

# Lifelong Learning Strategies – Teaching Material Production and Course Development at FHTW Berlin

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**ABSTRACT:** This paper investigates the usage and benefits of e-learning systems, multimedia teaching material and different devices for aspects of electronic and mobile learning. It reflects experiences of integrating this technology into the further education course “Mobile Computing” at FHTW Berlin. The curriculum was developed during spring 2006 and the first course was offered during the winter semester 2006/2007. The teachers and students use the e-learning management system “eCampus” for the courses. “eCampus” offers a wide range of communication tools, such as chat, forum, blackboard, mail and video conference. The presentation will demonstrate the use of the communication tools in the course. There is also a complete collection of e-learning material, such as PDF files for reviewing recent lectures, flash and html files for interactive lectures, TV-like video material and enhanced podcasts in three different formats. In addition, there is a collection of self-tests, produced in flash, with score and analyse features. The presentation will show some examples of e-learning material and self-tests to discuss the usage and effects of rich media learning material, including mobile usage aspects. It will also reflect the production process and the technical support for teachers to produce rich media courseware with minimal resources in a higher education environment. The results allow multiple conclusions about the additional value from the student's perspective and future optimising potentials regarding the production process.

## INTRODUCTION

As long as you live, keep learning!

Learning and studying with modern information and communication technologies in Engineering, Natural Sciences, Business, Art and Culture provides a bridge between the needs of companies and the knowledge and expertise of the people. The development of modern information and communication technologies during the past years is characterised through the continual development of new devices, communication networks and services. These many technical developments raise the question of new applications and application areas. E-learning is one of these new areas.

Beyond access to interactive multimedia content, modern information and communication technologies can help:

- learners to engage with multimedia information by classifying, indexing, annotating, analysing, organising, evaluating, cross-referencing and searching the contents;
- teams to collaborate and learn simultaneously;
- anyone to develop and practice skills in different contexts, time and locations independently;
- creators and teachers of learning courses to analyse the quality and quantity of the learning success.

While newly developed device types, with different technical specifications, have surrounded us in our everyday life and private environment, new multimedia and communication technologies have also been established in parallel. Industrial standards tremendously affect inventions and developments in the education sector, starting in the field of ergonomic hardware and software design and ending with common patterns for highly effective courseware engineering and learning strategies. By combining the advantages of established technologies with these new approaches and furthermore

adapting those criteria to the different user needs and application scenarios we are able to offer new learning modules and courses. Furthermore highly effective concepts can be realised and integrated in the users environment.

## CURRICULUM DESIGN FOR THE FURTHER EDUCATION COURSE “MOBILE COMPUTING”

By looking more closely at the development of wireless network technologies, mobile phones, smart phones, PDA, mobile computers, and navigation systems there is a large demand on new services and applications. On the other hand, there is a lack of well-educated staff able to develop new services and applications. The University of Applied Science FHTW Berlin developed a course “Mobile Computing” to educate the participants in the fields of databases, information systems, wireless networks, mobile devices and location services. After starting with an introduction to mobile computing and wireless networks the course offers a wide range of topics around databases and information systems for mobile devices. The course closes with navigation systems, location based services and application development:

- introduction to mobile computing,
- multi-modal systems and XML,
- wireless networks,
- mobile devices,
- introduction to databases,
- data modelling,
- programming of database applications,
- replication and synchronisation of databases,
- development of e- and m-commerce applications
- mobile information systems,
- multimedia information systems,
- navigation systems,
- location and time based services.

The duration of the course is 25 weeks with 2 hours face-to-face teaching, 2 hours lab instruction, 4 hours e-learning and 2 hours mobile learning. More information is available under: <http://inka.f4.fhtw-berlin.de/moco/>.

