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The status of E-learning at German higher education institutions

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Focusing on the central questions specified by the editors the following contribution outlines the development of computer-based learning at German universities and institutes of higher education. Although it is based on existing surveys and data, it has to remain subjective in many ways, simply because the phenomenon »E-learning at German universities and institutes of higher education« is hard to view as a whole. Moreover, the questions posed demand evaluations that can but remain vague or general. Methodically, it remains difficult to say something more to the point about E-learning at the 330 institutes of higher education[1] in Germany.

For this reason it makes sense to, in a first step, concentrate on aspects that can be seen as typical of the "german approach" to E-learning and then, in a second step, view these aspects in a European perspective in order to evaluate the status of E-learning in Germany.

Consequently, we will focus on the following aspects:

- the shifting of attitudes towards »computer based learning« between euphoria and depression,
- the cultural sovereignty of the German federal states (Länder) competing with national educational policy,
- the surprisingly low effect on the system of higher education as a whole,
- some characteristics of the professional discourse on education and technology.

1. Background

In Germany the discussion of computer-based learning was characterised by two big waves, disclosing both great expectations and disappointment. Before trying to understand the particularities and the results of the discussions during the »second wave« in the second half of the 1990ties we should reconstruct the discourse of the first »educational-technological« wave. During this first stage, special aspects of dealing with the tense relationship between education and technology had become apparent that have affected the discussion in Germany to date.

[1] Acc. to Association of Universities and other Higher Education Institutions (HRK): 89 State Universities, 104 State Institutes of Higher Education, 11 private Universities, 32 private Institutes of Higher Education, 17 parochial Universities, 18 parochial Institutes of Higher Education and 52 Music and Art Academies

see http://www.hochschulkompass.hrk.de/

1.1. The first wave of Educational Technology

With the availability of mainframe computers in the mid-1960ties computer-based learning boomed for the first time. The government invested money into national development centres, reorganised existing educational institutions and consistently adapted the planning of new institutes of higher learning to the new approaches. Nevertheless, all high hopes were soon disappointed, and during the 1980ies the development almost came to a standstill. Politicians had trusted the announcements of industrial representatives and scientists and – from today's perspective displaying a surprisingly naïve belief in progress – taken the feasibility of the projected scenarios in terms of technology and pedagogics for granted. A closer look at the discussions at that time shows how emotionally charged this controversy was fought out even in the general public. The protagonists wanted nothing less than to fundamentally reconstruct the educational system, or even to »make the whole nation fit for the future«, whereas most critics questioned the involvement of technology as an element basically extrinsic to the educational sector.

The visions put forth by the supporters of computer-based learning at the time still appear rather oppressive today: Helmar Frank, the founder of »cybernetic« pedagogics, figured out how many years it would take after a consistent introduction of computer-based teaching to supersede teachers in schools, respectively when the remaining teachers would predominantly work on the development of teaching materials for computer-based teaching (Frank, 1975). In fact, the available computer systems then merely permitted to facilitate the simplest »interactive« applications in a question-answer pattern that today would be referred to as »behaviouristic«. The idea of having such systems replace traditional teaching on a large scale is astonishing – today probably more than then.

These far reaching visions and their implementation in the form of mere »automated learning machines« brought about equally vehement resistance – from educational scientists as well as from teachers. The controversy soon reached a deadlock and the topic of computer-based learning rapidly lost its significance in educational science, predominantly shaped by the humanities at the time, and educational practice. A more pragmatic approach allowing to explore the potentials and limits of computer-based training without any bias was hard to establish. The mainstream of educational science simply could not abandon its doubts about discussing »educational technology« at all.

1.2. The Multimedia – Wave

With the availability of multimedia-systems in the 1990ties the discussion about computer-based learning were revived. The focus now was on the potentials of the presentation of multimedia information, process visualisation and animation and the new hypertext concept. Nevertheless, it was the boom of Internet- and digital technology throughout society that gave the biggest push to the development. Not only have these technologies spread rapidly, but people also have had mostly positive connotations about them, so they have in fact become kind of ubiquitous.

The national funding programmes on »multimedia learning« set up in the second half of the 1990ties drew on similar lines of argumentations as had been put forward during the first wave of educational technology. Representatives of industry and science called upon the government to invest into this all-important technology in order to gain a leading position in Europe or even the world, respectively to at least not fall behind the technological development. In their well-received article Encarnação, Leidhold & Reuter (1999) outlined a future scenario for the university of the year 2005. They believed that digital technology would dramatically change the education sector.

This scenario saw institutes of higher learning merge into a global science market:

> The classical alma mater has survived in two forms – in reduced numbers or on lower levels. Where it survived, it has expanded its range to online-services. Many universities, however, had suffered a rapid drift of students. And many a private and public institution were forced to cut back investments or close down locations completely, concentrating their efforts on outstanding and seminal locations instead. Consequently, we find, especially in Germany, primarily two types in this segment: a handful of elite-institutes and a lot of traditional universities struggling to survive and fighting against cutbacks, administered reforms, and agile competitors.[2] (Encarnação et al., 1999)

Against an economically rather sound background broadly based funding programmes were initiated at federal and federal state levels. These programmes initially addressed businesses that worked on the development of adequate technologies and then all educational sectors, where manifold projects exploring forms of multimedia learning were funded. During the evolving dynamic process, the different public funders soon started to compete which each other and tried to hone their profiles.

