support and advice from third parties since the legal expertise available within the project itself was not considered to be sufficient. In other cases, respondents voiced their wish for a system of central, case-by-case related legal advice to be established for the projects. The reasons cited for taking recourse to legal advice mentioned, in particular, aspects of copyright law, of how to arrange contractual relations, and licence and company law issues relating to sales structures.

Who was asked to provide legal support and advice?

Fig. 55: Who did your individual project consult for legal advice?

Number of (multiple) answers

Other institutions   7 — Centres of e-learning excellence / Head of the network project / Institut of Computer Law
Law office   4
Colleagues/staff   8
Project sponsors   13
Licensing office   1
Law department of a university   9

37 answers
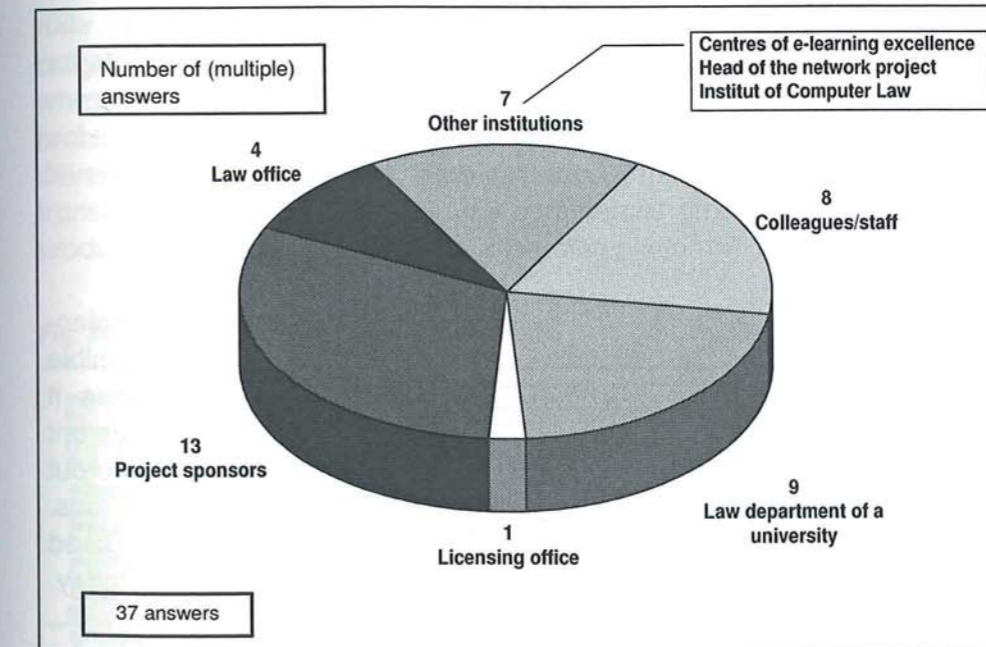
Individual projects which obtained legal advice primarily turned to the Government Programme Management Agency "E-learning" (FhG, Projektträger NMB+F) or to the legal department at the university in question. Colleagues and staff as well as other university and cross-university partners were also contacted when the relevant information was needed. By contrast, relatively few projects made use of fee-charging legal advice from a law office.

Use of budgetary resources for the management of rights

Of the projects responsible for managing rights, 10 stated that a part of the budget of the network project had been used for this purpose. The fact that one project stated that it used €0 could be put down to the fact that funds had actually been promised for the management of rights, but had not yet been spent. The funds planned or actually spent on managing rights averaged out at just under €18,000. One project actually stated that it had spent €80,000 on this expenditure item. Since it is not clear from the answers which costs funds had been allocated to, the informational value of these answers must remain limited. It is also to be assumed that the 50 projects which answered "No" had made staffing funds available in the form of time budgets for dealing with legal issues.

Fig. 56: Are parts of the network project budget used for the management of rights?

Number of answers: 60

Average: just under €18,000
Span: from €0 to €80,000

10
Yes

50
No

60 answers

3.4.7 Technology

Use of XML

Fig. 57: Do you use XML?

No, not relevant
27%

Not yet, but planned
16%

Not possible
8%

Yes
49%

223 answers
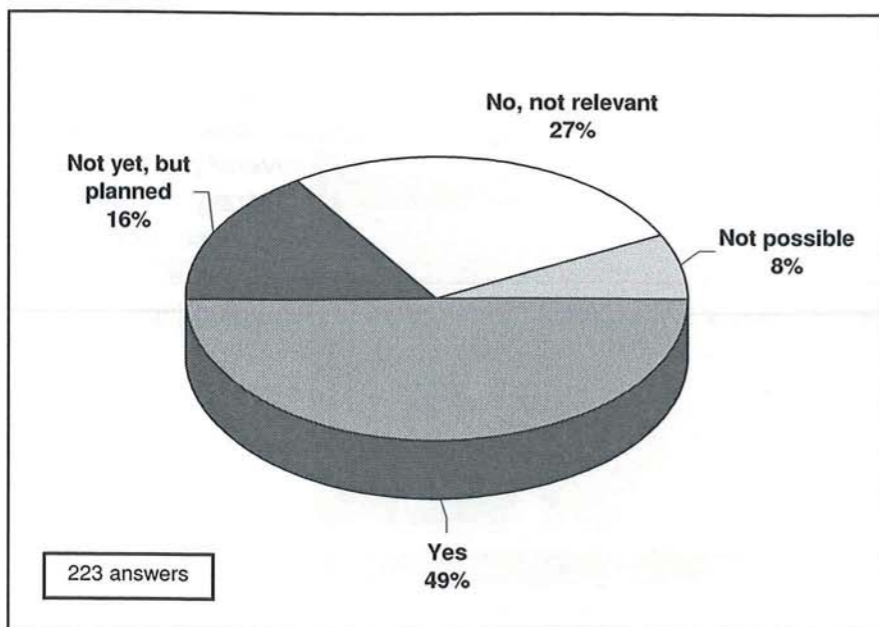
The future-compliant metalanguage XML (Extensible Markup Language) makes it possible to separate content and layout and to output content in various formats. This language is already used by half of all projects today. Another 16% plan to use XML, with 27% judging the language not to be relevant, while 8% describe its use as not possible (although no reasons are given). One reason could be that the use of XML is presently still hampered by the lack of editors which are as powerful as they are easy to use.

Implemented learning management systems

Fig. 58: What kind of learning management system was used?

- No learning management system: 16
- Own development: 43
- Open source solution: 23
- Commercial product: 35

223 answers
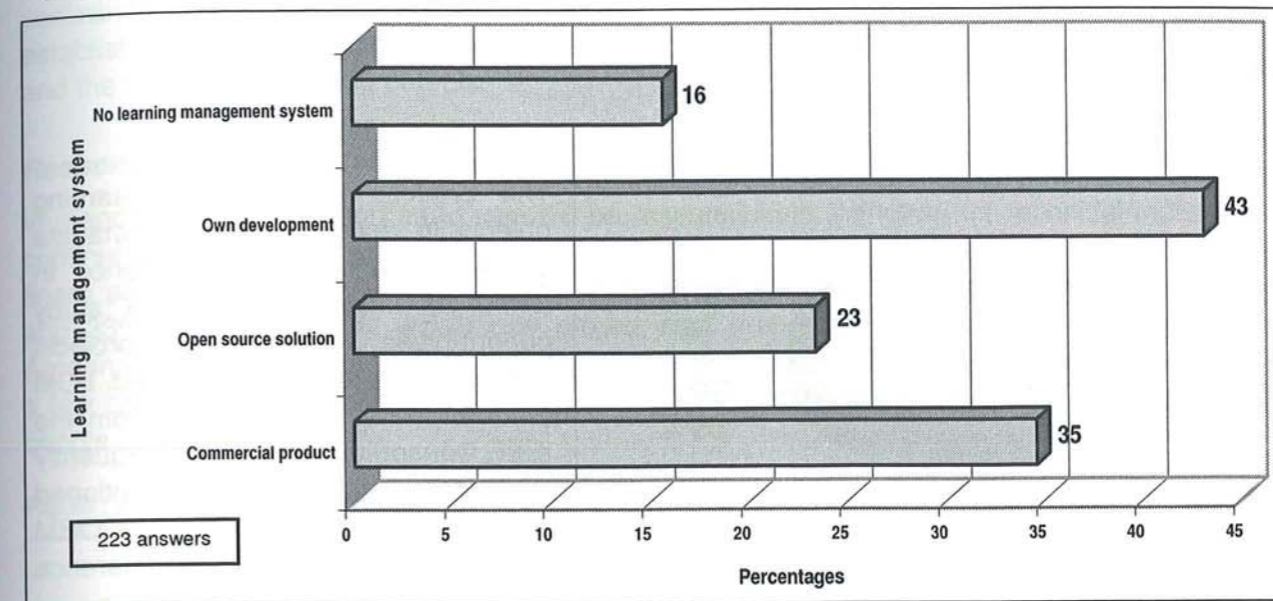
A substantial percentage of the projects (43%) uses a self-developed learning platform to offer their range of teaching units. Experience has shown that the inadequacies of commercial programmes, such as their high costs and a market for commercial learning management systems which is only gradually becoming more transparent, were the decisive factors mentioned here. The problem presented by this result lies in the high time and cost input associated with a dedicated development as well as the to-be-assumed generation of proprietary, solutions which can only be transferred with difficulty. 35% use commercial products, 23% of the projects take open source products. And 16% dispense with a learning platform.

Fig. 59: Learning management systems in use

Commercial learning management system	Times mentioned	Open source learning management system	Times mentioned
Blackboard	14	ILIAS	21
Netcoach	13	Webassign	8
CLIX Campus	12	BSCW	8
WebCT	12	Dreamweaver*	1
Hyperwave E-Learning Suite	11	EdoWorkSpace	1
Community::Web	4	Campus Virtuell	3
Lotus Learning Space	3	Study 2000	1
NetLearn	3	uPortal	1
JaTek	2	Collaborative Virtual Workspace	1
SAP Learning Solution	1	PostNuke	1
Docent LCMS	1	Encore-Lambda-MOO	1
Saba Learning	1	CommSy	1
ART-Web	1	ActiveMath	1
Macromedia E-Learning Suite	1	* This product is not a learning platform, but rather a commercial webpage editor.	
LernPlus	1		

Fig. 59 shows a leading group of products standing out among the commercial solutions, including Blackboard, Netcoach, CLIX Campus, WebCT and Hyperwave E-Learning Suite. Among the open source solutions, ILIAS clearly comes top (in fact it is the most frequently used platform by the projects), followed by Webassign and BSCW.

Implemented metadata standard

Fig. 60: Do you adhere to a metadata standard in your individual project?

yes 45%

no 55%

223 answers
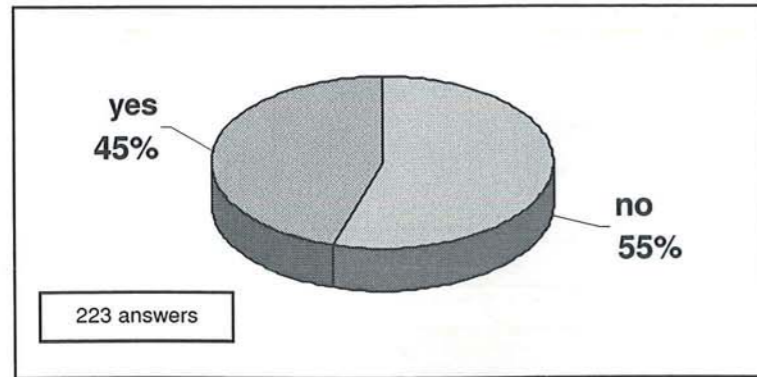
The practice of describing learning objects in accordance with metadata standards is of great importance in terms of locating web-based study opportunities. 45% of the projects already use a metadata standard. LOM (Learning Objects Metadata) from the IEEE Consortium is the most-frequently used standard, having been mentioned 58 times, followed by SCORM (Sharable Content Object Reference Model) mentioned 24 times, IMS with 15 citations and Dublin Core with 14.

Fig. 61: Implemented metadata standards

Metadata standard	Explanation	Times mentioned
LOM	Learning Objects Metadata (IEEE)	58
SCORM	Sharable Content Object Reference Model	24
IMS	IMS Global Learning Consortium	15
Dublin Core	Dublin Core Metadata Initiative	14
ARIADNE	ARIADNE Foundation for the European Knowledge Pool (based on LOM)	7
XML DTD	eXtensible markup language document type definition	6
AICC	Aviation Industry CBT Committee	4
PMML	Predictive Model Markup Language	3
RDF	Resource Description Framework (W3C)	3
FGDC	Federal Geographic Data Committee	2
LMML	Learning Material Markup Language	2
MedicCaseML	Project MedicDAT	1
MedicML	Project MedicDAT	1
Damit-Standard	Project Data Mining Tutor	1
EML	Ecological Metadata Language	1
MESH	Medical Subject Headings (National Library of Medicine, USA)	1
SPOLIT	Database of Sports Science Literature	1
HTML	Hypertext Markup Language	1
ADL	Advanced Distributed Learning Initiative (parent of SCORM)	1
Doc-Book	Extensible Markup Language DTD for technical publications	1
Thesaurus DZZ (extended)	German Journal of Dentistry	1
Normdata of the German Library Frankfurt a.M.	Normdata on names of persons, key words, joint corporate bodies of the Deutsche Bibliothek Frankfurt a.M.	1
Own development (not specified)		1

Measures to ensure technical sustainability

In the selection of measures to ensure technical sustainability, projects considered a whole number of various activities which included documentation, continuing development, distribution and quality assurance of project-own software solutions as well as developer and user training, the establishment of cooperation models for the continuing maintenance and upkeep of the software and the potential marketing of tools.

Responsibility for continuing technical development and maintenance

In response to the question as to who will be responsible in the future for technical maintenance, continuing development and adaptation of the product, it appeared that many projects have not finally settled this issue yet. For example, 54% stated that no solution existed yet in this respect and 33% stated that they would use project staff respectively staff from a follow-up project. Agreements with computer centres, media centres and partner companies were only mentioned in a few cases. Solutions within or close to the university predominated under the heading of other people and institutions.

Fig. 62: Who is responsible for technical maintenance, continuing development and adaptation of the product?

e.g. research centre, media (excellence) centre, media institute/workshop, prospective centre of excellence, university institute/department, teachers from the subject, staff of the institute/department, students, affiliated institute, continuing training provider, open source community, exploitation company (copyright, intellectual property, products, etc.), spin-off company.

223 answers
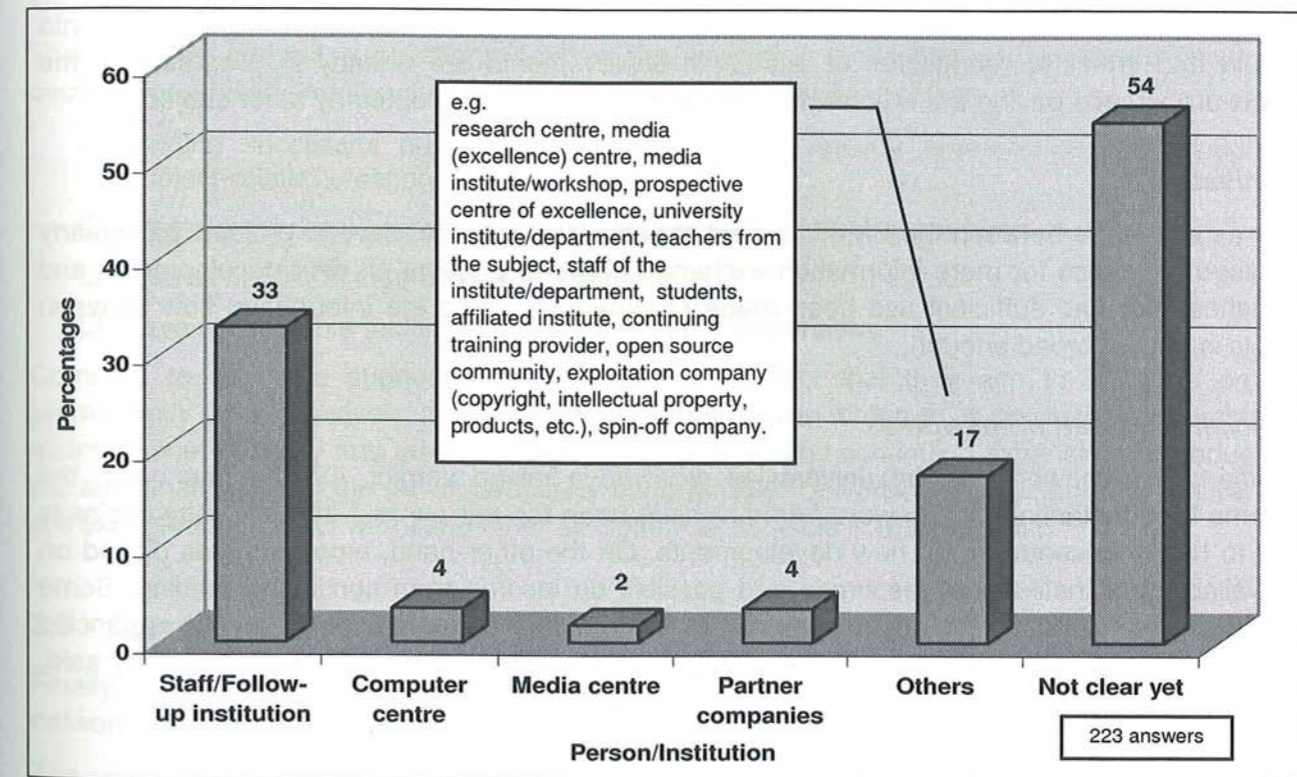
3.4.8 Final remarks

Ensuring sustainability – comments, suggestions, requests

The extremely extensive answers to the deliberately open final question in the individual project's questionnaire ("The following text field gives you the opportunity to make further comments, suggestions and requests as far as ensuring your individual project's sustainability in technical, organisational, financial, etc. terms is concerned.") were naturally very heterogeneous in their range of content. The analysis briefly summarised these under the criteria of "Similarity" and "Relevance" and subdivided them into the following headings:

❏ Development status

- ❑ Integration into teaching
- ❑ Organisation
- ❑ Financially-relevant frameworks
- ❑ Product maintenance and upkeep
- ❑ Future project plans
- ❑ Continuing support funding
- ❑ General ideas

Development status

The emphasis on a high degree of staff motivation, on the high quality of the work done to date and on the federal funding programme's immense benefit for the implementation of new media is countered by the verdict that the funding term had been set too short and by statements on the uncertainty of future financing.

Integration into teaching

Developed products are already being or are about to be used in many projects (integration into curricula and credit for/recognition of academic achievements are already in progress). Some projects are already paving the way for products and models to be adopted by other subjects.

Organisation

As far as exchange between the BMBF funded projects is concerned, several projects particularly expressed their wish for more information exchange between projects on their developments and experience. Nor had sufficient use been made of synergies, since the information flow between projects is not yet broad enough.

Financially-relevant frameworks

The financial frameworks at the universities received a mixed verdict. On the one hand, the freedoms for substantial funding were found to have been too narrow and the university business policy to have concentrated on new developments. On the other hand, emphasis was placed on the availability of institutional resources and possibly on income from continuing training. Some projects see no market for their developments, others are considering creating marketing agencies and a commercial involvement in the field of continuing training. This would require, they said, support with migrating projects into suitable business modes.

Product maintenance and upkeep

While, on the one hand, a lack of resources for product maintenance was seen as a problem, other projects financed these fields from the faculty budget or relied on committed staff. Costs for maintenance and upkeep were reduced by concentrating similar content in a learning environment.

Future project plans

Project plans gave absolute priority to completing the range of content offered (finishing a full set of modules). In addition, finished products are to be tested in teaching. The transformation of major network projects into smaller operational units after the end of the funding term represents a major challenge. The integration of projects into state initiatives or funding programmes is considered to be one option for continuing the work.

Continuing funding

The wish for further funding for the project work is, as expected, expressed by many of the projects. The goals of this funding are defined as

- ❑ concluding the content,
- ❑ completing the requisite software tools,
- ❑ developing marketing and cooperation models.

BMBF, in particular, as well as the states and the EU are named as possible sources of such funding. The required funding periods range from six months to three years. Funding is to be used to pay for between half and two research staff positions plus positions for research assistants.

Several projects suggested that the current support round should be followed by a selection of the best and particularly successful projects and that these should receive continuing funding at a lower level. Other suggestions focused on financing the international distribution of project outcomes (e.g. in the form of translations) and concentrating future funding on a few long-term projects.

General ideas

The following general suggestions on how the e-learning landscape at Germany's universities could be organised and structured in the future deserve special attention:

- ❑ funding successful projects through national disciplinary organisations or through the subject-related creation of project clusters,
- ❑ creating a federal (nationwide) portal for projects' e-learning products,
- ❑ intensifying exchange between projects,
- ❑ developing viable multimedia strategies at the universities.

Common to all these suggestions and ideas is the fact that they aim to integrate projects permanently and effectively into overarching structures in order to support the dissemination, maintenance, publicity and marketing, quality assurance and continuing expansion of products for the sustainable use of the developed study opportunities. University, disciplinary and federal level are expected to interact with each other as closely as possible in this process.

3.5   Conclusion and outlook

Finally, some of the key findings and developments identified in the course of the survey of network projects and individual projects will be summarised and commented on in the following.

The very different degrees to which the various universities and departments drove forward the process of distributing university e-learning solutions led in 2002/2003 to a broadly-differentiated *adaptation spectrum* ranging from highly-committed pioneers and early adopters through to sceptics and the indifferent with a hesitant to negative stance towards this development. At departmental level, a strongly-developed interest could be seen among funded projects in using web-based, asynchronous forms of teaching, above all, in mathematics, engineering and science degree programmes as well as in the fields of economics and business administration, psychology and education. Apart from the technology-affinity of the first group of degree programmes, the relevant factors playing a major role in these fields are very likely to include the optimal visualisation of complex contexts, the productive results of the project work, the partial solution of the undercapacity problem in teaching (relieving the pressure of overcrowded classroom courses) and the medium-term hope of achieving potential savings.

Respondents unanimously confirmed that web-based teaching had great potential in the opportunities they offered for complementing and for giving a qualitative-innovative structure to teaching and learning processes. The project coordinators hope to achieve clearly-specifiable *added value effects* from using interactive, web-based teaching methods, including, above all, the extended availability of content, easier self-organised learning, and greater clarity and better appeal of the content. High development costs mean that the trend towards increasingly using virtual course units combined with interactive elements to teach basic skills and fundamental knowledge clearly predominates, rather than delivering special knowledge with a short half-life value. Since the development of content, on the one hand, and of software tools, course management systems and portals, on the other, frequently run parallel to each other, there are concerns that the cost and time trap may close when preparing intensive fringe specialist knowledge for modules.

E-learning programmes are currently largely used as *complementary additions to classroom teaching*, since experience has shown that investments in partly-virtual teaching amortise more quickly than do the much higher expenditures on purely-virtual teaching. Blended learning courses additionally counter the risk of course drop-outs caused by inadequate student guidance-counselling. While exclusively virtual courses offered without close guidance-counselling and regular feedback have a disillusioning effect on the learning motivation and staying power of students, this danger does not seem to be acutely present in blended learning courses because of the course sections completed in a conventional classroom setting.

Obstacles in the way of web-based teaching and learning in the university context are, at present, to be seen in the field of the general frameworks of the project work (legal forms, quality assurance systems, etc.), self-financing and marketing (e.g. business models, accounting systems). These factors contribute substantially to the dampened expectations as far as the ongoing development is concerned. Deliberations relating to possible marketing and sales channels were generally only of secondary significance. The focus of the project work lay largely on the production of content and on didactic advice and design.

This is why university e-learning projects cannot be measured on the same scale as "start-up companies". The latter specifically anticipate the favourable and negative factors of their successful marketing in a business plan and strategically align their actions accordingly. In most cases, the former only have a limited degree of business know-how. Their position in the academic context means they are additionally bound by the frameworks of public law as stipulated in the higher education act, which sets narrow limits as far as those freedoms are concerned which are required for entering the market.

Nevertheless, the individual projects, in particular, appeared as the successful *promoters* of a general strategic media development at the universities. And with the invested financial and human resources they were able to set decisive impulses in improving the general conditions of studying (e.g. the facilitation of flexible studies) and motivation-raising improvements in the quality of teaching. Not least, the projects managed – in accordance with their obligation to engage in a cooperative form of work organisation – to establish successful cooperative structures with various central facilities within the university (above all, computer and media centres) as well as across the various universities in terms of project-like collaborations and with external service providers.

Although numerous projects received substantial support from their own university management, this actually only rarely led to a definite willingness on the part of the university management to continue financing the initiated developments. The absolutely essential *minimum staff* of between one and two research staff positions required for the successful continuation of projects (in the sense of maintaining and making available the developed products) seemed, at the time of the survey, only to have been secured through post-support funding by the fewest projects. After numerous challenges had often been successfully solved, such as coordination within the project

network, the didactically sound conception of project-own modules, clarification of legal problems (partly achieved by consulting external expertise), overcoming technical obstacles (production of project-own software, use of a learning platforms, conversion to XML, etc.) and the question of an active public relations campaign, many projects nevertheless still face problems regarding the continuing maintenance, continuing development and adaptation of their products.

In this context, the core *success factors* for the long-term, permanent implementation of interactive learning environments at universities included, for example, appropriate university support structures for e-learning modules, the ability of universities to change (development of a feasible media development strategy), realistic project goals and embedded cooperation structures, business models developed in line with actual market requirements, efficient legal advice, incentive structures for university teachers for developing media and using existing programmes, tailor-made public relations measures as well as appropriate quality assurance processes.

In summary, it can be said that the development of virtual learning environments by funded projects had already advanced well at the time of the survey. Problems which above all appeared at the start of the funding term (e.g. learning platforms, rights management) were recognised, were addressed within the projects and were, in many cases, solved. Developed products were already being used and tested in practice at many universities in spring 2003. The development's Achilles Heal was doubtlessly to be seen in the unresolved *financing prospects* for the time after the end of the current funding and in the lack of strategies and business models with which products could be positioned in the continuing training market. Most of the projects hoped that the financing would be continued from public funds, albeit that this did not materialise as hoped due to the way in which the financial situation of government sponsors developed.

In order to secure and extend the achieved development level, the creation of cross-project structures is therefore recommended which are able to offer advisory, development and distribution services at the level of individual universities, subject groups and possibly also nationwide, and so mobilise synergies which help to consolidate the achievements made by the network projects.

The following chapter will systematically discuss the problems associated with the sustainability requirement for e-learning at universities as well as the action options available for solving them at a general level, considering both the BMBF funding programme taken here as an example as well as the developments in the individual states.

4 MEASURES TO ENSURE THE SUSTAINABILITY OF E-LEARNING

4.1 What does "sustainability of e-learning" mean?

As Chapter 2 describes in detail, the development, testing and use of e-learning applications at Germany's universities is being driven forward in the form of extensive support measures provided by federal government and the states (Bundesländer) as well as by financial commitments which universities themselves make. In most cases, these programmes are designed, along the lines of research funding, to finance projects for a fixed term. These are expected to use this specified term to develop products from initial idea all the way through to full application maturity or, alternatively, to generate services which accompany and support media usage. This time limit on funding availability leads to a fundamental problem, because teaching, in contrast to innovation-driven research, relies on the permanence of its structures and only changes its fundamental characteristics at a very slow pace. However, additional inhibiting factors also exist which can complicate the smooth transition of innovative products and services into everyday university teaching. As Christoph Brake stated, the following difficulties can be identified (cf. Brake 2000, p. 149ff):

❑ unsatisfactory or awkward legal and political frameworks – for example, regarding the exploitation of products or rules and regulations on questions of employment;

❑ a lack of incentive structures to encourage a commitment to media-based teaching;

❑ an organisational structure at universities which is hardly conducive to innovation and not designed to allow or encourage project-like, flexible working methods in the field of teaching;

❑ lacking or inadequate media concepts which prevent an assertive strategy development policy from being pursued on the goal, scope and responsibilities of media usage;

❑ high media production costs caused by a concentration on ambitious showcase projects and the multiple development of content or software;

❑ a lack of inter- and intra-university coordination and collaboration which complicates the aggregation of distributed knowledge and experience bases and the attainment of cost-saving synergies;

❑ an occasional lack of didactic quality in the teaching/learning media, caused not least by the technology-driven nature of many developments;

❑ lacking or only weakly-developed media expertise on the part of teachers and students – especially beyond an elementary knowledge of computers and the Internet (for more on this point, see, for example, Middendorf 2002);

❑ inadequate quality assurance and underdeveloped evaluation research in the field of teaching – which simultaneously leads to a lack of reliable information on the actual effects of digital learning environments;

❑ a lack of market transparency as far media-based teaching/learning systems are concerned, often leading to an inadequate awareness of the quality and range of uses;

❑ poor technical infrastructures at universities which prevent the uncomplicated development and use of media learning systems.

