

E-learning using E-learning

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ABSTRACT

During the last winter term of 2006 we offered our students a course about e-learning for the first time. 11 students participated.

The content of this course was to teach the main aspects of e-learning like the didactical and historical background, e-learning technologies and strategies, multimedia and authoring software typically used to produce e-learning applications, the use of a learning platform offering downloads, communication, collaboration, web based training (WBT), online testing etc.

We think, the best way of teaching e-learning means to use e-learning methods in combination with the well established concept of conventional presence lecturing using Powerpoints or a whiteboard. Together with computer based training (CBT) for homework, our course should be a good example for the blended learning concept, not only enriching but also integrating many e-learning concepts.

This paper sketches the curriculum, arrangement, and findings of our course. Chapter 2.7 might be of special interest, because it describes how we discovered the positive influence of good CBT design and layout on the students learning effect.

KEY WORDS

Curriculum, e-learning, practical experience, blended learning, course

1. Introduction

Some e-learning aspects are changing very fast, like those depending on internet technologies do nowadays. Others are researched, evaluated, and well established. For more than 50 years we learn to use e-learning methods more and more effectively, and we should not repeat our mistakes of this e-learning history. The future of e-learning will depend on the people understanding its didactics, history, new multimedia possibilities, and on the competencies of both, the instructor and the learner.

We think that today is the right time to teach tomorrow's learner and instructor about what lies behind and what might lie ahead of today's world of e-learning, and so we developed a curriculum for a course about e-learning using e-learning. This course was held for the

first time during the last year's term for students of bachelor informatics in third semester.

2. Course structure

We divided the course into 13 lectures covering the most important aspects of e-learning:

1. Learning platforms
2. Communication competencies
3. E-learning technologies
4. E-learning didactics and history
5. Online testing
6. Design and layout of learning software
7. Influence of design and layout on learning effect
8. Production of learning software
9. Authorware in practice
10. Image editing and color management
11. Photoshop in practice
12. Audio and video editing
13. Audio and video in practice

2.1 learning platforms

When developing a course, one important question to ask is if a learning platform should be used for online WBT sessions and/or material distribution to enrich the course. learning management systems (LMS) are complex, internet based software systems for organisation, integration and distribution of such learning contents, offering functionality, communication and virtualisation.

To give our students an overview on the topic, we started with a conventional Powerpoint presentation pointing out the didactical pros and cons of online learning platforms, classifying them into LMS and learning content management systems (LCMS) and to formulate the associated standards. [1] We also gave a script to the students that described this in more detail and introduced four common learning platforms.

After this theoretical part the students should get some practical experiences on the learning platform ILIAS [2] that we would be using during the whole course (we used ILIAS version 3.7.3). In a tutorial, their job was to subscribe for the course, creating an account with a

picture (avatar), and to try out the communication tools e-mail, chat and forum.

Outlining of this chapter:

Presence	Lecture with Powerpoint	1 h
Homework	script	1 h
Online	ILIAS tutorial	2 h

2.2 Communication competencies

One of the biggest didactical advantages that the internet can bring to an e-learning course comes with the use of synchronous and asynchronous communication tools like chat, forum and e-mail. Their main goal is to enhance information exchange between students and instructor, and among the students, preserving social contacts and enabling project-oriented collaboration. [3] To use these communication tools efficiently, the instructor and the students need *communication competencies*. But how can they be taught? We needed a scenario that motivates the students to use these communication tools.

We found a feasible scenario in the task of grouping the students for later assignments during the course. For this purpose, we all met online on the learning platform at a given time, all from different locations. But the affiliation to a specific group should not be obvious to the students, they had to communicate and collaborate on a mathematical level in order to do the job.

As a basis we used four prime numbers, four Fibonacci numbers and for the three-man-group we used three numbers associated with Pythagoras. In an e-mail each of the students received one of these eleven numbers and the task to find his group members using forum, chat, and e-mail only. Only all group members together would then be able to find a password that would grant them access to the group area on the learning platform. All the time during this online session, they were coached over the chat, and periodically, they received little hints from the instructor to solve their task. In order to make the whole communication target-oriented, we also gave them the access rights necessary to create new chat rooms and forum-threads themselves.

