

35 Virtual Campus – Trends and Perspectives in Germany

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Abstract

In the last few years in Germany virtual campus initiatives have been funded considerably. In our paper we will give a review of comments and recommendations of the advisory boards in higher education policy and of the various funding schemes on the level of the federal states and the federal government. An analysis of the current program „New Media in Education” indicates trends of possible developments as well as hindrances in the virtualization of higher education.

Keywords: virtual campus, higher education policy, evaluation

1. Introduction

The possibilities of the new information and communication technologies for information, learning, communication, and cooperation are manifold. Since several years, this is a challenge for the whole educational area, and especially for higher education (HE). In the mid nineties there was a first survey on the organisation of media based teaching in German higher education. This survey (Lewin et al., 1996) documented 979 projects using new media for teaching. The authors state only singular activities of enthusiastic people with very few cooperations between institutions. In most cases the media were used as add ons to traditional forms of teaching, not using the full potential of the media.

It is assumed that this is a crucial backlog compared to international competitors (especially in the anglo-saxon area) in a global education market (Encarnação, Leidhold, & Reuter, p. 14, 2000). Not least to considerable public investments for the development and the utilization of virtual components in higher education, this situation has changed.

Today the challenge in higher education consists mainly of the necessity to find ways to integrate technological innovations in a highly differentiated educational system and to adapt them into the inherent logic of the system. Thus we deal with processes of change for the organisation as a whole. German institutions of higher education at present pass through such processes of adaptation and further development.

Germany has a highly differentiated higher education system, with about 90 universities, more than 100 Fachhochschulen (universities of applied sciences), and a number of teacher training colleges and academies for vocational training. Distance teaching is offered by the Fernuniversität Hagen and some dual mode universities. Compared to activities in other

countries, these institutions did not take increased initiatives in introducing new media for teaching and learning.

Ultimately it is not astonishing, that respected advisory boards have commented on the possibilities and consequences of the use of information and communications technologies in higher education, like the Science Council (Wissenschaftsrat, 1998), the „Bund-Länder“ Commission for Educational Planning and Research Promotion (BLK, 1998, 1999, 2000) and the Association of Universities and other Higher Education Institutions in Germany (HRK, 1997). They all agree that use of the new media will become a structural and competitive factor for institutions of higher education. It can be stated that in the last four years political decisions took these recommendations into consideration and the situation has changed completely.

They emphasize the necessity to expand the infrastructure in higher education, and to coordinate the activities of central service institutions (like libraries, computer centres, media labs) in order to offer new services

- to develop multimedia material,
- and to use (and reuse) the materials at various locations.

Two aspects have to be mentioned as they can be found throughout the recommendations. Unanimously it is stated, that there is a good chance to improve the classical face-to-face situation by virtual components. As the central idea guided self-study is mentioned. On the other hand it is stated, that the realization requires an appropriate level of media competence of the teachers.

Both aspects also can be found in the current discussion on reforming HE in the anglo-saxon area. The Dearing-report (NCIHE, 1997) in Great Britain deals among other things thoroughly with the role of new media. Again there is mentioned first of all the improvement of the quality of teaching, greater flexibility for students, and better efficiency of teaching. On the short range considerable costs for investments are expected and only on the long range possible cost reductions are seen. Even in the United States, where virtual universities already act on the market, the necessity is seen to develop media competence of the teaching staff with public support (see WEBC, 2000, with the demanding subtitle “Moving from Promise to Practice”).

In our paper we will try to map out the emerging landscape of virtual teaching and learning in higher education in Germany, which is one result of our work in the project ‘kevih’.

2. The 'kevih'-project

The use of multimedia and telemedia at German universities and colleges is linked with high expectations. With a national funding scheme and corresponding federal activities a rather developed and differentiated scenery is observable. In order to get an actual and precise picture of this scenery, a horizontal project was established within our national funding scheme: kevih - concepts and elements of virtual higher education (<http://www.iwm-kmrc.de/kevih>).

The aim of the project is to survey, describe and analyze the current situation with reference to pedagogical, curricular and technical aspects, and to show prospects for potential developments:

- recording, investigating and presenting the state of the art, as far as 'virtual' institutions of higher education in Germany are concerned,
- analyzing existing models of organisation, proposing a framework for 'virtual' teaching in higher education in the German context,
- instituting a forum for information exchange and setting up networks of experts.