As institutions responsible for providing research, teaching and studies, today's universities have only been inadequately prepared for efficient production processes which (also) follow economy

criteria of the kind that are essential to the creation of high-quality e-learning environments. While the project management required for work-shared conceptional and development processes makes huge demands on universities – and especially so where major, cross-university and, in some cases, cross-disciplinary cooperative projects are involved. Moreover, unforeseeable difficulties arising in the course of a project's execution (late recruitment of specially-qualified staff, need for the preparatory development of software tools, intransparent market of learning management systems, staff fluctuation, etc.) mean that the closely-defined timeframe for many projects frequently prevents products from being completed on time. This in turn means that the trial and implementation phase itself already extends beyond the actual funding period. The acceptance among teachers of new forms of teaching also still leaves much to be desired; besides the sceptics, it is probably mainly the "wait and see" group which is delaying the widespread adoption of existing solutions. They are still unfamiliar with the potentials which digital teaching offers, are unable to assess the added value which these provide, and also tend to take a cautious stance towards any personal challenges which may come their way, such as the need to record lectures or to delegate responsibilities relating to the preparation of courses. This means that the curricular integration of media-based courses into the study and examination regulations is subject to intradepartmental and intrafaculty disputes where substantial resistance often first needs to be overcome. And finally, the ambivalent internal and external understanding which projects have of themselves – on the one hand, the expectation that they are meant to produce courses for teaching, and, on the other, the fact that they are also expected to take on innovative research and development responsibilities – helps to cause frictions with the established academic understanding of studies and teaching and irritations in the way in which teachers perceive themselves and their role.

This presently still unsatisfactory degree of achieved project integration into existing higher education structures bears the danger – especially when public funds are tight – of high-quality project outcomes remaining unused and the acquired know-how being left fallow or allowed to dissipate into areas outside the university sector. If reliable short- or medium-term solutions aimed at securing the sustainability of what has been achieved to date are not found, then – as Dieter Euler and Sabine Seufert pointed out – e-learning will remain "a foreign body" at universities and the educational technology graveyard will not only accommodate school television, programmed instruction and the language lab, but also e-learning." (Euler / Seufert 2003, p. 2)

So, it is a fact that the number of multimedia and telemedia course units (from single animation through to virtual degree programme) which is growing more or less day by day still faces an implementation deficit whose causes need to be remedied if functionally meaningful learning environments with high-quality content and didactics are to be introduced successfully into everyday practical use. The well-known catchword for the envisaged permanent and broadbased integration of new media into university teaching is called *sustainability*. Many grant programmes include the term as an explicit or generally understood requirement in their calls for applications, while the term – in its capacity as a thematic focus – influences many publications on technological innovation in teaching and – in its capacity as a discussion topic – dominates the agenda of most of today's conferences held on the subject of media-based teaching.

Yet, as popular as the term may be – so many-sided is it as well. What the sustainability of e-learning really means is often anything but clear. This is why in the following the paper will initially seek to develop and propose a definition, and hence understanding, of the term specifically for the current situation of the e-learning-university landscape, characterised as it is by government-sponsored development projects. Then, it will be necessary to answer further-reaching questions on what the action dimensions of sustainability are and on who the key players in this field are. Which fields of university action does the call for sustainability affect and who are the players responsible for ensuring that a development is sustainable? Only when these dimensions have been clearly defined and the stakeholders responsible for ensuring sustainability have been clearly

identified can those concrete measures be addressed which these players can and should adopt in order to guarantee that the new media are implemented permanently. The following will make a number of recommendations and comments based on the analysis and evaluation of the relevant literature, on numerous consultations with experts and complemented by further considerations. The catalogue of measures developed makes no claim to present each and every conceivable step that can be taken towards sustainability; rather, it aims to provide ideas and impulses which can help to shape and structure the development in such a way that the potential of media-based teaching can be used purposefully to the benefit of higher education.

4.2 The sustainability dimensions of e-learning

The word "sustainability", originally commonly used in agroforestry vocabulary and later found in the context of development policy as well (cf. Euler / Seufert 2003, p. 5; Kruppa / Mandl / Hense 2002, p. 4f), continues – as mentioned – to influence discussion on the implementation of e-learning at universities. Despite being used in various ways, it is possible to identify a core meaning for the term. An e-learning project is sustainable when

❑ its results can be used long term (permanence),

❑ its results can be adopted by other institutions within and / or outside the higher education system (broadbased),

❑ the financing available for implementing, maintaining and further developing the results can be secured long term – be it from university budgets or from earnings produced in the continuing training market (sound financial basis).

This means that the sustainability of an e-learning project depends on it being able to dissolve itself *as a project* (e.g. a time-limited venture) and to transform itself into a permanent structure. So, strictly speaking, it is not the project as a working context, but rather the use and continuing development of its results (products and services) that can be described as sustainable when a development is successful.

To make sure the products and services as well as the structural changes to university teaching which are connected with their use are sustainable, it is important that the right approach is chosen in each of the various action fields at an early stage. Sustainability does not depend solely on the long-term financing of technical and human infrastructures, but rather on appropriate provisions being made in the following areas:

❑ Strategy

❑ Technology

❑ Didactics and curricular integration

❑ Organisation

❑ Financing

❑ Expertise and acceptance

❑ Public relations and marketing

❑ Rights management, and

❑ Quality assurance.

Experts agree that sustainability is a polydimensional responsibility. Of course, the various dimensions will be categorised differently in each case. For example, Euler and Seufert (2003, p. 6f.) place sustainability into the economic, educational-didactic, organisational-administrative, technical and socio-cultural dimension, although, in so doing, they also, as far as content is

concerned, consider the above-mentioned action fields within their categories. And so it is also possible to assume that a certain degree of consensus exists in respect of the areas of responsibility which need to be addressed. The individual dimensions will now each be outlined before they are later subjected to detailed treatment when the individual measures are explained.

Fig. 63: Dimensions of sustainability
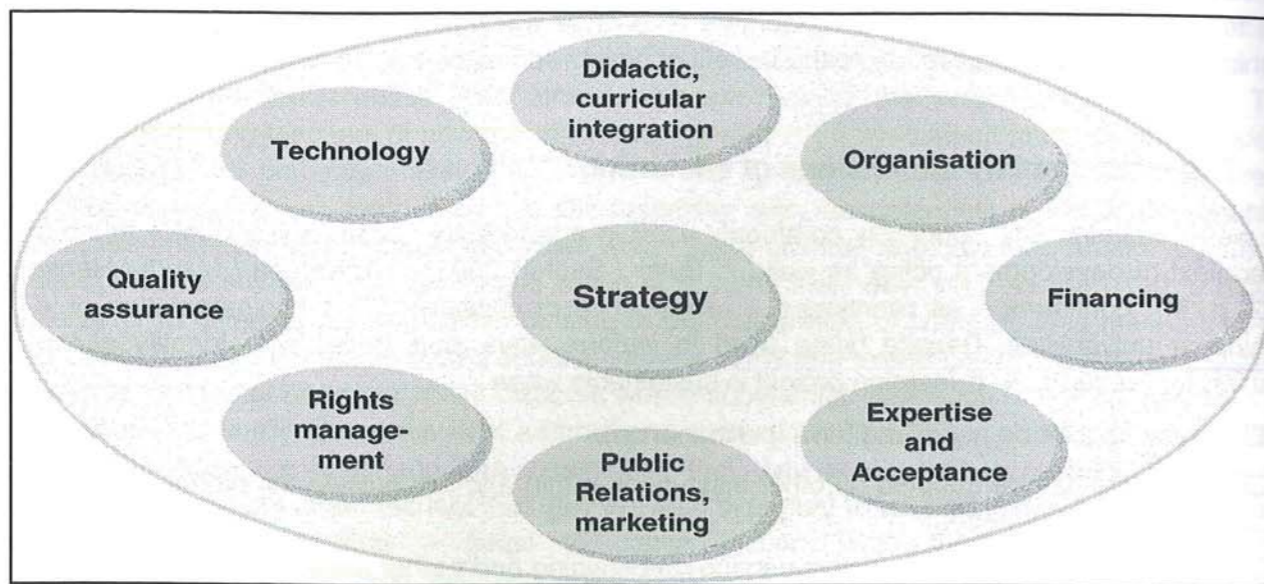
Strategy

The stable implementation of e-learning in everyday university operations first of all needs course-setting, strategic decisions and provisions to be taken which purposefully aim to make products and their implementation sustainable right from the start. In this context, the concepts and business models which the projects are expected to develop as well as the media implementation and promotion concepts developed at university and state level play a central role. The strategic dimension generally represents an overriding dimension to the extent that measures taken in all other action fields follow earlier strategic decisions. The way in which the relevant stakeholders are integrated into the process of strategy development and early decisions on who is responsible for the implementation and - if necessary - for the modification and adaptation of the strategy to take account of new frameworks are of decisive importance here.

Technology

As far as the technical components of digital learning environments are concerned, it is essential from the perspective of sustainability that attention is given, above all, to making products and services reliable, modifiable and user friendly. This includes, for example, a stable platform which is easy to use for authors, administrators and learners, is functionally matured and capable of continuing to develop, has a modular system structure and uses, as far as possible, commonly available tools and formats or guarantees that content can be transferred to other software environments. The design and use of technology should aim to balance the innovation, stability, and usability of the developed or integrated systems with each other.

Didactics and curricular integration

The didactic design of a digital learning environment serves to enhance the quality of the learning effects which can be achieved with the system. In so doing, consideration must be given to various factors whose influence is decisive to learning success and which must be appropriately balanced. This means that the goal is to establish an adequate interplay between learning object, learner,

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teacher, implemented media, learning situation and the greater cultural and personal environment in which the learning process is embedded. Since high-quality products (in the sense of promoting learning) have a greater chance, at least in the medium and long term, of establishing themselves permanently as teaching and study aids, their didactic design is a key to ensuring that they are sustainable.

However, because the didactic added value can only be turned into reality if well-made learning systems are indeed used, the curricular integration of media-based courses in the study and examination regulations is just as indispensable as is ensuring that academic achievements made in appropriate courses are recognised at other universities. Without any such transfer of credits and examination relevant courses, the broadbased effect of such resources – which is central to sustainability – will not transpire.

Organisation

Promoting major cooperative projects, in particular, as well as establishing innovative teaching and service structures at individual universities constitute organisational challenges. Forms of organisation need to be found which facilitate efficient and well-organised cooperation between the "work-sharing" partners – both at project as well as at university and programme level. Clear responsibilities and performance structures, transparent work and communication processes as well as relevant target-group and demand-based advice and training services need to be established at all these levels. In contrast to traditional classroom teaching, e-learning also requires interdisciplinary and inter-institutional cooperation to be suitably organised in (practically) each and every case. And as far as the creation of new institutions is concerned – and above all where support for teachers is concerned – attention must additionally be given to ensuring that forms of institutionalisation are chosen for the various areas of responsibility which the established higher education system will not reject as foreign bodies.

Financing

Any measures which aim to consolidate e-learning depend on the provision of adequate funds to pay for human and technical resources (staff, software and hardware). If the financial resources required for maintaining content, continuing technical development and advising and supervising students are not made available, then even excellent teaching/learning software will be condemned to gather dust on a shelf somewhere. This is why central importance attaches to provisions which aim to secure the timely availability of the financial resources required for the implementation, maintenance and continuing development of products. Profitable marketing of university digital education products currently tends to be a great exception, which is why the universities are called upon, in their very own interest and in line with their own profile-building measures, to provide the necessary resources to equip promising projects with infrastructures and requisite staff.

Expertise and acceptance

Very different kinds of expertise – ranging from device and software-specific basic knowledge via media didactic know-how through to programming skills – are needed for the planning, development, maintenance and use of digital learning units; most teachers (and even a lot of students) can either not or only partly be expected to have such key expertise. And this is compounded by the fact that the largely work-shared nature of media-based teaching means that it will hardly be possible to find such expertise concentrated in a single person; rather this can only be developed and extended as a combination of the skills and capabilities of various persons and positions. And so the complex task of e-learning constitutes an excessive personal – and in some cases structural – challenge (the Deutsche Initiative für NetworkInformation e.V. tabled an ideal

competence portfolio for university teachers; cf. DINI 2002, http://www.diepold.de/oldenburg.htm.). Advice services and training programmes need to be created to overcome these skills deficits and to facilitate the acquisition of the know-how required for e-learning on the supply and the demand side.

An important effect of improved media competence additionally lies in greater acceptance for new forms of teaching and learning. Those versed in using the technology and trained in using the opportunities which it offers will have a more positive attitude towards it than will the non-initiated who tend rather to be shocked by the unfamiliar. Additional instruments to raise acceptance include, for example, crediting work done in the field of media-based teaching to the general teaching load or providing human or financial resources for promising projects. The creation of a climate of trust in which the sceptical and irresolute can openly articulate their reservations while the advocates of the new educational technologies can openly present their experience and visions is also beneficial. The goal must be to dispel unfounded prejudices as well as excessive expectations and to enter into a serious process of exchange on the pros and cons of digital teaching. Only if it is possible, through extrinsic incentives and intrinsic motivation, to succeed in encouraging more teachers to use the new media will it be possible to organise the broadbased and, consequently, sustainable use of technology.

Public relations

The large number of projects and a multitude of participating institutions currently make it much more difficult to find quick and results-oriented information on university e-learning. To create the information transparency which a successful development needs, existing products along with the acquired and available experience and proven experts need to be used and made known at various institutional levels (departments, universities, states, nationally and, finally, internationally as well). The accessibility of this information – both for providers of digital teaching/learning units as well as for students and customers – is a key component in securing sustainability, since it contributes to preventing double developments, shares knowledge and transfers successful solutions into other contexts. This is why appropriate information and communication channels need to be established at the various levels so that all relevant information is made accessible to as many interested parties and people as possible. This applies also and particularly to the field of commercial continuing training programmes whose benefit and character need to be transparently communicated to customers.

Rights management

Initially, the legal dimension of e-learning did not play much of a role as far as public funding programmes were concerned, because priority was placed on the development challenges. In the meantime, however, an awareness has developed for the fact that the legal frameworks at the level of copyright, rights of use and exploitation rights as well as at the level of university legislation (e.g. teaching load regulations) are of substantial significance to the lasting success of innovative learning environments. Measures to prevent legal problems have meanwhile been taken to protect a project's or person's rights and to obtain the rights of third parties, while the first amendments have also meanwhile been made to higher education legislation to take account of the changing frameworks of a (partly) virtual mode of teaching. By contrast, much still needs to be done in respect of advisory and information services and programmes located below the threshold of professional (and therefore chargeable) legal advice. In most cases, university lawyers are not prepared for questions relating to copyright, Internet and multimedia law. Moreover, further-reaching statutory provisions need to be adopted which make it possible to set specific incentives for the purpose of encouraging commitment in the field of digital teaching.

Quality assurance

Another important factor in the sustainability of digital teaching/learning systems lies in the use of suitable processes and procedures to assess and assure quality. In view of the fact that only high-quality learning environments will generally be able to establish themselves in the field of initial and continuing training, quality assurance is responsible for assessing the content and formal qualities of these learning environments on the basis of transparent and objectively-appropriate criteria and for generating empirical proof of their specific added value. Besides relevant quality seals for finished products (e.g. the accreditation of virtual degree programmes), a formative, process-integrated evaluation is also required which produces results at a stage where it is still possible to incorporate these into the design and development of products. A clear and pertinent documentation of the characteristics and features of a learning system which allows products to be compared also supports quality assurance measures.

This brief outline of the characteristics of the individual dimensions of sustainability has marked out the action field within which the various players must undertake measures to establish, distribute and permanently finance products and services. But just who are these players? Who needs to act to make e-learning products and services sustainable?

4.3 The players

The players responsible for ensuring that e-learning is sustainable are not only the projects themselves, but players are also generally all bodies and persons (stakeholders) whose decisions exert an influence on the success of multimedia and telemedia teaching. These stakeholders can be divided into five groups (cf. Fig. 64).

Fig. 64: Players ensuring sustainability
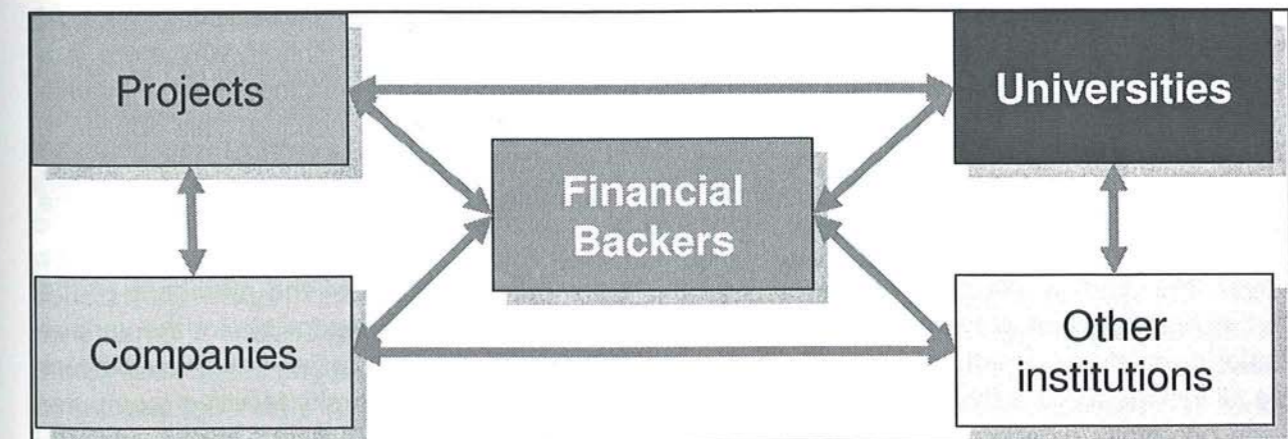
Projects and pioneers

Planners and developers of media-based forms of teaching/learning at universities are among the prime players in the implementation of e-learning. Neither the production nor the use of innovative learning environments is conceivable without their active commitment, their creativity, their ability to learn and their frustration tolerance. Even though they are not the only players, they are nonetheless absolutely essential, operational promoters of the whole development.

The work situation in which many media pioneers find themselves is a difficult one in three respects: Firstly, there is often a lack of opportunities with which a continuation of the required staffing levels can be ensured for the work once the support funding comes to its scheduled end; secondly, action at project level is subject to conditions which project staff can hardly or only indirectly influence; and thirdly, since sustainability does actually aim at the dissolution of the

project structures, those responsible for the project need to proactively transform the operational level of their commitment.

This is why – as far as possible – suitable measures must already be taken during the term of the project itself to ensure adequate staff continuity for normal operations, to establish interest networks aimed at modifying inhibitive framework conditions, and to find a work system which can be transferred from project mode into everyday operation without suffering frictional losses.

Since current e-learning projects involve a high degree of work sharing, responsibility for securing sustainability within projects also rests on various shoulders. In these cases, the main burden is undoubtedly borne by project leaders and coordinators who, because they are responsible for the whole project, have to ensure that suitable measures aimed at ensuring sustainability are taken in good time and also have a substantial duty towards project staff.

Since the broad transfer of projects into permanent structures has not yet taken place, projects (respectively those heading or responsible for them) continue to be the key players at the operational level. When the project comes to its scheduled end, it is they who are responsible for ensuring that the developed products and services are implemented, completed and carried forward.

Universities and university management

As experience has shown, the broadbased implementation of e-learning will be difficult to achieve without the support of the university management. This is why numerous papers urgently call for e-learning to be made into a top-level responsibility – that is an area of strategic responsibility for the university's senior management (cf. BLK-Strategiepapier 2002, http://www.blk-bonn.de/neue_medien_hochschule.htm).

The reason for this demand is clear to see: Without positive decisions by university management in relation to media-based teaching, pioneers will often have difficulties getting the necessary support for their innovative work in the various university decision-making bodies. This is why there is a danger, if the university management does not take up the topic of e-learning, that innovative developments will not be used and ambitious projects will simply come to nothing. This applies in particular in times of severe public funding shortages. If the willingness to redistribute funds and to provide resources for e-learning projects fails to materialise, the operational basis for the permanent implementation of new media will be eroded.

However, the team working within the universities is not only made up of the members of the university management; players in this team also include those who are responsible for the various institutions which are directly or indirectly involved in e-learning. These internal university players above all include the faculty and departmental heads and the central university facilities (computer centres, university didactics centres, continuing/postgraduate education facilities, media centres, etc.). Besides these, there are informal groups (such as cross-departmental multimedia work groups) which can certainly play a significant role in the current consolidation phase. Finally, students, who as users, evaluators and in some cases as co-designers of media-based learning environments contribute to shaping the overall development of e-learning, also work on structuring e-learning programmes and services – something that is often overlooked from the mostly exclusively programme-oriented perspective.

Financial backers

Since the current situation is extensively shaped by the major support funding programmes and initiatives presented in Chapter 2, financial backers from outside the university sector also have a decisive role to play in the process of ensuring that a development becomes sustainable. Their grants, which are actually what made the broad development of content and software possible at

all, turned these financial backers into key players in respect of the strategic, structural and financial frameworks. Besides federal government and the states, the major financial backers in terms of the extent of funding provided are foundations and companies which support promising projects either financially or by providing services and know-how.

However, federal government and the states are not only the most important sources of funding, but are also the key players when it comes to setting the political and legal frameworks for media-based teaching. Besides the other above-mentioned factors, the success of e-learning also depends on how federal government and the states organise their political, legal and financial freedoms in the field of higher education policy.

Companies

Companies are involved in various areas of university e-learning development. *On the one hand*, they provide products and services. Publishers or commercial educational providers often act as important partners in marketing and distributing university educational and study programmes. ICT companies additionally act as service and product providers of software and hardware equipment (e.g. LMS, CMS, authoring tools, etc.) and are active in the field of software development (e.g. partnerships with universities in the continuing development of learning platforms). Other activity fields for companies in the context of university e-learning are to be found, for example, in areas of legal advice, market research, evaluation or quality management.

On the other hand, companies are naturally potential buyers of modules and courses offered by universities. And even though the cultural and structural gulf between industry and science has so far resulted in universities failing to achieve any noteworthy returns in the continuing training sector, with even only part refinancing of e-learning projects being an extremely rare event, the development by universities of promising business models needs to target customers from business and industry right from the start so that shrewd business models can at least create the prerequisites with which a return on investment can be achieved (cf. Dohmen / Michel 2003).

As far as the relevance of business and industry for the sustainability of media-based teaching at universities is concerned, it has to be said that companies are not actually inherently interested in the success of *university* projects; rather they will only be interested when they can profit from these as customers or strategic partners. Those companies, in particular, which themselves offer online educational programmes compete – albeit as long as they share the same target markets – with university developments. This is why companies are not core players in the field under consideration here; rather they are strategic partners or customers who can be consulted or considered in specific measures. However, they will not of their own account work towards making media-based teaching a success at universities. Consequently, strategic business partners will not be treated separately in the following, and will only be referred to as far as their respective function for specific measures is concerned.

Other institutions

Besides the actions of the above-mentioned players, a number of decisions taken by other institutions may also be indirectly relevant to the success of media usage in teaching. For example, research centres which (like the Learning Lab Lower Saxony) work on the technical principles or the learning-promoting characteristics of e-learning or accreditation agencies responsible for the quality assurance of media-based Bachelor's and Master's programmes may have a specific role to play in how certain projects develop. Yet, the influence of these institutions on certain sections within the individual sustainability dimensions is limited, meaning that they are not to be seen as primary players, especially since their activities lie either in the run-up to concrete projects or – as in the case of accreditation agencies – relate to existing products where quality development

teams are responsible for quality. And so these institutions and their measures will only be mentioned where appropriate in the following and will not be treated separately.

4.4 Measures

So once the sustainability dimensions have been named and the circle of key players marked out, the question needs to be addressed as to the individual measures which need to be taken to ensure sustainability. Crossing the above-mentioned, characteristic sustainability dimensions with the respective players produces a matrix of 27 measure sets which can each be attributed to the individual players in the form of activity packages for the various action fields (the model is illustrated in Fig. 65).

Fig. 65: Players, dimensions and measure sets involved in making developments sustainable

Of course, it is not always possible to follow this schematic allocation of measures to players and action dimensions to the letter, because a measure may, as a result of pragmatic interdependencies between individual action fields, relate to various sustainability dimensions and involve various players (for example, the development of a business model is relevant to strategy and financing, while efforts in the field of public relations are closely connected with endeavours aimed at extending the acceptance of new technologies among prospective users).

In the following the key measures sets – arranged in the order of the three principle players (projects, universities and financial backers) are characterised. The list particularly includes action options which might contribute to the success of e-learning at universities in the short to medium term.
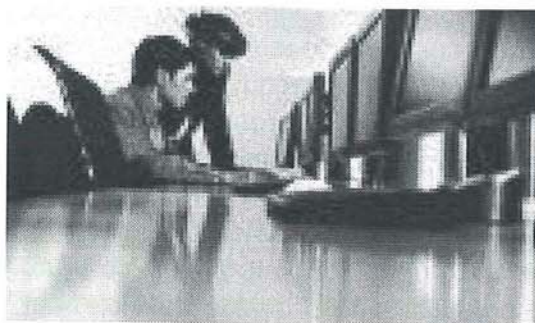
4.4.1 What can projects / pioneers do?

From a *strategic perspective*, projects need to develop concepts and business models for the sustainable use of their products. Plans submitted with new project applications should include a market and target group analysis for the university and continuing training sector to assess the true potential of reachable students, private customers and companies. Research

into and assessment of competitor products can help to minimise the risk of double developments. In addition, strategic conceptions and business models should consider the following factors:

❑ choice of academic disciplines and media-adapted content,

❑ choice of the underlying implementation scenario (to enrich classroom teaching, to partly or completely substitute classroom teaching; cf. Bachmann et al 2002, p. 94f.),

❑ choice of market penetration strategy, based either on innovative or particularly high-quality or especially reasonably-priced products (niche, differentiation and cost leadership strategy; cf. Uhl 2003, p. 16ff.),

❑ definition of didactic concept and of the kinds of courses and supervision / support to be provided,

❑ identification of the resources required to carry out the project,

❑ planning of project organisation, timetable and administration (e.g. controlling, accounting system, etc.),

❑ initiation of cooperation agreements and strategic partnerships (both within a university as well as between universities and also with companies, associations, research institutes, etc.).

A strategically shrewd project conception is a key factor, because such a conception reduces the risk of plans overlooking the university's requirement or the demand in the continuing training market. And it additionally prevents the dysfunctional use of resources and staff demotivation caused by obstructive frameworks which could and must have been considered in good time in the project planning stages.

