

Transforming a Standard Lecture into a Hybrid Learning Scenario

Hans-Martin Pohl¹, Jan-Torsten Milde², and Jan Lingelbach²

¹ University of Applied Sciences
Heinrich-von-Bibra-Platz 1b, 36037 Fulda, Germany

² University of Applied Sciences
Marquardstrasse 35, 36039 Fulda, Germany
hans-martin.pohl@hs-fulda.de,
{jan-torsten.milde, Jan.lingelbach}@informatik.hs-fulda.de

Abstract. We describe the successful transformation of a traditional learning setting of a standard lecture into a hybrid learning arrangement. Based on the 3C-Modell of Kerres and de Witt, the lecture has been extended to integrate exercises. Students are motivated to work in smaller groups. In order to allow students to work according to their own work speed and motivation, the learning material is distributed using the e-Learning platform. This material includes video recordings of the lecture in a high quality. The evaluation of this transformation process shows evidence, that students take profit from the extended hybrid learning arrangement.

Keywords: Hybrid learning scenario, interactive slide presentation, blended learning.

1 From Standard Lecture to a Hybrid Learning Scenario

E-Learning has been very successful over the last years. This is especially true in the context of higher education, where many universities have set up e-Learning systems to support their teachers and students. While the systems provide a rich set of possibilities to the teachers, it can be seen, that many (if not most) of them do not integrate e-Learning into their teaching settings.

At this point in time the didactics of e-Learning scenarios needs to get more attention. Using e-Learning or blended learning as a central part of the general teaching methodology has substantial effect onto the design of both teaching and learning style.

In this paper we would like to focus onto the transformation problems and outcomes, that arise when using new e-Learning based teaching methods and integrating new media into higher education teaching (see [Ker05]). The transformation process leads to a more open learning setting that we expect to lead to a higher learning motivation and better learning outcomes. (see [Sch04], [Nie04], [Sch09]) We will provide observations how the didactics have been influenced by each of the transformation steps taken (see [Ojs06], [Car02], [Bro89], [Lav91]).

In our example a traditional introductory course on bachelor level had been transformed into a blended learning arrangement. The course “Introduction to Electronical Engineering” of the winter term 2009/2010 is a first years course (see [AISOP]).

It is structured into a lecture and additional exercises, which were taught separately from the lecture. The students in this introductory course have a very inhomogeneous background. Especially their knowledge in mathematics and physics vary substantially. This leads to a number of problems. While it was possible for most of the students to keep up with the content of the lecture, many had problems when it came to doing exercises, which in turn formed the basis for the final written exam. Some students also had problems with the complexity of the lecture and were unable to structure the content to their needs, making it hard for them to solve the exercises.

1.1 The 3C-Modell as a Didactical Framework for the Design of Blended Learning

For most blended learning arrangements lectures or seminars are combined with the application of new media. This technical support is often based strongly to quite available learning-management-systems (LMS). The combination is obtained in the optimum case, the best of both worlds. On the one hand there is direct contact between teachers and students with the opportunity to interact directly in focus. On the other side the rather learner-centered view is stressed. By the offer of electronic materials the self-determination of the students increases. They get the possibility to themselves to choose her learning paths and to determine the learning speed independently. [Dem07] About test scenarios and learning success excrement roles the teacher can intervene steering and accompanying. Hence, it corresponds to often demand "shift from teaching to learning".

However, the main question with Blended Learning attempts is always after the right mixture of on-line study and presence study. Also the variety of the electronic support must be used carefully. The pure supply of digital materials is a really successful didactic conversion of a draught in the rarest cases. [Bac01]

For Driscoll [Dri02] blended learning scenarios are a good entrance in the learning with new media. Besides, in particular must be taken on them, mostly still to be developed, media competence of the learning consideration. The arrangement of these teaching arrangements is always a question to the concept of the teacher. So Kerres und de Witt wrote:

“In our interpretation, blended learning basically refers to (at least) the mix of different:

- didactical methods (expository presentations, discovery learning, cooperative learning, ...) and
- delivery formats (personal communication, publishing, broadcasting, ...)” [Ker03]

The 3C-model by Kerres and de Witt [Ker03] underlying to this article creates exactly for these questions a framework to describe the components of the learning arrangement and their weighting and to determine the suitable methods and formats in a second step.