Public discussions were initially again dominated by the question, wether multimedia learning will, may, or shall replace face-to-face teaching. Influenced by the general euphoria the public opinion was clearly in favour of the use of digital technologies in education. A broader discussion of the conditions and added value of media based learning was neglected. Questions arose, if anything, concerning the predicated advantages of multimedia learning, for instance, the effectiveness of media use.

With the growing base of experience the discussion was resumed, whether many of the postulated effects could be actually sustained (Keill-Slawik & Kerres, 2003). The enthusiasm about new forms of multimedial visualisation, simulation, and animation was put into perspective, when it became clear, how much costs and energy it would take to produce appropriate materials. It had to be admitted that the implementation of learning with digital media into education was a more demanding task than many projects had accounted for.

Different from the first wave of educational technology, the digital multimedia technologies had been firmly established as common tools in private and business life over the years. That is why during the second wave disillusionment did not result in the technologies to »vanish« from the world of learning. In fact, despite the disillusionment interesting scenarios of use were developed for higher education, emerging from different aspects that had not reached much attention during the »multimedia euphoria«.

But let us first take a closer look at the federal and the public funding strategies and policies.

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[2] The original passage reads as follows: »Die klassische Alma Mater hat in zweierlei Form überlebt – in verringerter Zahl oder auf reduziertem Niveau. Dort wo sie überlebte, hat sie sich ebenfalls um ein Online-Angebot bereichert. Viele Universitäten hatten jedoch rasch ihre Studenten verloren und manche private und staatliche Träger sahen sich gezwungen Institutionen schrumpfen zu lassen oder ganz zu schließen, um ihre Kräfte auf herausragende und zukunftsträchtige Einrichtungen zu konzentrieren. Daher findet man in diesem Segment, besonders in Deutschland, vornehmlich zwei Typen: wenige Elite-Institutionen und eine Menge althergebrachte Universitäten, die zwischen Rotstift, staatlich verordneten Reformen und einer agilen Konkurrenz um ihr Überleben kämpfen.«

Interestingly, in some aspects the authors' predictions did not turn out altogether wrong – it seems, however, that other factors – beyond the »virtualisation of education« – were significantly involved in this development as well.

2. Funding policy

Educational policy is a field, in which the German Länder try to compete with each other and the educational policies of the Federation. The constitutionally guaranteed cultural sovereignty of the Länder gives them extensive freedom to design and develop their educational systems. In addition, there are two important coordinating bodies spanning the Länder: the Standing Conference of Education Ministers (KMK) and the Commission for Educational Planning and Research Promotion of the Federation and the Länder (BLK). The scope of the Federation's responsibilities in the field of education is rather narrow and strictly defined.

Consequently, the educational landscapes of the Länder have developed differently over the past decades. Each of the Länder has followed its own approach and with a different emphasis and investments in higer education: Baden-Württemberg, for example, consistently adhered to Universities of Applied Sciences (Fachhochschulen) and Universities of Education (Pädagogische Hochschulen) as discrete types of universities, which had been expanded over the years. In contrast, Northrhine-Westphalia tended to merge the different types of institutes of higher education. And compared to the other Länder, in Baden-Württemberg and Bavaria an absolutely and relatively big part of the total state budget goes into education. The consequences of such differences in the intensity and direction of educational policies increasingly become evident in recent years. Rankings of faculties and universities are conducted since the late 1990ties and have revealed big differences between the Länder. Nevertheless, unlike in other European countries German institutes of higher education hardly had to cope with fundamental systemic challenges or cuts until the late 1990ties. In Germany, the concept of universities and institutes of higher learning being autonomous organisations responsible for finding their strategic position on »educational markets« and »science markets« has not been explicitly developed so far. Instead, they continue to be seen as something like »authorities subordinated« to state ministries (Müller-Böling, 1994). With the actual implementation of the Bologna-Process fundamental changes currently are taking place that eventually will have a fundamental impact on higher education.

How German institutions of higher learning have been treating the multimedia issue has to be viewed within this framework. During the 1990ties the importance of the multimedia approach for the future development of economy, education, and society had been widely acknowledged by the public and re-addressed by politicians. Soon funding programmes were developed on federal state, national, and European levels. Due to a favourable economic background voluminous national funding programmes could be issued that aimed at pressing ahead development in this field and, at the same time, create a favourable framework for Germany with regard to EU-activities.

But what was the practical approach then to actually disseminate multimedia and the Internet into institutes of higher eudcation? In a first step a lot of money went into technical equipment. Consequently, German higher education institutions were by and large – and in comparision with other nations – technically quite well equipped by the late 1990ties. The practical use of the equipment, however, was not always convincing: it looked as if the opinion prevailed that it was enough to simply »provide« the technical equipment in computer rooms or via the network. The concept of technology as a means of creating added value in the crucial processes of research and education was little developed. On that basis the implementation of digital media into teaching could hardly create a clear value to learning and education.

The funding programmes dominating the second half of the 1990ties then aimed at the development of content. This redirection towards multimedia content set in with the »Hochschulsonderprogramm III« in 1997. Within the framework of this programme the Federation provided the Länder with 122 Million Euro (1997 – 1999) for the funding of multimedia projects at universities and institutes of higher learning. The Federation left it to the Länder to decide on the form of the programmes and possible own grants.