As far as *technology* is concerned, the following and other aspects (relating mainly to online teaching/learning systems as reference products) need to be considered as sustainability factors:

❑ avoidance of proprietary hardware and software solutions which might lead to data transfer problems and – in view of the instable market – might also lead to manufacturers not providing the necessary support,

❑ use of learning platforms in which the standard packaging procedures allow content to be ported to other platforms,

❑ use of standard tools to produce software respectively an astutely weighed up "make or buy" decision in respect of the software components to be used,

❑ high degree of user and operator friendliness and excellent usability of the learning system, stable, reliable and secure software engineering of the learning system,

❑ learning system with a modular structure so that it is possible to add or leave out individual components,

❑ attractive web design,

❑ integration of useful help functions,

❑ detailed documentation of the software and its development to facilitate its continuing advancement,

❑ scalable access to content so that bandwidth limitations are irrelevant in terms of access to learning resources,

❑ provision of interfaces to university administration systems,

❑ consideration of barrier-free accessibility in the software design so that students with disabilities can also access the system.

In the current situation, it is fundamentally advisable to choose solutions which provide the greatest possible independence from special software or specific types of terminals, since technical

developments will progress and since a shakeout of learning management systems can be expected. This is why it would be disastrous to bind the project to individual products or suppliers come what may.

In *didactic terms* the traditional form of teaching offered in the subject in question should initially be reflected and a weaknesses analysis carried out so as to identify where specific digital media can lead to particularly high added value, because they are able to rectify a specific shortcoming in the classroom teaching. So when choosing the didactic course, it is advisable to

❑ inquire in detail into the traditional teaching practice by talking to stakeholders and didactic experts,

❑ take into account current research findings from the field of teaching/learning research and to become familiar with the current didactic paradigms of media-based teaching (e.g. by seeking early didactic-conceptional advice).

When creating the didactic design, the definition of content, course (delivery) type, student target group, disciplinary culture, learning situation and cultural setting must be followed by the selection of an appropriate didactic methodology and of the media best suited to putting it into practice. At the same time, this must include consideration of the available resources (staffing capacities and available know-how, software and hardware equipment) which constitute potential "bottlenecks". Under certain circumstances, it may also be sensible in didactic as well as economic terms to devise the learning system in such a way that the contents can be used in various didactic settings, so that various target groups can be reached, each with differing didactic methods. The goal should continue to be that of achieving the highest possible degree of individual adaptivity for the learning environment in order to facilitate individual autodidactic learning paths and the initiation of innovative, collaborative learning processes, if group work formats are to be realised in an digital environment. The conception of target-group appropriate online and offline supervision / support concepts which, as has been proved enhance the learning success, is also of paramount importance. For marketing purposes, the didactic features of the learning system must be documented in detail (didactic metadata set) so that the advantages of the learning environment are clearly communicated to potential interested parties. Finally, in the case of multilingual programmes, differences between various learning cultures need to be considered when translating content and designing teaching and learning methods.

Before the *curricular integration* of existing digital study opportunities can be carried out, the initial market analysis must already identify the prevailing conditions for integrating the study opportunity into the curricula of the target and partner universities. In the case of cross-university collaborative projects, the project partner should already have committed itself to using the teaching/learning system and the conditions agreed for crediting academic achievements at the respective university gained during the course of a virtual programme. Generally and as far as possible, the question of if and how academic achievements can be credited needs to have been settled during preliminary talks.

Experience has shown that it is additionally wise to generate content for required courses, in particular, because this means that relatively high numbers of users can be reached and so the learning system can be made known quite quickly. When compiling whole degree programmes, the added value of the virtual study sections needs to be convincingly presented to emphasise the unique selling propositions of the study opportunity and to ensure that the corresponding academic achievements are accepted. Furthermore, new forms of examination need to be considered for study achievements, which, for example, presuppose the existence of effective procedures with which the authenticity of students sitting virtual examinations can be verified. Finally, a progressive approach involves bringing digital study opportunities into line with the credit points systems used by Bachelor's and Master's degrees which will broadly establish themselves at universities in the future as the pressure to internationalise academic training increases. In this, web-based teaching,

especially in career-integrated Master's programmes which target location- and time-bound target groups, has the very best chances.

Fundamentally, curricular integration both within a single university as well as across various universities requires an active communications policy on the part of the responsible players, since decision-makers in university bodies and institutions can only be won over for digital forms of teaching when the specific added value of the study opportunity in question can be made absolutely clear to them.

As far as the **organisation** of the project work is concerned – that is project management – it is necessary to find work and cooperation formats which

❑ provide for a transparent and generally-accepted leadership structure,

❑ have a work process that reliably follows a jointly agreed and adopted road map,

❑ clearly distribute the work and responsibilities (such as project control and coordination, didactic conception, software development, content production, graphic design, evaluation, administration, controlling, rights management, public relations, etc.) and provide for defined role concepts,

❑ clearly govern performance obligations,

❑ provide for sanctions in the event of inadequate or non-performance as well as bonus systems for outstanding performance,

❑ allow smooth internal project communication (e.g. regular work meetings, spontaneous, problem-focused meetings or video conferences, continuous information flow in the form of newsletters, continuous exchange via e-mail, etc.),

❑ give preference to short decision-making paths to allow quick course corrections and quick response times in the event of unexpected developments.

Furthermore, the choice of an organisational form which can be migrated into everyday operation with the least possible – if any – breaks or adaptation problems is also conducive to achieving sustainability. Moreover, equally flexible and efficient partnerships with other higher education institutions, companies, associations, etc. need to be paved in order to produce synergies, share workload, tap into existing resources and achieve the desired broadbased effect.

Projects can contribute to solving the problem of permanent **funding** for their work – beyond the acquisition of external funding which is mostly done by individual university teachers – by drawing up a promising business model (see section on *Strategy* for more on this) and by adopting a proactive communications policy which brings the established products to the early attention of potential financial backers. Projects which receive funding from outside the university must agree at an early stage to what extent and under what conditions the university in question (its institutes, departments, management) is prepared to continue financing the requisite human and technical resources. To ensure that this covered in good time, the appropriate decision-making bodies need to be contacted at the earliest possible time, since the process of convincing others mostly takes a relatively long time.

Furthermore, all potential follow-up funding options (state, federal government, EU, foundations, companies, associations, etc.) need to be identified and corresponding applications prepared in good time. In certain circumstances, clearly-sized projects may also be able to attract transitional funding from departmental or institute budgets or combine the resources of several departments or institutes, for example, to create a time-limited position responsible for establishing the project long term. Attracting sponsorship by financial backers from business and industry is also an option for actions and products which promise to produce adequate publicity. Earnings from the continuing training market are – albeit only so far to a small extent – most likely to be achieved in collaboration with academic continuing training institutes which market a university's online

courses and degree programmes or with commercial providers (such as publishers). In addition, a tight system of financial controlling as well as the use of appropriate pricing models and accounting procedures is likely to have a positive financial effect when marketing continuing training products and services.

In respect of the **acceptance** of a teaching/learning system and the **expertise** in using it, it is advantageous to integrate students (e.g. by carrying out pilot evaluations) as well as teachers (by using material in return for evaluation or co-authorship as well as through an informal exchange of know-how, project presentation, meetings of multipliers, etc) into the development process at an early stage so that both user groups are acquainted with the learning environment. In addition, target-group specific training measures can be used to recruit them to use digital educational technologies. Experience has shown that professors tend to prefer individual, personal forms of advice and training, while young academics also accept workshops, courses and tutorials as forms of continuing training. While the delivery of skills and expertise will simultaneously serve to raise the acceptance of the new media. Those who know how to master the technology, will be able to assess its performance and efficiency, while the uninitiated novice who is not yet versed in these technologies will not be informed either as to their added value and will consequently tend to take a sceptical attitude.

The strategy of recruiting proven authorities as content-contributing authors to raise the value of teaching/learning products can also serve to raise the appeal and acceptance of such products, especially in the context of science, research and education where the strongest performance incentive lies in the field of academic reputation. This not only raises the quality of the content, but also substantially improves the marketing potential.

In terms of **public relations**, various paths are open to projects through which they can publicise their products and promote them appropriately for the market. In this process, cooperation with the university press office as well as with other central university facilities (e.g. the university's continuing training centre) and with individuals versed in public relations and competent in using the corresponding communications channels represent possible options. These channels include, for example,

❑ the written publication of findings and experience with a succinct description of the project-specific added value and of the available evaluation results (press releases, flyers, brochures, newsletters, specifically-targeted mailings, articles and essays in specialist journals and collections),

❑ lectures and product presentations held as part of in-house or external conferences, meetings and workshops (attended by colleagues and/or students),

❑ specific contact with colleagues, disciplinary societies and scientific associations and unions,

❑ availability of (personalised) guest access rights to the teaching/learning system and demo versions available for downloading,

❑ development of models for the mutual and reciprocal exchange of products and services between various projects or universities.

Since innovations in the field of teaching do not tend to become known very quickly, due, in contrast to research, to the lack of direct competition in this field, an active public relations policy is particularly important. Only those products which become known in the relevant specialist community can be tested, implemented and, possibly, also successfully sold.

Quality assurance initially includes formative and summative evaluation procedures with which students at the university in question, departmental colleagues or external service providers can assess digital teaching/learning systems. However, such methods will only prove effective where

the results are also systematically implemented in (carrying forward) the development of study opportunities. Moreover, it is sensible to arrange student evaluations to run over several semesters in order to achieve reliable results which are not influenced by the specificity of a test group. Initiation of or respectively participation in peer reviews in the form of web-based appraisals and discussions (forums, portals) and contributions to specialist journals is also a beneficial way of gaining the verdict of specialist colleagues. Finally, the accreditation of media-based Bachelor's and Master's programmes is a forward-looking, albeit cost-intensive way of proving the quality of courses designed as full degree programmes. At present, the accreditation of study units (modules) below the level of full degree programmes is being considered; projects which mostly do not develop full degree programmes should support this and take part in appropriate pilot projects so that they can also show that they have gained a quality seal at module level.

The **management of rights** in projects must be recognised as an important responsibility and should be firmly assigned to a project member or an external authority. Since project staff will only very rarely be sufficiently versed in the legal position, close cooperation with the university's Legal Department would certainly suggest itself as a way of using available legal expertise (cf. Dusch / Sprenger 2003, p. Ilf.). In addition, it is important to ensure that available information and advisory services (such as Veddern 2001) are used and, when necessary, that part of the project budget can also be used to pay for legal advice.

Furthermore projects must ensure that, as far as the field of rights management is concerned, they

❑ either do without third party materials or obtain the full rights to previously existing works through licence agreements,

❑ ensure that the rights of use which project staff possess relating to parts of the project which they have themselves produced are contractually transferred to the university, and,

❑ in the case of cooperative projects, concentrate the rights of all participating parties – possibly in trust – at a central point by using cooperation agreements in order to facilitate the smooth and unproblematical exploitation of developments at a later date.

Although the action options listed here at project level are of elementary importance to the success of e-learning at universities, they do not suffice alone to ensure that all the measures required for the permanent, broadbased and financially viable implementation of new forms of teaching/learning are taken. Rather, the various decision-makers in the universities also need to promote and advance sustainability by carrying out adequate measures.

4.4.2 What can the universities do?

In **strategic terms**, universities have a central role to play in the sense that their willingness to allow and support innovations in the field of teaching plays a decisive part in the implementation of project outcomes. Academic media development plans which, on the one hand, establish a coordinated internal university approach to providing a media infrastructure and to the use of media and, on the other, can serve as planning and legitimation instruments vis-à-vis higher education policy institutions, represent an important component in this respect. By establishing an agreed multimedia strategy coordinated with the goals of the general university development plan, a university documents that it is actively and specifically examining and considering the potentials offered by the new media; and so consequently raises its profile. Furthermore, media development plans can be incorporated into target agreements reached with ministries and so provide a basis

for support measures respectively for the performance-oriented allocation of resources. While within the university itself, department-specific media concepts are a suitable way of presenting the intentions, measures, goals and requirements in respect of media-based teaching and can act as a basis for agreements with the university management. And finally, a multimedia strategy also serves to portray the university as an innovative, needs-oriented educational institution in the field of teaching and can help to bring the university to the attention of students.

The elaboration of media development and implementation strategies should consider aspects such as the following:

❑ integration of all relevant interest groups when drawing up the strategy (questionnaire-based survey, hearings of experts and media workgroups, discussions in the various university bodies, e-learning days with the opportunity to exchange views and collect information, etc.),

❑ presentation of the current status of the ICT infrastructure, of the existing and expected demand and of the planned extension measures,

❑ information on and web-based documentation of e-learning measures, initiatives and projects which have been completed, are currently in progress or are being prepared,

❑ presentation and explanation of the strategic goals which the university aims to achieve with the aspired media usage,

❑ integration of media usage in teaching into a coherent overall concept which also incorporates the fields of research and administration,

❑ details on existing or yet to be established facilities which provide support for e-learning projects,

❑ information on existing or yet to be developed cooperation agreements with partners outside the university.

Agreement on accepted goals which can be pursued in the realisation of the strategy is decisive to the effectiveness of a media deployment strategy. Without consensus regarding the thrust of the overall development and without a shared interest on the part of the management, central and departmental institutions in supporting digital teaching, even the most elaborate papers will remain nothing more than mere statements of intent. Only if the strategy is taken seriously by all the stakeholders can it serve as an orientation basis for the current projects and initiatives to provide a certain degree of planning certainty.

Where *technology* is concerned, it is the computer centres, in particular, and – where available – the e-learning centres of excellence that are responsible at university level for all services relating to media-based teaching. The following responsibilities are examples of technical support that is provided for projects by corresponding university facilities:

❑ selection and operation of a learning platform (identification of the user requirements, production of a criteria catalogue, testing of available products, selection of a product together with users, purchase and test installation of a platform, guaranteed stable long-term operation (24/7), evaluation of operational parameters);

❑ integration of the learning platform into the university's general computing infrastructure under consideration of security and data protection aspects;

❑ maintenance and upgrading of the hardware, software and network infrastructure (e.g. allocation of multimedia rooms, purchase of campus licences for authoring tools, creation and extension of a WLAN, etc.):

❑ hotline for urgent technical problems;

❑ individual advice and training measures on all technical questions relating to e-learning.

In respect of the *didactic conception* of e-learning projects, the university has an indirect role to play, for example, to the extent that it provides successful or promising projects with resources to supervise students in media-based courses (such as in the form of tutoring resources) and so supports specific investments in the field of teaching. Higher education didactic or continuing training centres can make a direct contribution to the didactics by passing on their know-how in information meetings and sessions or in the form of individual advice for teachers. And of course, a university's departmental institutions can contribute to *curricular integration* by incorporating courses into their curricula which they have developed themselves or adopted from other universities and by supporting the development of internationally-recognised, media-based Bachelor's and Master's programmes.

The university's influence in *organising* the services structure required for successful e-learning and in preparing and carrying out cooperation agreements with external partners (universities, companies, chambers, etc.) is of great importance. The design of the organisational structure of internal university support facilities constitutes an important element where consideration must be given as to which facilities already exist and what their areas of responsibility are and to which services are to be transferred to the new services unit. Various solutions can be found in practice at Germany's universities in this respect and these will be presented and typologised in greater detail in Chapter 5 of the report at hand (on the typology of support solutions see also Kerres 2001a, p. 38ff.). It is not yet possible to tell which organisational model promises to support teachers (and students) best in the field of digital teaching. It is clear, however, that organisational forms need to be established by universities in accordance with the prevailing conditions and that these need to guarantee the availability of suitable support and so institutionally integrate media production, distribution and advice into the university structures.

As far as the make-up of cooperation agreements with other universities and business enterprises is concerned, effective support can be offered by the university management concluding appropriate agreements and by the university administration offering administrative services (such as the preparation of cooperation agreements and project proposals or by providing accounting services). Moreover, the willingness to make the appropriate resources available for the realisation of strategic partnerships naturally represents a key factor in the success of the relevant cooperation agreements.

As far as the *financing* of e-learning is concerned, which naturally represents a central factor in ensuring sustainability, universities which wish to raise their profile through the specifically-targeted implementation of media, need to commit themselves more strongly than has been the case to providing the appropriate resources. Conceivable measures which serve this goal and can possibly be combined with each other include

❑ making available and announcing limited levels of support funding for internal university e-learning projects,

❑ making the award of support funding conditional on proportionate matching funds being provided by the recipient facility,

❑ financing e-learning developments via the free-of-charge provision of human resources (for example, in the form of research assistant hours),

❑ providing resources for the creation and extension of e-learning support centres (e-learning centres of excellence, and so on),

❑ being prepared to contribute matching funds to projects and initiatives supported by the federation, states, foundations or companies, etc.,

❑ supporting successful projects initially financed by cross-university support programmes by providing transitional financing to facilitate the development of business models or by providing the infrastructure required to operate the system,

❑ initiating competitions for successful media-based teaching.

Flanking measures should aim to make information on alternative sources of funding (foundations, states, federal government, EU, business cooperation) and alternative kinds of support during the application process available throughout the university.

Universities can help to create **expertise** in dealing with the new media and to raise the **acceptance** of educational technologies by adopting a range of measures to be put into practice in close cooperation with the pioneers on site. The various measures should aim to establish a culture of confidence in which university members can openly communicate on the pros and cons of e-learning. Examples of such measures include

❑ creating an information portal managed by an editorial team which brings together the relevant information on the topic of e-learning and presents university facilities and activities in this field, offers discussion forums on e-learning relevant topics and provides information on projects based at the university,

❑ creating a support facility to maintain and manage the information portal, provide or arrange advice on technical, didactic, organisational, etc. questions, offer training measures and courses for teachers as well as students (e.g. multiplier tutorials and courses run by external experts, support for teachers from initial idea to practical implementation and evaluation),

❑ naming contact partners (multimedia officers) at departmental institutions and at university management level,

❑ opening informal forums for experience exchange between teachers (multimedia workgroups, meetings of experts, virtual communities, etc.),

❑ considering media expertise and teaching success (proof of this being furnished, for example, in the form of a teaching portfolio) when appointing university teachers,

❑ assertively communicating the university's existing media strategy,

❑ providing resources for e-learning developments (for more information see section on Financing),

❑ actively supporting the process of academic cultural change (enhancement of the status of teaching in the self-conception of the university and the teachers) by providing appropriate incentives.

In the field of **public relations**, universities can fall back on existing facilities (press office) and should make active use of accepted publicity instruments (for more information see the comments of public relations contained in Section 4.4.1 "Projects"). This needs to be accompanied by an information portal on e-learning with a compact description of the current activities (see *acceptance* and *expertise*), a web-based media database and the assertive integration of "e-learning" into the university's website. In addition, university-wide e-learning events with national and even international participation should be used to raise and attract attention.

Furthermore, universities need to overcome their fear of contacts with business and industry and to prove that they are professional partners in the field of continuing training/advanced training and can cooperate with companies. They need to provide material, administrative and intellectual support for e-learning initiatives and to initiate promising business and cooperation models for these, possibly cooperatively in a network involving several universities. Companies need a clearly recognisable contact ("one face to the customer") and transparent decision-making and performance fulfilment structures. This is why mechanisms need to be established which allow the rapid response to impulses from business and industry and actively support the marketing of university-own e-learning developments.

With regard to **quality assurance,** the university must cooperate closely with projects and pioneers. Its responsibilities here include submitting applications and financing the accreditation

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processes for web-based degree programmes, the conclusion of cooperation agreements, the award of certificates for media-based continuing or postgraduate studies or the initiation of suitable evaluation systems. Particular importance attaches to integrating credit point systems into Bachelor's and Master's programmes which have been developed by projects and departments and which need to be seen as part of the university's strategy of converting to Bachelor's and Master's degrees.

In terms of **rights management**, the university can effectively help out projects with the elaboration of employment, cooperation and work and services contracts or can provide legal expertise to secure or obtain licence and exploitation rights. Continuing training measures in the field of Internet and multimedia law are also certainly meaningful for those responsible in the university administration as is funding for obtaining legal counsel in the event of legal problems arising whose resolution requires the know-how of a specialised law office. Insofar as the university disposes of the rights to digital teaching/learning systems from its own development projects, it should actively use these to extend e-learning and should reinvest any returns it may make in the operation and continuing development of systems.

4.4.3 What can financial backers do?

Great **strategic** importance attaches retrospectively and prospectively to the grant programmes offered by federal government and the states since their support guidelines decisively influence the content focus and organisational structure of projects. While it is currently possible to see that support for content and software development, which prevailed in the past, will be reduced in the future in favour of a more structure-oriented policy in order to set the course more towards broadbased and permanent implementations. This is why support will increasingly concentrate on provisions aimed at establishing projects long term and at planning measures which promote implementation structures at various levels.

As far as the strategic design of support policy is concerned, great importance attaches to independent specialists providing impartial and expert advice for political decision-making bodies. Reviewers and advisers should not – which has not always been possible due to the initially small group of pioneers – profit themselves from any support measures so that they are able to make unbiased judgements. Appropriate consultations can enable federal government and the states to gain the best possible overview of the current situation. With this background they can work to develop strategies which, although not ignoring the existing competitive relationship between the states respectively between federal government and the states, should not lead to unfavourable impacts at large. This is all the more important since the current general economic situation means that past volumes of support can no longer be expected to be available in the future. So, in order to avoid frictional losses and competitive disadvantages in the national and international education markets, federal and state strategies need to be coordinated as closely as possible with each other, however not completely stopping various profiles from forming or focuses being set ("coopetition").

Against the background of coordinated strategies by federal government and the states, a support strategy which aims to achieve a permanent, broadbased implementation could, for example, include the following points:

❑ initiation of cooperation between the states' virtual universities and educational portals to consolidate e-learning nationwide,

❏ creation of an e-learning portal for Germany as a national and international advertisement for excellent, forward-looking developments,

❏ support for distribution partnerships with publishers, commercial continuing/adult training providers and other partners from business and industry,

❏ provision of specifically-targeted continuing support for successfully-evaluated best practice projects which are required to subject themselves to regular reviews by independent experts,

❏ provision of start-up funding for support and marketing units (at selected universities and/or nationwide) which, after a specified period, either fund themselves or are taken over by the universities,

❏ support for systematic educational and psychological research in the field of media-based teaching and learning,

❏ support for international cooperation specifically aimed at opening up foreign e-learning markets (e.g. in the emerging economies of South East Asia).

In the field of *technology* thought needs to be given to whether calls for applications and project announcements, especially for scenarios and projects based on standard and practice-proven technical solutions, should be supported to avoid delays, for example, through separate LMS evaluations and drawn-out coordination processes on the implemented technical basis. Whatever the case may be, a support strategy would certainly be desirable which above all aims to advance the development of existing successfully implemented technologies, without this artificially curtailing the diversity of existing solutions. Another aspect in the design of support measures relates to strengthening the negotiating power of universities in the purchase of licences for software products which are to be used on a broad basis (e.g. the purchase of state-wide LMS licences, etc.).

To support the continuing development of the *didactics* of media-based courses, financial backers could also consider teaching/learning research institutes in their funding policy and so drive forward research on the impact and effects of media usage. Working on the basis of valid effectiveness research findings, it would then be possible to issue recommendations on the didactic (and technical) design of digital learning environments and to verify the effective added value of media-based teaching. From a didactic perspective, the financing of training courses and tutorials for e-tutors – which are free-of-charge for participants – as part of the support measures also represents a meaningful step, as is the case at the Swiss Virtual Campus. Furthermore, support for translating study units into other languages under consideration of the particular nature of the corresponding learning cultures could not only provide didactic insights but also open up new marketing opportunities. *Curricular integration* can be driven forward by concentrating funding measures on projects, which either lead to Bachelor's and Master's degrees, for example, or focus mainly on offering required courses or aim to ensure that academic achievements can be recognised at other university institutions.

As far as the *organisation* of the e-learning landscape is concerned, the award guidelines issued by federal government and the states are important to the extent that they at least partially preform the organisational design of the development project. As long as the support of individual projects continues to be the determinative higher education policy control instrument for e-learning, the following measures need to be considered for the organisation of projects and programmes:

❏ In the medium term, it is advisable, on the one hand, to aggregate current and successfully-completed projects (e.g. within the scope of a subject) in order to use synergies and, on the other, to continue major cooperative projects in a leaner form and with central responsibility after evaluation in order to prevent frictional losses between project partners.

❏ The range of funding recipients could be extended by adding business enterprises to establish powerful Public Private Partnerships (e.g. start-up funding for strategic

cooperation agreements between universities and publishers/commercial educational providers, etc.).

❏ Funding programmes should also take into consideration support centres which provide services in various areas of sustainability as key partners for development projects – be it as funding recipients or be it as strategic partners to support projects which are required to commit themselves to cooperation.

❏ It could be advantageous to award support funds to a central body, especially in the case of major cooperative projects, so that the specifically-targeted allocation of funding can possibly be used to co-steer the project work.

❏ Project responsibility should also lie with the staff who, through their career position, have an inherent personal interest in the sustainability of project developments.

❏ On the part of financial backers – possibly arranged by intermediary project financiers – clear areas of responsibility and competent contact partners must be provided for projects to allow quick and effective reaction to changing circumstances and situations.

❏ After receiving support for (cooperative) projects involving content and software development respectively as flanking measures, university networks could be supported at state level to set incentives for the exchange of products and know-how between the universities, for example.

In the *financial field* greater attention than has been the case needs to be given to universities making an appropriate financial commitment on campus – for example, by matching a proportion of the support funds. Moreover, it is advisable in the nearer future to support fewer new projects; rather funding should support the business model development and implementation of successfully-evaluated projects. Legislators are still called upon to create the legal frameworks to allow possible returns to flow into the projects respectively to those in the universities who advocate e-learning and so facilitate the marketing of study opportunities. In addition, the political will is needed to finance e-learning also and particularly in the current transitional phase, instead of turning to other topics on the education policy agenda because they currently attract interest. Since innovation in the field of teaching requires plenty of staying power, a continuation of the financial commitment with different focuses would be desirable.

Financial backers can indirectly contribute to generating *acceptance* and to creating and extending *expertise* by financing measures, as described in the two sections "Projects" (4.4.1) and "Universities" (4.4.2). In addition, the media-didactic and media-technology training of lecturers (e.g. e-tutors) certainly represents a meaningful step as a component of support programmes. Another, frequently-mentioned incentive lies in amending the teaching workload regulations which should allow work performed in the field of media development and implementation to be credited to the general workload – as is the case in Bavaria, for example, where up to a maximum of 25% of the workload can be credited for appropriate activities. Furthermore, media-related skills and the degree of previous experience gained in the field of media-based teaching could serve as a decision-making criterion in the appointment of professors. The announcement of university or even nationwide competitions on the use of media in teaching (cf., for example, the trinational MedidaPrix (Germany, Austria, Switzerland; www.medidaprix.org) can also serve as incentives.

The *public relations work* performed by projects can be supported, for example, by financial backers requiring product presentations to specifically target interested parties from science and research, business and industry. Along the same lines, funding could conceivably be given for taking part in events (conferences, meetings, trade fairs and exhibitions, etc.) at which a department's projects are presented to the national and international public. In order, additionally, to make existing products and services easy to find and to forcefully present these in an international context, thought might be given – as already mentioned – to using a nationwide e-learning portal (e.g. an advanced version of the BLK portal www.studieren-im-netz.de) to make

state and university-specific initiatives and programmes accessible. The central function of such a portal would necessarily lie in the searchability of quality-assured study opportunities based on intuitively clear, user-oriented metadata to provide interested developers and users with the information they need, quickly and without all too much effort.

As far as **quality assurance** is concerned, various paths are open to financial backers through which they can support the production of high-quality learning environments. For example, they can

❑ introduce mandatory (e.g. half-yearly) project evaluations by independent reviewers as a criterion for support,

❑ oblige funded projects to have teaching practice evaluations carried out by students and teachers; these evaluations should be executed both at the developer university as well as at previously defined external university institutions (e.g. institutes/departments at other universities and similar institutions),

❑ pay the accreditation costs of successfully-evaluated, media-based Bachelor's and Master's programmes,

❑ support pilot projects respectively accreditation agencies in the trial accreditation of individual courses or modules,

❑ pay for the creation of "subject-specific" peer review systems.