It is based on three components: content, construction and communication.

Content is all material the learner should be able to recall. All types of media, e.g. literature, scripts, slides, pictures, animations, podcasts, video podcasts, lecture recordings, are possible. Thereby the content is necessary to allow the learner to internalize the externalized knowledge and construct its own knowledge.

The *construction* component is necessary when the information from the material should be available for actions. The learner must reflect the learned facts and fit it in the whole issue.

For an integrated learning arrangement the *communication* component is essential to e.g. discuss learning results with other students, to reflect the facts with the practical reuse in contact with the teacher or got a different view by interaction with others.

All three components could be realised in a number of different media types including synchronous and asynchronous online presentations.

In a traditional teaching setting, content will be presented by the teacher (e.g. as a slide presentation), in a non-communicative setting (teacher is presenting, students are listening) with a very low fraction of construction time (students will repeat content for themselves after the presentation).

In our transformation process we attempted to change this situation to make the teaching situation more communicative and constructive. The slide presentations in the lecture have been changed to a more interactive way of presentation to support the content component. Exercises have been integrated into the lecture, thus closing the temporal gap between content presentation and practical appliance to enhance the construction component. The complete lecture has been video recorded and is provided as an online video stream to the students. In order to support the students with their exercises, sample solutions have been worked out and have also been video recorded. The complete learning material of the lecture is located on the central e-Learning platform of the university and can be used by students asynchronously to the lectures and exercises. Furthermore communication tools were provided there to promote the communication component.

2 Interactive Presentation

The interactive slides presentation has been realised using the “Oxford Paper Show” system (see [papershow]). This system allows to couple traditional slide projection with a computer based presentation. The underlying technology is based on a special paper with extremely tiny control marks printed onto it. These marks are recorded and processed by a camera, which is integrated into a special pen, which in turn is wirelessly connected to the computer using Bluetooth.

In our arrangement we copied all slides onto the paper and created scans of these slides. A physical version of the slides was given to the teacher and a virtual version of the slides existed on the computer.

As an effect of this technology, teachers do not have to change their style of presentation. The slides can be selected with the digital pen and will be projected by the computer. It is possible to write onto the (paper) slides. These comments will be shown on the virtual slides in real time. Every slides transaction is therefore captured

and can be recorded. This allows an asynchronous playback of the slide presentation. In addition, all comments on the slides will be stored and can later be distributed electronically.

A noticeable effect of the integration of this new technology into teaching is the calm presentation style. The teacher explains the content to the student and simultaneously writes down comments. As such, he remains seated and is not moving across the class room. The students seemed to be much more focused and kept listening to the teacher. Instead of writing down everything the teacher explained, more individual notes were taken.

3 Integration of Exercises

In order to consolidate the lecture's content, exercises were integrated into the lecture. The exercises were given to the students at the end of each lecture. After 20 Minutes a sample solution was presented by the teacher using the paper show technology. Further exercises were given, which should be solved as part of the self-study phase of the students. If requested, the solution for this exercises were presented in the following lecture.

Integrating the exercises resulted in a deeper understanding of the lecture's content. Students took part in the lecture more actively and misunderstandings were identified immediately. Another effect of the exercise integration is the speed reduction of the lecture. The teacher focused on the most relevant topics, thus reducing the complexity of the lecture.

The students profited from the interactive presentation style of the sample solution. The exercises are relatively complex and the stepwise explanation helped them to comprehend the solutions. If needed, the presentation could be replayed multiple times.

To interact and communicate with other students outside the lectures the students uses very often asynchronous methods like threaded discussion. It was interesting to see that for this interaction not the standard learning management system was used. Instead a server outside of the university supported by student representatives of the department Applied Computer Science.

4 Video Recordings of the Lectures

In order to facilitate an intensive self-study phase, all lectures have been video recorded and were put onto the e-Learning platform for individual downloading (see [AISOP]). In addition a streaming server was set up. This made it possible to watch the lecture even on a slow bandwidth connection. It only takes about two hours of post processing (mainly automatic transcoding) until the lectures are available to the students.