2.1. Funding policies on federal state level

Baden-Württemberg was one of the Länder to consistently take on the issue as an early mover. In 1996 plans for the »Virtual University Baden-Württemberg« already aimed at pressing ahead with the use of the Internet at institutes of higher learning.[3] The basic technology had been made available to the institutions during previous funding arrangements. What was missing were the contents necessary for media based teaching and learning. A critical question was how to ensure that, given the high costs of content development, these expensive contents could be used at different institutes of higher learning. Institutes of higher learning are known to be typically susceptible for the »not invented here«-syndrome. Of course, for print materials a rather low interchange rate is far less tragic than for costly multimedia products.

The favoured solution were joint projects based on the cooperation of scientists at several institutes of higher learning. It seemed obvious to model the cooperation of the scientists on research associations. It was expected that scientists from adjacent subjects would group around a topical centre and work out a concept for the development of media that could then used to apply for funding.

From today's perspective the ambitious concept had several flaws: First of all, it did not sufficiently account for the fact that the production of digital media was a very demanding process that neither the scientists nor the media centre staff had the necessary competencies for at that time. Competencies were to be »bought in« by hiring competent project staff; but there were also the tasks of managing complex media projects, developing media-didactic concepts, project-controlling, and the development of marketing strategies that were bound to ask too much of the average »head of department« in charge of project leadership. As a consequence, some projects were renamed »research projects« instead of »media development projects«, because that was exactly how they were really organised. Additionally, projects that were divided into several sub-projects to some extent worked self-sufficient and lacked mechanisms for internal or external controlling. This way it could neither be guaranteed that the sub-projects were convergent with each other nor that the project as a whole was convergent with the programmes objectives.

Interestingly, the »Virtual University Baden-Württemberg« (1998) for the first time established a »competence centre for multimedia and telematics« in the »Deutsches Institut für Fernstudienforschung« at University of Tübingen that was to support media projects in their work and to facilitate the dissemination of concepts and results. However, after the first stage of the funding programme the centre was not continued.

Other federal states have implemented competence centres and coordinating bodies across universities as well. But these centres act more as project agencies organising tender procedures and implementing federal state funding programmes for the media sector as well as organising certain service activities of the funders and the recipients of funds. It has been recognized that installing media competence centres at all institutes of higher learning would involve too much labour and costs, however, no basically convincing solutions have been found how competency centres across institutes can be reliably interlocked with the activities of each and every institute of higher learning. Again, the characteristic feature of German higher education institutions described above prevails: It is rather difficult to implement sustainable media concepts and strategies at institutes of higher learning and motiviate the individual actors (the scientists) to follow such a route.

[3] As the first-author was a member of the planning-group, the Baden-Württemberg activities are especially featured her.

A small extract of some funding initiatives on federal state level that show the different focuses and organisational models of policies, in Baden-Württemberg, Bavaria, and Northrhine-Westphalia, can be found in Appendix 1 (detailed overviews can be found in: (Cleuvers, Dohmen, & Simons, 2004). More bottom-up structured activities, like in Northrhine-Westphalia, and more top-down strategies, like in Bavaria, become apparent her.

2.2. Funding policies on federal level

The systematic funding of content-production on the federal level began in 1998, when the Federation gained large revenues with the sale of UMTS-licenses for next generation mobile telephony. By the end of 2003 the Federal Ministry of Education and Research invested some 550 Million Euro into multimedia funding programmes for secondary education, vocational education, and higher education. In the same period the Ministry of Economics and Labour invested about 13 Million Euro into media projects at operational level.[4]

During the first federal funding initiative aiming at content development starting in 1998 the Ministry of Education and Research funded five pilot projects with 70 Million Euro. Four of these successful projects were presented in 2005. In the sector of higher education these were the projects Vernetztes Studium - Chemie (VS-C) and Virtuelle Fachhochschule (VFH), an association of universities of applied sciences (Fachhochschulen) that implemented a distributed online course of studies in media informatics. Since October 2001 students can enrol at the Virtuelle Fachhochschule for the study of media informatics or for industrial engineering (since October 2002) and use the offers of the consortium of eleven universities of applied sciences. Students at one university can thus use online modules that were developed at another university and vice versa.

In 2000 the central national funding programme »New Media in Education« then strictly focused on the production and implementation of contents. Its objective was expressed as follows: »Together with the scientific community, with industry, the *Länder* and local authorities, the Federal Ministry of Education and Research will contribute to making Germany a world leader in educational software by the year 2005.«[5] For secondary education the medium term aim was »the development and provision of teaching and learning software for all subjects and age-groups. «

Concerning the use of new media at institutes of higher learning the Federal Ministry amplifies:

> At higher education institutions 100 joint projects are funded that include the development and trial of innovative multimedia forms of teaching and learning and as their implementation into normal university working mode. At the same time the integration of multimedia contents into teaching and the development of new forms of teaching and learning aims at improving the quality of teaching, the organisation of studies, and shorter study times. A second focus is the Notebook-University: In this branch projects are funded that develop and implement innovative and integrative overall concepts for mobile learning into workaday university teaching. This includes the development of strategies that provide low priced access to learning with mobile computers

[4] see: The Government's answer to a question in parliament by the members of parliament Ulrike Flach, Birgit Homburger, Horst Friedrich (Bayreuth), other members of parliament and the fraction of the FDP – Drucksache 14/9616 – Zukunft des eLearnings in Deutschland, 15.7.2002