In the field of **rights management**, financial backers can contribute to professionalising the procurement and safeguarding of rights by

❑ including binding regulations in the award guidelines on concentrating licences and exploitation rights (with a central body) so that staff fluctuations or conflicts of interest between project participants do not negatively impact a development's exploitation chances,

❑ making available through project backers and other institutions access to case-specific advice on legal questions as well as typical solutions for recurring legal problems,

❑ ensuring that the support guidelines allow grants to be used to obtain professional legal advice, and

❑ supporting central information and advice centres at cross-university level and making these known to funded projects.

4.5 Outlook

This catalogue of measures, which projects, universities and financial backers can adopt in order to support the sustainability of e-learning projects at Germany's universities, does not claim to list all action options which might be meaningful in pursuing this goal. Rather, its intention is *firstly* to clearly illustrate the order of magnitude of the challenge which the sustainability postulate involves, *secondly* to provide ideas for the planning and realisation of concrete short- to medium-term implementable action steps on the three above-mentioned player levels, and *thirdly* to contribute to the debate among stakeholders on how to proceed.

The catalogue of measures additionally sets no priorities as far as individual measures are concerned – and for good reason. Indeed, the question as to which action field needs to be addressed with priority depends on the individual situation of the respective project, university or support initiative. This is why priorities need to be set by the various players active in the field in accordance with the respective starting conditions.

The overriding goal of the above-mentioned recommended actions consists in contributing to safeguarding what has been achieved (products, know-how, new forms of organisation and

cooperation) and of carrying forward the development of the frameworks for successful digital teaching. This target is borne by the expectation that the various kinds of media-based university teaching will further establish themselves in coming years. And even though economic crisis and the, occasionally, precarious situation faced by some public budgets and the fact that support funds will only be available to a much lesser extent in the future may have slowed down the heyday of e-learning, this does not mean that the death penalty has been pronounced on digital teaching/learning technologies. Rather – after many major projects with their pilot function – the coming years will see the development of more low-level, easily and cost-effectively producible systems take centre stage. Experience gained in earlier projects can and must be used to this end. What has been comparatively cost and time-intensive in the past will – it may be assumed – prove easier to turn into practice in the future by accumulating and distributing media-didactic and technological know-how as well as by carrying forward (and, above all, simplifying) the technology (e.g. authoring tools).

Nevertheless, it is above all the production of Internet-based teaching/learning environments, for example, which will continue to remain largely a matter for specialists in the future. In view of the complexity of the tasks that lay ahead, it cannot be expected that one person alone will be able to carry out the various work processes involved in the development and use of e-learning applications. Market analyses, didactic conception, development of content, choice of software platform, definition of the kind of multimedia elements to be produced, programming of learning environments, production of multimedia objects, development of quality guidelines, evaluation, e-tutoring, project management, etc. – these and other tasks can only be successfully managed within work-sharing structures.

And so the question arises as to how the complex, work-shared processes relating to the production and implementation of digital forms of teaching/learning can be institutionalised at universities. The need for such institutionalisation is clearly evident, since those responsible for the teaching require stable support structures so that they can concentrate on the core task. On the other hand – since this extension of the university's service portfolio represents a very new challenge – the question as to how such support should be constituted and what responsibilities universities will actually take on and how these are to be structured internally and are to be embedded in the organisational make-up of the university institutions has not yet been finally answered. To provide some ideas on this, the following chapter will present examples of such centres which have been installed at some of Germany's universities. These are centres of excellence and service centres which have been set up in recent years and are characterised by varying areas of core responsibility and by various organisational formats. They are presented here to provide an impression of how universities are currently trying to provide systematic support for the production, implementation and distribution of media-based forms of teaching/learning. Although direct comparison between institutions is not possible due to their heterogeneous structures, the presentation does aim, in particular, to provide universities which have not yet established such advisory and support services and centres but are currently considering doing so with a number of ideas on possible ways to shape and structure their organisation.

5 E-LEARNING SUPPORT CENTRES AT GERMAN UNIVERSITIES

5.1 Review of university e-learning centres of excellence

The support structures found at individual universities take a wide variety of different forms and are of decisive importance to the question of sustainably implementing digital teaching into everyday university practice. The e-learning centres of excellence which have been established at many universities and at some universities of applied sciences may be seen as central bodies which serve to drive forward and consolidate the production of academic content and virtual course offerings. These centres provide continuous support for interested university teachers and lecturers by making a comprehensive range of advisory services available to them. The regularly extensive inner-university networking which the staff from such centres make possible and their familiarity with the campus-specific structures means that these centres are highly committed to and strongly involved in promoting e-learning – and this in turn means that these university-embedded centres have clear advantages over facilities located outside the university. E-Learning support centres contribute decisively to raising media acceptance and media know-how over the medium-term, to optimising the use of existing production capacities and, last but not least, to consolidating the application of new media at universities.

Between January and November 2003, HIS visited 12 university centres which promote web-based learning processes and held guided interviews on each centre's areas of responsibility, resources, financing, organisation, history and evaluation. HIS visited centres of excellence at: the Free University Berlin and the Humboldt University Berlin, at the Universities of Bremen, Darmstadt, Dortmund, Dresden, Duisburg-Essen, Oldenburg, Stuttgart and at the FHs Düsseldorf, Cologne and Munich. Talks clearly showed that generally very different approaches had been taken in terms of available resources, the individual needs of lecturers and the individual strategic objectives. These ranged from models involving project-like funding packages through to the establishment of completely autonomous support centres, from training-based multiplier/dissemi-nator models through to full-service support models for lecturers and e-learning projects.

These centres will be presented in a brief outline below. To be able to take the substantial differences in the service approaches taken by these support centres into account, this review has divided the following summaries into a number of headings based on "Types of organisational structures". Besides the respective organisational structure, these reviews above all consider the "Range of services" respectively "Defined responsibilities", "Human and infrastructural resources", "Financing and business models", Cooperative structures" plus "Medium and long-term prospects".

5.2 Organisational models

Our choice of e-learning centres of excellence to visit was based on the criteria of inner-university effectiveness and acceptance of the individual centre or unit, innovative results, differing organisational models, available human and infrastructural resources, and whether centres attended specialist conferences respectively how they presented themselves in press releases and on the university websites. A further decision-making basis involved a mailing requesting background information which HIS sent to all e-learning centres of excellence known to it on 28 August 2003. To ensure a representative basis, however, the following description is not restricted to the twelve e-learning support centres which we visited, but rather covers a total of thirty facilities.

The information basis for the other centres and units included, not least, the self-profiles which they submitted, media reports and information contained on the university websites.

Support centres were categorised in accordance with their respective organisational models. While a number of universities had created a new unit at an existing facility (research unit, university computer centre, media centre) or had partially or fully restructured such a facility, other universities chose to create a network of (new and) existing facilities in order to bring together and coordinate existing activities and so produce synergies. Some individual universities established a new central facility which performed its duties in cooperation with existing university IT infrastructure facilities.

The review also considered special cases, such as project-like university development programmes administrated by an existing institution (University of Stuttgart), cross-university facilities responsible for the state-wide networking of university e-learning centres of excellence (like the Hessisches Telemedia Technologie Kompetenz-Center – httc), or the establishment of e-learning related services within integrated communication and media centres. Since institutionalised facilities, in the sense of sustainability, are currently seen as a promising approach to university e-learning support, informal approaches without recognisable institutional structure were not taken into account.

5.3 New unit at an existing facility (restructuring)

5.3.1 Free University Berlin: CeDiS / Center of Excellence for E-Learning and Multimedia (Kompetenzzentrum für E-Learning und Multimedia)
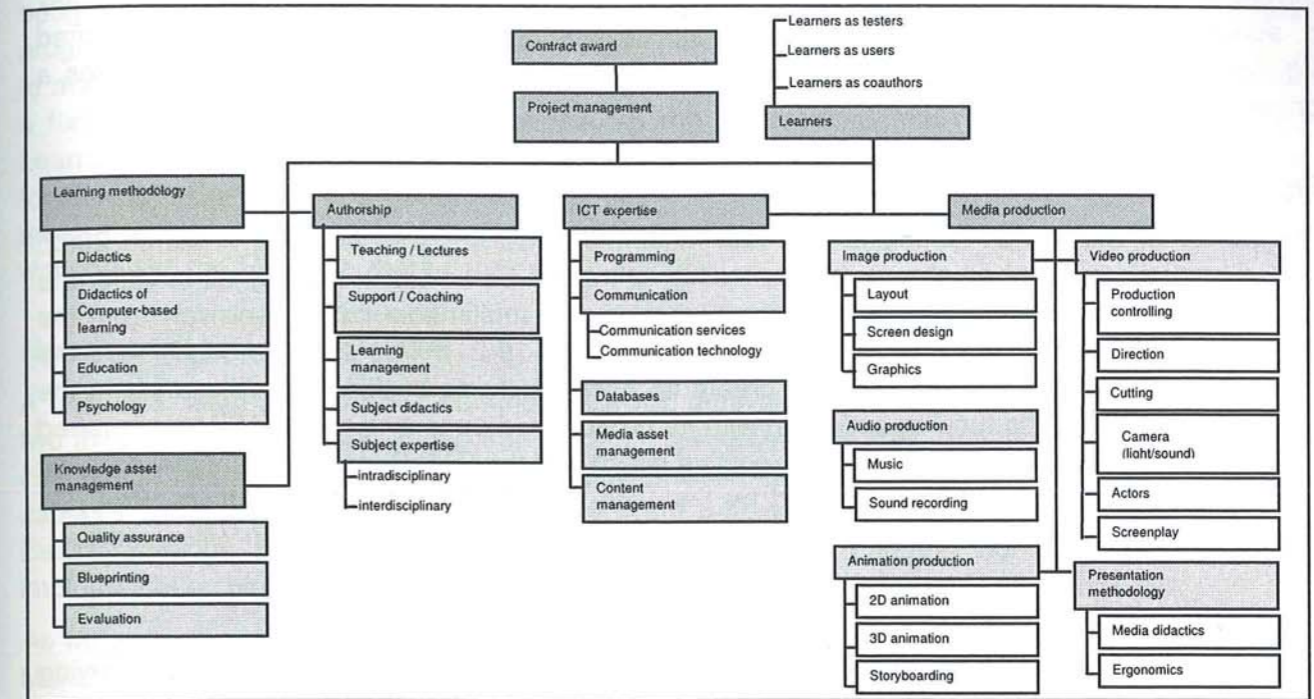
CeDiS

The "Centre of Excellence for E-Learning and Multimedia" based at the Centre for Digital Systems (CeDiS) of the Free University Berlin (FU) was founded in March 2002 and achieved noteworthy success at the MedidaPrix 2003 Awards. The MedidaPrix is a trinational competition held to encourage and support didactically-motivated media projects which make a special contribution to university quality assurance. Two of the eight MedidaPrix finalists came from the FU Berlin. On 18 September 2003, the study programme "Statistics Lab", which supports interactive and explorative basic training in statistics, and the "Pharmasquare" project from the University of Basel won the MedidaPrix 2003 prize worth a total of 100,000 euros at the 2003 GMW Conference held in Duisburg. The FU Berlin is supporting the use of e-learning with a project-based funding programme.

Range of responsibilities

CeDiS's e-learning development strategy aims to spread e-learning as far as possible throughout the FU Berlin. CeDiS provides broad-ranging support for highly-promising e-learning projects below the marketability threshold. Individual projects directly based at CeDiS receive special support. At first, CeDiS geared its support for projects towards the very highest quality standards and in so doing pursued a primarily didactic support approach. The education-driven procedure resulted in several FU projects winning prizes – including those at the 2003 GMW Conference. Figure 66 illustrates the many stages that were carried out, from awarding contracts through to answering questions which arose in the fields of learning methodology, knowledge asset management, authorship, ICT expertise and media production.

The earlier development strategy involving cost and time intensive, individualised solutions within an open software architecture was criticised, especially by the computer science departments which, when producing learning modules, focus primarily on reusability. Dr. Nicolas Apostolopou-

Fig. 66: Production team responsibilities at CeDiS (functional perspective)

los, the head of CeDiS, is meanwhile in favour of taking an approach which aims to find a happy medium between a system of well-founded "mass production" ("villas" are more attractive but also much more expensive than "tower blocks made of prefab concrete slabs", which means that the design and building of "prefabricated houses" simply has to be perfected).

The *core responsibilities* of the centre of excellence are:

- ❏ To provide basic infrastructure (CMS/LMS, design, media services).
- ❏ To use project funding to spread e-learning know-how through multipliers/disseminators.
- ❏ To secure the availability of financial resources for the FU's internal development programme.
- ❏ To support applicants with subsequent applications for external funding.

The FU Berlin's project-based funding programme

CeDiS's work focuses on designing and supporting a project-like *development programme* run annually by the FU Berlin since 2002. Under this programme, 40 e-learning projects are currently receiving up to 20,000 euros per project for equipment/technical costs and assistants. The project terms and conditions require projects to acquire counterfunding. Project leaders are personally responsible for the approved budget in line with the project goals. However, resolutions adopted by Berlin's Senator for Science and Research on savings to be made in coming years mean that the programme's continuation does not seem to have been secured.

The *"Lenkungsgremium E-Learning"* at the FU Berlin is steering body responsible for evaluating the funded e-learning projects which are all required to present their

Fig. 67: CeDiS start page

intermediate results in a report. A decisive goal for and a success criterion of this project work specifically involves how developments can be successfully migrated into everyday teaching at the university. The experience gained by CeDiS nevertheless shows that real sustainability is not easy to achieve within the scope of one round of development funding, because the required organisational changes mean that the integration of new media into the teaching often takes a longer period of time.

Organisational structure / Type of organisation

The Center of Excellence for E-Learning and Multimedia (CeDiS) was founded in March 2002. Even though e-learning had already been pursued at the FU Berlin since as early as in 1993, the spark to create this centre of excellence for e-learning and multimedia came decisively from the BMBF funding initiative "New Media in Education" (see pp. 18-21). This initiative occasioned the FU Berlin's university executive board to create its own structures in this field. According to the CeDiS management, the funding approach with its broadbased aims which the FU Berlin pursued has proven itself. Three members of the executive board and the CeDiS management make up the e-learning steering body which is chaired by the Vice-President for Academic Affairs, Prof. Dr. Werner Väth. The steering body decides on which e-learning projects the FU Berlin will support.

E-learning projects, cooperation agreements

A small group of *e-learning research networks and projects* at the FU Berlin are currently receiving direct support from CeDiS. These are

- ❑ the Forschungsverbund "Learning Net", a research network set up to create an Internet-based learning environment,
- ❑ Neue Statistik, a project set up with the work environment "Statistiklabor",
- ❑ New Economy, a project to develop a new curriculum and a Master's programme,
- ❑ "Distributed Campus", a project which prepares foreign students for a stay at the FU Berlin.

The following projects have already been completed at CeDiS:

- ❑ Investitionsrechnung unter Steuern – (IRS), a project for calculating investments under consideration of various taxes,
- ❑ "Optical Distortion Inc." (ODI), a project on diffusion theory in marketing,
- ❑ "DIALEKT", a development environment which uses authentic, problem-oriented sample cases.

The specific focuses of projects based at the FU Berlin, which include various BMBF and EU funded projects, lie in the geosciences as well as in philosophy and humanities, including numerous language projects.

CeDiS maintains *cooperation agreements* with the Internet company Cisco Systems Inc. and the Fraunhofer Society (FhG). In addition, it has good working contacts with the German Academic Exchange Service (DAAD), the Multimedia Higher Education Service Berlin (*Multimedia Hochschulservice Berlin GmbH - MHSG*) and with publishers Springer Verlag. The university plans to deepen and extend these. Other cooperation partners are the Berlin Senate Administration for Economic Affairs, the Federal Ministry of Education and Research (BMBF) and Germany's National Research and Education Network (*Deutsches Forschungsnetz – DFN*). Through the BMBF project networks, CeDiS also maintains cooperation agreements with a total of 20 higher education institutions.

Financing model, marketing

The Centre of Excellence for E-Learning and Multimedia is partly financed from standard university budget resources complemented by funds from the HWP "Hochschul- und Wissenschaftsprogramm", a federal university-science programme. Besides the overall budget which is allocated to maintaining and expanding the implementation of web-based interactive learning environments, a further budget exists which funds measures run at the academic and scientific institutes (E-Learning-Förderprogramm). The structural adjustments adopted by Berlin's Senate Administration for Science, Research and Culture and the public spending freeze imposed by the Berlin Senate mean that a shrinking process seems very likely. Some of the 50 projects at the FU Berlin are working with the MHSG to *market* their study modules.

Human and material resources

A total of 37 staff are currently working at CeDiS, equivalent to around 23 full-time posts. Around two thirds of the staff are financed from external resources. On the one hand, this facilitates quick changes of focus in a rapidly changing work field, while, on the other, it can lead to a quick loss of capacities. Six permanent staff are responsible for e-learning development and funding at the FU Berlin, although they have also been given the task of carrying out the strategic media implementation planning for the university and coordinating the external funded projects.

As far as software resources are concerned, the centre of excellence intends to make Content Management Systems (CMS) and Learning Management Systems (LMS) including technical support centrally available in the future. A decision on this will be made at the beginning of 2004. Open source solutions will not be supported. As far as the LMS problem field is concerned, great importance is attached to having open interfaces respectively APIs (Application Programming Interfaces) and to using e-learning standards like SCORM (Sharable Content Object Reference Model), in order, if need be, to be able to guarantee the migration of content to other platforms.

Website: http://www.cedis.fu-berlin.de/

5.3.2 Humboldt University Berlin: Multimedia Teaching and Learning Centre (Multimedia Lehr- und Lernzentrum – MLZ)

E-learning support measures at the Humboldt University Berlin

The ambitious e-learning support strategy pursued at the Humboldt University Berlin (HU) is characterised not least by a project-based multimedia development programme which the Media Commission has been running since 2001 and which aims to provide start-up funding for new e-learning projects at the HU Berlin. The HU Berlin's Multimedia Teaching and Learning Centre (*Multimedia Lehr- und Lernzentrum – MLZ*) presented the results of the work produced by funded projects at a major Multimedia Project Exhibition organised in the summer of 2003. This exhibition presented 50 multimedia projects from the HU Berlin in the university's Main Building on Unter den Linden and parallel to this on the MLZ website. To make it easier for all members of the university to work with multimedia methods and techniques and to promote and drive forward the development of content and technical expertise, the HU Berlin put together four inter-coordinated measures in a package known as the "Multimedia Initiative":

- ❑ the Multimedia Förderprogramm, a multimedia development programme,
- ❑ the Dokumenten- und Publikationsserver called edoc, a document and publications server developed from an electronic dissertations project,

- ❑ Medienportal, a media portal which enables teachers to make their course contents available, and
- ❑ the Multimedia Lehr- und Lernzentrum (MLZ), a multimedia study centre.

Range of services offered by the MLZ

The MLZ was founded in April 2002 as a work group at the "Multimediaservice Department", one of four departments located at the *Computer- und Medienservice (CMS)*. The MLZ was established specifically to provide project development advice on all questions of integrating new media into teaching. This may involve problems of detail or areas like the digitisation of material collections and documents, or conceptional support with the preparation of courses. In principle, the MLZ plays a multiplying and disseminating role. It integrates staff from the respective departments and institutes as well as student assistants to help spread the relevant knowledge at the respective institutes. The MLZ is intended both for people with a new interest in the field as well as for already motivated and active players. Consequently, it contributes to maintaining and extending existing work structures and activities.

Fig. 68: Handouts on multimedia support at the HU Berlin

"Little brothers"

In its search for individual solutions to multimedia and e-learning projects, the MLZ enlists the support of other work groups at the CMS (the HU Berlin's computer centre) so as to network existing services. Consultations are held at the MLZ itself (so-called "practice visits"), while MLZ staff also go out and visit projects. A key advantage of these on-site consultations lies in the opportunity to work on problems in an environment that is familiar to the project staff.

Multimedia exhibition, project database

The *Multimedia Exhibition* held in the summer of 2003 presented some of the work done by the e-learning projects at the HU Berlin on posters displayed in the foyer of the Main Building and distributed folders and folded handouts ("little brothers"). The exhibition was simultaneously presented on a dedicated website. Furthermore a *project database* is currently being produced which will serve as a basis for a larger data pool on established e-learning structures at the HU Berlin to be created at a later date.

Events series

The two events series *"Multimedia-Forum"* – created six years ago as a multimedia roundtable – and *"Multimedia-Thema"* have already established themselves at the HU's central campus *"Campus Mitte"* (cf. Sand / Wahlen 2000, pp. 75-90). The *Multimedia-Forum*, which is regularly held on every first Wednesday in the month, discusses more general questions and presents e-learning projects, project opportunities and sources of funding. While *"Multimedia-Thema"*, held on every third Wednesday in the month, focuses on the obstacles faced on site in the concrete project work (didactic questions and tools) as well as on experience exchange (for

Fig. 69: Website on the Multimedia Exhibition held at the HU Berlin
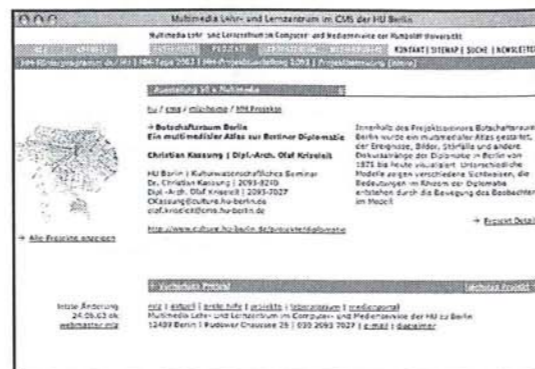
example, on questions of detail such as image processing). In addition, *"Multimedia Tage"*, are conferences which focus on initiatives, projects and services at the HU Berlin and were held at the HU Berlin for the first time in 2003. The *Multimedia-Tage* will be an annual feature in the future.

Moreover, CMS and MLZ staff offer a number of *courses* (e.g. graphic HTML editors, PHP basic course, ZOPE basic course, JavaScript basic course). The first consequence of the CMS's move to the Adlershof Campus is that these courses are experiencing a significant drop in demand.

Media Portal, cooperation

In accordance with academic standards and the university library's digitisation concept, a *Media Portal* is being made available. This is designed for media projects at a level below the publication threshold. The Media Portal is intended to accelerate access to data of a wide variety of kinds – e.g. text documents, image and audio archives – and to enable searches through any, which means in particular, non-text-based types of media, which are available on the various servers located at the HU Berlin. Originally conceived as an image database, the Media Portal offers each lecturer his or her personal, decentrally usable portal area ("little principality") over which the lecturer is free to dispose. The Media Portal works with open interfaces and is intended to support structures involving place independent cooperation. The Media Portal also offers an Internet-based service which includes a literature administrator, two alternative open source learning management systems as well as a course database.

In the one and a half years since its foundation, the MLZ has cooperated with the companies Nionex and Zweitwerk in developing the Media Portal. In addition, the MLZ collaborated with the Institute of Electronic Business at the Berlin University of the Arts on developing open source software.

Organisational structure of the MLZ

The human resources available to the MLZ include three permanent staff and five student assistants each working 80 hours a month. Integrated into the CMS as a centre of excellence for the application of new media in teaching and research, the MLZ has its offices at the Erwin Schrödinger Centre on the new Science Campus Adlershof which focuses on mathematics and natural sciences ("Science, Business and Media City"). Besides the CMS, the Erwin Schrödinger Centre also accommodates the central natural sciences library. Although the MLZ has access to the excellent technical equipment held by the CMS-based Multimediaservice, the disadvantage of the Adlershof site undoubtedly lies in the fact that the majority of those using the MLZ's services are based on the main campus in Berlin-Mitte. The Adlershof Campus was opened in December 2003.

Wireless Local Area Network structures (WLAN)

The WLAN within the main university building has already been partly completed at the Berlin-Mitte campus and is largely in place at the Adlershof Campus. In addition, the CMS offers a notebook loan service and plays an active part in Public Private Partnerships involving various systems providers from Berlin so that it can offer students reasonably priced notebooks. The Charité's notebook university programme is a special case as far as WLAN structures are concerned; the fee-charging continuing training programmes which the university hospital offers for registered doctors means that its notebook university programme has already succeeded in becoming financially consolidated.

Financing model

The MLZ is currently financed through the university-science programme (HWP-IV), which the Federal-State Commission for Educational Planning and Research Promotion (*Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung - BLK*) has extended until 2006 and is counterfinanced from the HU Berlin's budgetary funds. These financial resources have made it possible to support the implementation of multimedia at the HU Berlin since 1999, including through the project-based *Multimedia Development Programme* run by the Media Commission (originally a "projector purchasing programme"). Since prices for computer hardware are falling continuously, it has been possible – subsequent to the programme's restructuring in 2002 – to use some of the money from the projects to pay student assistants as well. The overall multimedia funding is to be continued, despite the outline structural planning for 2004 as was announced in October 2003. This plan was drawn up by the Berlin Senator for Science, Research and Culture, Dr. Thomas Flierl and involves savings of 22.9m euros each at the FU Berlin and HU Berlin, and of 30m euros at the TU Berlin; in view of the unclear impact which these cutbacks will have within the university, it is impossible to be certain whether such a financing model can succeed.

Website: http://www.hu-berlin.de/cms/mlz/

5.3.3 University of Dortmund: Media Centre (Medienzentrum – MZ)

The Media Centre at the University of Dortmund (MZ) developed out of the "Media Didactics Centre" in 2000 and is advised by a group of ten multimedia experts. It was elected by the Senate and is chaired by the Rector Prof. Dr. Eberhard Becker (represented by the Vice-Rector for Infrastructure and Media). The group of experts monitors and encourages the Media Centre's networking with the various departments. The university's Media Centre has drawn attention to itself not least with its "30+30" and subsequent "E-Learning-Plus" projects, with its university-own learning platform ("EDO Workspace") and its mobile computer labs with wireless connections ("edoLABS"), and with its participation in North Rhine-Westphalia's Open-Source-Initiative "CampusSource". The University of Dortmund has invested substantially in the MZ in recent years which, in view of the substantial cutbacks in other parts of the university, documents the particular strategic importance which the university management attaches to its central facility.

Range of services

The broad range of services offered by the MZ include designing multimedia study materials, the university-own learning platform EDO Workspace, providing video conferencing technology, recording lectures and assisting with video productions – above all for Dortmund's 8,000 or so student teachers – making digital recordings of TV programmes available (mpeg2 format) via the Media Centre's website, providing workplace capacities in special multimedia rooms, maintaining a video archive which is to be linked to the university library, plus a very well used online booking system for rooms at the Media Centre.

As part of the work for Dortmund's InWiDA project (Integration of Knowledge and Service Tasks, *Integration von Wissens- und Dienstleistungsarbeit*) – a new transdisciplinary research structure ("*Forschungsband*") at the University of Dortmund – the Media Centre set up a research lab in cooperation with organisational psychologists and computer scientists. This research facility is made up of two lab rooms equipped with cameras and video conferencing technology and a control and evaluation room and can, not least, be used for the cross-disciplinary analysis and evaluation of web-based teaching, learning, communication and cooperation processes.

edoLABs, wireless local area networks (WLANs)

In the narrower sense of e-learning, Dortmund's experience with its own learning platform EWS ("EDO Workspace") and mobile computer labs equipped with WLAN connections ("edoLABs") proved very informative. The edoLABs developed in 2000 consist of a trolley and 12 laptops which are taken from the trolley and are placed at the various workplaces in a seminar room. These are then connected to the built-in server on the trolley by means of the WLAN. However, as the wireless networking of the whole campus advanced, a process that will be completed in the coming few years, the edoLAB project lost some of its priority status. In the meantime, the edoLABS have been placed at the disposal of other institutions at the university on permanent loan. The researchers at Dortmund are meanwhile driving forward the creation of access points for use with mobile notebooks (the Media Centre alone offers wireless access points in 20 rooms). Furthermore, 30 laptops are available for loan. The extension of the campus WLAN is being supported by the "Dortmund Wireless Network Initiative" (*Dortmunder Initiative Funknetz - DIF*), in which regional business and industry, higher education institutions, the city, the schools office and other bodies are actively involved. Public WLAN hotspots will initially be created in the municipal Berswordt-Halle, at the city administration and the state library, and later at the city hall as well. The overriding framework for this initiative is provided by the projects "Wireless Network Ruhr" (*Funknetz Ruhrgebiet*) and "Metrobroadband Ruhr" (*Metrobreitband Ruhr*) which are patronised by Harald Schartau, the North Rhine-Westphalian Minister of Economic and Labour Affairs. These two projects will also be presented at CeBit 2004.