PRODUCTION OF MULTIMEDIA LEARNING MATERIAL

For the course “Mobile Computing” we produced different teaching material. It starts with traditional Keynote and PowerPoint slides:

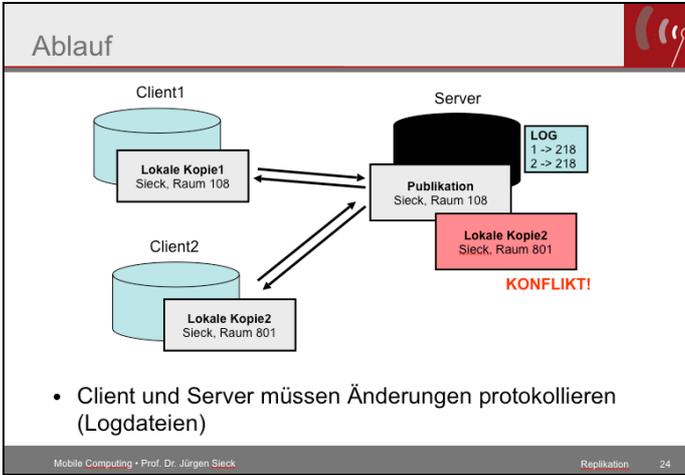


Figure 1: Keynote slides for face-to-face lectures.

For the lab instruction we produced work sheets and tutorials.



Figure 2: tutorial for a lab instruction

The students of the course have access to additional e-learning material. We offer different types of e-learning material, such as scripts, interactive lectures and TV-like video material.

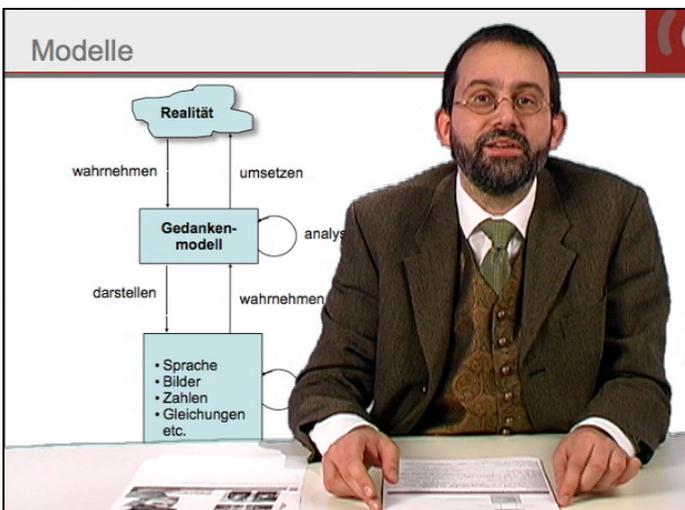


Figure 3: TV-like video material

The students have also access to m-learning material. We transformed the idea of e-learning to mobile devices and mobile information systems. It was necessary to provide a convenient way to access audio content from the lecture combined with additional visual information. The technology of choice had to simultaneously remain focused on the principles of simplicity, comprehensiveness and ease-of-use both for the creator and consumer. The only technique that fulfils all demand is Podcast.

The production process is very easy. Lectures were recorded using portable hard disk recorders and subsequently, image data was extracted from the presentations of the lectures. The retrieved data assets were combined in a media container format and finally published on the internet using a supporting base technology. Available lectures were marked at the website of the tutor through a flag. There, the user gains access to an RSS-file. This file contains both general information about the lecture itself and specific declarations concerning each episode and its provided media asset. It is possible to access this constantly enriched source with a single subscription by using freely available aggregator software (e.g. Apple iTunes). New episodes are downloaded regularly and automatically, while the user has the capability to configure the intervals of choice. Finally, the data pool will be transmitted from the home system to the portable media player as soon as it is connected and properly configured. A wide range of mobile device types could be addressed in this way.