To achieve these goals we work on the following tasks:

- develop a system of relevant categories and criteria, based on international standards,
- describe and analyse existing developments, projects and initiatives on the basis of these categories,
- compile a database of relevant project informations, developments, and applications,
- evaluate the data, using curricular, pedagogical and technical criteria,
- identify those forms of organisation, concepts and elements of 'virtual' teaching which support innovative changes in the practice of training and further education, especially in pedagogical and technical terms and in the field of evaluation,
- analyse the concepts and existing forms of organisation of 'virtual' teaching in higher education, based on relevant literature and project applications on the background of existing (infra-)structural conditions in the Federal Republic of Germany.

Our analysis is based on the material of 546 proposals with more than 2000 project partners. It was assumed thus to have a nearly complete coverage of all activities in teaching and learning with multimedia and telemedia in German higher education, as only few institutions, persons, and initiatives have not bidden for funding in this scheme.

3. New Media in HE in the Federal States

In the last few years in German institutions of higher education many attempts have been made to introduce multimedia and telemedia. The resulting funding schemes have been shaped by the recommendations and predictions on the virtualization of teaching and learning in HE, given by the boards mentioned above. Due to the responsibility of the sixteen federal states, at first there was not one national program to coordinate these activities, but a number of funding schemes in most of the sixteen federal states. Here we will just mention the three largest. A comprehensive outline of the situation in the federal states is given in a very recent report (Kleimann & Berben, 2002).

3.1. Universitätsverbund Multimedia Nordrhein-Westfalen

The Higher Education Association Multimedia (www.uvm-nrw.de) is a competence network within which the cooperative development of software for teaching and learning is initiated. About 60 projects have been supported in a wide range of subjects as a result of five calls for projects. The resulting products are used in more or less traditional teaching settings. Nevertheless these projects have had already a catalytic effect, now leading to strategic decisions on the use of multimedia in several of the participating universities.

3.2. Virtuelle Hochschule Bayern

The Virtual Campus Bavaria (www.vhb.org) is a joint effort of the Bavarian universities and technical colleges. It bundles all their virtual courses and gives free access to all bavarian students as well as interested persons in continuing education. This offer helps to expand the range of courses at a local institution. A scientific board and project managers, supporting the participating institutions in the development of their courses, guarantee quality control. In semester 2001/2002 41 courses have been available in computer science, engineering, medicine, economics, and key qualifications. Other subjects are under development. Whole courses of study are not yet available.

3.3. Virtuelle Hochschule Baden-Württemberg

The Virtual Campus Baden-Württemberg (www.virtuelle-hochschule.de) is not a new university, but under this umbrella new organizational, didactical and technical aspects to virtualize higher education are developed and tested. Six large cooperative projects are funded to develop virtual components. Represented are all types of HE institutions (universities, technical colleges, pedagogical colleges, academies for vocational training) covering a broad spectrum of topics. It is intended to use the emerging final products in new contexts. With „Campus Online“ a non-profit-making

institution will be established in the near future to make available the range of online courses for continuing education.

4. New Media in HE – The National Program

As a consequence of the recommendations mentioned above and in addition to the federal efforts, the German national government (BMBF) has set up some large new funding schemes – the flagship projects („Leitprojekte“) as well as the funding schemes „New Media in Education“ (with three areas of funding: school education, higher education, vocational education and training) and „Notebook University“. Thus in 2000/2001 the situation changed considerably. In total, the BMBF will invest about 430 million € over a period of five years (2000 – 2004).

4.1. Virtuelle Fachhochschule

In a federal flagship project twelve universities of applied sciences, two universities, federal employers association, unions, and businesses are working on the development of a Virtual University of Applied Sciences (<http://www.oncampus.de>). In the future it will offer programmes of study to students that are tailored both to their personal and career needs following a modularised study plan that combines courses which are available globally. It is intended that degrees of the universities of applied sciences will be internationally recognised. A second aim of the flagship project is to investigate the technical, organisational, pedagogical, psychological, social, economical and legal conditions of building a virtual university. In October 2001 started the programme in computer sciences (bachelor/master).

4.2. Vernetztes Studium Chemie

In a second flagship project on networked chemistry studies (<http://www.vs-c.de/>) interactive modules are prepared to support problem-based and inquiry-oriented types of learning. The project aims to cover the basic studies in chemistry, following the model of a reformed curriculum for chemistry („Würzburger Modell“). Addressees are students in chemistry, postgraduates in chemistry and related subjects, and interested persons in continuing education. A number of modules have been made available with free access (<http://www.vs-c.de/beispiele/index.html>).