EDO Workspace

Dortmund University's learning platform EDO Workspace (EWS) is made up of the following components: public area, material area, publication area, communication area (with e-mail function, blackboard and chat room), personal online 'locker' plus group rooms. The EWS meanwhile hosts more than 200 e-learning courses and has 10,000 registered users. It is also increasingly being used for study seminars in the field of teacher training and at numerous schools in Dortmund. Besides the EWS, other learning platforms (WebCT, ILIAS) are also in use at the University of Dortmund. A second EWS server has been installed at the University of Duisburg-Essen. The scope of the EWS development includes close cooperation with the North Rhine-Westphalian open source initiative "CampusSource", which brings together and focuses the work of individual university projects and makes the open source platforms available as the technical basis for a virtual university to all interested parties for use and further development. The EWS cooperates with the university didactics centre on questions of didactics.

The "30+30" and "E-Learning-Plus" projects

A further step in the promotion of e-learning within the scope of the NRW-wide "e-competence@NRW" initiative at the MZ is to be seen in the "30+30" project, a funding package created to support the development and conception of e-learning modules. The university's group of multimedia experts set up this project on 9 July 2002. The successful candidates from the 15 to 20 incoming project proposals were each given 30 staff hours (e.g. a graphic artist) and 30 assistant hours at no cost. The "E-Learning-Plus" funding package aims to ensure the continuation of this programme. As the MZ Director, Josef Hüvelmeyer, sees it, this follow-up project on the creation of e-excellence at the University of Dortmund and the production of digitised study materials must be tailored more individually to the needs of users, since the quota of staff hours made available under the 30+30 package proved to be too low. At the same time, Hüvelmeyer also described the lack of inner-university accounting systems as a problem.

Two new staff members (BAT-IIa positions) were taken on at the end of 2003 in order to continue the development of the EWS learning platform in cooperation with other universities. EWS is to be offered to all teachers as a central learning platform. The Media Centre is helping with the migration of existing material and content to this central platform.

Website: http://www.mz.uni-dortmund.de/

5.3.4 University of Applied Sciences Cologne (FH): Information Technology Centre (Zentrum für Informationstechnologie – ZI)

Despite the fact that universities of applied sciences (*Fachhochschulen*) are generally less strongly positioned in the e-learning field, a result of the structural weaknesses which universities of applied sciences have in comparison with traditional universities, the Information Technology Centre (*Zentrum für Informationstechnologie - ZI*) at the FH Cologne has been able to develop a profile for itself as a driving force in the e-learning field at universities of applied sciences, not least by merging several institutions in order to concentrate the available expertise, by creating the Cologne Multiplier/Disseminator Model (*Kölner Multiplikatorenmodel*) and by offering an extensive workshop programme. The Central Multimedia Unit (*Zentrale Arbeitsstelle Multimedia – ZAM*) was established in 1999 as a predecessor to the ZI. In the course of the NRW council of experts' review of the studies offered by NRW higher education institutions – where the original recommendation reduced 23 departments at the FH Cologne down to 10 faculties on 1 September 2002 – the council of experts decided to complement the initially strongly decentralised structures of the FH by adding more central units. It was in this context that the decision was taken to merge the network centre (3 staff), the data processing centre (1½ to 2 staff responsible for the computer pool) and the ZAM (responsible for content management systems and the web editor).

Workshop series, multiplier/disseminator approach

While the decision had initially been made to concentrate on assisting with the production of e-learning modules, limited human resources mean that the strategic focus of the ZAM's activities since the end of 2001 lay in providing lecturers at the individual departments with assistance regarding their own implementation of new media in everyday teaching. The "*Multiplikatorenmodel*" consequently initiated as a means of raising lecturers' interest in e-learning processes distributes the e-learning support activities via a large group of collaborators, especially at the departments. December 2001 saw an initial needs analysis carried out at the departments in cooperation with a small external agency. According to the ZI, a series of workshops carried out in 2002 managed to reach up to 20% of the lecturers at the FH Cologne. The series began with an opening workshop which for its part carried out a kind of needs analysis to determine and check the actual and target status of the media implementation process. The remaining workshops in the series focused on technical and didactic aspects of e-learning, on the didactic aspects of various forms of web-based courses (purely virtual courses through to Blended Learning) as well as on the responsibilities of the "e-lecturer" (what is the lecturer's role, what work processes are there, how to redesign a seminar into a "Blended Learning" course).

Fig. 70: Start page for the FH Cologne's ZI
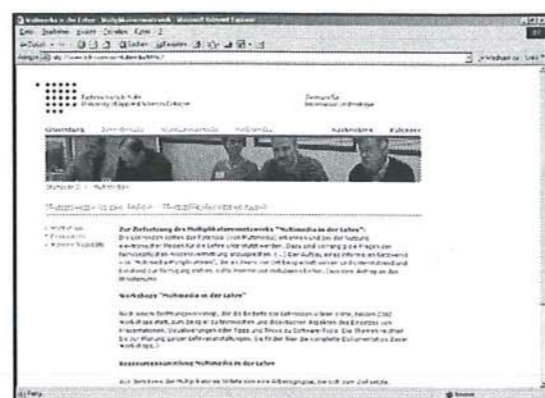
Range of responsibilities

After the projects had been completed, a group of 5 to 7 colleagues collected the basic e-learning material resources and subsequently made the results available online. This collection aims to serve multipliers and disseminators as a knowledge base (including fundamental services such as introductions to PowerPoint). In addition, the ZI offers an inter-university module database on its website that lists the e-learning modules offered by German universities which can currently be used, with metadata to allow thorough educational assessment, including open source materials and demo versions of fee-charging offerings. Most of the tasks at the ZI actually fall under the heading of technical support, including services such as equipping multimedia lecture halls, organising video conferences with Polycom-Viewstation and Smartboard facilities, and the very high in demand production of lecture recordings. No agreement has yet been reached on a uniform solution for learning platforms (ILIAS, Hyperwave, OpenUSS are available). An independent learning platform for the Faculty of Business and Economics ("E-Learning Portal") has been well accepted by lecturers on account of its reduced complexity. Closer cooperation with the state, federal and EU funded projects at the FH Cologne had not taken place.

Specific situation of universities of applied sciences (Fachhochschulen)

Networking with other players and projects at universities of applied sciences in North-Rhine Westphalia on e-learning-related developments is generally carried out within the scope of the "Working Group for Multimedia at NRW Universities of Applied Sciences" (*Arbeitskreis für Multimedia an nordrhein-westfälischen Fachhochschulen*). In addition, FHs are actively involved in the German Initiative for Network Information (*Deutsche Initiative für Netzwerkinformation – DINI*), which was formed in 1997 and supports the development of information infrastructures at higher education institutions and in subject societies, both regionally and nationally. In respect of the development prospects for e-learning at FHs, the Director of the ZI, Prof. Dr. Horst Stenzel, cannot yet see any clear consolidation taking place, since FHs currently perceive e-learning as an additional burden, because the public coffers are empty. In view of the FH-specific conditions (tighter budgets than universities, lack of non-professorial academic staff, higher teaching load) the continuation of the successfully initiated e-learning activities now depends, he said, above all on relieving the burden on multipliers and disseminators and university teachers by making appropriate teaching load arrangements and providing funding for student assistants. Despite growing interest on the part of lecturers and the everyday nature of using laptops and projectors, Stenzel predicted that a counter movement would arise. The ZI intends to continue its training activities at departmental level in the medium term.

Website: http://www.zi.fh-koeln.de/

5.3.5 Other new units at existing institutions / Restructuring measures

Johann Wolfgang Goethe University Frankfurt/Main: New Media in Teaching Centre of Excellence (Kompetenzzentrum Neue Medien in der Lehre)

The New Media in Teaching Centre of Excellence at the University of Frankfurt/Main is organisationally affiliated to the university computer centre and also performs special project-based tasks on behalf of the university executive. The centre of excellence concentrates on qualifying academic staff at the university by providing a comprehensive training and consulting programme on the use of new media in teaching. A series of workshops covers topics such as planning a virtual university course, didactic aspects of hybrid forms of courses, suitable media applications and media functions, activating and group-oriented methods in virtual academic courses and the implementation of a learning environment based on the university's internal learning platform

WebCT. In addition, university teachers can make use of the various advisory offerings that are available. Responsibility for technical realisation will remain with the individual departments, while the creation of a learning platform and the provision of additional, easy-to-use tools will simultaneously aim to give university teachers the qualifications they need to enable them to use their own resources when applying multimedia in teaching.

Website: http://www.rz.uni-frankfurt.de/neue_medien/

Justus Liebig University Gießen: Multimedia Competence Center (MMCC)

The Multimedia Competence Center at the Justus Liebig University Gießen is organisationally integrated into Prof. Dr. Ulrich Glowalla's research group on Instruction and Interactive Media (*Instruktion und Interaktive Medien – IIM*). It is responsible for assisting teachers from the university with e-learning projects. The cross-disciplinary MMCC offers services relating to the use of multimedia in teaching and research in the fields of information and communication, initial and continuing training and assistance with carrying out multimedia projects (information events and workshops for lecturers as well as a course for students on study and media skills). Specific needs and feasibility analyses aim to contribute to finding an individual strategy with which the ideas and needs of teachers and learners can be put into practice. Specific evaluation during and after the development aims to help achieve sustainability and the learning effectiveness of the developed programmes and to raise the appeal of projects.

Website: http://www.mmc.uni-giessen.de

University of Hagen: Distance Learning Development Centre (Zentrum für Fernstudienentwicklung – ZFE)

The Distance Learning Development Centre (ZFE) at the University of Hagen is probably the most important institution for the realisation of the "Learning Space Virtual University" (*Lernraum Virtuelle Universität*) concept which the University of Hagen has been pursuing since 1999. The ZFE at Hagen concentrates on model-like development work in a few albeit changing areas of teaching. The goal is to achieve the broad diffusion of e-learning know-how in all departments by means of complementary practice-transfer seminars, practice-transfer labs and practice-transfer materials. The ZFE is driving forward the development of integrative learning environments (so far at the Departments of Cultural Studies and Social Sciences, Law, and Economics/Business Administration). The current platform (Plattform 2000) is to be replaced by a new version with a modified system architecture and extended functions (Plattform 2003). The editorial (content management) system "FuXML" plays a key role in translating the course contents into various output media (print, CD-ROM, Internet). The annual "Multimedia Workshop Hagen" offers developers of multimedia teaching concepts an internal discussion forum. The wide range of support measures means that the classical printed "basic courses" offered by the University of Hagen have increasingly been complemented or replaced by digital "data courses" including interactive assignments, graphic animations, video sequences, computer simulations, exercise packages, lab environments and (AV) source collections. Hagen's virtualisation concept offers the specific chance to complement the traditionally low proportion of classroom teaching by offering web-based "distance learning courses" and so to didactically enrich distance studies and courses. Despite various text-based online seminars and synchronously held online lectures there nevertheless remains a great deal of development work to be done here.

Website: http://www.fernuni-hagen.de/ZFE/

University of Kassel: Multimedia Coordination Centre (Koordinationsstelle Multimedia)

Kassel University's Vice-President as well as a unit located within the Department for Development Planning are responsible for implementing the university's multimedia strategy presented in 2000. The practical work is carried out by the Multimedia Coordination Centre, which is based at the university computer centre and started its work in December 2001. The coordination centre has two HWP-financed staff and works as a project agency, thereby assisting projects at the departments by providing project management services throughout the whole study module production process. It helps projects produce the screenplay, select suitable media and tools and organise the concrete implementation process. In so doing, the centre creates a network of work-sharing cooperative structures. Practical support for individual projects is performed by student assistants who have been specifically trained for this task in courses offered at the coordination centre. In these courses, students gain academic credits in the form of e-learning building blocks which form the basis of the e-learning modules. In order to implement e-learning applications across the whole breadth of departments, the university additionally encourages the development of educational software by running an annual project competition (funding for 30 projects in 2003 with each receiving up to 10,000 euros). This additionally helped the coordination centre "open doors to the departments".

Website: www.uni-kassel.de/hrz/e-learning

Philipp University Marburg: Multimedia Competence Centre (Multimedia-Kompetenzzentrum – MMCC)

As part of the state initiative *Hessen-media* launched by the state government of Hesse, a Multimedia Competence Centre (MMCC) was set up at the university computer centre in Marburg as a time-limited project group (July 2001 to December 2003). The MMCC is funded from the HWP programme budget. The main responsibility for the MMCC staff definitely lies in designing multimedia teaching and learning units. The requisite content must be provided by the teachers from the various departments. The HRZ is endeavouring to continue the work of the MMCC as part of the extension to the HWP programme (2003 to 2006). The MMCC has been assigned to the "user support" department at the HRZ; in total, the project has three staff who, besides designing study modules, also cover the usual work focuses (multimedia design of teaching and learning units by specialists from the MMCC, support for the existing multimedia infrastructure, provision of and support for learning platforms, etc.).

Website: http://www.uni-marburg.de/hrz/multimedia/mmcc.html

Mittweida University of Applied Sciences (HSMW): New Media in Education Centre of Excellence (Kompetenzzentrum Neue Medien in der Bildung)

October 2002 saw the Mittweida University of Applied Sciences and its affiliated institute, the Training Academy Mittweida (*Bildungsakademie Mittweida e.V.*) found the New Media in Education Centre of Excellence. This centre of excellence aims to establish a sustainable structure for the cooperative project "Education Portal Saxony" (*Bildungsportal Sachsen*) at Mittweida and to assist in developing the Central Saxon Knowledge Exchange for High Technologies (*Mittelsächsische Wissensbörse für Hochtechnologien*) as part of the *Inno-Regio* Project in Saxony as well as with the acquisition of research projects in the field of online learning (e.g. the "Education Marketplace Saxony" – *Bildungsmarktplatz Sachsen* – financed by the European Social Fund). In addition, the centre of excellence takes on traditional responsibilities in the field of promoting university e-learning structures (participation in strategy development, advice and consultancy, support and training for professors and their staff, marketing for all online teaching and learning products, etc.). In fulfilling this objective, the New Media in Education Centre of Excellence is assisted by the

Application Centre for Multimedia Technology and Virtual Learning (*Applikationszentrum für Multimediatechnik und virtuelles Lernen*).

Website: http://www.htwm.de/wbildung/medienkompetenz.htm

5.4 Network of (new and) existing facilities, interfaculty coordination centre

5.4.1 University of Bremen: Multimedia in Teaching Centre (Zentrum für Multimedia in der Lehre – ZMML)
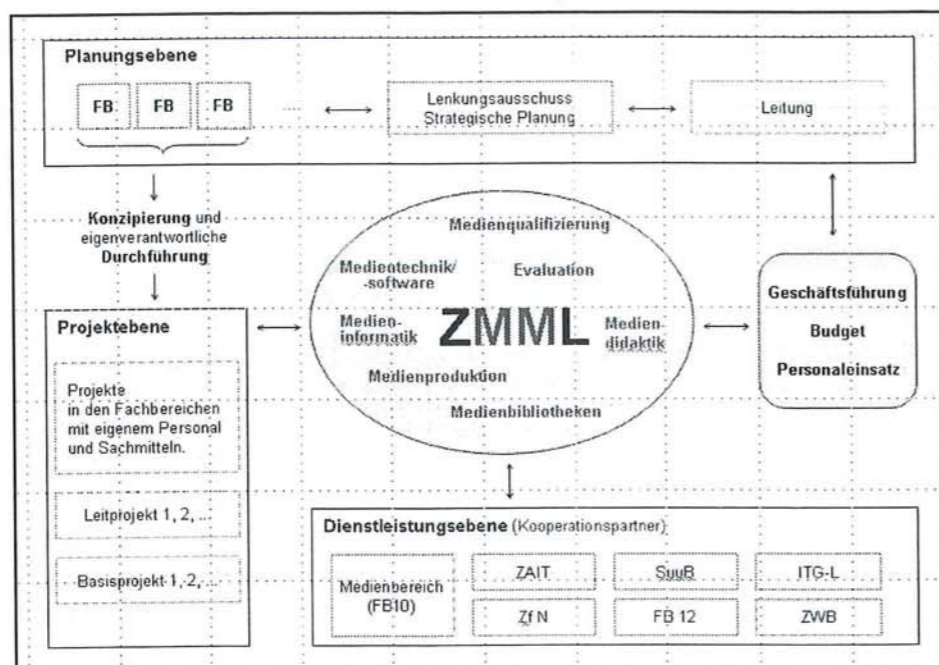
ZMML
Zentrum für Multimedia in der Lehre

The responsibilities of Bremen University's Multimedia in Teaching Centre (ZMML) lie in promoting the use of digital media in teaching at the university. The ZMML works within the university to encourage the integration of digital media into teaching, supports the innovative teaching concepts of individual university teachers and degree programmes, coordinates the media equipment, develops learning and support concepts aimed at qualifying teachers, and co-

Fig. 71: Structure of the ZMML at the University of Bremen

operates with other universities on all relevant questions. In addition, the ZMML coordinates the multimedia development planning of the departments and integrates these into the University of Bremen's central multimedia development plan. To a greater extent than the new or restructured e-learning centres covered in Section 5.3, the University of Bremen is implementing a cooperative model with an interdisciplinary team structure and a services infrastructure. As an alternative, consideration was initially given to a more cost-intensive variant of a new central facility. The advantages of the cooperative model that was eventually created include, in particular, the large available pool of staff as well as the centre's cost-effective realisation (a new facility would have cost an estimated 10m euros or so during the two- to three-year set-up phase). The resource sharing in staffing areas is leading – as planned by the current heads of the ZMML, Prof. Manfred B. Wischnewsky and Prof. Klaus Bönkost – to the early full functionality of the ZMML (cf. Sand / Wahlen 2000, pp. 105-118).

Wireless local area network structures (WLAN)

The cooperative structure already managed to prove itself in the centre's application to the New Media in Education (NMB) Funding Initiative (see pp. 18-21) run by the Federal Ministry of Education and Research (BMBF). The University of Bremen achieved a high success rate on account of its internal concentration and coordination of information (eight project proposals, seven approvals; plus five EU funded projects). In addition, a notebook university project was carried out

that was able to build on earlier intensive investments in the WLAN at the University of Bremen which meanwhile has one of the highest WLAN densities of all German university locations (around 500 access points at the University of Bremen). In terms of technical equipment and in the context of the extensive campus WLAN, it is important to mention the student-friendly system of funding notebook purchases which is supported by Public Private Partnerships. Three IT suppliers, for example Avitos, have opened an outlet on campus and offer special terms and conditions for their notebooks (installed WLAN card, three-year guarantee, extended right of return period). This offer – just as many others at the ZMML – is also open to teachers and pupils. In view of the intensive support which the former Rector, Prof. Dr. Jürgen Timm, as well as the Vice-Rector for Academic Affairs, Prof. Dr. Peter Richter, gave to the ZMML and of the successes achieved by the multimedia strategy, the university managed to recruit the Department of Science Planning/Research Promotion at Bremen's Senate Administration for Education and Science as a co-financier for the facility.

Organisational structure

The organisational structure of the ZMML (planning level) is headed by a university steering committee on which the deans of all the faculties sit. The steering committee guarantees the neutral definition of responsibilities for the ZMML and serves to integrate teachers from the departments into the decision-making processes. The steering committee cooperates with the ZMML management and also involves the board members of the following ZMML's individual subfacilities:

❑ Department 10 / Media Area,

❑ State and University Library Bremen, *Staats- und Universitätsbibliothek Bremen* (SuUB),

❑ Centre for Applied Information Technologies, *Zentrum für angewandte Informationstechnologien* (ZAIT),

❑ Centre for Networks and Distributed Data Processing, *Zentrum für Netze und verteilte Datenverarbeitung* (ZfN),

❑ Continuing Training Centre, *Zentrum für Weiterbildung* (ZWB),

❑ degree programme in media computing, *Medieninformatik*,

❑ the Bremen Institute for Educational Research, *Bremer Institut für Bildungsforschung* (BIB),

❑ the work group on basic information technology training, *AG Informationstechnische Grundbildung* (ITG-L FB 3).

The individual multimedia projects are carried out by the departments and their multimedia teams. The ZMML offers projects services to complement those multimedia components which departments themselves do not have. In order to avoid an inner-university "digital divide", particular attention was given to the "non-technical" departments (e.g. Department 11, Humanities) where the ZMML contacted young lecturers and made technical equipment available. This approach contributes to reducing and removing the typical university demarcation mechanisms and barriers.

Broad range of responsibilities

The ZMML services profile covers the fields of media technology / software, media computing, media production, media qualification, media didactics, media libraries and evaluation. The following will address some typical examples of services:

❑ "d-lecture"

❑ e-Books,

❑ multimedia course notes, and

❑ training programmes.

The "d-lecture" programme involves the production of digital AV lecture recordings (video streams including slides/transparencies and audio commentary) using sofTV.net-Software with little time and financial input. In addition, the service offers to produce XML-based e-books which are suitable for any kind of lecture script. Their content can be compiled at will and used via various output media. Multimedia course note systems (*Studienbücher*) enable students to collect and store the materials provided by their lecturers over the course of a semester and so enrich their own contents and notes.

Using the Innovation Campaign for Multimedia and Web-based University Teaching (*Innovations-offensive für multimediale und netzbasierte Hochschullehre – IMUNHO*) as a vehicle, the ZMML offers a wide ranging training programme for lecturers which makes needs-oriented and practicable everyday problem solutions available (e.g. teletutoring training) and delivers specially didactically arranged access to e-learning. At present, 28 academic staff and more than 50 students are actively involved in this programme. In order to be able to provide the time and cost intensive support for 12 departments, the position of a "Multimedia Officer" was additionally created at each of the departments. Moreover, a number of international educational alliances exist (continuing training and joint courses with the University of Belgorod and with other Russian universities).

Prospects

In addition to the implemented services, the ZMML management team is considering a wide range of future development measures, including a suggestion to create small networks respectively "pairs" made up of an e-learning versed university and a latecomer university. The University of Bremen plans to conclude media usage-related target agreements with individual departments and to create incentive structures. In addition, the ZMML is calling for students to pay media usage fees, for stronger activities in the field of sponsoring and professional education brokerage as well as for cooperation with *corporate universities*.

The wealth of activities in the e-learning field, as described above, led to the University of Bremen being distinguished as one of eight European reference universities (best practice case studies on the integration of ICT in teaching) as part of an EU-wide E-LNE competition (E-Learning Network of Excellence). The university has stated its willingness to exchange experience with the other award-winning universities within the scope of a network-like community (Politecnico di Milano, Finnish Virtual University, Umeå University, Canege, Open University of Catalonia, Utrecht University and the UK Healthcare Education Partnership).

Website: http://www.zmml.uni-bremen.de/

5.4.2 University of Duisburg-Essen: E-Competence-Team (Campus Essen)

Before being merged with the University of Duisburg in 2003, the University of Essen had made a name for itself by developing the so-called "Essen Model". Under this model, the central facilities at the university, namely the computer centre, media centre and university library, drew up a successful joint multimedia strategy. They agreed to cooperate closely in all overlapping areas, with responsibilities being redefined and formally laid down in the rules of procedure. All three facilities create multimedia resources and operate and make available the following infrastructures, among others, to and for members of the university: a telelecture studio, an authoring lab, the Multimedia Teaching and Learning Server Essen (*Multimedialer Lehr- und Lernserver Essen –*

MILESS), which contains study materials such as animations, simulations, audio and video material, the content management system Imperia (RZ) and the learning platform ILIAS.

Responsibilities

The E-Competence-Team established in November 2002 advises and supports cross-disciplinary university lecturers on how to use new media in university teaching. The range of services offered follows in line with the needs of university lecturers and with regard to their teaching demands. In most cases, the E-Competence-Team contacts lecturers directly and then advises them as the need arises on a one-to-one basis. In addition, the team guarantees individual, long-term support and confidentiality. The work of the E-Competence-Team primarily consists of providing concrete advice and consultancy in line with the principle of helping clients to help themselves.

As a newly-created e-learning support unit, the E-Competence-Team is not a network in the narrower sense, although it is classified as such here, since it provides a university-wide range of services *and* concentrates the specialist knowledge which is available at the three central facilities and so performs its duties in close operational coordination with other facilities. The team is positioned at the intersection between the media centre, university computer centre and university library. Its operational basis is formed by established cooperative structures which also extend to the management level of the three central facilities, i.e. the computer centre (Dr. Bruno Lix), media centre (Dr. Thomas Strauch) and university library (Albert Bilo). The team is also closely involved in the "e-teaching@university" project and the qualification portal www.e-teaching.org, that is jointly funded by the NRW Ministry for Science and Research, the Bertelsmann Foundation and the Heinz Nixdorf Foundation.

Fig. 72: Home page for the E-Competence-Team (Campus Essen)
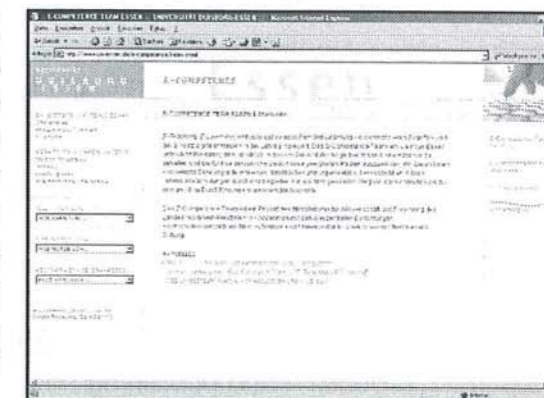
Organisational model

Essen's E-Competence-Team, whose offices are located at the media centre, is essentially made up of project coordinator Birgit Hennecke plus two other staff members (Olaf A. Schulte, Oliver Traxel). The extended advisory team includes five long-standing staff members from the central facilities who spend varying numbers of hours working in the team. Within the scope of this cooperative structure, the E-Competence-Team offers university teachers a comprehensive range of didactic concepts, technical information and training measures covering all aspects of using digital media and information technologies in teaching. A steering group made up of professors from Essen who have run successful multimedia projects assists the E-Competence-Team and ensures that the exchange channels work between the team and the e-learning and multimedia academic expertise represented at the individual departments.

Advisory activity

The range of practical advisory services offered by Essen's E-Competence-Team aims to reach lecturers with varying degrees of experience in the field of new media. Lecturers with little previous knowledge can get to know the advantages of using digital technologies in teaching by means of concrete examples and demonstrations as well as on a one-to-one basis. The E-Competence-Team is also a point of contact for more experienced university lecturers looking for expert tips and advice on how best to use the technology which they already have. In terms of content, the team's advisory activities cover the whole breadth of digital technologies already used in teaching today.

This includes, among other areas, synchronous and asynchronous cooperation and communication, application software and visualisation, use of teaching and learning platforms, digitisation of image, audio and video formats, seminar-based home pages, video conferences and digital search and archiving processes.

Outlook

The team's goal is to establish itself on the campus as a service unit: the team plans to make its advisory services known to all lecturers at Campus Essen by increasing its PR work and networking (media application, integration of multipliers/disseminators, visiting various university bodies) and by making even more personal contacts so that it can provide needs-oriented support and advice. A further challenge relates to the need to network and harmonise with the E-Competence-Team at the Duisburg Campus in the context of the merger which has not been organisationally completed yet.