[5] http://www.pt-dlr.de/pt_nmb/BMBF_NEUE_MEDIEN_ENG.PDF

> for all students. The objective to broadly use forms of multimedia teaching and learning in higher education will have to be funded in mid-term perspective as well. Furthermore, the establishment of a framework that will allow higher institutes of learning to develop sustainable strategies and the improvement of particularly effective learning scenarios have to be accounted for. Another potential object of funding is the use of these technologies for further education on the international educational market as well.[6]

The funding of these joint projects with 186 million Euro has brought forth some high quality products and many interesting scenarios of using multimedia and the Internet in teaching. Examples in medicine particularly stand out. The intensive discussion of academic reforms and new ways of teaching in the late 1990ties surely had an effect here. Case-based applications allow learners to work on cases with authentic materials. This approach has proven to be an effective way to learn about methods and procedures of diagnostics and therapy in medcine.

In sciences and engineering, and to some extent in economics, multimedia applications featuring animations and interactive simulations also have demonstrated innovative and effective approaches. Based on abstract models of parts of real life scenarios learners can move through virtual landscapes. This way a different, much more intuitive approach to complex and rather hard to imagine phenomena is rendered possible (see Schulmeister, 2001).

At the beginning of the multimedia funding initiative it was not always easy for Humanities and Social Sciences to develop convincing concepts for multimedia applications. Consequently, comparably few projects were funded initially. However, they got a new impetus when approaches of cooperative and distributive learning as well as other forms of net-based learning were established that emphasised communicative and discoursive scenarios.

An overview of offers for online-study can be found on the Internet:

http://www.studieren-im-netz.de/ in German
http://www.online-studying.de/ in Englisch

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[6] http://www.bmbf.de/pub/14_9784-elearning.pdf; the original passage reads as follows: Gefördert werden 100 Verbundprojekte an Hochschulen, die die Entwicklung, Erprobung und die Umsetzung innovativer, multimedialer Lehr- und Lernformen in den Normalbetrieb der Hochschule umfassen. Mit dieser Integration von multimedial gestalteten Inhalten in die Lehre und mit der Entwicklung neuer Lehr- und Lernformen sollen zugleich die Qualität der Lehre verbessert, eine bessere Organisation des Studiums und eine kürzere Studiendauer erreicht werden. Im zweiten Schwerpunkt Notebook-University werden Vorhaben zur Entwicklung und Einführung einer innovativen und integrativen Mobile-Learning-Gesamtkonzeption in den Regelbetrieb der Hochschule gefördert. Dabei sollen auch Strategien für den wirtschaftlich günstigen Zugang aller Studenten zum Lernen mit mobilen PCs entwickelt werden.

Das Ziel einer breiten Anwendung multimedialer Lehr- und Lerntechniken im Hochschulalltag wird auch auf mittlere Sicht Gegenstand der Förderung sein müssen. Hierbei sind die Rahmenbedingungen für nachhaltige Strategien der Hochschulen ebenso in den Blick zu nehmen, wie die Weiterentwicklung besonders effektiver Lernszenarien. Zusätzlich ist die Anwendung solcher Techniken in der Weiterbildung auch auf dem internationalen Bildungsmarkt möglicher Gegenstand von Fördermaßnahmen.

More information on projects funded by the Federal Ministry of Education and Research (BMBF) can be accessed over the Internet portal of the Project Management Organisation "New Media in Education": http://www.medien-bildung.net in German and English

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Between 2002 and 2004, in a second branch of funding 25 Notebook-University projects were funded with 26 million Euro. In the course of these projects single universities could implement concepts on the use of notebooks in teaching on campus. Although the concepts differed in many ways, their implementation definitely proved to be able to intensy the use of IT-applications on campus. Particularly, these projects pushed the discussion about the sustainable integration of media into teaching and the necessary organisational structures (Kerres, 2004). Deplorably, evaluation only played a minor role in the funding programmes and, consequently, in the projects.

A serious problem for some projects was, the lacking of controlling mechanisms even in the bigger consortia. Therefore, there were only few chances to manage large scale projects, when - for example – sub-projects did not converge in terms of content or time schedule.

At the same time (2001) it was critically reflected, to what extent the funding programmes would yield a sustainable change in teaching and learning in higher education. It was obvious that the federal and federal state funding programmes would not come up to all expectations. It became also clear, however, that any achievements that undoubtedly had been made would come to nothing, if there was no way of sensibly securing and enhancing them. Fears were raised that the enormous investment would peter out without yielding sustainable effects.

Consequently, sustainability has become the central question of the discussion since 2002. In a strategy paper dating from June 17th, 2002, the Commission of the Federation and the Länder for Educational Planning and Research Promotion (BLK) claimed:

> »Strategy paper: Broad use of New Media in higher education institutions«
>
> A broad use of new media is not only strategically important for the further development of higher education institutions but also an essential requirement for improving their standing in national and international competition.
>
> Planning for the use of new media should be given top-priority in higher education institutions as well. The options for the use of media and for strategic focusing are manifold.
>
> Institutes of higher learning have already started many sophisticated media projects and submitted numerous interesting project outcomes. Despite all these multifarious efforts the implementation of new media into teaching, studies, and further education has not come up to expectations. In particular a sustainable integration into workaday university teaching is still lacking in many cases. Reasons are manifold. Teachers have no one to turn to for technical and didactical support. There ist no overall concept for the creation of local or regional competency-, support-, or service-structures (media competency centres).
>
> The higher education institutions are far from a situation where teachers can simply use existing structures for creating, storing, and presenting multimedia objects. Neither can every student choose net-based teaching offers according to their individual abilities and learn regardless of place and time. ((Hier müsste eine zusätzliche Fußnote eingefügt werden, die auf das Originalzitat verweist))

The evaluation of the national funding programme »New Media in Education« analysed the status and perspectives of the programme. The Audit Report identified strong points and flaws as well as chances and dangers (see Appendix 2).