The learning targets:

- Developing strategies for an efficient information exchange e.g. nominating a chat moderator.
- Which communication tool should be used for what purpose? For example, the password should not be sent over the chat but individually by e-mail.
- How efficient is online collaboration in comparison to a meeting?
- What is the optimal chat room size? When 11 students are chatting at the same time you soon lose track.

- Are there any indicated means to increase communication efficiency? For example can smileys :-) or acronyms be used expedient?
- What can go wrong? What problems can be expected?

Outlining of this chapter:

Online (on time)	Online communications	2 h
Online	Collaboration	1 h

2.3 E-learning technologies

In this chapter of the course we wanted to give the students an overview on today's common used e-learning technologies. For this we used conventional lecturing, since this is mostly declarative knowledge transfer.

The main aspects of these Powerpoints were the definition of multimedia (technological, pedagogical and economical aspects), multimedia-software-tools (CBT and WBT, authoring, information and communication, virtual classrooms, d-lecturing software, learning platforms, test and assessment tools), tutoring and coaching, blended learning, simulations, d-lectures, video conferencing, mobile learning, e-test and e-assessment, quality management and evaluation, e-learning appliances and areas of application, business models, and education controlling.

Outlining of this chapter:

Presence	Lecture with Powerpoint	1 h
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2.4 E-learning didactics and history

From the instructors point of view conventional lecturing is very effective to impart declarative knowledge, but for the students it lacks motivation and isn't very sustainable. We therefore punctuated the lecture with a homework phase, providing a script to the students about e-learning didactics, and a WBT about e-learning history that they had to work with on the ILIAS learning platform.

Outlining of this chapter:

Homework	Script and WBT	1 h
Presence	Lecture with Powerpoint	1 h

2.5 Online tests

For both, the instructor and the students, tests are very important in order to control the learning effect. In the e-learning way, online tests let the instructor and the students benefit through automation and organisation provided by the software. The ILIAS learning platform is able to perform online tests supporting many question types like multiple choice, cloze, ordering, matching, image maps, gap-fill, numeric questions etc.

Based on the contents of our e-learning course so far, we accomplished a time restricted online test. During this test the students were coached through the chat by

the instructor and a tutor, but since the students could be cheating in this test (because we can't supervise them at home), the test results were not part of their final grade on the course.

After the test, the results were evaluated by the instructor, put into graphs, and then discussed with the students during the next presence phase, enabling a discussion on specific questions of the test and also revealing some deficiencies.

Outlining of this chapter:

Online (on time)	Online test	1 h
Presence	Discussion on test results	1 h

2.6 Design and Layout of learning software

The influence of information architecture, layout, and design concerning learning software is beyond dispute. In this lecture, the students should learn theoretical basics and also make practical experiences on good and bad layout and design.

We started with a conventional lecture about the principles of media design covering aspects of navigation and control, typography, visuals (pictures, video, animations), and audio (speech, music, sound), interactivity, communication and collaboration. Subsequent we posted some corresponding design criteria. For a more vivid impression on these aspects, we also provided a CBT we created about design and layout, for a homework. The assignment for this lecture was to discuss the 20 most important criteria in a forum on our ILIAS learning platform.

Outlining of this chapter:

Presence	Lecture with Powerpoint	1 h
Homework	CBT	1 h
Online collaboration	Forum discussion	1 h

2.7 Influence of design and Layout on learning effect

The influence of design and layout in CBT on the learning effect is still a matter of scientific research. But in the meantime it's also a matter of common knowledge, that good layout and design will result in a higher learning effect. In contribution to this, we decided to make a little experiment with our students. We produced two CBT, one called FDS (Force Directed Scheduling – a method to optimize the size of a chip) and the other called GOTO (describing the algorithm of *Satoshi Goto* for placing and routing of components on a chip). Both CBT existed in two different versions: one version with a good layout and design, the other one fairly not. We divided the students into two groups: one got the *good* version of FDS and the *bad* version of GOTO, the other group of students got the opposite combination.