For the recording of the lectures a mobile recording system had been designed and set up by the central e-Learning laboratory of the university. The system has been built around a "Sony AnyCast Station", a mobile video recording system, allowing to recording and mixing down up to six video channels. We attached two cameras to the

system. These cameras are fully remote controllable. Using two cameras provided us with a higher flexibility for the art work of the recording, resulting in a more “interesting” video providing a higher level of immersion. In order to capture the signal of the presentation computer, a splitter had been attached to the system, thus making it possible to both show the signal on the data projector and to record it in a high quality. The sound has been recorded using wireless microphones.

The recording, video mixing and camera control is done in real time by a single person. We trained a couple of student tutors, who are now able to record lectures on their own. As the recording system is designed to be mobile, it can be used in any standard lecture class. Setting up the system takes about 15 minutes for two people.

The students used the video recordings very intensively. The video were watched almost around the clock. Quite often only smaller parts were selected and have been watched multiple times. The recordings also had positive effects onto the lectures. Students explained that it was comforting to them, that they could repeat topics, even when they did not understand the topic during lecture time. The attendance rate did not drop, so students still wanted to take part in the “live” lecture.

A similar effect was noticed by the teacher. It took him little time to get used to the recording situation. Knowing that the content was available for replay, he was able to refer to the video, if needed. That reduced the need to repeat things during the lecture, leaving more time for the exercises.

5 Presentation on the e-Learning Platform

Additional material to the video recordings and the slide presentation was put onto the central e-Learning platform of the university. This material included the texts of the exercises and a large number of exercises of past years. The students rarely used this additional material and rather stuck to the content which was of immediate interest to them.

The e-Learning platform provided means of communication, such as forums and chats. These were used by the students for organisational purposes only. A content related discussion did not take place.

The e-Learning platform formed the basis for the self-paced study style of the students. In earlier years students tended to learn “on demand”, starting to learn about two weeks before the final exam was due. With the platform online and the material available, the students started to work in a more continuous way.

6 Conclusions

At the end of the term, the students were asked to fill out a questionnaire. A total number of 78 persons attended the course. Of these 55 persons took part in the evaluation. The questionnaire is standardised which makes the automatic processing of the data possible. The evaluation is archived for documentation purposes. Therefore long term comparison becomes possible and will be performed during the next years.

The analysis of the evaluation showed a high acceptance rate of the used methodologies and technologies. More than 55% of the participants took advantage of the new media. Almost 70% observed positive learning effects when using the e-learning material for their course preparation and course repetition (see Fig. 1).

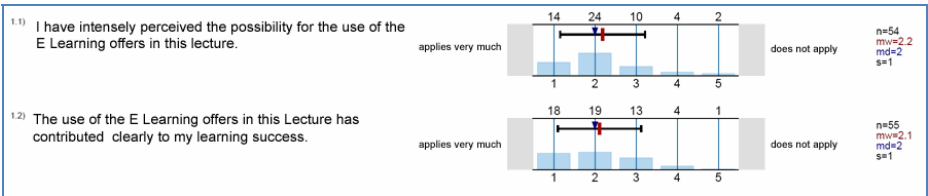


Fig. 1. Evaluation results

Switching from a standard lecture to a hybrid learning scenario has resulted in a number of positive effects. Most of the participants explained, that e-Learning played an important role in their learning success.

The students liked the online support and would like to see it extended in the future. As shown in figure 2 especially online exercises and audio and video recordings were requested. This is a very positive outcome, as the self-activation of the students was one of the central targets of this transformation.

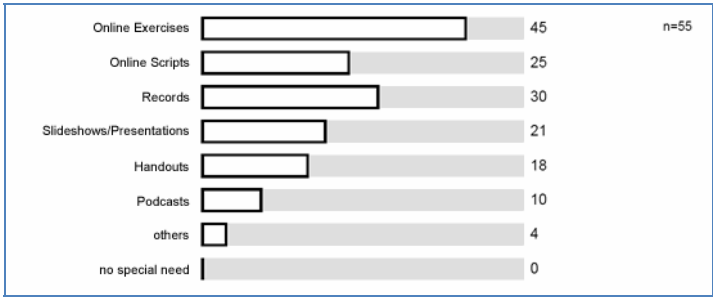


Fig. 2. Requested forms of online support

Offering an open learning situation to the students leads to a more intensive learning experience and results in a deeper understanding of the content. The integration of exercises into the lectures provided a transfer to the practical appliance of the theoretical content.