1. Systemic level

Unlike the prognosis of (Encarnação et al., 1999), the system of higher education has proved to be surprisingly stable as a whole. Apparently, higher education did not shift into a large scale »virtualisation« .Surprisingly few complete online study programmes or courses have been established. Traditional universities opened up much fewer offerings for online courses than it was assumed earlier. With a few exceptions business and organisational models could only be established in niches, if anything. It seems that universities of applied sciences (Fachhochschulen) have provided a more fertile ground for the successful implementation of business cases, for instance the Distance Studies Association (Fernstudienverbund) of universities of applied sciences (Fachhochschulen) in Berlin-Brandenburg, the Distance Studies Centre at universities of applied sciences in Hessia, Rhineland-Palatinate and Saarland, founded in 1996[7], or the tele-akademie of the Fachhochschule Furtwangen[8] that is offering online courses since 1994.

With distance studies, there is one German peculiarity that has lingered to date. The »FernUniversität« is the only university that has been authorised by agreement of the Länder to offer university level programs with Bachelor and Master-Degrees in distance education. This is why there still are only few institutes that offer full study programmes. Nevertheless, the FernUniversität also only has reluctantly picked up the options of Internet-based learning so far. Against one's expectations this process of taking up the opportunity of the Internet is not less complex for a FernUniversität working with traditional print media than it is for an on-site institute of higher learning.

All institutions involved in this topic during the 1990ties had to address the challenge of digital media. Some of these institutions had severe problems managing this change. The continuation of the German Institute *for Research* on Distance Education at University of Tübingen, for instance, was assessed negatively during an evaluation. The institute received financing as a federal research institute apart from universities. It had emerged from the German Institute for Distance Education that had been offering distance courses for teachers and organised the Telekolleg, a course package consisting of radio broadcasts, printed materials, and accompanying learning groups held in adult education centres (Volkshochschulen). In 2001, a part of the institute was integrated into the new Knowledge Media Research Centre at University of Tübingen. Its focus is predominantly on empirical research on learning with digital media.

In the media production sector we have two state financed federal media institutes, the IWF Knowledge and Media in Göttingen, working for the higher education sector, and the FWU (Media for Education) in Munich, working for the primary and secondary education sector. Both institutes were in danger of being closed down in the 1990ties. Here, too, a negative evaluation led to a fundamental reorientation towards digital media.

3. The discourse in scientific disciplines

The German-speaking part of the discourse on educational technology seems to be dominated by scientists with a background in computer science. This can be traced back to the fact that many educational scientists had been in the front line against a broader use of technology in education during the first wave of educational technology. Consequently, educational scien-

[7] http://www.zfh.de

[8] http://www.tele-ak.de

tists partly fell behind in the discussions and their expertise in some areas was hardly sought after. It is striking, how sparsely pedagogy as a science has accompanied and influenced this social challenge. The problem also shows in the rather low media competence of students, especially in pedagogics and teacher training; these students are relatively short in experience with IT-applications and computers, as a representative survey shows (Middendorf, 2002).[9]

Against the background of the controversies of the first wave of educational technology the term »educational technology« has predominantly negative connotations in the discourse of pedagogy. It has been replaced by the term »media didactics« that generally refers to learning with media from a pedagogic perspective and is favoured by many a scientist with a background in educational psychology – and is therefore empirically oriented.

In general, the issue has recently been viewed more positive in educational science and, vice versa, pedagogic problems of eLearning have gained acceptance in the other disciplines as well. This might partly be ascribed to the growing understanding that a predominantly technological perspective will not meet the requirements of educational practice and needs to be supplemented with pedagogic views as well. As some technically ambitioned projects failed in practice, didactical issues were given increasing consideration. In the late 1990ties the question of an »added value« generated by digital media was lively discussed and increasingly not taken for granted any longer. Many of the so-called advantages of computer-based learning turned out to be hardly convincing.

To this day there has been a partly subliminal conflict between technologically ambitioned projects and pedagogically focussed activities that can be traced, for instance, in the discussion of the »standardisation« of learning objects. Many scientists with a bias to informatics see this issue as the »silver bullet« regarding the future of E-learning. Authors with a rather pedagogic focus have their doubts that this path can lead to high quality learning offers. They point to experiences at hand with approaches based on automated instructional design and underline the importance of contexts in learning.

For fostering the scientific discussion the Society for Media in Higher Education (Gesellschaft für Medien in der Wissenschaft) has been established as an important, interdisciplinary forum in the German-speaking part of Europe. It holds an annual conference and edits a series of books documenting current trends. Moreover, the Society organises the MEDIDA-PRIX, an award for media products and E-Learning innovations in higher education, that annually awards outstanding projects and initiatives. The body responsible for the award are the Ministries of Science of the Germany, Austria, and Switzerland, which inherently can be perceived as an innovation.