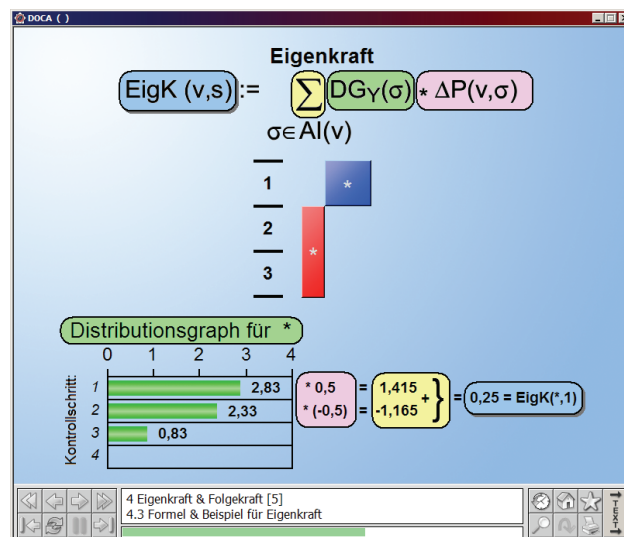


Fig.1: Screenshot from the *good* CBT "FDS"

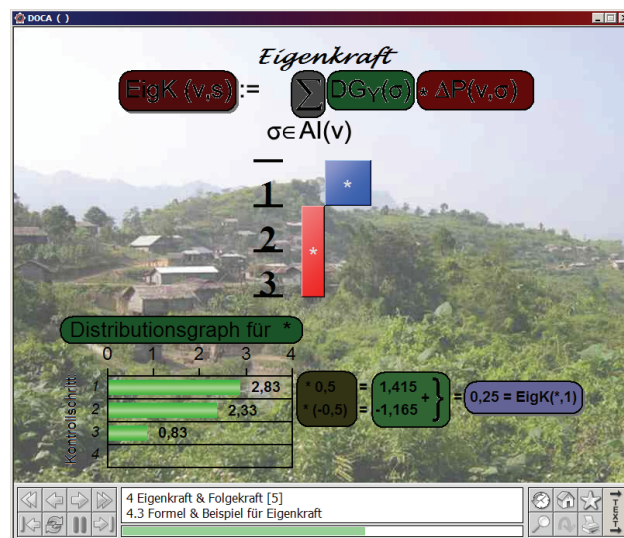


Fig.2: Screenshot from the *bad* CBT "FDS"

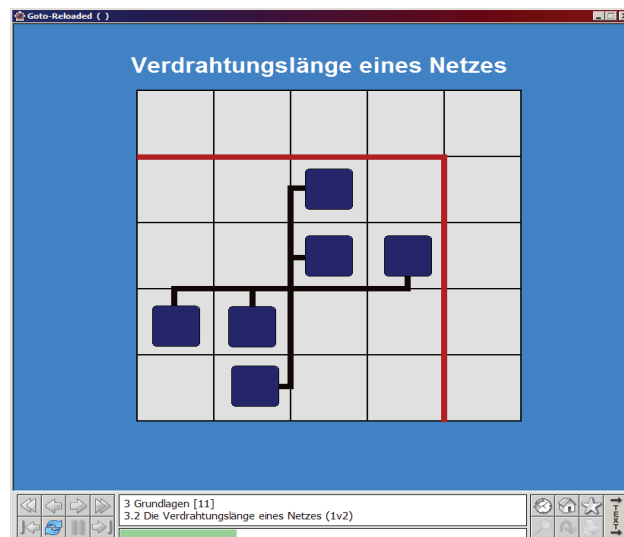


Fig.3: Screenshot from the *good* CBT "GOTO"