Website: http://www.uni-duisburg-essen.de/e-competence

Besides the University of Duisburg-Essen, the **University of Wuppertal** is also receiving support from the state of North Rhine-Westphalia (NRW) as a pilot university within the scope of the North-Rhine-Westphalian e-Competence-Initiative. This involved an **ec-Team** being set up at Wuppertal which cooperates closely with the Audio-Visual Media Centre (*Audiovisuelles Medienzentrum – AVMZ*) at the University of Wuppertal. The goal pursued by this team is very similar to that of the team in Essen (including improving the media expertise of academics and researchers, producing and publishing new media).

Website: http://e-teaching.uni-wuppertal.de/

Fig. 73: e-teaching@university home page

5.4.3 Carl von Ossietzky University Oldenburg: Center for Distributed eLearning (CDL)

The Center for Distributed eLearning (CDL) was founded on 31 October 2001 by Senate resolution as an interfaculty centre for web-based teaching. The basis for the resolution was provided by a previously existing, quasi-private initiative launched by media-versed university teachers who knew each other personally and decided to enter into a cooperative project in order to exploit synergies and create a framework for the various project activities which they pursued. The CDL is an example of how the creation of stable inner-university organisational structures in the field of e-learning can be achieved by committed and competent university members proactively introducing their labour, finances and know-how into a project. According to CDL Director, Barbara Terfehr, one-off projects are, in the final analysis, not very helpful in establishing permanent structures. In the opinion of the CDL management, the CDL embodies the organisation node which provides infrastructure, assures transparency and facilitates communication processes and contact making.

Financing

Financing for the CDL office (a half position held by Ms. Terfehr) is provided via funds which six or seven chairs from the various departments make available via external project financing.

Information material on the CDL, such as flyers, are financed by participating professors. In order to assure a continuous presence, the financing for the management position in the CDL office will certainly eventually have to be paid from the university's budgetary resources. The present arrangement is that professors or departments interested in taking part are required to make an appropriate financial contribution towards securing the financing of the CDL office. However, it is the CDL's view that the opportunity to become actively involved in the CDL must not be allowed to fail on account of a lack of pecuniary resources.

Responsibilities

As the senate resolution shows, the CDL is meanwhile recognised and supported by the university and the university management, despite initial scepticism, since the CDL is considered to be making an important contribution to the university's profile. Besides inner-university networking, it is primarily the maintenance of relations with political institutions and with regional business and industry that has proven to be productive; and so, using the contacts established by Prof. Hans Kaminski, the Director of the Institute for Economic Education (*Institut für Ökonomische Bildung*), a work group was founded with company representatives to coordinate e-learning activities with regional business and industry.

In addition, the CDL is a founding member and – represented by Ms. Terfehr – also an executive member of the Northern German Association of eLearning Business (*Verband eLearning Business Norddeutschland e.V. – vebn*). This new interest group brings together – across state borders – companies from the e-learning industry, software producers, solution providers as well as advice and service providers plus continuing (professional) training institutions, universities and schools with specific applications know-how relevant to the future topic of e-learning.

The CDL is based on the concepts of inner-university cooperation and interdisciplinarity. It offers a reliable organisational framework for all e-learning activities carried out at the University of Oldenburg which contributes decisively to creating transparent structures as a means of building confidence in all activities relating to the use of media in higher education. This concept has so far been successfully implemented as can be seen, for example, in the fact that the University of Oldenburg, in comparison to other higher education institutions, is running the most e-learning projects in Lower Saxony.

In total, the financial value of the e-learning projects based at Oldenburg amounts to around 10m euros.

The CDL's range of responsibilities covers the following core areas and core competences:

Education management:

❑ To create a balance in the dynamic relationship between educational demands, everyday educational reality and external demands (job market, education policy etc.).

Knowledge management:

❑ To identify and present relevant knowledge.
❑ To convert implicit into explicit knowledge.
❑ To generate new knowledge.
❑ To sensibly link up technological targets with the organisational, cultural or psychosocial frameworks of a corporate knowledge management system.

Fig. 74: Responsibilities of the Center for Distributed eLearning (Oldenburg)
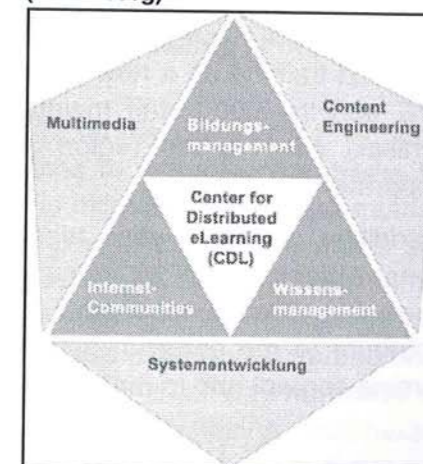
Responsibilities for Internet communities:

- ❏ To create suitable, social contexts as a prerequisite for the willingness to actively share knowledge.
- ❏ To develop "virtual communities".

Content engineering:

- ❏ To produce, advise on and promote electronic study materials.
- ❏ To guarantee the efficient distribution of content between differing producer and user groups.
- ❏ To develop and operate learning platforms (testing Blackboard CourseInfo, using StudIP, ILIAS, Lotus Learning Space and Hyperwave) as well as to develop innovative solutions for the trouble-free production of teaching/learning content.

Multimedia:

- ❏ To develop modern and user group relevant multimedia technologies to support the appropriate communication of knowledge.

Systems development:

- ❏ To encourage the individualisation of teaching and the sustainable enhancement of learning adaptivity by taking into account the methods of artificial intelligence in distance learning systems.

In addition, two lecture and conference series have already been organised by the CDL, of which one addressed inner-university concerns and the other extra-university matters. More than 250 participants from throughout Germany attended a major CDL conference held in March 2003.

Organisation

Seven to eight chairs are currently actively involved in the CDL, providing around 23 staff. They cover the following seven institutes from three faculties, plus other university or university-related facilities which are affiliated to the CDL: Faculty I: Institute of Education, Faculty II: Institute for Business Education and Technical Education, Institute of Law, Department of Computer Science, Institute for Business Administration and Business Education, Institute for Economics and Statistics, Faculty V: Institute for Mathematics, the affiliated institute OFFIS, the Central Distance Learning Unit (ZEF) and University Library (BIS). The CDL represents projects both regionally (small and medium-sized enterprises) as well as nationally and internationally (for example via the Moscow branch of the Business Education Online project – ÖBO). Intensive contacts and cooperation with business and industry are absolutely essential to developing continuing and advanced training as a new business model for the university – and so the regional energy utility EWE with its 3,000 staff maintains close contacts with OFFIS and the ÖBO project. As Prof. Kaminski sees it, the region above all provides the social breeding ground for productive cooperative relations.

In addition, the CDL sees teachers, in particular, as the main target group, as shown by its intensive cooperation with local schools. Essentially, the work of the CDL aims to contribute to developing didactic concepts and solutions for various target groups. And the CDL also wants to contribute to the process of information and experience exchange in terms of the quality of e-learning content and in respect of robust and functionally matured technical solutions.

Business model, rights management services

The CDL considers the development of a new business model at the university to be a necessary step on the way to fully exploiting the potentials of e-learning. Market effective, unique features can hardly be achieved in e-learning projects by one university alone, but must rather be developed through cross-university networking between various projects. In the interest of Oldenburg University's close regional integration, the CDL has also launched measures to ensure that it offers solutions of particular regional interest when developing e-learning products. This in turn strengthens the support for the CDL from local decision-makers in politics, business and industry. As far as questions relating to the management of rights of e-learning projects are concerned, all higher education institutions which offer e-learning can obtain access to an innovative knowledge portal which assists in the legally secure design of these forms of teaching. After appropriate registration, access to the site is open to all via http://www.uni-lernstadt.de. The Internet portal "Uni Lernstadt" is the result of a project called "eLearning and Law" (*Rechtsfragen des eLearning – el.la*) which has been running under the ELAN pilot "epolos" since 2002 and is funded by the Lower Saxony Ministry of Science and Culture. Its scientific director is Professor Dr. Jürgen Taeger, Deputy Director of the CDL.

Prospects

The high percentage of temporary staff contracts at universities and the rigid provisions of the federal statutory salary scale BAT represent serious problems for e-learning projects. To achieve a more flexible personnel policy in terms of time and income, the university is now considering creating a limited company as a spin-off. However, the legal frameworks mean that this is fraught with difficulties. And the staff of the spin-off company additionally face the problem that despite working in a university-related context, their non-traditional academic employment means that they will hardly have the option of later getting a tenured position at a university.

Website: http://www.cdl-oldenburg.de/

"Center of Excellence" at the University of Oldenburg

As part of a Public Private Partnership involving Sun Microsystems, the University of Oldenburg and Oldenburg's computer science institute OFFIS, a new *"Center of Excellence"* for e-learning technologies is to be created (equipped with Sun computers and software worth around 100,000 euros and commissioned with creating an e-learning platform for "Java in university teaching").

5.4.4 Other network-like facilities

Friedrich Alexander University Erlangen-Nuremberg: "New Media in Teaching" Forum (Forum "Neue Medien in der Lehre")

The "New Media in Teaching" Forum established at the Friedrich Alexander University Erlangen-Nuremberg (FAU) in 1998 is a cross-faculty action circle which aims to promote new media in teaching at the FAU Erlangen-Nuremberg. In particular, the forum is intended to facilitate mutual experience exchange on ways of using digital educational technologies. The forum maintains six work groups, namely: Digital Image Archiving (*Digitale Bildarchivierung – AKBA*), Multimedia Infrastructure (*Infrastruktur Multimedia – AKIM*), Teleteaching (*Teleteaching – AKTT*), Long-term Archiving (*Langzeitarchivierung – ALZA*), Quality Assurance and Didactics (*Qualitätssicherung und Didaktik – AQSD*) and Virtual Reality (*Virtual Reality – AVIR*). Once a year, an all-day workshop is held on new projects and on projects in progress which aim to or are developing multimedia teaching elements. In addition, the "New Media in Education" Forum has carried out surveys on

the acceptance of new media-based study courses offered by the University of Erlangen-Nuremberg and by the Virtual University Bavaria (*Virtuelle Hochschule Bayern*).

Website: http://www.mmforum.uni-erlangen.de

Albert Ludwig University Freiburg: New Media Center

In the course of implementing a 120-page media development plan published in 2001, the university computer centre (media technology unit) and the audio-visual media centre of the university library joined forces to create the New Media Center (NMC) at the University of Freiburg. Besides helping with work on teaching materials (e.g. offering training courses on the design and programming of static and dynamic websites, provision of a central database server), the NMC above all offers the following support in the field of open distance learning: it provides a learning platform (CampusOnline / CLIX), offers courses on CampusOnline, supports communication and cooperation tools, and produces e-learning courses. In addition, it maintains a multimedia repository as a digital library which is part of the ARIADNE Knowledge Pool Baden-Württemberg. Additionally a notebook university programme "Mobile Teaching and Learning (*Mobiles Lehren und Lernen – F-MoLL*) was run at the University of Freiburg. Results from the work of the Multimedia Conferences held at Freiburg are published sporadically. The Committee for ICT and New Media (*Ausschuss für IuK und Neue Medien*) is responsible for managing the ICT-related tasks at the university.

Website: http://www.mmk.uni-freiburg.de/

Christian Albrecht University Kiel: Interdisciplinary Multimedia Centre (Interdisziplinäres Zentrum Multimedia – IZM)

More than 30 academics and researchers from almost all the CAU's faculties who deal with multimedia technologies and applications in their teaching and research were actively involved when the Interdisciplinary Multimedia Centre (IZM) was founded at the Christian Albrecht University Kiel (CAU) in 1996. The IZM is intended to define current research questions, to bring together research groups from various fields of practice and to ensure that information on the various research and development activities in the field of multimedia flows smoothly at the CAU. Furthermore it aims to initiate model experiments (at federal and EU level) on research topics in the field of multimedia and to jointly acquire research funding. By organising workshops (e.g. on didactic theory and practical applications in the construction of interactive learning software for classroom teaching or on theory and application of online-oriented authoring systems for school practice) knowledge on the latest e-learning developments is distributed at (inter)national level.

Website: http://www.av-studio.uni-kiel.de/izm/

5.5 New central facility

5.5.1 Technical University Dresden: Media Design Center

The founding of the Media Design Center (MDC) at the Technical University Dresden as a central research and service facility was prepared from 1998 onwards (cf. Sand / Wahlen 2000, p. 102f.) and completed on 13 June 2001 by an appropriate senate resolution. The MDC has been commissioned with promoting the development and introduction of multimedia teaching and learning services and programmes for use in initial and continuing training at the TU Dresden in cooperation with the faculties and university facilities. Cooperation agreements exist not least with inner-university respectively university-related facilities, such as the Institute of Advanced Studies

(*TUDIAS*; the TU Dresden's exploitation society), the Centre for Continuing Training (*Zentrum für Weiterbildung*), the University Computer Centre (URZ) and the Audiovisual Media Centre (AVMZ), with the Saxon State Library (SLUB) as well as with institutions outside the university. In particular, the MDC is responsible for

- providing faculties and institutions with advice and services on the development and introduction of multimedia offerings,

- developing joint projects on multimedia offerings with the faculties and institutions,

- carrying out applied, interdisciplinary research on the development, design and quality assurance of multimedia offerings,

- developing initial and continuing training programmes, and

- representing the TU Dresden in cooperative networks on the development and design of multimedia offerings in agreement with the university executive board.

In addition, the MDC is also actively involved in drawing up a multimedia strategy which is being developed by a work group headed by the Vice-Rector for Academic Affairs and is to be presented in early 2004.

Structure

The MDC is headed by a scientific director and also has a general manager plus five other budget-funded positions to cover the fields of expertise: didactics, psychology, computer science, design and administration/economics. At least an equal number of staff from supported and/or completed projects are involved in the work of the MDC (for example, two staff members from the Education Portal Saxony). In the development of strategic guidelines for the work and as a bridge to the faculties, the MDC is supported by a scientific council made up of eight professors from the faculties, the Vice-Rector for Academic Affairs, the scientific director and general manager of the MDC, the directors of the AVMZ, URZ and SLUB, the managing director of TUDIAS, an academic staff member and a student representative. The members of the board of trustees – maximum of 6 public figures from science and education, business and industry, media and publishing – make recommendations on the structuring of the MDC and support it in all other affairs. During a monthly meeting with the heads of the cooperating facilities AVMZ, SLUB, URZ and TUDIAS, the scientific director develops and discusses perspectives on a joint approach to using the MDC as the central contact point for offering services in the field of e-learning across all these facilities. Close cooperative relations additionally exist with project partners inside and outside the TU Dresden (e.g. with the universities of applied sciences "*Hochschule für Technik und Wirtschaft Dresden*" and "*Hochschule Zittau/Görlitz*").

Project management

The MDC is the lead institution in the development of the Education Portal Saxony (*Bildungsportal Sachsen*) for which it drew up the subprojects "Platform Choice", "Advisory Model", and "Quality Criteria". MDC support for the Education Portal Saxony includes providing advice on content development in various other subprojects. In addition, the MDC is actively involved in a large number of e-learning projects at the TU Dresden and at other educational institutions, such as: Multimedia Learning Environment in Mechanical Engineering (*Multimediale Lernumgebung Maschinenwesen*), Multimedia Teaching and Learning Platform for the Civil Engineering Degree Course (*Multimediale Lehr- und Lernplattform für den Studiengang Bauingenieurwesen – Portiko*), Study Site Languages (*Studierplatz Sprachen*), Study Site Criminal Law (*Studierplatz Strafrecht*), the research CD "*Transfer Direct*", the Digital Library Saxony (*Digitale Bibliothek Sachsen*), and the Education Marketplace Saxony (*Bildungsmarktplatz Sachsen*).

A multimedia project database (http://www.mdc.tu-dresden.de/mmdb/_mmdb.htm) established in 2000 records and outlines 68 (as per: 19 January 2004) multimedia projects at the TU Dresden. The database is primarily intended to create transparency on the projects carried out at the various academic institutions, is constantly updated and enables users to search projects by keyword, project titles, contacts or participating institution/faculty.

Course and continuing training programmes

An MDC series of lectures on the topic of "Learning and teaching with multimedia" has been held at the university since the winter semester 1999 and provides continuous information on current developments in the field of multimedia, web-based teaching methods. A series of workshops presents and discusses projects which are currently in progress. In particular, the workshops aim to serve the exchange of experience between those working on and interested in the wide range of multimedia projects. The programme of courses offered by the MDC includes courses on "Authoring Tools and Content Management Systems", "Macromedia Dreamweaver 4.0", "Adobe Photoshop 6.0", "Design Principles for Multimedia Courses", "Application Scenarios for Multimedia Courses" and the advanced training course "From Idea to E-Learning Course". The range of continuing training programmes extends from courses lasting just a few hours through to one-week training measures. Participants in these courses are largely staff members from multimedia projects who want to gain further qualifications and knowledge in task-specific areas. Besides these course and continuing training programmes, the MDC also advises projects on an individual basis on all problems arising in the context of media-based teaching (e.g. conceptional questions, metadata, platform choice, funding sources, etc.).

Website: http://www.mdc.tu-dresden.de/

5.5.2 University of Applied Sciences Düsseldorf (FH): Institute of Media, Communication and Information Technology (*Institut für Medien, Kommunikation und Informationstechnologie – MKI*)

Under its founding director, Prof. Dr. Günter Franke, the MKI was created at the FH Düsseldorf as a central scientific institute in June 2000. Since October 2001, a core of permanent staff have been driving forward the institute's establishment and, since November 2002, an executive board made up of four professors from four departments has been in place. The MKI acts as the central platform for implementing the "cross-disciplinary focus on location-specific and future-oriented topics and methods of media, communication and information technology" as defined in a target agreement reached between the NRW state government and the FH Düsseldorf.

The MKI's particular strengths in the web-based teaching methods sector include programmes such as the summer/winter academy (cooperation between various higher education institutions in NRW) which involves the shared use of various resources, close cooperation between the FH Düsseldorf and general schools ("eSchool Youngster"- and "eSchool Helpdesk" programmes) as well as cooperation with IT companies.

Core work areas, advisory services

As defined in the target agreement, "the MKI is to be developed into a central, cross-departmental, multimedia centre of excellence which will provide all areas of the FH Düsseldorf with technological and organisational support on media questions." With this goal in mind, the MKI is currently working on the following core areas:

❑ Qualification and advice in the field of media and information technology,

❑ coordination and evaluation of e-learning activities throughout the FH,

❑ coordination and new development of the FH Düsseldorf websites,

❑ provision of central resources in the field of media and information technology.

In addition, the MKI is collaborating with other higher education institutions, the City of Düsseldorf and several companies on a number of projects.

The MKI advises students, teachers, departments and institutions at the FH Düsseldorf within the scope of its areas of responsibility, its expertise and its resources. In cases where the specific media-relevant expertise is available at individual departments, the MKI arranges the appropriate contacts.

The Data Processing Centre (*Datenverarbeitungszentrale – DVZ*), the University Library and the MKI jointly publish a newsletter called KIM. Over and above this, the MKI offers qualification courses for students and staff on topics in which there is a cross-departmental need for qualification which cannot be covered by courses offered by the departments themselves (so far on Metaaesthetics for Integrated Studies, Iconic Turn, Man and High Tech respectively Man-Machine-Interaction, Audiovisual Media Academy, Animation Techniques, Cisco Networking Academy, Operating Systems, MS Office Applications, Web Application Server Zope and on the Coordination and Evaluation of all E-Learning Activities of the FH).

Within the project group FACE, the MKI is working on a new information architecture for the FH Düsseldorf. The central element is made up of a web-based container system for the interactive preparation and dynamic presentation of information (internal and external communication). The new FH Düsseldorf website is integrated into this via a new, MKI-developed design and a content management system developed specifically by the FH Düsseldorf for the web application server Zope.

"CISCO Networking Academy", module evaluation, Knowledge Systems Platform of Excellence (Kompetenzplattform Wissenssysteme)

The first e-learning offering initiated by the MKI was the "CISCO Networking Academy" delivered in Blended Learning mode. In addition, the MKI, in cooperation with the university library and the media department, acquired a one-year licence from NETg in spring 2002 for the use and evaluation of 50 study modules by all students and staff. In the course of this year, the use of these modules was scientifically evaluated by the MKI, with the results published on the MKI website. The study modules will continue to be used after completion of this evaluation, albeit under different terms and conditions. In addition, the MKI is supporting the prototypical implementation of the e-learning portal "Alex" for which Prof. Dr. Michael Marmann from the Media Department is responsible. Working together with various professors, the MKI has, on behalf of the FH Düsseldorf, applied for the establishment of a platform of excellence on the topic of "Knowledge systems and e-learning" in order to be able to develop an implementation model and supporting framework for the sustainable integration of e-learning and complex knowledge systems at universities.

Cooperation

The MKI cooperates with other universities in numerous of the above-mentioned projects. Within the scope of the Audio-Visual Media Academy, cooperation agreements have been concluded with various universities offering degree courses in the field of media, while the cross-university course "Man and High Tech" involves collaboration with the Heinrich Heine University Düsseldorf, while, in

the cross-university work group on Internet offerings, the MKI cooperates with the Design Department at the FH Aachen and with the Cologne International School of Design. Besides joint projects with individual companies like Cisco, the MKI also works closely with the schools administration of the City of Düsseldorf. Training courses have been held for pupils who, on behalf of the schools administration, provide part of the IT support at Düsseldorf's schools ("eSchool Youngster") and training courses for teachers responsible for managing the computer pool at their respective school. And since December 2002, the MKI, on behalf of the City of Düsseldorf, has taken on the running of the "eSchool Helpdesk" to which Düsseldorf's schools can turn when they experience IT problems.

A continuing training concept is being planned for external participants which is to be run by a newly-established registered association called "Diasa".

Website: www.mki.fh-duesseldorf.de (and http://kim.fh-duesseldorf.de, www.diasa.de)

5.5.3 University of Applied Sciences Munich (FH): Media and Teaching Department (*Abteilung medien+LEHRE - ML*)

The Media and Teaching Department (ML) at the FH Munich University of Applied Sciences was set up to publicise the e-learning opportunities offered at the FH Munich, which the Centre for Higher Education Development (*Centrum für Hochschulentwicklung - CHE*) had distinguished as a "Best Practice Higher Education Institution in 2002". The Media and Teaching Department respectively its predecessor, the Multimedia Centre of Excellence (*Kompetenzzentrum Multimedia – KMM*) had stood out as pioneers in the FH media field by running an active campaign of training courses on "Multimedia in Teaching" since 1997 and offering a "Multimedia Certificate" for students. The KMM had been established by senate resolution in summer 1997. While it existed up to 2001, its activity fields had been the provision of support for lecturers in preparing conventional course materials for media implementation ("MeiLe", i.e. "Multimedia in Teaching", projects in 1999 and 2000) as well as in developing its own multimedia projects, such as creating and holding courses for the Virtual University Bavaria (*Virtuelle Hochschule Bayern – VHB*) and for BR Alpha, the education channel of the Bavarian broadcasting corporation (*Bayerischer Rundfunk*).

Work fields "Multimedia in Teaching" and "Multimedia Certificate"

Following a restructuring process in July 2001, the Media and Teaching Department was subordinated to the Centre for Applied Communication Technologies, although since 2002 it has been academically supervised directly by the FH Munich's Vice-President, Prof. Dr. Peter Kammerer as a "temporary core responsibility" performed on behalf of the steering body. In this period, the department concentrated its activities on training professors by offering classroom seminars and digital study programmes, on developing a concept for the implementation of a learning platform (LMS), on providing project advice and, to a lesser extent, on providing practical support for the production of course material by creating individual modules.

The two central work fields for the Media and Teaching Department, namely *"Multimedia in Teaching"* (MML) and the *"Multimedia Certificate"* (MMZ) are organisationally separated from each other. An advisory council made up of two professors and an advisory body with 14 professors were established to assist with the work of the MML, which has a staff of three. An advisory council with two professors exists for the Multimedia Certificate, which has one permanent staff member.

Training courses, CBT

Following a survey carried out among lecturers at the FH Munich (response rate of 10%), a comprehensive continuing training programme for lecturers was drawn up two years ago which

initially attracted strong demand in 2001. Demand fell in the following semesters, above all among professors – not least as a result of the fact that it overlapped with programmes offered by the Didactic Information Centre (*Didaktisches Informationszentrum DIZ*). Consequently, training courses were eventually suspended, although they can be taken up again at any time. The Media and Teaching Department delivers complementary basic skills and introductory knowledge in the e-learning field through a newly-developed offering which introduces participants to the functions of central web-publishing programs. It is to become available in the winter semester 2003/04, both as a Computer Based Training programme (CBT) for lecturers as well as on the FH Munich's website as a Web Based Training programme (WBT) for students. Otherwise, the departments and lecturers generally develop their multimedia programmes themselves. The Media and Teaching Department has a policy of helping clients to help themselves.

Besides the active support which it received from the Vice-President, the Media and Teaching Department also received a strong and positive response from students from all departments in respect of the Multimedia Certificate. While under the earlier funding programme "MeiLe" around 15 to 20 projects had been supported, only five projects at the FH Munich are currently receiving financial support (including the MedidaPrix finalist 2003 "Bautop", Professor Karl Heinz Volland's project on building materials studies, thermal insulation and condensation protection).

Multimedia Certificate

The attractive cross-departmental Multimedia Certificate (MMZ), which is part of a more comprehensive range of certificates offered at the FH Munich, aims to provide students with career-relevant basic skills and expertise, and forms a counterpart to the "E-Learning Certificate" offered by the ETH Zurich, which is intended for university teachers. The MMZ has been offered at Munich since the winter semester 1997/98. Initially, 20 courses were offered. The constantly growing range of programmes today makes up around 50 courses held by university professors from the FH Munich as well as by contract lecturers. Each semester sees an average of 40 students gain the MMZ. Since 1997/98, a total of 296 students have gained a Multimedia Certificate. Experience has shown that many students take the certificate after the fourth semester or just before they complete their studies. 80% of the teaching for the MMZ is offered in block courses with a study load of 2 semester credit hours (SWS) per week. In 2003, five courses were offered for the first time via the Virtual University Bavaria as well. In addition, a lottery system had to be introduced for admission to the beginners' courses, since a single course can only take up a maximum of 24 participants. The introduction of a fee for attendance of the MMZ programme is currently being considered.

Fig. 75: Course catalogue for the MMZ at the FH Munich
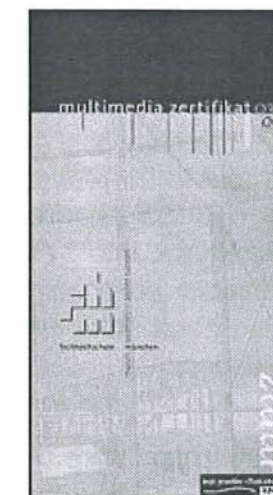
Organisational model, resources

Organisationally, the Media and Teaching unit (ML) was initially affiliated to the Centre for Applied Communication Technologies (*Zentrum für angewandte Kommunikationstechnologien – ZaK*), from which it is currently separating. Technical support for the ML unit will continue to remain largely in the hands of the ZaK in the future, which manages the ML unit's course room equipped with a total of 13 computers. The technical resources available to the ML unit itself include three rooms, 13 computers in the course room (12 of which for students), six staff computers, a video cutting station, a Macintosh computer as well as a computer for the secretary. The FH Munich is currently actively working on providing a central learning platform. Delays have been caused so far by the question of engaging staff to manage this and the actual choice of a suitable platform. Partly, the commonly-found open source system ILIAS was used, since the high licence costs of

commercial learning platforms made it difficult to take these. Any parallel implementation is to be avoided as far as possible, in order to keep the maintenance work and cost which the expansion of a central learning platform causes to a minimum.

Financing, cooperation

The ML Department is financed with structural funds from the university budget (partly also with money from the HWP fund and from the Bavarian High-Tech Offensive). In the original concept, cooperation agreements with business and industry were to contribute to continuing the e-learning activities at the FH Munich. However, the high costs associated with developing modules meant that no corresponding partners have been found yet. Negotiations with potential partners remained fruitless, especially since companies, as the experience of the Media and Teaching Department's management team shows, are most likely to invest financial resources into finished products. A "Basic Multimedia Course" (eight units costing 800.- euros) was jointly organised and broadcast by the KMM and BR Alpha. By contrast, a multimedia degree course launched in 1999 as well as a "Multimedia Academy" were abandoned again due to the collapse of the New Economy. The Media and Teaching Department draws attention to itself with lectures, cooperative projects run with the DIZ (e.g. a classroom course on interactive media), a DVD production and the production of video streams.