The used technologies allowed to preserving a classical teaching/presentation style, while transforming the material into the digital world. The teacher was able to focus onto the lecture and was not distracted by technological problems.

References

- [Ker05] Kerres, M.: Didaktisches Design und E-Learning. In: Miller, D. (Hrsg.) E-Learning - Eine multiperspektivische Standortbestimmung, pp. 156–182. Haupt Verlag (2005)
- [Sch04] Schulmeister, R.: Didaktisches Design aus hochschuldidaktischer Sicht - Ein Plädoyer für offene Lernsituationen, Stand: (March 4, 2010), http://www.zhw.uni-hamburg.de/pdfs/Didaktisches_Design.pdf
- [Sch09] Schulmeister, R.: Studierende, Internet, E-Learning und Web 2.0. In: Apostolopoulos, N., et al. (Hrsg.) E-Learning 2009 - Lernen im digitalen Zeitalter, pp. 129–140. Waxmann (2009)
- [Ojs06] Ojstersek, N., Heller, I., Kerres, M.: E-Tutoring. Zur Organisation von Betreuung beim E-Learning. In: Arnold, R., Lermen, M. (Hrsg.) eLearning-Didaktik, pp. 107–116. Schneider Verlag, Hohengeren (2006)
- [Nie04] Niegemann, H.M., et al.: Kompendium E-Learning. Springer, Heidelberg (2004)
- [papershow] <http://www.papershow.com/de/index.asp> (July 5, 2010)
- [AISOP] E-Learning Plattform der Hochschule Fulda (July 5, 2010), <http://elearning.hs-fulda.de/aisop/>
- [Bro89] Brown, J.S., Collins, A., Duguid, P.: Situated Cognition and the Culture of Learning. *Education Researcher* 18, 32–42 (1989)
- [Lav91] Lave, J., Wenger, F.: Situated Learning: Legitimate Peripheral Participation. Cambridge Press, New York (1991)
- [Car02] Carman, J.M.: Blended Learning Design: Five Key Ingredients (July 5, 2010), <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.95.3197&rep=rep1&type=pdf>
- [Pel01] Pellegrino, J.W. (Hrsg.): Knowing What Students Know: The Science and Design of Educational Assessment. National Academy Press, Washington, D.C (2001), ISBN 978-0309072724
- [Bac01] Bachmann, G., Dittler, M., Lehmann, T., Glatz, D., Rösel, F.: Das Internetportal LearnTechNet der Uni Basel: Ein Online Supportsystem für Hochschuldozierende im Rahmen der Integration von E-Learning in der Präsenzuniversität. In: Haefeli, O., Bachmann, G., Kindt, M. (Hrsg.) Campus 2002 – Die Virtuelle Hochschule in der Konsolidierungsphase. Münster, pp. 87–97. Waxmann (2002), ISBN 978-3830911913
- [Ate04] Attewell, J., Savill-Smith, C. (Hrsg.): learning with mobile devices – research and development. Published by the Learning and Skills Development Agency (2004), ISBN 1 85338 833 5
- [Dem07] Demetriadis, S., Pombortsis, A.: E-Lectures for Flexible Learning: a Study on their Learning Efficiency. *Educational Technology & Society* 10(2), 147–157 (2007)
- [Foe02] Foertsch, J., Moses, G., Strikwerda, J., Litzkow, M.: Reversing the lecture/homework paradigm using eTEACH web-based streaming video software. *Journal of Engineering Education* 91(3), 267–274 (2002)
- [Wie10] Wiethäuper, H.: E-Learning: Integration von Mediendidaktik und Lerntechnologie in Bildungsprozesse (2010), http://www.uni-marburg.de/fb21/sportwiss/mitarbeiter_seiten/wiethaeuper/elearning/zw_medien_technologie.pdf, Stand: (January 14, 2011)
- [Dri02] Driscoll, M.: Blended Learning: Let's Get Beyond the Hype, Stand: (January 20, 2011), http://www-07.ibm.com/services/pdf/blended_learning.pdf