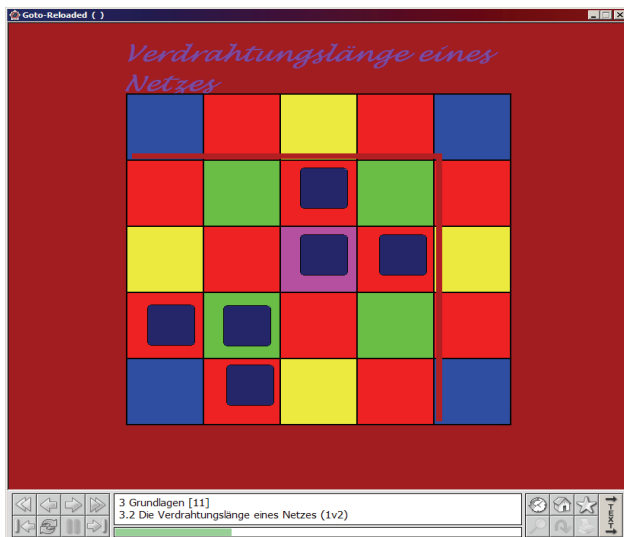


Fig.4: Screenshot from the *bad* CBT “GOTO”

After finishing the two CBT, each student was asked to process another online test on our ILIAS learning platform without using the CBT or any other resources, knowing that the test result will also not influence his or her final grade of the e-learning course. The results were analysed and presented in the following presence lecture: The test results based on learning with a *good* CBT were better and furthermore, those students took less time to finish the online test. Test results based on learning with a *bad* CBT were worse and those students took more time to finish the test.

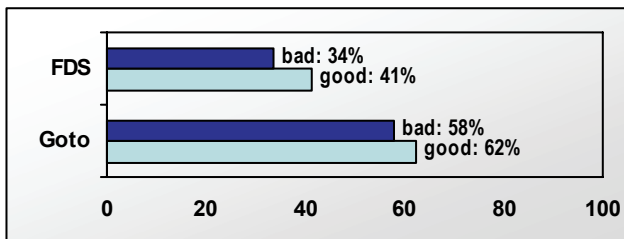


Fig.5: Average test results



Fig.6: Average time used to finish the test

With this experiment we could ascertain the fact that good layout and design has a positive influence on the learning effect! But we have to keep in mind that only 11 students participated in this little experiment and that during the test the students were unsupervised.

Outlining of this chapter:

Homework + Online	2 CBT + online test	1 h
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2.8 Production of learning software

The production of educational software like CBT and WBT is done with authoring tools. They combine the different multimedia contents with the learning context, and coupling it with interactivity. *Adobe Authorware* (formerly Macromedia Authorware) is such an authoring tool and considered to be easy to learn, powerful and universally applicable through the integrated script language. In a presence lecture we discussed some authoring tools, introduced Authorware software to the students and reviewed the process of producing learning software after the phase model (waterfall model) or the spiral model.

Outlining of this chapter:

Presence	2 CBT + online test	1 h
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2.9 Authorware in practice

In preparation for the practical course *multimedia learning software* following in the winter term of 2007, the students should now practice the production of learning software with Authorware. In a tutorial with five assignments, they learned elementary things like the integration of pictures, text, animation and interactivity. During this lecture they were supervised by a tutor.

Outlining of this chapter:

Practice	Authorware exercises	12 h
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2.10 Image editing and color management

Among the five human senses, the eye as the source for visual information can't be appraised highly enough. Therefore, the professional use of pictures, video, and animation in learning software is a very important quality factor.

In a presence lecture with Powerpoints we discussed the fundamentals of colors itself, including physical, physiological and psychological aspects, additive and subtractive color mixture, color models, and color spaces, standardizations and transformations and color management, including the workflow, color profiles and gamut mapping.

Outlining of this chapter:

Presence	Lecture with Powerpoint	2 h
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2.11 Photoshop in practice

In order to visualize color management and make it more understandable to the students, the preceding lecture was pursued by another practical lesson. With a script as a guideline they had to do five practical assignments with the image editing software *Adobe Photoshop*. These included the visualization of color spaces, assigning and

transforming color profiles, and color level adjustment using gradation curves.