Website: http://www.fh-muenchen.de/ml/

5.5.4 Other new central facilities

Heinrich Heine University Düsseldorf: Multimedia Centre (Multimediazentrum – MMZ)

The beginning of 1999 saw a Multimedia Centre (MMZ) founded at the University of Düsseldorf with university-wide responsibility. Its core component is a cooperation agreement between the medical faculty and the computer centre, since, at the time, it was assumed that 60% of the contracts to be processed at the MMZ would come from the medical faculty (cf. Sand / Wahlen 2000, pp. 53-73). The objectives of the Multimedia Centre, which is located on Düsseldorf University's Clinic Campus, include media production, media processing, integration of media into multimedia programmes and user interfaces, production of technically demanding websites, production of study programmes, production of information systems for researchers, organisation of video conferences and many other aspects. The MMZ presents some of its own Internet productions on the website: www.med.uni-duesseldorf.de.

Website: http://www.mmz.uni-duesseldorf.de/Aufgaben.html

University of Koblenz-Landau: Institute for Knowledge Media (Institut für Wissensmedien – IWM)

The Institute for Knowledge Media (IWM) is a central research and transfer facility located on the Koblenz Campus of the University of Koblenz-Landau. The IWM is responsible for working on e-learning, knowledge management, CSCL (Computer Supported Cooperative Learning) and CSCW (Computer Supported Cooperative Work). The services offered by the IWM include the evaluation of e-learning software, the provision of learning platforms for pilot projects (for example, WebCT), as well as initiation and support of an e-learning work group. The IWM is actively involved in extending the university-wide WLAN (Hypercampus Koblenz) with the flanking provision of a pool of loan notebooks. The IWM's research projects include, not least, the development of open distance learning modules, participation in the EU funded research and development project MOBILearn on the development of a model mobile learning architecture as well as the Synchronicity in Knowledge-based Cooperative Learning project (*SYWIKOL – Synchronizität beim*

wissensbasierten kooperativen Lernen), which investigates the advantages of synchronous and asynchronous knowledge acquisition in groups.

Website: http://iwm.uni-koblenz.de:9080/iwm/

Ludwig Maximilian University Munich: Internet Unit (Referat Internet)

The Internet Unit at the Ludwig Maximilian University Munich (LMU) supports institutions at the university which want to use e-learning systems. It offers the following support services: use of a virtual seminar room, advice on the evaluation of products and technical support/management of projects, for example, the "Online Textbook Youth Research" project (*Onlinelehrbuch Jugendforschung*). Internet applications are being developed at many places in the university. The Internet Unit tries, by providing advice, to ensure that these decentral developments are adequately coordinated in terms of organisation and content. It focuses particular attention on the visual design of Internet applications, interaction design, web database application and the corporate directory. In addition, the LMU is decisively integrated into the activities of the Virtual University Bavaria, which promotes and coordinates the use and development of multimedia teaching and learning elements at Bavaria's higher education institutions.

Website: http://www.lmu.de/conman/index.cfm?path=2293

University of Osnabrück: virtUOS Support Centre for Virtual Teaching (virtUOS Zentrum zur Unterstützung virtueller Lehre)

The virtUOS Centre was established at the University of Osnabrück in June 2002 to support virtual teaching by integrating, concentrating, unifying and professionally assisting the existing individual efforts to integrate multimedia elements into university teaching. Following a phase of experimental projects and isolated applications, e-learning courses will be migrated into the university's everyday academic operations. The external occasion for founding the centre was provided by the ELAN initiative (eLearning Academic Network) launched by the Lower Saxony state government. Under ELAN, the Universities of Oldenburg and Osnabrück were given the role of a net pilot for the epolos project. The ELAN concept plans to have net pilots create technical and organisational infrastructures which extend beyond the individual universities and represent the framework for an innovative, Lower Saxony-wide e-learning landscape. Besides lecturers and students, especially from the University of Osnabrück, the virtUOS Centre is particularly intended for teachers at schools in Lower Saxony.

Website: http://www.virtuos.uni-osnabrueck.de/

Stuttgart School of Media (HdM): "E-Learning" Centre of Excellence (Kompetenzzentrum "E-Learning")

In its capacity as a full-service higher education institution for the media industry, the Stuttgart School of Media (HdM) maintains its own "E-Learning" Centre of Excellence. This acts as a contact point both for representatives of industry and business and for students and lecturers on all questions relating to virtual and partly-virtual continuing training. The centre of excellence is intended to didactically re-work courses by using multimedia techniques and make these available to students using the HdM Intranet. The centre of excellence's responsibilities include deciding on what courses with which methodology are to be re-worked using multimedia elements, identifying the qualification needs of university teachers as well as organising media-didactic support, assisting with implementation concepts and the production of multimedia study materials. In addition, the centre of excellence makes the learning platform WebCT and the web application TeRM for video productions available throughout the university.

Website: http://www.hdm-stuttgart.de/e-learning/

5.6   Special case: Inner-university development measures

5.6.1 University of Stuttgart: 100 online / self-study online

100 ▬▬online

The approach taken at Stuttgart represents a special case of a project-like development initiative by the university. The University of Stuttgart Computer Centre (RUS) is responsible for implementing and coordinating the development initiative which the Rector, Prof. Dr. Dieter Fritsch, declared to be a corps responsibility. The university's long-term multimedia strategy involves creating an "online campus". This strategy is currently being put into practice by an initiative to implement web-based teaching and learning methods on a broad basis. The University of Stuttgart's online campus will take shape in three successive phases:

- ❏ 100 online
- ❏ self-study online
- ❏ Training online.

These endeavours were complemented by a notebook university programme (NUSS). The around one-year start-up phase for the online campus involved a PR-effective project called "100 online" (April 2001 to July 2002), an inner-university competition to fund e-learning projects aimed at raising acceptance for new technologies in teaching. Following completion of the 100 online programme, the second funding phase "self-study online" started with the goal of producing study modules and multimedia materials for "self-contained study tasks". The third development phase aims to realise a more refined version of the online campus.

Success model "100 online"?

The dynamic support provided for the project by the Rector, Prof. Fritsch, and the Vice-Rector for Academic Affairs and Continuing Training, Prof. Dr. Peter Göhner, proved to be a decisive success factor at the University of Stuttgart. In October 2000, the Rector announced a virtualisation strategy, with responsibility for its concrete implementation at the University of Stuttgart lying with the Vice-Rector for Academic Affairs and Continuing Training. This early and highly focused PR work involving local and national media created an extraordinary degree of publicity for the university project and resulted in a remarkable public presence. There was very large response within the university itself as well as within the German e-learning community.

Under the 100 online programme, the implementation of new media in classroom teaching was funded with non-assigned, university own funds worth 5,000 euros per project. The large number of incoming proposals meant that instead of 100, as originally planned, 230 funded projects were eventually approved. With a total of 170 lecturers, more than half the academic staff of the University of Stuttgart were actively involved in the multimedia preparation and processing of courses. The aspired broadbased orientation was achieved to an optimal degree by the 100 online programme. However, the goal of developing the results to the highest degree of qualitative refinement would have undermined the intended initialising function at this point in time.

"self-study online"

self-study ▬▬online

The follow-up programme "self-study online", which commenced in October 2002, represented the second step on the way to the University of Stuttgart's online campus. It made it possible for students to delve into their course material more deeply in personal study – regardless of where they were learning or of the times which were prescribed by classroom courses. The self-study online programme has been designed as a framework to run for three years or through three separate application rounds (2003 to 2005). Complementing the university-own financing, the university succeeded in acquiring

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grants from the state of Baden-Württemberg. The institutes and departments at the University of Stuttgart started by carrying out projects limited to run for 12 months; at the end of each year, they were then able to apply for the next project stage. The opening event for the second round of the self-study online programme was held on 22 October 2003. Of the 135 self-study online project proposals that had been submitted in the first round, 73 were approved for participation in the second round. Know-how forums were additionally established to act as platforms for the exchange of experience and ideas. Projects addressing similar tasks would use these forums to discuss specific technical and didactic questions (study and exercise modules, self-tests, tutorial support, evaluation). The self-study online programme currently reaches around 5,600 students via courses using a Blended Learning approach.

Other e-learning related responsibilities of the RUS / Prospects

The RUS additionally offers continuing training courses on e-learning optimisation and produces an e-letter. The projected third phase of the e-learning support funding "Training online" will serve to develop continuing training programmes and hybrid online-degree courses. In this stage, study units will be arranged from previously developed and new study modules; these units can be used and are to be commercially marketed as web-based personal study programmes in the field of professional and academic continuing training. The Training-online study units will be made up of study programmes with proper organisational, course-integrated support and accounting concepts. The university and its teachers as well as an industrial service provider responsible for running the Training online portal will cooperate as partners in the Training online programme. Target groups are seen in business and industry, among education providers and organisations, universities, job centres as well as among people interested in continuing training and among alumni. In the medium to long term, the existing multimedia study products as well as the online courses developed at the University of Stuttgart in response to specific demand will be expected to produce a financial return and so to enhance the university's competitiveness in the international education market.

Website: http://www.campus-online.uni-stuttgart.de/self-study/

5.7   Special case: Cross-university facility

5.7.1 Technical University Darmstadt (TUD): httc

The "Hessisches Telemedia Technologie Kompetenz-Center" (httc) has a staff of eight and is a Hessian centre of excellence on telemedia technologies and their implementation in all forms of learning and teaching, and will primarily serve universities in the state of Hesse. Consequently the httc is a special case of state-specific e-learning development structures (and is not comparable with the virtual universities found in other federal states in Germany). The httc brings together and concentrates the skills and expertise available at universities in Hesse as well as at public and private research and education institutions and makes these accessible to university members, schools and other interest groups. The httc was established at the end of 1998 and has the legal status of a not-for-profit registered association. Its members are Hessian universities, private and public education bodies and providers as well as private companies. The httc office in Darmstadt is integrated into Prof. Dr. Rolf Steinmetz's Department for Multimedia Communication (KOM) at the Technical University Darmstadt (TUD), coordinates e-learning projects at universities in Hesse, and takes on project management and project consultancy responsibilities. The httc currently simultaneously serves as the e-learning centre of excellence for the TU Darmstadt and provides technical, organisational and didactic support for university teachers interested in this field.

Hesse-wide coordination?

The httc office in Darmstadt serves as a link to the other variously structured university centres of excellence in Hesse (Kassel, Marburg, Gießen, Frankfurt), which are all equipped with around two staff positions. The httc initiates cross-disciplinary and cross-institutional development and application partnerships, and acts as a contact point with the continuing training courses and activities offered by business and industry. In addition, the httc has a subproject called "Multimedia-Werkstatt" (MMW: www.mmw-hessen.de). This multimedia workshop is a demonstration and training centre which covers all areas related to using multimedia in learning and teaching.

Fig.76: httc structure (Darmstadt)

A qualifying remark must be made at this point, namely that a lack of willingness on the part of participating institutions meant that it was not possible, in particular, to realise the work-sharing approach which Hesse's universities sought to achieve (e.g. a focus on instruction design at the University of Gießen, a focus on learning platforms at the TU Darmstadt) to the extent that had been originally planned. The coordination is limited to a regular, very intensive exchange of experience. The most important result of the inter-university cooperation in the field of virtual study courses was achieved recently in the realisation of an Internet portal www.e-learning-hessen.de, which presents the Hessian e-learning centres of excellence and, among other aspects, makes available a project database which currently contains 130 e-learning projects run by Hessian universities (cf. Chapter 2.8). In addition, the httc is the lead institution in the Hessian flagship project "k-MED", formerly the Virtual Department of Medicine (*Virtueller Fachbereich Medizin*).

Seminars offered

As part of the Multimedia Workshop, a range of seminars is currently being offered (one-day training courses held three times a year on around six topic blocks) for which all university members in Hesse can apply. Relevant training courses have so far reached between 250 and 300 participants. In addition, the httc annually holds the "*Darmstädter E-Learning Symposium*", as well as monthly lectures, a lecture cycle and other continuing training courses. These are also open to representatives of business and industry, since one of the httc objectives lies in transferring know-how to Hesse's business and industry community.

"Dual Mode University" / TUD-online

Following a suggestion tabled by the httc, an interdisciplinary work group called "Dual Mode University" was established at the TU Darmstadt (TUD) to act as a steering body. It is responsible for identifying the infrastructural needs of the individual departments in respect of e-learning offerings, for developing a comprehensive support concept and business model, for motivating departments and subject areas as well as for convincing Hesse's Ministry of Science and Art as to the financing required for e-learning infrastructures and projects at the TUD and, also, at the other Hessian universities. The aspired goal is to make financing for the duties of a multimedia or e-learning centre of excellence a fixed item in the TUD's budget in the future.

The core project currently pursued by the httc within the scope of putting the Dual Mode University into practice involves the development and management of the "TUD-online" funding programme
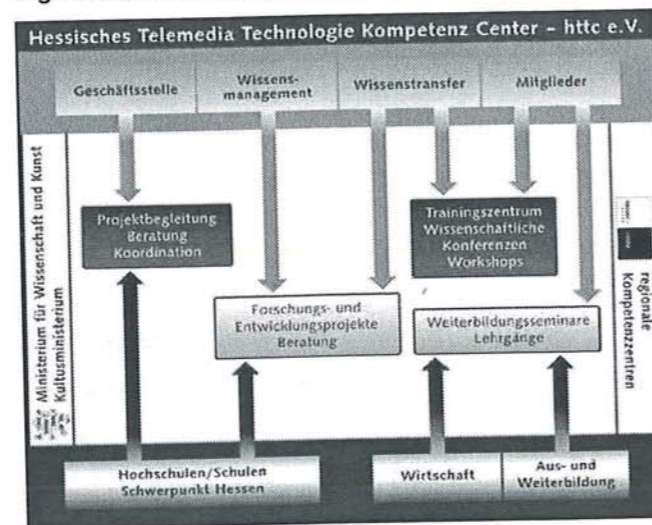
within whose scope 30 projects from all TUD departments have been financially supported from budgetary resources since 2003. Technical, didactic and organisational support is provided by the httc itself in its capacity as a university centre of excellence and by the university computer centre and the university didactics unit. And so projects are, not least, given the opportunity to use a learning platform (one-year trial licence for WebCT). The corresponding funding programme was announced at the end of the httc symposium held in February 2003; the public call for applications resulted in 70 to 80 project proposals being submitted. Each of the approved projects will receive support funding of up to 2,000 euros. The goal is to achieve a system of joint project development in the sense of the "help for self-help" principle, with the requisite technical equipment being made available. This initiative aims to enable lecturers to manage their own projects autonomously, of course without taking the practical realisation of their study modules off their hands (as offered at some e-learning centres in Hesse). The project heads are additionally given a number of academic assistants, with user training courses also being offered. The first results from the 30 projects are to be submitted after one year and then presented at a conference from a student and user-related perspective.

In addition, one university teacher who has put an innovative e-learning approach into practice will be distinguished by receiving the "Best E-Teaching TUD" Award. Working together with the Department of Mathematics (work group specialist didactics) at the TUD and with user interface specialists ion2s, the httc is drawing up a catalogue of criteria for a quality seal which aims to assure high quality standards for computer-aided study arrangements offered at universities.

Website: http://www.httc.de/

5.7.2 Other cross-university facilities

University of Hildesheim, University of Lüneburg, University of Oldenburg: VIA online

VIA online is a joint centre of excellence run by the distance learning centres at the University of Hildesheim (*Zentrum für Fernstudium und Weiterbildung*), the University of Lüneburg (*Fernstudienzentrum*) and the University of Oldenburg (*Fernstudienzentrum*). VIA online helps with the planning and development of virtual courses, offers assistance with the practical realisation of courses, trains teachers and students in how to use the learning environment, provides information on the technical requirements and takes on the technical administration of study modules. VIA online is able to adapt the virtual teaching to the living circumstances of students in a differentiated and situation-focused way, because the relevant virtual study rooms and their resources, their discussion forums and the support by lecturers are always easily accessible. At present, VIA online offers courses in areas such as languages, the education system, urban planning, renewable energies and mathematics. VIA online currently uses the Groupware Lotus Notes (with Lotus LearningSpace) for the virtual study elements and courses.

Website: http://www.via-on-line.de/index.html

5.8 Special case: Integrated communication and media centres

Finally, the paper will address a very recent trend which is developing. This new approach involves integrating a subsidiary e-learning area of responsibility into an integrated communication and media centre. Reference had earlier been made to a similar development involving the HU Berlin's Science Campus at Adlershof. Operational units of the HU Berlin's university library and computer and media centre have been brought together at Berlin's Erwin Schrödinger Centre. Further-reaching measures and practical steps to merge these by organisationally combining library services, computer and media centres can currently be observed at the Universities of Tübingen

and Ulm. However, it is not yet possible to foresee how this model will impact the e-learning infrastructure.

Eberhard Karl University Tübingen: Information, Communication and Media Centre (Informations-, Kommunikations- und Medienzentrum – IKM)

The Information, Communication and Media Centre (IKM) at the University of Tübingen is responsible for all e-learning related responsibilities. The IKM is the central operational unit which has resulted from the merger of the university library, the data processing centre (ZDV) and the multimedia lab (MML). The IKM continues the programmes formerly developed by the ZDV and the MML, namely the "*Tübinger Internet Multimedia Server*" (timms), which offers video and audio material in the field of research and teaching, as well as the "*Tübinger Internet Seminar Server*" (tiss), which is a publication and communication platform for university courses. The IKM supports teachers in the process of converting traditional seminars into Internet-based courses. In addition, there is a Tübingen-programmed learning platform ("MOST") whose continuing development has been put on ice for the time being, however. Moreover, an Institute for Knowledge Media (Institut für Wissensmedien – IWM; www.iwm-kmrc.de) is associated with the University of Tübingen: the IWM does innovative research on delivering knowledge via the new media and works on research topics covering aspects of individual and cooperative learning and knowledge acquisition in media-based learning environments.

Website: http://www.uni-tuebingen.de/uni/qvr/03z/03z01.html

University of Ulm: Communication and Information Centre (Kommunikations- und Informationszentrum – KIZ)

The merger at the University of Ulm of the university computer centre, the university library and the photo, graphics and reproduction centre in 2003 led to the creation of the Communication and Information Centre (KIZ) as a new central facility. All activities of the Communication and Information Centre are steered by a university office, the KIZ office and executive board, which is made up of the heads of the computer centre and the library. The Communication and Information Centre has five departments: Infosystems, Infrastructure, Literature Provision, Literature Administration, and Media. It employs a total of around 140 staff. The Media Department, which covers the service groups multimedia and design, technical book processing, communication and multimedia infrastructure, printing and reproduction, and photography, is responsible for all tasks arising within the field of e-learning support. When it was established, the human resources respectively the collected know-how was taken on from other fields. In addition, KIZ is responsible for all voice communications (telephony) and for the technical media support for the lecture halls and rooms at the University of Ulm.

Website: http://kiz.uni-ulm.de/

5.9 Conclusion

The above compilation of university bodies and support centres working in the field of promoting the implementation of digital study systems shows that very different support structures have developed at the individual higher education institutions since the late 1990s and increasingly in the first decade of the new millennium after the university media strategy papers which had been produced at many places also began to be supported and assisted by increasing project activities originating from the various e-learning funding programmes. Whether a completely new central facility or a network of existing media-related university facilities is better suited to performing the responsibilities which arise at the individual university cannot be decided from the outset on the

basis of the models presented here. Depending on the structure and form of the media development strategy which a university is pursuing, on the existing media infrastructures and cooperation partners, on the identified needs, on the openness of students, lecturers and university management to e-learning, and on the financial freedoms, each of the various solutions seems suitable. While network structures or new units at existing facilities often accelerate the development through to the full operation of centres, completely new facilities are able to determine their responsibilities and to largely act with a high degree of autonomy and independence.

Range of responsibilities

Besides serving the growing demand for direct *project advice and consultancy* and project support, the responsibilities taken on by e-learning support centres also often include the proactive creation of acceptance for web-based interactive study methods. A majority of the support centres found that the approach of *full-service support* for projects exceeded their capabilities, even though some centres of excellence were able to provide such support by integrating student assistants who were able to gain academic credits for their work (e.g. the Multimedia Coordination Office at the University of Kassel, the Multimedia Centre of Excellence at the University of Marburg). In most cases, it was much more realistic to take a diffusion-based respectively *multiplier/disseminator-based approach* in which assistance provided on special questions, the arrangement of support by inner-university experts, and the spread of requisite skills and expertise by means of workshops, lectures and training courses for multipliers/disseminators constitute important elements.

One of the greatest problems probably proved to be the provision of a central university-wide *learning platform* which, due to the high implementation costs of commercial providers, the hard-to-foresee developments in the commercial as well as in the open source field as well as the hurdle of undertaking a change of platform led to substantial uncertainty. This is the only way in which the significant number of university-own LMS developments pursued with substantial time and cost input can be explained. In view of the tight financial resources, a permanent responsibility for many e-learning centres of excellence will also involve establishing effective internal *funding and incentive structures* (e.g. project competitions, multimedia workshops, training programmes for lecturers) to accomplish the implementation and increase the application of e-learning systems.

Organisational structures, establishment history

As far as the organisational structures of the e-learning centres of excellence are concerned, *internal top-down solutions* are found just as frequently as are *internal bottom-up solutions*. While in some cases initiatives on the creation of internal support structures triggered by the specific commitment of the university management provided the necessary spark and initiated long-term developments, in other cases the lack of a relevant e-learning support body led to a close cooperation between several central facilities or between professorial chairs in the creation of a joint work structure which, in the best case, then continues to be supported by the university management. An important role often fell to the *media and computer centres*, and in some respects also to the *libraries* (online publications, establishing databases or repositories) of universities which themselves had the know-how but not always the necessary support potential for dealing with the growing number of inquiries in the e-learning field. This is why, in some cases, a new *unit* was established at the media or computer centre or an *external agency* was created in order to centralise the tasks of checking, passing on and processing of the incoming e-learning support inquiries of lecturers.

It is not possible at the moment to reach a final conclusion or judgement on specific approaches to base e-learning duties at an *integrated communication and information centre* by merging the university library and computer centre. As far as the centralist approach is concerned, such as is

pursued in Hesse with the establishment of the httc as a *coordination office for the support centres* or in Saarland with the "Competence Center Virtual Saar University", it is necessary first of all to state that the diverging interests pursued by university e-learning protagonists can obviously stand in the way of any successful cooperation. An unavoidable consequence in such a case is the restriction of coordinated actions to those universities willing to cooperate. Yet, even a higher education institution such as the University of Hagen, which combines its external communication with a strongly affirmative statement in favour of the learning environment of a virtual university, is only gradually succeeding in achieving the goals it has set itself.

Financing model

As a rule, the establishment of a completely new e-learning centre of excellence proves to be a cost-intensive step, while the positioning of such a body at existing facilities or the creation of vital, network-like cooperative structures generally allows for more cost-friendly operations. The responsibility of supporting and managing the production of study modules by the individual e-learning support unit implies high staffing and financial burdens. In fact, the production of study modules can in most cases be coordinated and carried out with less frictional loss by new units located at existing facilities with considerable technical ICT competencies (e.g. a media centre) than by completely newly established centres of excellence. In each case, the established cooperative structures of passing on inquiries from lecturers interested in e-learning to experts from other facilities or of carrying out support tasks by incorporating existing inner-university capacities proves that university e-learning centres of excellence act as the key hinge between university management, central facilities and university lecturers.

Marketing models

A generally unsolved problem arises with the marketing question, since university study modules are, as a rule, tailored to a narrowly defined application context and so cannot simply be transferred to outside user contexts. If university study modules are to be offered at education markets (university continuing training, advanced corporate staff training, general education market), then a decisive success factor lies in the *target group focused adaptation* of these products. Even university marketing agencies can only act successfully if the marketable products have been designed appropriately for the addressees or have been appropriately amended. The Virtual FH (*Virtuelle Fachhochschule*), the Teleacademy Furtwangen (*Teleakademie Furtwangen*) or the Education Portal Thuringia (*Bildungsportal Thüringen*) are already trying to focus their marketing efforts in line with these requirements. The fact that even universities with close ties to the domestic industry are, meanwhile, only achieving limited successes in this respect also points to a fundamental problem in designing marketable products (as well as in the legal frameworks).

A few years after the foundation of the first university support centres, the continuation of several of these facilities is often no longer certain due to the current consolidation measures taking place in the state budgets which are deeply affecting the whole system of higher education. The successful advisory, networking and PR work and the productivity of these centres means that this is an extraordinarily regrettable situation. Relevant, central contact points at the universities have an eminently important role to play in the successful implementation and the long-term consolidation of e-learning applications. Without such infrastructural backbones, e-learning production will continue in the future to depend substantially on the initiative of individual professors and their departments, and digital teaching, with its various value-added aspects, will at best be able to partially establish itself at universities.