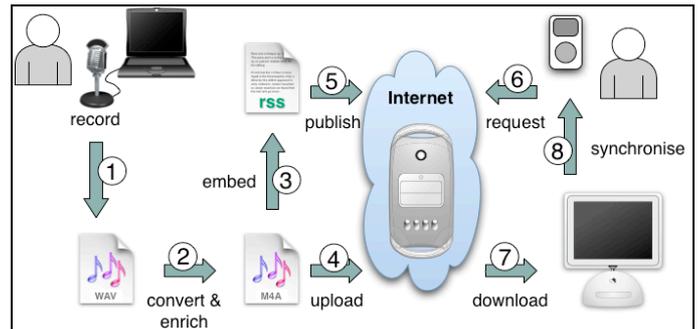


Figure 4: Podcast production process

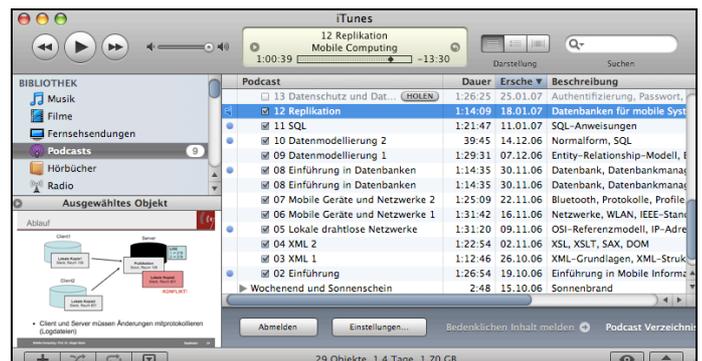


Figure 5: using Podcasts with iTunes

With the described podcast scenario, an Apple iPod video device is used for this purpose. These devices have a storage capacity of 30 GB and are able to display menu structures for navigation as well as visual content through an integrated colour display of 320 x 240 pixels.

While voice content of the lecture is streamed over the audio output, at the same time the user can view the appropriate slide on the display. In addition, it is possible to navigate the content due to specified jump labels. This enables users to follow the content at their own speed and sequence.

At the end of each lecture, every student must attend a specially produced multiple-choice test. This is an easy way to check the knowledge for the students as well as for the lecturers.



Figure 6: multiple choice test.

LEARNING. USING MULTIMEDIA LEARNING MATERIAL, COMMUNICATION TOOLS AND LEARNING MANAGEMENT SYSTEM eCAMPUS

At present, e-learning content at FHTW Berlin is available in two predominant ways. Every lecture at FHTW Berlin is listed in the lecture catalogue of the Learning Management System (LMS) eCampus. The entry in the catalogue includes a description of the lecture, the name of the lecturer, the maximum number of participants and the type of the course. Only by using the LMS eCampus are students able to book lectures through a centrally offered mechanism.



Figure 7: booking a lecture in eCampus

The result of the booking process is a list of participants, a mailing list and an automatically generated personal website for every participant of the lecture.

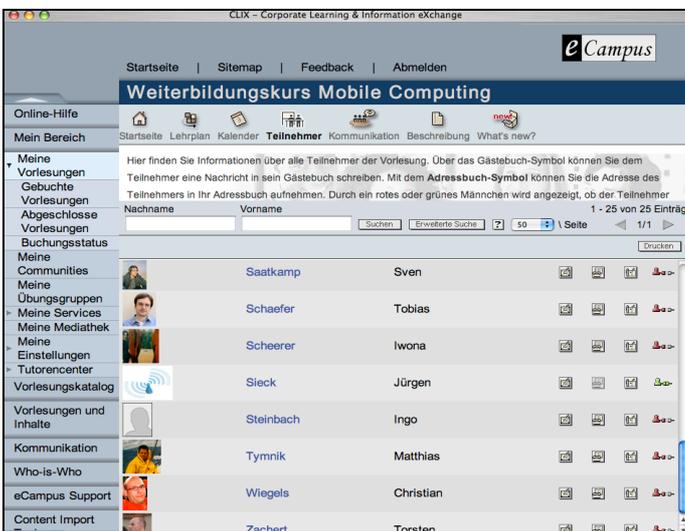


Figure 8: list of participants for Mobile Computing

The students are supplied with static and interactive learning material. Additionally, for better understanding, a range of customised web-based tests can be offered and homework or projects can be published and submitted using this platform. As a second way of accessing lecture material, students have the opportunity to use specialised servers, such as streaming servers for video content and web servers for RSS-feeds and Podcasts. The LMS eCampus is also used for the management of the course "Mobile Computing". The lecturer can use address books and different search engines, publish news, offer additional learning material, check the learning process and generate statistics. The students use the systems as an entry point for the access to all learning material, including external resources like video and Podcast.