4.3. Neue Medien in der Bildung

In 2000 the BMBF set up the funding scheme „New Media in Higher Education“. About 450 proposals have been submitted in 2000, 100 projects have started in 2001 (for a complete list of projects and partners see <http://www.medien-bildung.net/>). According to the political aim to support the use of teaching and learning software at German institutions of higher

education until 2005, all of the 100 projects are networks, consisting of 546 individual projects. The average volume of funding is 1,86 million € (data provided by the Project Management Agency for New Media in Education, PT-NMB; December 2001). The establishment of networks as well as the integration of scientific associations as partners should help to avoid the “not invented here syndrome” and guarantee the long-lasting use of the products when the funding is dropped.

The challenge for higher education policy in this program was seen to design the content and develop concepts for use, rather than to support and channel the development of technical prerequisites, as the developments in Germany can be characterized as follows: Whereas information and communications technologies have for years been regularly used in academic research, the new media are now being integrated at a different pace into academic teaching where they are to serve as additional infrastructure or as an additional information and communication option.

A prerequisite for offering web-based multimedia education programmes is the willingness and ability of students and teachers to make optimum use of multimedia technologies. In order to achieve this, some fundamental criteria were formulated (BMBF, 2000, p. 19), which should be fulfilled by all projects applying for funds, i.e.

- The concept must include processing of relevant content for presentation by the new media, and methods for media-based teaching.
- The concept must include the organization of the learning environment and communication elements, and it must integrate internal and external information systems.
- The projects must be part of a comprehensive concept (at the level of the federal states, inter-university collaboration, the institution or department concerned) for multimedia support of teaching, in particular when they refer only to parts of a study course.
- Quality assurance and evaluation must be an integral part of the project concept.
- In order to ensure sustainability, measures securing long-term maintenance of the product and its distribution must be planned right from the start, and there must be a clear intention to pay for use on a permanent basis from the institution's basic funding.
- Care should always be taken to ensure that these measures can be certified and/or reviewed.
- In order to avoid funding of software that cannot be broadly applied, for example, because it requires sophisticated technical equipment that may not be available everywhere, only those projects should be considered which, on submission of relevant proposals, promise potential for implementation in

academic teaching.

5. The 'kevih'-analysis - First Results

Our analysis is based on the utilization of all project papers, which were available at the beginning of the funding period. Thus it mainly reflects the plannings of the projects involved. The central question of our project 'kevih' is the innovative potential of the funding scheme concerning didactical aspects.

Percentages, given in the following paragraphs, refer to the total number of 100 cooperative projects. Multiple mentionings were possible.

5.1. Changes of general conditions

Range: According to the criteria of the ministry, nearly all funded projects (92%) cooperate across boundaries of the federal states. It is striking that only few projects plan to act on a European level (4%) or even worldwide level (4%). Nevertheless about one third of all projects are developing their content in two languages and seven of them are producing it only in English. It turns out that international networks (at least with german partners) are not sufficiently established, even though a global perspective can be assumed.

Distribution of subjects: The distribution of subjects within the funded projects is as follows: mathematics/computer science 26%, engineering sciences 23%, medicine 20% are in the leading position. Social sciences and the humanities (14%) are clearly underrepresented and in the case of teacher training it is even worse (2%). Incidentally this distribution is quite similar to the situation in Switzerland and Austria. Compared to a former analysis (Lewin et al., 1996) there is no significant change and the dominance of the technically oriented subjects could not be reduced. A possible explanation could be the missing media competence in the subjects in question. Though some projects try to compensate these deficiencies by outsourcing technical work packages to external partners (33%), mainly from industry. Another way to better involve these subjects is shown by the University of Basel (Switzerland). There a central service is offered (see <http://www.unibas.ch/lehre/>) giving advice and training, as well as support for the development of media based teaching materials.

For the German higher education system it is remarkable that only in 5% of the projects universities of applied sciences are involved (in total numbers there are twice as much of them as universities). This is unexpected, as in the past they were much more open to innovations in teaching.

Target groups: The funding scheme is addressing students in basic courses and main courses of studies as the main target group of (76%). Flexibilisation by the independence of time and space indicates a general reaction on the changing circumstances of living. Thus two thirds of all students

nowadays are forced to practise a regular gainful activity to earn their living (Schnitzer et al., 2000).

In addition to basic and main studies there are also master studies on the offer (8%) and other graduate studies (6%). So far the sector of scientific continuing professional development was rather neglected by the German universities and colleges. Since several years therefore commissions of higher education demand from the institutions a stronger focus on this target group as a part of life long learning. After all more than half of the projects (52%) indicate, that in addition they will develop offers for continuing professional development.

Sustainability: To ensure sustainability a set of preparatives are advised. Thus 72 projects embed their products in the degree course schemes.

For the most part the virtual teaching materials cover standards in a particular field (56%). In many cases they are designed for further utilization. They are either relevant for other fields and subjects (42%) or they can be used within further education activities (52%).