The MEDIDA-PRIX has substantially contributed to the formation of a German-speaking community that promoted the discussion of quality in E-Learning. An ever-important aspect of the discussion is the exchange across the Länder and nations. Equally important is that the systematic process of assessment and communication has substantially promoted the argument about the quality and added value of media-based learning (Brake, Topper, & Wedekind, 2004).

2. Sustainable E-Learning innovations

The great waves of federal and federal state project funding have been ebbing away since the end of 2003. Against the distinctly worse economic background it severe cuts in multimedia

[9] A new survey by (HIS GmbH, 2005) points out that the pronounced differences between students of different courses of studies begin to level.

policies were on the horizon. At the same time there were fears that a full stop in funding policy would endanger the present output and render the sustainable backup of current substantial investment transactions moot.

Doubtlessly, previous projects had hinted at ways, how E-learning could facilitate alternative forms of teaching and learning, and E-learning has proven a substantial impetus to innovation in education. Nevertheless, it became apparent that these potentials can only be tapped, if higher education institutions meet certain requirements (Seufert & Euler, 2004). E-learning would not integrate into higher education institutions automatically. And because the required changes in higher education institutions have turned out bigger than assumed, the discussion since 2001/02 has increasingly focused on issues of sustainable integration of e-Learning. Organisational questions have been addressed as well (Schönwald, Euler, & Seufert, 2004).

From *the authors' perspective* the project at hand show that E-learning holds substantial potentials for alternative forms of teaching and learning at institutes of higher learning. These potentials, however, do not come along with the implementation of E-learning itself, but with the implementation of new forms of teaching and learning. As part of this process, E-learning is a powerful instrument that can be used to improve the quality and effectiveness of certain forms of teaching and learning or didactic settings in face-to-face and distant teaching. In this vein, E-learning would have to be considered as an instrumental tool for achieving certain innovations, not as the innovation itself.

Many projects have shown the different potentials of didactic innovations (Rinn et al., 2004). These innovations, however, become only visible and take effect in higher education, if substantial changes and developments in higher education institutions are taking place (HIS GmbH, 2003).

The analyses of the framework necessary for a sustainable integration of E-learning innovations mentioned before show that a sustainable integration of E-learning into higher education institutions requires further reaching arrangements and provisions in different sectors than have been approached in many projects. At the same time it is obvious that additional investment in mere project activities will not contribute to making E-learning a common part of studies, neither for the short term nor in the long run. Despite substantial investments E-learning pioneers at institutes of higher learning represent an esteemed 5 % of teaching staff (Rinn et al., 2004). Teachers play an important role in this process, as their competencies can be regarded as one of the requirements for the implementation of necessary innovations. Without the interest of the teaching staff in E-learning and their willingness and ability to use it their potentials regarding the support of innovative forms of teaching and learning cannot be tapped.

Multimedia and E-learning had so far been a key to the acquisition of third-party-funds in the hands of individual scientists acting on their own. The centrally acting entity in higher education institutions were still individual scientists cooperating based on common purposes. Even the constitution of compound structures demanded by politicians as part of the application for project funds in order to establish cooperation across institutes and disciplines has not changed that.

4. Summary

Federal and federal state funding programmes have developed substantial dynamics at higher education institutions. The prognoses of Encarnação, Leidhold & Reuter (1999) have in fact become reality in some respect. Even if the explicit use of didactically prepared (e.g. multimedia) materials has reached a smaller rate as had been expected, the use of the Internet for information and communication as a »workaday« learning and working tool by students and

teachers on and off campus has rapidly increased – and this use will certainly be further integrated into daily routines.

Students have already incorporated the use of digital technologies into their daily routines to a great extent. According to recent surveys (2005) students can access most of the materials accompanying lectures and courses over the Internet. Interviews showed that in 2003 83 % of all students accessed materials accompanying lectures, 23 % use interactive learning offers (particularly in medicine and economics). Virtual seminars/tutorials, tele-lectures, and virtual laboratories/placements have been used much less. Compared to other disciplines medicine has a particularly high rate of E-learning use.

Compared to the survey in 2000 materials accompanying lectures and online-information have been used more intensive. The use of interactive teaching offers has in fact doubled, but remains on a rather low level. The use of didactically prepared settings, like virtual seminars at on-site universities, has remained static and even partly receded:

> In some subject areas there are still different rates of use concerning the offers in the individual E-learning sectors. Apparently, only the use of materials and information tends to level. Materials and information have been more accepted than in 2000. Depending on the subject area, interactive teaching offers show mostly ascending developments, few are less in demand. Acceptance of virtual seminars has declined in most subject areas.

Net-based services offered by higher education institutions on the »digital campus« (e.g., online-access to libraries, net-based examinations, or evaluation) have become more and more important. They have to be considered as important building blocks of the digital learning and working environment of higher education institutions and discussed accordingly.

The consistent focus on multimedia content production that had rightly been part of the logic of the 1990ties has, in fact, partly led into a cul-de-sac. The Internet is less a supplier of high-quality multimedia content, but mainly a source of data and information and the increasingly favoured way of communicating in higher education institutions.