Outlining of this chapter:

Practice	Photoshop exercises	4 h
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2.12 Audio and video editing

Adding spoken text, music and sound effects to learning software and dubbing them with its visual context is an important quality aspect. Furthermore the integration of Video can have considerable positive impact on the learning effect, because the information density of a video can be very high.

We produced two CBT for the students, covering the principals of generating, editing, and saving audio files, and respectively video files.

Outlining of this chapter:

Homework	2 CBT (Audio and Video)	2 h
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2.13 Audio and video in practice

To be proficient in the use with typical audio and video editing software, the students received guidelines and four practical assignments. First, they used the freeware audio editing software *Audacity* in our professionally equipped sound studio (containing a high end microphone and a sound processor) to make their own speech recordings, then they used the professional video editing software *Adobe Premiere* to produce a small video clip. For this assignment, we provided them with the needed video recordings, because there was not enough time in this course left to let the students do the video recordings for themselves.

Outlining of this chapter:

Practice	Audio and video editing	3 h
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2.13 Upshot of the course

The described e-learning course had a total length of 40 hours, segmented into the following four phases:

Presence	8 h
Homework	6 h
Online	7 h
Practice	19 h

There also was an initiation hour at the beginning, and an ending hour including a anonymous course evaluation. Finally each of the students had to pass a 20 minute colloquium for their final grade. Altogether this course took about 42 hours and was designed for 14 weeks and 3 hours per week.

3. Conclusion

To estimate an adequate timing for the individual lectures of this course was very difficult, especially for the online parts and the practical assessments. As a resumé, we can say that the online phase took considerably longer than we originally thought.

During the lecture on *Communication competencies* (see chapter 2.2) we experienced some difficulties resulting from the disparity of the students. On one hand the unexercised students had problems to keep up with the communication speed, while on the other hand the more experienced students tended to be bored. The challenge was to compensate these differences in competencies without loosing sight on the learning target. Also, you may reckon with technical problems of the students that can not be solved in time. In our case, one student could not participate in the chat, probably because a firewall was blocking in some way.

The continuous use of the ILIAS learning platform turned out to have a positive effect because it helped to distribute the course material and to exchange information with the participants. Questions that are usually asked personally or per e-mail (one by one) could be asked and answered in a forum, so everyone could read it before asking the same question.

But there was also some criticism concerning the communication tools of the ILIAS learning platform, especially on the chat room. Its functionality and usability can not compete with those of other well known chat clients (e.g. ICQ, Trillian, Jabber). We wish to have a working chat protocol standard, so every participant can use his own favourite chat client, like it is already become reality when sending or receiving e-mail.

During the presence lectures, the use of a Smartboard (a.k.a. interactive whiteboard) turned out to be an excellent way to enrich the Powerpoints with interactivity. This was also positively perceived by the students and stated in the course evaluation.

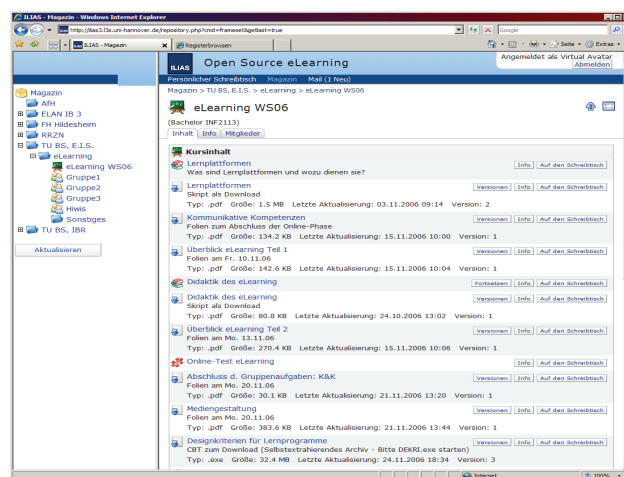


Fig.5: Virtual course room on the ILIAS learning platform showing some learning contents

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