More than half of the projects (55%) support technical sustainability with open source developments. Thus their products will be available free of charge after the end of funding and as a rule they are open for an ongoing support, as well as for changes and extensions.

Compared to that 48% of the projects are planning a marketing of their products in cooperation with industrial partners after ending of the funding period. Some projects expect that commercialization and charges of utilization partly will enable to finance the maintenance of the products. The return flow of money is expected to serve the long-term embedding of the virtual components in the regular teaching and learning context. Industrial partners in the ongoing development process are named only by five projects, that is industry is less involved in the development than in the commercial exploitation.

5.2. Changes in Teaching

Products: There is less a lack of technical tools for virtual education than rather of content and didactical concepts. One main aim of the funding program is to extend the availability of learning software, thus the projects put their main emphasis on the development of content (100%) and transferable didactical concepts (38%).

Size of products: most projects (83%) are producing teaching and learning elements, which can serve as independent modules for self-study or can be added to traditional lectures or classes. Compared to that the percentage of cooperative projects, intending to develop a complete virtual course of study is rather low (11%). It can be stated, that especially the development of integral modules, which can enrich traditional courses of study in a very flexible manner, open a high

potential for changes in teaching. They can be used in different scenarios, ranging from self-organised learning to guided studies or cooperative learning.

Types of usage: The high potential of multimedia seems to be used on an elaborated level, when transferring the content to media. In many projects the content is visualized and made interactive by multimedia applications like simulations (57%), animations (51%), or hypermedia (48%). Concerning telemedia in most cases text-based applications are mentioned, like chat (38%), newsgroups (35%), or e-mail (29%), whereas technical more ambitious applications are mentioned more rarely, like video-conferencing (17%), video-lectures (12%), or application sharing (11%). Altogether the area of telemedia seems more technology-driven; only in a few cases the didactical integration of these applications were described. In contrast to the use of multimedia applications, there are fewer experiences with such examples of good practice, to which it would be possible to refer to.

Functions for teaching and learning: It is of special importance, how innovative techniques are used and which effects these have on the quality of learning. With the provision of multimedia and telemedia components the projects aim to enhance the availability of contents (85%), to make teaching objects more illustrative by using visualizations and animations (82%), and to improve the motivation of the students (74%). In total 74% of the projects expect an improvement of quality by using multimedia and telemedia materials. This is one consequence of the funding scheme, if we compare the concepts with those mentioned in the earlier report (Lewin et al., 1996): There it was stated, that most projects were limited to supply students with informations, like the download of lecture notes, hints for literature, appointments etc. Thus in most cases text based materials were made available in the internet. At that time only in the last place interactive courseware and cooperative work were mentioned.

Scenarios for teaching and learning: The analysis of the project materials has shown, that new media are not used as mere add-ons to traditional teaching and learning contexts, but can also induce structural changes. Thus hybrid scenarios are described, in which students learn as well in real sessions as in the "cyberspace", thus overcoming constraints in time and space. Thereof as a consequence changes concerning the methodological concepts of lectures become apparent. In the funding scheme not only expository teaching/learning media will be introduced (85%), but also teaching/learning media enabling the students a discovery (82%) or exploratory (71%) ways to proceed and to acquire knowledge. It has to be pointed out as a positive trend that to a growing extent (61%) group work will be built into the teaching/learning processes.

Course management systems: For the implementation of their teaching scenarios 50% of the projects go back to the help of course management systems. As recent workshops on this topic have shown, there is a great insecurity about these tools

within the projects. This concerns the capabilities of these systems in general and also aspects of compatibility and reusability. In this area is a great demand for knowledge transfer, exchange of experiences and aids for decision-making.

Evaluation: In the proposals of the projects different preparatives for quality assurance are described. 66% of the projects will implement procedures for internal evaluation. 39% will charge in addition or exclusively external partners. Both formative (87%) and summative (66%) designs for analysis will be performed.

5.3. Promotion of Media Competence

For us the term media competence comprises – in addition to more technical oriented aspects of usage and operating new media – especially didactical and presentational aspects (Bett, Rinn & Wedekind, 2000).

About one third of the projects explicitly plan to introduce activities to support the development of media competence for the students (36%). A bit less it is planned for lecturers (30%) and for the developers (28%). About a quarter of the projects (26%) are planning internal advanced training courses for their staff – mostly as workshops, in order to transfer and to discuss specialist knowledge, i.e. that of computer scientists to educationalist or vice versa. Only particular projects describe far reaching concepts, like interdisciplinary working groups or the involvement of companies – those to which part of the developments are outsourced – to offer advanced courses for the staff. These concepts are steps in the right direction and should be extended even more.