The disillusionment at the end of the »second wave« of educational technology did not result in a principal rejection of digital media in higher education institutions. Due to the increasing general digitalisation of administrative processes there are rather chances to »organically« integrate digital learning environments into university workflows: Not later than all important data of »university life« will be available online, teaching and learning on the web will go without saying.

Particularly the Notebook-University projects pointed into this direction. These projects have shown how learning offers situated in virtual and physical environments can merge in a future digital university (Kerres, Kalz, Stratmann, & de Witt, 2004). The predominant view of a virtual campus as a universe of its own parallel to in-site university-life proved questionable. A central task for most (on-site) higher education institutions is to consistently use digital technologies in on-site teaching and create intelligent link-ups to net-based offers that provide gates to other learning environments.

In addition, these projects show that computers need not necessarily be used in seminars or lectures in order to capitalise on interesting approaches, but eventually beyond lecture and seminar rooms as well: the boundaries of the »experienced learning space« are expanding and the campus as a whole is more experienced as a learning space. Due to net-based forms of communication this impression increasingly expands as far as the students' (and teachers') homes. Precisely the Notebook-University projects have shown us how net-based learning can support a different approach towards knowledge on the campus.

Some projects proved that E-learning can support and enhance different, more active, self-directed, and cooperative forms of learning. It became clear, however, that this added value is

not inherent in E-learning as such, but has to be generated by appropriate media-didactical design. The point is to implement scenarios that create added value through E-learning and pursue different ways of teaching and learning.

Furthermore, the projects have pointed out that organisational structures have to be changed in order to be able to provide the necessary support. Fort this purpose many higher education institutions have fundamentally reorganised their centrals units reconsidering the layout of libraries, computing services, media services and other areas.

Higher education institutions are increasingly in demand of defining their positions and developing concepts how they want to deal with E-learning. As strategic thinking has not been in high gear in this sector yet, for most German higher education institutions this is a particular challenge. By funding concepts covering higher education institutions as a whole the current funding programme of the Federation aims exactly into this direction. The objective is to implement strategies for the integration of E-learning into higher education institutions. A second funding line aims at topically focussed utilisation and marketing strategies. Here business models of consortiums are funded, that pursue the systematic and continued utilisation of products and developments.

At the same time the integration of E-learning at higher education institutions have brought about serious changes in the behaviour of students and teachers that have to be scrutinised and discussed regarding their impact on studies. Here are a few examples:

- For many students Google has become the most important if not the only research tool. In some places the use of libraries has significantly declined. Many students hardly enter a university library.
- Seminars with a »link-list« and a possibly complete online-library providing all necessary texts in downloadable form become the typical course format. The digital collection of semester texts supersedes research on one's own account.
- Plagiarism and handing in of copied or bought research papers are getting out of hand, especially because the legal frameworks of higher education institutes in Germany largely have ignored this problem.

The declared objective of the Federal Ministry's funding policy, namely to make Germany the world leader in educational multimedia software has definitely not been achieved. One important reason for this is that all other industrial nations also invested in this sector, and a global market for education has not developed as had in some ways been expected.

Viewed altogether the funding programmes have to be looked upon favourably. In addition to explicit successes in the media production sector other aspects smut be pointed out that are not easily tangible. Here are a few examples:

- Funding supported progress in the broad development of competencies of teachers and students in IT-utilisation and the use of media.
- Funding and accompanying activities have supported community building and thus enhanced the interdisciplinary discourse on learning and teaching at higher education institutes.
- Over the past years funding has substantially promoted the process of reflexion on teaching and the associated reforms of studies. Without media projects some of the innovative forms of teaching and learning – that is, concepts subsumed under the term »constructivist didactics« – had certainly not entered the discussion about higher education didactics as rapidly.

The funding programme has set the stage well for the German higher education institutions in terms of availability and use of media- and IT-applications in teaching. What they are facing

now are major structural challenges that have already been systematically approached for years in other European countries. In fact, the E-learning discussion in Germany has clearly pointed out that with their current structures and layouts the higher education institutions can by no means capitalise fully on the potentials of IT-based offers. It therefore makes sense for current higher education policy to highly focus on these systemic changes. This way the abilities of higher education institutions are braced for acting the role of strategically acting organisations competing with others and, in the process, developing as a whole.

All in all the German higher education institutions are probably facing one of the sharpest turning points in their history concerning their work and orientation. The only now introduced systems of quality management, of quantifying performance tests in all sectors, of the preparation of key data as a basis for budgeting and controlling, all this implies a drastic change for the German system of higher education institutions. Trying to learn from the experiences in other countries would – from the authors' point of view – mean that these methods should be consistently implemented, without, however, destroying the »heart« of the university, i.e. the essence of what makes the university stand out from other organisations that generate and communicate knowledge.

In this process of transformation E-learning can, depending on the specific higher education institute, make various contributions. Over the past years higher education institutes in Germany have established a large pool of relevant experience. In the years to come it will be exciting to watch how they will seize the chances of E-learning in terms of supporting sustainable innovations in higher education.

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Appendix 1

Extract of funding initiatives on the level of the 16 Länder (detailed overviews in: Cleuvers et al., 2004).