Appendix

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B. URL Index / Federal Ministries

Ministry of Science, Research and the Arts of the State of Baden-Württemberg	http://www.mwk.baden-wuerttemberg.de/
Bavarian State Ministry of Sciences, Research and the Arts	http://www.stmwfk.bayern.de/
Senate Administration of Science, Research and Culture	http://www.berlin.de/senwisskult/index.html
Ministry of Science, Research and Culture of the State of Brandenburg	http://www.brandenburg.de/cms/list.php?page=mwfk_site_home_site&_siteid=3
Senator of Education and Science, Bremen	http://www.bildung.bremen.de/
Science and Research Authority, Hamburg	http://fhh.hamburg.de/stadt/Aktuell/behoerden/wissenschaft-forschung/start.html
Hesse State Ministry of Higher Education, Research and the Arts	http://www.hmwk.hessen.de/home/
Ministry of Education, Sciences and Culture, Mecklenburg-West Pomerania	http://www.kultus-mv.de/
Ministry for Science and Culture of Lower Saxony	http://www.mwk.niedersachsen.de/home/
Ministry of Science and Research of the State of North Rhine-Westphalia	http://www.mwf.nrw.de/
Ministry of Science, Continuing Training, Research and Culture, Rhineland-Palatinate	http://www.mbww.rpl.de/web2/mwwfk.htm
Ministry of Education, Culture and Science, Saarland	http://www.bildung.saarland.de/
Ministry of Science and the Arts of the State of Saxony	http://www.smwk.de/
Ministry of Education of the State of Saxony-Anhalt	http://www.mk.sachsen-anhalt.de/
Ministry of Education, Science, Research and Culture of the State of Schleswig-Holstein	http://landesregierung.schleswig-holstein.de/coremedia/generator/Kategorien/Landesregierung/Ministerien/MBWFK/Aktuelles/Aktuelles_Trefferliste.html
Ministry of Science, Research and the Arts of the State of Thuringia	http://www.thueringen.de/de/tmwfk/

C. URL Index / E-Learning Programmes and Initiatives of the Federal Government and the Federal States (Länder)

Educational Server Sachsen	www.bildungsportal.sachsen.de
Educational Server Thüringen	http://www.bildungsportal-thueringen.de/
Competence Center Virtual Saar University	http://visu.uni-saarland.de
ELAN-Pilot Oldenburg / Osnabrück	www.epolos.de
Advisory Board Multimedia of Lower Saxony	www.sbmm-niedersachsen.de
Docs'n Drugs – The Virtual Polyclinic	www.docs-n-drugs.de
E-Learning Consortium Hamburg (ELCH)	www.e-learning-hamburg.de
E-Learning in Hesse	http://www.hessen-media.de/projekte/inhalt/inhalt.htm
	www.e-learning-hessen.de
E-teaching@university	www.e-teaching.org
Chemistry Information Centre Berlin	http://www.fiz-chemie.de/de/
Funding Programmes MMKH	www.mmkh.de
Funding Programmes MMKH – Projects	http://www.mmkh.de/projekte/index_0.html
Cooperation with institutions and networks in NRW:	
- Network Multimedia of Universities of Applied Sciences	
- Digital Library NRW	http://www.verbundstudium.de/german/mmedia/menu.html
- CampusSource	
- Data Network Agency NRW	www.digibib-nrw.de/
- e-nitiative.nrw – Education Network	www.campussource.de
	http://netzagentur.informatik.uni-bonn.de/netzagentur/
	www.e-nitiative.nrw.de
Lab of Content Engineering, Oldenburg	www.celab.de
Learning Management Systems E-Learning in Hamburg	www.eStudent-Hamburg.de
- Declaration of Hamburg	http://www.mmkh.de/upload/dateien/artikel/hamburg_erklaerung1.pdf
Multimedia University Service Berlin GmbH	www.mhsg.de
New Media in Education	www.medien-bildung.net
Baltic Sea Virtual Campus, Schleswig-Holstein	www.bsvc.de
Tutors and Scientific E-Learning Assistants	http://support.mmkh.de
University Network Multimedia, North Rhine-Westphalia	www.uvm.nrw.de
Network Studies Chemistry	www.vs-c.de
Network Studies Chemistry, examples	http://www.vs-c.de/beispiele/index.html
VIB – Virtualisation in Education	www.vib-bw.de/

Virtual University Network Karlsruhe / ViKar	http://vikar.ira.uka.de/
ViKi (Virtual Cooperation and Information Network for the Application of New Media in University Teaching)	http://www.virtuelle-hochschule.de/index2.html?102
Viror – Virtual University Upper Rhine	www.viror.de
Virtual University of Applied Sciences	www.oncampus.de
Virtual University Baden-Wuerttemberg	www.virtuelle-hochschule.de
Virtual University Bavaria	www.vhb.org
Virtual Campus Rhineland-Palatinate	www.vcrp.de
Virtugrade – Virtual Education for Postgraduates	http://www.virtugrade.uni-tuebingen.de
VVL – Network Virtual Laboratory	www.vvl.de

D. URL Index of E-Learning Support Centres at Universities

University of Applied Sciences Düsseldorf: Institute of Media, Communication and Information Technology (MKI)	http://www.mki.fh-duesseldorf.de/
University of Applied Sciences Cologne: Centre of Information Technology	http://www.zi.fh-koeln.de/
University of Applied Sciences Munich: media+teaching	http://www.fh-muenchen.de/home/ze/zak/ml/
University of Hagen: Centre for the Development of Distance Studies	http://www.fernuni-hagen.de/ZFE/
Freie Universität Berlin: CeDiS / Competence Centre of E-Learning and Multimedia	http://www.fu-berlin.de/einrichtungen /verwaltung/zuv/cedis.html
University of Applied Sciences of Media, Stuttgart: Competence Centre	http://www.hdm-stuttgart.de/e-learning/
University of Applied Sciences Mittweida (HSMW): Competence Centre „New media in Education"	http://www.htwm.de/wbildung/medienkompetenz.htm
Humboldt University Berlin: Multimedia Teaching and Learning Centre	http://www.hu-berlin.de /cms/mlz
Ludwig Maximilian University Munich: Internet Department	http://www.lmu.de/conman/index.cfm? path=2293
Darmstadt University of Technology: Telemedia Technology Competence Centre of Hesse (httc)	www.mmw-hessen.de http://www.httc.de/
Dresden University of Technology: Media Design Centre	http://www.mdc.tu-dresden.de/
University of Bremen: Centre of Multimedia Teaching (ZMML)	http://www.zmml.uni-bremen.de/
University of Dortmund: Media Centre (MZ)	http://www.mz.uni-dortmund.de/
University of Duisburg-Essen (location Essen): E-competence Team	http://www.uni-essen.de/e-competence/
University of Düsseldorf: Multimedia Centre (MMZ)	www.med.uni-duesseldorf.de http://www.uni-duesseldorf.de/HHU/MMZ
University of Erlangen-Nürnberg: Forum New Media in Teaching	http://www.mmforum.uni-erlangen.de
University of Frankfurt: Competence Centre New Media and Teaching	http://www.rz.uni-frankfurt.de/neue_medien/
University of Freiburg: New Media Centre	http://www.mmk.uni-freiburg.de/
University of Gießen: Multimedia Competence Centre (MMCC)	http://www.mmcc.uni-giessen.de/mmcc.asp
University of Hildesheim, University of Lüneburg, University of Oldenburg: VIA-online	http://www.via-on-line.de/index.html
University of Kassel: Coordination Unit Multimedia	www.uni-kassel.de/hrz/e-learning/
University of Kiel: Interdisciplinary Multimedia Centre (IZM)	http://www.av-studio.uni-kiel.de/izm/

University of Koblenz-Landau: Knowledge Media Institute (IWM)	http://iwm.uni-koblenz.de:9080/iwm/
University of Marburg: Multimedia Competence Centre	http://www.uni-marburg.de/hrz/multimedia/mmcc.html/
University of Oldenburg: Centre for Distributed eLearning	http://www.cdl-oldenburg.de/
University of Osnabrück: virtUOS	http://www.virtuos.uni-osnabrueck.de/
University of Stuttgart: 100 online / self-study online	http://www.campus-online/uni-stuttgart.de/self-study/
University of Tübingen: Information, Communication and Media Centre (IKM)	http://www.uni-tuebingen.de/uni/qvr/03z/03z01.html
University of Ulm: Communication and Information Centre (KIZ)	http://kiz.uni-ulm.de/
University of Wuppertal, ec-team	http://e-teaching.uni-wuppertal.de/

E. Sources of Figures

Fig. 1	http://www.oncampus.de/kontakt/kontakt.php?von=infocenter
Fig. 2	http://www.vs-c.de/partner/index.html
Fig. 3	BMBF 2002
Fig. 4	BMBF 2002
Fig. 5	http://info2002.vhb.org/hochschulen/karte/
Fig. 6	http://info2002.vhb.org/vhb/institutionen/traegerhochschulen/
Fig. 7	http://info2002.vhb.org/vhb/institutionen/gremien/
Fig. 8	http://info2002.vhb.org/vhb/leistung/
Fig. 9	http://portal2002.vhb.org/katalog/frameset_katalog_anonym.html
Fig. 10	http://www.cedis.fu-berlin.de/Linkdatei/mhsg.pdf
Fig. 11	http://www.mmkh.de/projekte/foerderprogramm.html
Fig. 12	http://www.e-learning-hessen.de/
Fig. 13	http://www.elan-niedersachsen.de/
Fig. 14	http://www.elan-niedersachsen.de/piloten.html
Fig. 15	http://www.epolos.de/
Fig. 16	http://www.learninglab.de/deutsch/presse/faq.html
Fig. 17	http://www.learninglab.de/deutsch/konzept/interactiveLearningLab.html
Fig. 18	http://www.uvm.nrw.de/C1256AFC003A7991/0/BE512A68EC668311C1256B1F002E3826?OpenDocument
Fig. 19	http://www.uvm-nw.de/C1256AFC003A7991/0/0DEBE5C6FBB2EA82C1256B2100472ADC?-OpenDocument
Fig. 20	http://www.e-teaching.org/
Fig. 21	http://www.bertelsmann-stiftung.de/medien/pdf/Projektinfos_030716_tsm.pdf (S.9)
Fig. 22	http://www.vcrp.de/interna/orga.htm#organ
Fig. 23	cf.: http://www.bildungsportal-sachsen.de/doku/ws190503/thiem190503.pdf (S.5/S.8)
Fig. 24	http://www.bsvc.de http://134.102.65.100/bsvc/modules.php?op=modload&name=News&file=index&topic=2&allstories=1
Fig. 25	http://www.bildungsportal-thueringen.de/servlets/sfs?s=kRqmtrZdSn5hTXdcPA3&t=/Default/-selectCatalog&i=1019815954489&b=1019815954489&l=1&ParentID=1040112202421&-CustomerID=0&intro=1
Fig. 26	http://www.bildungsportal-thueringen.de/portals/bpth/story_docs/18.12.2003_Bildungsportal_-Praesentation.pdf (S.2)
Fig. 27	http://www.bildungsportal-thueringen.de/servlets/sfs?s=KN8etfzEsdix4pyp&t=/Default/select-Catalog&i=1019815954489&b=1019815954489&l=1&ParentID=1063037977453&Customer-ID=0&intro=1
Fig. 66	http://www.cedis.fu-berlin.de/plain.php?cont=97
Fig. 67	http://www.cedis.fu-berlin.de/plain.php?cont=3

Fig. 68	MLZ-Lehren und Lernen mit Multimedia, in: cms-journal Nr. 24, Berlin 2003, S. 32
Fig. 69	http://www.hu-berlin.de/cms/mlz/index.php?frame1=beratung/kopf.php&frame2=http://lms.hu-berlin.de/mlz
Fig. 70	http://www.zi.fh-koeln.de/
Fig. 71	http://www.zmml.uni-bremen.de/struktur_neu.php
Fig. 72	http://www.uni-essen.de/e-competence/
Fig. 73	http://www.e-teaching.org/
Fig. 74	http://www.cdl-oldenburg.de/cdl/kernbereiche.html
Fig. 75	Medien+LEHRE, FH München (Hg.): Multimedia-Zertifikat (MMZ). Veranstaltungsverzeichnis WS 2003/04, München 2003
Fig. 76	http://www.httc.de/schaubild.htm

F. Online Survey "Sustainability Strategies for E-Learning Projects" – Cooperative Projects

1. General Information on the Project

■ **Question 1: Allocation Code**

Please enter your allocation code.

[   ]

2. Product

■ **Question 2: For which subject group are the outcomes of your project intended?**

Please mark the appropriate field. If you mark "other", please indicate the subject group in the following description field.

- ☐ Computer Science, Mathematics
- ☐ Engineering
- ☐ Natural Sciences
- ☐ Medical Science, Pharmacy, Public Health
- ☐ Agricultural and Forestry Science
- ☐ Psychology, Education
- ☐ Sociology and Social Sciences
- ☐ Law and Economics/Business Administration
- ☐ Art, Design, Media Studies
- ☐ Languages, Cultural Studies, Humanities
- ☐ Sports Sciences
- ☐ Others: [   ]

■ **Question 3: Which type of product does your cooperative project develop?**

Please mark one or several fields. If you mark "other" please indicate the kind of product in the following description field.

- ☐ content/course modules
- ☐ software tool
- ☐ platform/course management system
- ☐ portal
- ☐ Advice and consultancy
- ☐ technical support
- ☐ others, i.e.: [   ]

■ **Question 4 To what extent have the following value-added aspects been implemented in the product developed by your project network?**

Please place a mark on the scala for each of the value-added aspects.

	not imple-mented				fully imple-mented
greater clarity	O	O	O	O	O
greater availability	O	O	O	O	O
easier updating	O	O	O	O	O
greater appeal (motivational aspect)	O	O	O	O	O
relieve classroom teaching from pure knowledge transfer tasks	O	O	O	O	O
Self-organised studies	O	O	O	O	O
adaptability to individual learning styles and processes	O	O	O	O	O
enabling easy communication between lecturers and students	O	O	O	O	O
enabling easy communication between students	O	O	O	O	O
digital preparation of standard knowledge of one subject	O	O	O	O	O
digital preparation of knowledge relevant for different subjects	O	O	O	O	O
digital preparation of specialist knowledge not available elsewhere	O	O	O	O	O
digital preparation of new knowledge/ recent research results	O	O	O	O	O

3. Implementation in teachings

■ **Question 5: In which educational fields will the product be applied?**

Please mark one or several boxes. If you mark „other" please specify the educational field in the description space.

☐   basic study stage
☐   main study studies
☐   postgraduate/doctoral studies
☐   doctoral studies
☐   research

☐   academic continuing training
☐   professional continuing training
☐   school
☐   others, i.e.:

■ **Question 6: Which type of study opportunity will be developed by your cooperative project?**

Please mark one or several boxes. If you mark "other" please specify the type of study opportunity in the following description field.

☐   entirely virtual degree programme
☐   partly virtual degree prorgamme
☐   indivdual course (seminar, lecture etc.)
☐   study modules for combining at will
☐   complementary course materials for classroom teaching/learning
☐   others, i.e.:

■ **Question 7: In which way will the study opportunity be integrated in the curriculum?**

Please enter your answer in keywords in the description field.

■ **Question 8: Which course attendancy policy is pursued?**

Please mark the appropriate boxes.

☐   required course
☐   optional course
☐   elective (voluntary) course
☐   cannot say yet

■ **Question 9: Where will the product be used?**

Please mark one or several boxes.

☐   Germany
☐   German speaking foreign countries
☐   non-German speaking countries in Europe
☐   non-European countries

4. Distribution und Application

■ **Question 10: In which languages will the product be offered?**

Please mark one or several boxes. If you mark "other" please specify the language in the following description field.

☐ German

☐ English

☐ others, i.e.: [   ]

■ **Question 11: Which problems (legal, financial or likewise) have you encountered or do you expect with the commercial exploitation of your product?**

Please indicate the (estimated) problems in keywords in the description field.

[   ]

5. Quality management

■ **Question 12: Will your cooperative project be evaluated?**

Please mark the appropriate field.

O yes

O no

O not clear yet

■ **Question 12a: How is the project evaluated?**

Please mark one or several boxes.

☐ summative project-internal evaluation, i.e. final recapitualtory evaluation that will be performed by the content developers themselves

☐ summative project-external evaluation, i.e. final recapitualtory evaluation that will be performed by persons not participating in the development of the product

☐ formative project-internal evaluation, i.e. simultaneous evaluation that is performed by the content developers themselves

☐ formative project-external evaluation, i.e. simultaneous evaluation that is performed by persons not participating in the development of the product

The last question should only be answered if the foregoing question ("Will your cooperative project be evaluated?") has been answered with "yes".

■ **Question 13: Will the outcomes of the cooperative project (or parts of it) be accredited for a (full) degree programme?**

Please mark the appropriate field. If you mark "yes" please specify the accrediting institution in the following description field.

O yes, through: [   ]

O no

O cannot say yet

■ **Question 14: How will the continuing development of the project outcomes regarding content and didactics after the termination of the funding programme be ensured?**

Please insert your answer in keywords in the description field.

[   ]

■ **Question 15: Is any user training given? Please mark the appropriate box.**

O yes

O no

O cannot say yet

■ **Question 15a: Who will perform the user training measures for the project outcomes?**

Please fill in the name of the institution in the description field.

[   ]

The last question should only be answered if the foregoing question has been answered with „yes" ("Will user training for project external users of the product be provided?")

6. Final Remarks

■ Question 16: The following description field provides the possibility to place additional remarks, proposals and requests regarding aspects of the technical, organisational, financial etc. sustainability of your project.

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■ Question 17: All questions have been answered. If you want to finish the questionnaire mark "Finish questionnaire" now. Alternatively the "Return" button of your browser can be used to go back and check your answers again.

O   Finish questionnaire

We have received your data. Many thanks for your kind support!

We will inform you about the results after the analysis of the questionnaire has been completed. If you would like to leave the questionnaire now please close the browser.

G. Online Survey "Sustainability Strategies for E-Learning Projects" – Individual Projects

1. General Information on the Project

■ Question 1: Allocation Code

Please enter your allocation code.

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■ Question 2: : What BMBF grant-financed staff were involved in your individual project?

Please mark one or several boxes and fill in (in numbers) the appropriate amount of employees in the description field.

☐   research staff:

☐   research assistants with a degree:

☐   research assistants without a degree:

☐   technical-administrative staff:

☐   first-year resident (Arzt im Praktikum):

☐   tutors:

☐   contract lecturers:

☐   authors:

☐   miscellaneous staff:

■ Question 3: Which activities did your individual project perform for the network?

Please mark the appropriate field. If you mark "other" please fill in the task in the following description field.

☐   project management

☐   didactical design and consulting

☐   content production

- ☐ technology development
- ☐ technical support
- ☐ software development
- ☐ evaluation
- ☐ quality assurance
- ☐ marketing and sales
- ☐ others, i.e.: [   ]

2. Use in Teaching

■ **Question 4: Is the project actively supported by the university management?**

Please mark the appropriate box. If you mark "yes" please indicate the form of support in the following description field.

- O   yes, i.e. through: [   ]
- O   no
- O   cannot say yet
- O   no response

■ **Question 5: Was the project integrated into a media development strategy?**

Please mark the appropriate field. If you mark "yes" please indicate in which way the project is integrated in a media development strategy in the following description field.

- O   yes, namely through: [   ]
- O   no
- O   no media development strategy yet

■ **Question 6: How important are the following project goals within your project?**

Please mark the appropriate value on the scale for each project goal.

	unimportant				very important
improving the quality of teaching	O	O	O	O	O
improving student guidance and supervision	O	O	O	O	O
speeding up studies	O	O	O	O	O
cost savings	O	O	O	O	O
income from marketing	O	O	O	O	O
Raising student learning motivation	O	O	O	O	O
reaching new student groups	O	O	O	O	O

place, time, area independant studies	O	O	O	O	O

3. Didactics

■ **Question 7: How important are the following multimedia application forms within the scenarios of teaching and learning applied by your individual project?**

Please mark the appropriate value on the scale for each multimedia application form. If you want to completely erase the marks move back one page und return through the "Forward" button to this page. All marked fields will then be erased.

	unimportant				very important
documents (e.g. foils, HTML documents, pdf documents)	O	O	O	O	O
drill and practice programmes	O	O	O	O	O
tutorial	O	O	O	O	O
intelligent tutorial system	O	O	O	O	O
hypermedia information systems	O	O	O	O	O
video	O	O	O	O	O
animation (non interactive)	O	O	O	O	O
simulation (interactive, e.g. map exercise, laboratory etc.)	O	O	O	O	O
virtual reality	O	O	O	O	O
integration of tools (e.g. computer algebra systems)	O	O	O	O	O
archive (researchable)	O	O	O	O	O

■ **Question 8: How important are the following media based teaching / learning processes within the scenarios of teaching and learning applied by your individual project?**

Please mark the appropriate value on the scale for the applicable learning processes. If you want to completely erase the marks within a single line move back one page und return through the "Forward" button to this page. All marked fields will then be erased.

	unimportant				very important
distribution (e.g. sending of teaching material, exercises)	O	O	O	O	O
coordination/organisation (e.g. study and course organisation)	O	O	O	O	O

communication	O	O	O	O	O
cooperation/collaboration (e.g. virtual learning groups)	O	O	O	O	O

■ Question 9: How important are the following media based teaching / learning processes within the scenarios of teaching and learning applied by your individual project?

Please mark the appropriate value on the scale for the applicable teaching / learning processes. If you want to completely erase the marks within a single line move back one page and return through the "Forward" button to this page. All marked fields will then be erased.

	unimportant				very impor-tant
e-mail	O	O	O	O	O
mailing list	O	O	O	O	O
text chat	O	O	O	O	O
audio chat	O	O	O	O	O
discussion forum	O	O	O	O	O
groupware (e.g. BSCW)	O	O	O	O	O
application sharing	O	O	O	O	O
whiteboard	O	O	O	O	O
video conference	O	O	O	O	O
video broadcasting	O	O	O	O	O
remote control (lab telecontrol)	O	O	O	O	O

■ Question 10: Which of the following teaching / learning methods are performed in (partly) virtual mode in your individual project?

Please mark the appropriate value on the scale for the applicable teaching / learning processes. If you want to completely erase the marks within a single line move back one page and return to this page through the "Forward" button. All marked fields will then be erased.

	no virtual portions				entirely virtu-al process
speech, lecture	O	O	O	O	O
scripts	O	O	O	O	O

exercise	O	O	O	O	O
seminar	O	O	O	O	O
internship	O	O	O	O	O
dialogue (lecturer-student)	O	O	O	O	O
case study	O	O	O	O	O
map exercise, business game etc.	O	O	O	O	O
problem based learning	O	O	O	O	O
project work	O	O	O	O	O
(supervision of) seminar / final paper	O	O	O	O	O
course-related book collection, library	O	O	O	O	O

■ Question 11: How important are the following social teaching settings for the scenarios of teaching and learning developed by your individual project?

Please mark the appropriate value on the scale for one or several social teaching settings. If you want to completely erase the marks within a single line move back one page and return to this page through the "Forward" button. All marked fields will then be erased.

	unimportant				very impor-tant
single work / studies	O	O	O	O	O
partner work /studies	O	O	O	O	O
group work	O	O	O	O	O
large groups – e.g. ex-cathedra teaching, plenum etc.	O	O	O	O	O

■ Question 12: Does your project rely on explicit didactical concepts and principles (e.g. learning theoretical references / didactical models / instruction design models etc.)?

Please mark one field.

O   yes

O   no

■ Question 12a: On which didactical concepts and principles does your individual project rely?

Please fill in the underlying didactical principles in keywords.

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■ Question 12b: Which of the concepts mentioned have proved beneficial? State reasons briefly.

Please fill in the reasons in keywords.

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│                                                 │
│                                                 │
│                                                 │
└─────────────────────────────────────────────────┘
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The last two reasons should only be answered if the foregoing question ("Does your project rely on explicit didactical concepts and principles?") has been answered with "yes".

4. Distribution and Marketing

■ Question 13: How is your individual project's product presented to the public?

Please mark one or several fields. If you mark "other" please specify in which way your product will be presented to the public in the following description field.

☐　presentation at trade fairs, shows and conferences

☐　presentation at faculty conferences (Fakultätentage)

☐　presentation during a workshop

☐　cooperation with scientific disciplinary societies

☐　advertising via publishers

☐　advertising via marketing agencies

☐　university public relations activities

☐　web-based education portals/databases

☐　cooperation with chambers, associations and companies

☐　cooperation agreements with other universities

☐　cooperation with research institutes

☐　transfer through multipliers/disseminators

☐　involvement in a virtual university of the Länder

☐　others, i.e.: [_____]

■ Question 14: Is the product offered in continuing training courses at your university against payment of a fee?

Please mark the appropriate box.

○　yes

○　no

○　cannot say yet

■ Question 14a: Who will offer the product in the continuing training sector against the payment of a fee?

Please mark one or several fields. If you mark "other institutions" please indicate the marketing institution in the following description field.

☐　university marketing agency / university associated company

☐　continuing training centres at the university

☐　extra-university continuing training providers

☐　publishers

☐　education portals/virtual universities in the Länder

☐　international education portals

☐　other institutions, i.e.: [_____]

☐　cannot say yet

The last question should only to be answered if the foregoing question („Is the product offered in continuing training courses at your university against payment of a fee?") has been answered with "yes".

5. Financing

■ Question 15: How much annual funding do you estimate is needed for your individual project to continue after the end of the BMBF funding?

Please enter – if conceivable – the estimated amount in €.

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┌─────────────────────────────┐
│                             │
└─────────────────────────────┘
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■ Question 16: How can or will the continuation of the individual project be financed after the end of the BMBF funding (e.g. by other third-party funding programmes)?

Please place the answer in keywords in the description field.

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┌─────────────────────────────────────────────┐
│                                             │
│                                             │
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│                                             │
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■ **Question 17: Has your university made any promises regarding the continuing payment of staff in your individual project?**

Please mark the appropriate box.

O   yes

O   no

O   cannot say yet

■ **Question 17a: For which employees exists a covenant for a follow-up financing through your university?**

Please cross one or several fields and enter the appropriate amount of employees in the following description field. If you mark "other" indicate the type and amount of employees in the following description field.

☐   research staff:

☐   research assistants with a degree:

☐   research assistants without a degree:

☐   technical-administrative staff:

☐   tutors:

☐   assistant lecturer:

☐   first-year resident (Arzt im Praktikum):

☐   other, i.e.:

The last question should only be answered if the foregoing question ("Has your university made any promises regarding the continuing payment of staff in your individual project?") has been answered with "yes".

6. Organisation

■ **Question 18: Which university institutions does your individual project cooperate with?**

Please mark one or several boxes. If you mark "other" please indicate the name of the institution in the following description field.

☐   computer centre

☐   media centre

☐   AV centre

☐   university library

☐   departmental library

☐   university continuing training

☐   others, i.e.:

■ **Question 19: Which services are performed for your individual project by companies or individuals working on a commercial basis?**

Please mark one or several boxes. If you mark "other" please indicate the type of service in the following description field.

☐   content production

☐   software development

☐   didactic advice

☐   technical services

☐   evaluation

☐   rights management/ license sales

☐   sales

☐   others, i.e.:

■ **Question 20: Which non-project institutions does your individual project cooperate with on a non-commercial basis?**

Please mark one or several boxes. If you mark "others" please indicate the type of institution in the following description field.

☐   domestic universities

☐   foreign universities

☐   commericial education companies

☐   companies not active in the education sector

☐   non-commercial education organisations

☐   research institutes

☐   continuing teacher training centres

☐   others, i.e.:

☐   none

7. Rights management

■ **Question 21: Is your individual project responsible for managing the rights for the cooperative project?**

Please mark the appropriate field.

O   yes

O   no

■ **Question 21a: Who is responsible for managing rights?**

Please mark on or several boxes. If your mark "other" please indicate the person assigned with the rights management in the following description field.

☐   project staff

☐   legal officer/university law department

☐   personnel department at the university

☐   media centre

☐   marketing agency

☐   cross-university institution

☐   others, i.e.: [   ]

☐   nobody (yet)

■ **Question 21b: Did your individual project obtain legal support or advice?**

Please mark the appropriate field.

O   yes

O   no

■ **Question 21bα: Because of which problems or questions did your individual project obtain legal support or advice?**

Please enter the problems of questions in keywords in the description field.

[   ]

■ **Question 21c: : Who did your individual project consult for legal advice?**

Please mark one or several boxes. If you mark "other institutions" please indicate the type of institution in the following description field.

O   colleagues/staff

O   law department of a university

O   licensing office/transfer agency of the Land

O   project-administrating agency (workshop etc.)

O   law office

O   other institutions, i.e.: [   ]

■ **Question 21d: Are parts of the cooperative project budget used for the management of rights?**

Please mark the appropriate field. If you mark "yes" please indicate the amount of expenses in € in the following description field.

O   yes, i.e. (in €): [   ]

O   no

The last five questions should only be answered if the foregoing question ("Is your individual project responsible for managing the rights for the cooperative project?") has been answered with "yes".

8. Technology

■ **Question 22: Do you use XML?**

Please mark the appropriate box. If you mark the last box please indicate the reasons in the following description field.

O   yes

O   not yet, but planned

O   no, not revelant

O   no, because for the following reasons unnecessary: [   ]

■ **Question 23: What kind of learning management system was used?**

Please mark one or several boxes and enter the name of the learning management system in the description field.

commercial product, i.e.:

☐   [   ]

open source solution, i.e.:

☐   [   ]

own development, i.e.:

☐   [   ]

☐   no learning management system

■ **Question 24: Do you adhere to a metadata standard in your individual project?**

Please mark the appropriate field. If you mark "yes" please indicate the meta data standard in the description field.

O   yes, i.e.: [   ]

O   no

■ **Question 25: Which measures does your individual project consider to ensure technical sustainability (e.g. documentation and continued development of software, open-source solutions etc.)?**

Please enter the measures in keywords in the description field.

■ **Question 26: Who is responsible for technical maintenance, continuing development and adaptation of the product?**

Please mark one or several boxes. If you mark "other" please indicate the persons in charge of the continuing development in the following description field.

☐   staff/follow-up institution

☐   computer centre

☐   media centre

☐   partner companies

☐   others, i.e.:

☐   not clear yet

9. Final remarks

■ **Question 27: The following text field gives you the opportunity to make further comments, suggestions and requests as far as ensuring your individual project's sustainability in technical, organisational, financial etc. terms is concerned.**

■ **Question 28: All questions have been answered. If you want to finish the questionnaire mark "Finish questionnaire" now. Alternatively the "Return" button of your browser can be used to go back and check your answers again.**

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