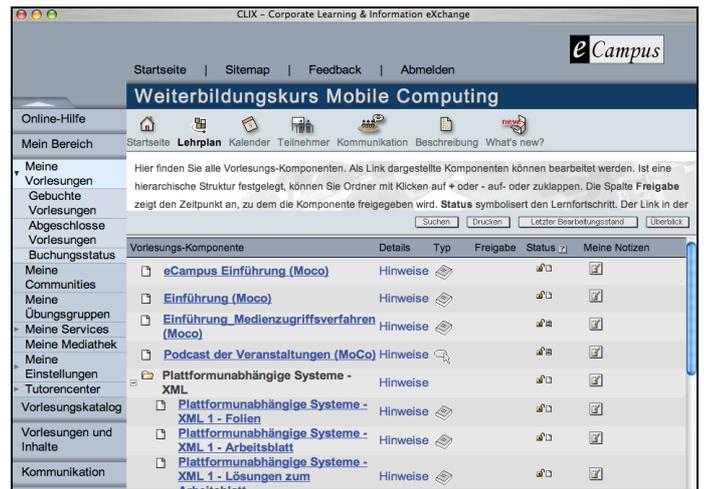


Figure 9: access to learning material in eCampus

The Learning Management System eCampus also offers different communication tools, such as discussion boards, blackboards, chat rooms, document exchange service, mail service and guest books.

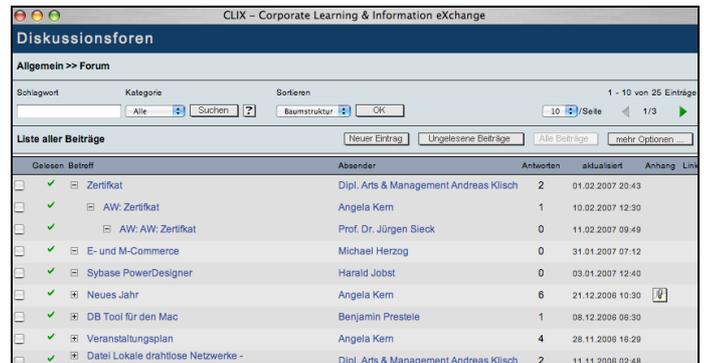


Figure 10: discussion board in eCampus .



Figure 11: blackboard in eCampus

## CONCLUSIONS AND OUTLOOK

With regard to the results described above, several conclusions can be drawn concerning the use of e-learning material in further education courses and the organisation of courses with eCampus. The combination of different rich media types of learning material such as flash and html files for interactive lectures, TV-like video material and Podcasts in many formats is very helpful for the students and improves the learning success. On the other hand, the production process is very complex and time consuming. The production of e-learning material in multiple formats for a single 90 minutes lecture, takes up to 15 hours. For serving the demands of several different data format versions, each with different enrichment levels regarding additional content, future work must cover the aim of reducing the current time-consuming production process.

Withholding the current standard, with regard to the quality of the content and the media assets, future work should be focused on the reduction of the complexity of the production process and on the effectiveness and automation of the production of e-learning material for different devices types and different formats. The plan for the future is the development of the media hub system “Mocca”. The main functionality of the system is the import of e-learning content in different media (HTML, XML, PowerPoint, Keynote, Open Office, ...), the allocation of editing tools in the system and the export of the content in different media, different resolution for different devices and different user groups. The platform independent system allows lecturers to decide if, and how many of their lectures should be recorded and which e-learning material should be provided to the learners. Here, the main focus lies on the generic editing and composition of contents via XML language dialects.

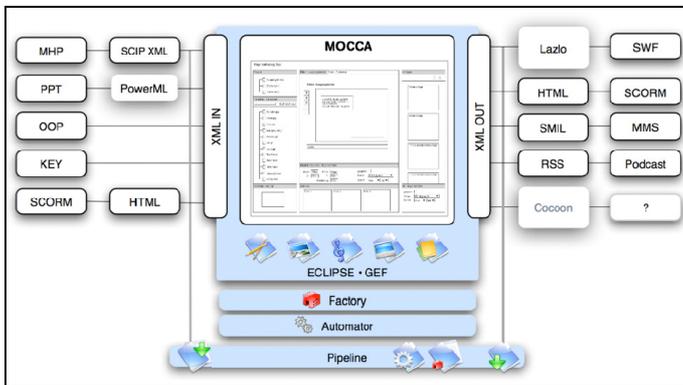


Figure 12: media hub Mocca

Additionally, instructions on how to use these contents, subscribe to them and the required technological base should be published for encouraging even more students to take part.

All these instructions are available in the Learning Management System.

The use of the Learning Management System eCampus is very convenient for the students. They are able to book lectures, are supplied with a large amount of teaching material and have the possibility to use a wide range of communication tools. For all the different tasks the students and lecturers have only one personalised system and only one entry point.

The task for next months is to integrate video conference tools to improve the quality of the communication between the students and the lecturers as well as the communication between students.

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