- Baden-Württemberg
    - In 1998 a five-year federal state funding programme named »Virtual University Baden-Württemberg« (Virtuelle Hochschule Baden-Württemberg) was initiated involving six joint projects across universities. The programme was implemented within the framework of the »Zukunftsoffensive Junge Generation« of the federal state Baden-Württemberg and was endowed with a a total of 50 Million DM over five years. The projects represented all kinds of higher education institutions and covered a broad spectrum of subjects.
        - Docs 'n Drugs – Use of virtual cases in medical studies
        - VIB – Virtualisation in education. Didactical concepts enhancing university teaching
        - ViKar – Virtual Association of Universities Karlsruhe. Use of flexible knowledge modules
        - VIKI – Virtual network for cooperation. Cooperation and information network for the use of media in higher education teaching, documentation and exchange of experiences between new media projects
        - VIROR – Virtual University Oberrhein. Trial of exchange and distributed use of teaching and learning modules
        - VirtuGrade – Education of graduates at the University TÜbingen. Concepts of media-based teaching and learning
        - VVL – Joint Virtual Laboratory. Joint development of virtual laboratories at several higher education institutes
    - 1998-2000 Multimedia-based courses of studies: Within the framework of a joint initiative of the German Telekom AG and the Ministry of Science, Research and the Arts the funding programme aimed at improving the quality and effectiveness of teaching, studies, and postgraduate education.

- University of Applied Sciences(Fachhochschule) Furtwangen digi-Medi@ - Modules on digital media
- University Tübingen BioInform@tics - Multimedia-based course of study in bioinformatics
- Berufsakademien Baden-Württemberg, Universities Stuttgart ELBA - Multimedia-based course of study in »Electronic Commerce«
- University Tübingen, University Heidelberg MURMEL. Multimedial training system for medical teaching
- University Freiburg, international university-cooperation LEC online-teaching-network- "European Social Structure" and "Cultural Globalization

  - Innovative projects in teaching: The call for tenders on March 8th, 2002, was answered with 30 applications, of which 14 projects were chosen and funded with some 2,3 million Euro.

- Bavaria
  - Foundation of the Virtual University Bavaria on May 16th, 1999: the objective is to sustainably integrate online-teaching into the regular courses of studies at Bavarian universities and universities of applied sciences (Fachhochschulen). Five faculties are represented (»Schools«): Informatics, Engineering, Medicine, Economics and Key Qualifications.
  - The Virtual University Bavaria (vhb) is not a self-contained university, but a corporate institution of its responsible bodies, the state universities and universities of applied sciences of Bavaria.
  - The responsible universities can participate in tender procedures for the extension of the vhb teaching offers and accordingly receive financial fundings for the creation of courses for the Virtual University Bavaria.
  - The universities of Bavaria join their powers and competencies in the vhb in order to provide students with multimedia learning courses supplementing face-to-face-studies and enhancing knowledge. The vhb is a Bavarian university network facilitating professional and interdisciplinary exchange and cooperation regarding the development and provision of online-teaching offers.
  - 2003 the vhb was faced with close-down, but is now secured and financed by the federal state Bavaria.

- Northrhine-Westphalia (NRW)
  - The Kompetenznetzwerk Universitätsverbund MultiMedia NRW (UVM) was founded in 1997 in order to promote the use of new media in higher education. Multimedia activities in NRW higher education institutions was to be promoted with the help of stimuli for multimedia experts and pioneers at the universities.
  - Up to 2003 the UVM predominantly funded single projects based on scientific objectives. As a project management agency of the federal state NRW it has

initiated the development of multimedia. Funds amounting to altogether 10,8 million Euro were distributed in 8 calls for tenders.

- 2004 saw a complete change in strategy. Instead of funding projects the systematic and sustainable integration of digital IC-technologies into higher education institutions was now to be supported. For this purpose the CeC Centre for eCompetence in NRW universities NRW was founded as a follow-up to the UVM.
- With CampusSource the federal state NRW is developing a portal for the extension and operation of learning platforms and software modules across universities. The objective is to distribute and use software programmes developed at the universities in teaching on a freeware basis. Proprietary developments will be available to developers and users at other universities based on defined licensing terms. CampusSource aims at national and international users at universities and universities of applied sciences as well as at other public and private educational institutions that want to offer online-contents and means of communication between teachers and learners. Offers aim at software users and potential co-developers.

Appendix 2

Extract from the Audit Report on the funding programme of the Federal Ministry for Education and Research[10]:

Strong Points:

- Large pool of usable media products; good and homogeneous broad effect of the programme
- Some outstanding products (about 5-10% of product outcomes)
- Many (about 1/3) good products
- Most projects met their funding objectives fully or in part
- Community-building and networking
- Broad acceptance

Flaws:

- Gender Mainstreaming was not or only partly accounted for
- Marketing hopes did not materialise
- Sustainability was not ensured
- Products show obvious flaws regarding didactical added value
- Interests and learning styles of students was often not accounted for in many products
- Fragmentary or insufficient integration into communicative teaching and learning processes

[10] http://www.dlr.de/pt_nmb/Foerderung/Bekanntmachungen/Audit_Bericht_2003.pdf, under the supervision of Peter Baumgartner

Chances:

- Realisation of potential transferability in terms of a (horizontal) broad effect
- Pressure to sustainably integrate E-learning products can be used for structural reforms at higher education institutions (change management)
- Promotion of integration of IT-infrastructure with E-learning
- Capitalising on good products as »good practice«-examples

Dangers:

- Pending loss of competencies after radical stop of funding initiative
    - Many media products might not be used any longer after funding has stopped