For successful developments, for the gainful operation and usage of virtual or partial virtual teaching and learning scenarios it is a central or even indispensable prerequisite on the part of the developers, the lecturers, and the students.

6. Conclusions

The analysis of the project papers has yielded a number of further results, which cannot be reported here. Our complete report will be downloadable at <http://www.iwm-kmrc.de/kevih/>.

The first results of our analysis of the German situation show a diversified situation. The large number of projects indicates a variety of approaches, as well as different types of materials and teaching concepts. This variety seems adequate for the highly different topics in various subjects and for addressees with varying needs and learning styles.

As our investigation is based mainly on project papers applying for funds, we will follow the developments with tense interest. As an overall effect there is a chance that didactical concepts, the didactical functions of multimedia and telemedia components, and their integration in conclusive curricular concepts, which have been neglected in German higher

education institutions far too long, make progress thanks to the incentives of this funding scheme.

Considering the statements and recommendations in German higher education policy as well as the funded initiatives on the national level and in the federal states, one can speak of a vehement effort to join or to keep up respectively with international standards in this area. There is a large degree of consensus, that information and communication technologies can enrich and improve the quality of teaching and that at least parts of the courses of studies can – and should be – virtualized.

Nevertheless, based on our analysis we come to a cautious conclusion: Concerning virtual campus Germany remains in an exploratory phase, and it is not yet clear, if the integration of ICT becomes established exhaustively in higher education. For three areas we want to provide further arguments to support this thesis: quality of teaching, media competence, and continuing education.

Teaching: Most engagement concerning Virtual Campus at present flows into the development of innovative teaching concepts and learning arrangements on the basis of ICT. It is striking that within the projects funded within the “New Media in Education” initiative the focus so far is more on the technical realization than on the didactical design. For us this indicates, that in the higher education institutions and their faculties there is a lack in technical infrastructure and services, which guarantee a trouble-free embedding of virtual components into the everyday routine of teaching. Furthermore there are positive basic approaches of networks, at least due to the fact that the projects all have a cooperative approach and thus are forced to work based on the division of labour. We have to admit though that we have found few clues, that with the actual activities really sustainable new organizational concepts for the faculties and the HE institutions as a whole are used as a basis. On the other side very often it is stated with reference to successful implementations, that it is just a knowledgeable technical concept and a well thought out organizational development plan, which are indispensable prerequisites for a long lasting success of virtual teaching (Pedró, 2001).

Media competence: Many of the current projects and initiatives to virtualize teaching also try to improve the media competence of the teaching staff. This is the only way that the teachers will have enough preparation to use the new elements in an innovative and meaningful manner, and to transform their own ideas and interests. At the moment the average competence is considered to be too low (Bertelsmann Stiftung, 2000). It is also very problematic that students do not necessarily have enough media competence to use the new offers adequately and without problems (Baacke et al., 2000). Of course it is an open question, if Germany can afford to wait for a new generation of teachers, as innovation cycles are getting faster. If virtual components for teaching and learning should have a broad acceptance in HE, a continuing education

offensive is necessary for the staff in HE institutions, and not only within the funded projects. The corresponding efforts in the competitive economy can be a good example. As the necessary decisions and steps to be taken for a whole organisation have to be based on a solid knowledge, especially the decision makers in the boards should have a good media competence.

Continuing education: Pedró (2001) gives an overview on the development of virtual campuses in Europe. He points out, that the most innovative concepts originate from HE institutions with a professional structure for continuing education. The development in Germany seems to be on a good way, as about half of the projects plan to offer courses for continuing education. Nevertheless the situation remains problematic, as continuing education is rated lower-level compared to basic study courses. The teaching staff first of all is obliged to ensure the basic studies. As workable legal fundamentals are missing for the payment of continuing education courses given within the HE institutions, to a growing extent the offers are organized off-site under conditions of the free market economy. In our opinion it is to follow the recommendation of the “Kultusministerkonferenz” (2001) and to find new regulations in this area, in order to use synergetic effects of the new media both in the basic studies and in continuing education. Without these regulations continuing education in HE institutions are in danger to remain in a shadowy existence.

As our state-of-the-art analysis shows, German HE institutions are on the way, to integrate virtual elements in the studies. To ensure sustainability of these efforts and to give these actions a clear structure, there is an intensified need for strategic concepts within the HE institutions themselves. In addition more initiatives of the federal government are necessary to coordinate the process as a whole by cooperations. The comments and recommendations of the various expert groups and advisory boards remain trendsetting.

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