

Integration of Education and Technology – A Long-term Study about Possibilities and Adequacy of a Learning Management System for Education

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ABSTRACT

Use of technology in educational scenarios has become self evident especially in contexts of higher or further education. But it still lacks a systematically and integrative discussion about how to exhaust all possible benefits of this integration enduringly. The study at hand aims at evaluating two different learning management systems in use at the University of Education (UE) Weingarten with regard to all perspectives on this topic in a long-term study over a period of three years. In the context of the implementation of a media-affine program of study the two systems moodle and DistanceLearningSystem® get surveyed. The basic functions of the systems are investigated for their adequacy for maximum benefits in didactic, organisational and curricular [1] tenor.

Keywords: Technology in Education, Learning Management Systems, Longterm Study, Moodle, DistanceLearningSystem®

1. INTRODUCTION

Since nowadays new media and communication technologies are important and even indispensable parts of all fields in education, their consideration during the process of drafting and implementing new programs of study seems self-evident. But although the integration of technology and education was not a new development at all [2] the prospects about possible, needed and desirable effects of integrating technology in educational processes developed in quite different directions in literature as in practice. The lack of a systematic discourse among the upholders of these different views has been criticised before [1] but it is essential if it has to be the base of seminal changes in the field of education. For exhausting all possible benefits of using technology in education, it is important to embrace all approaches and attitudes and to discuss the possibilities of realization and their benefits for education.

Desired effects by using technology in education e.g. learning management systems are to enhance the integration of the technology into teaching and learning processes, to foster changes in instructional design and to enhance learning possibilities for students. Inherently, most of these effects are rather long-term than short-term in consequence. Unfortunately typical studies concerning the effects of learning management systems are focused on short term aspects e.g. usability aspects [3]. It lacks studies which accompany the implementation process of technology in an educational system (e.g. school, university). Therefore, in addition to a multi-faceted

investigation of the learning management system we wanted to get an idea of the longitudinal effects of implementing technologies in education. Following these aims we developed a research concept to benchmark the learning management systems in use at the UE Weingarten for the duration of three years and investigate the educational potentials of the tools.

2. ISSUE

The starting point for the implementation of a new learning management system was the initiation of the new bachelor program Media and Educational Management at the UE Weingarten. In the context of this program of study the linkage between technology and education becomes clearly emphasized. These two domains interlock here both thematically (theoretical contents) and practically (instruction, equipment, format). For that reason the application of a learning technology was quite self evident but still the named questions about technology in education had to be answered.

3. OBJECTS OF INVESTIGATION

Beside the learning management system of the bachelor program there is although another one in use at the UE Weingarten which is used in all other subjects of the university. The general aim of this study is to compare these two systems concerning their adequacy for processes of teaching and learning with new media. After a short definition of the object “learning management system” the two systems of the UE Weingarten which are to be surveyed will be briefly introduced in the following.

Short definition: Learning Management System

A web based learning platform is comprehended as server-side installed software which helps to distribute any learning content via internet and supports the organisation of the learning processes [3]. The authors of this definition exclude e.g. sever-sided authoring tools or contents without organisational function for the learning process (e.g. download of scripts). For the intention of this study the definition will be expanded by these aspects. The access to and exchange of learning materials over the learning management system is an essential element of this study as these are frequent processes taking place at the UE Weingarten. Equally the availability and integration of authoring tools into the learning platforms is important and therefore included.

Distance Learning System®

The Distance Learning System®10.0 (DLS) is a Learning Management System that is provided by the company “didactic media e/t/s” in Halblech, Germany. The company has been working in the area of modern learning and teaching scenarios for now 20 years. By now they provide about 170.000 learners who work successfully with their systems in companies and academies (source: <http://www.ets-online.de/>). At the UE Weingarten the system has been installed in October 2007 for the new degree program Media and Educational Management. DLS is a proprietary-software which is externally hosted by “didactic media e/t/s”. The company also provides a custom-made authoring tool for the generation of interactive digital learning content.

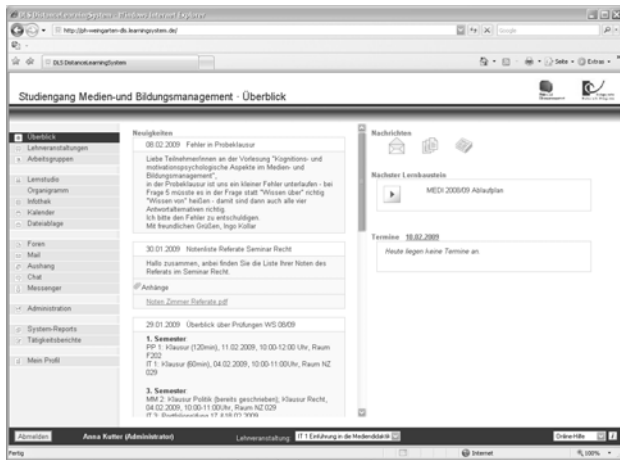


Figure 1: Screenshot of the user view of DLS at the UE Weingarten

moodle

All over the world there is no other Learning Management System with wider diffusion than moodle. Over 30.000 installations ranging from small systems for single trainers up to universities with 40.000 courses or over 100.000 students using moodle exist. The user interface is available in 75 languages and that on an open source basis without any licence fees (source: <http://www.moodle.de/>). Moodle was installed at the UE Weingarten also in October 2007. It is used all over the university and gets supported and hosted by the university's central office for innovation, media and technology.

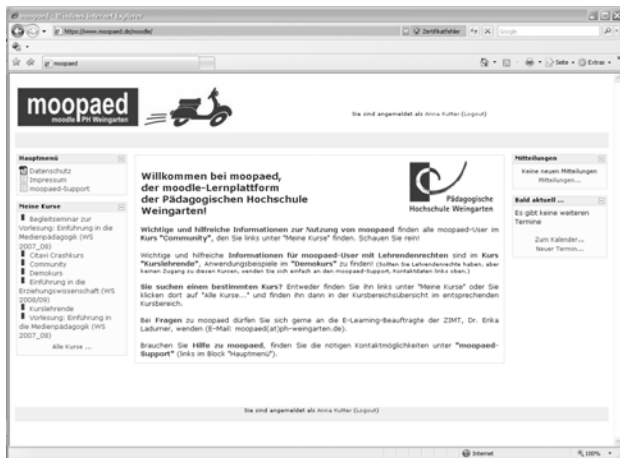


Figure 2: Screenshot of the user view of moodle at the UE Weingarten

Pivotal Differences

The pivotal differences of the two learning management systems which are part of the comparison in this study are:

- *Proprietary vs. open source software*: While the DLS is property of an external company, moodle is an open-source software. This means that analogous pros and cons exist concerning funds.
- *Offside vs. inside hosting and support*: Services like e.g. installation, updating, customization for the DLS are provided by the company “didactic media e/t/s” while for moodle the university itself has to raise human and financial resources.
- *Custom-made vs. unspecific authoring tool*: A custom-made authoring tool for the UE Weingarten is provided for the DLS while the users of moodle have to use other authoring tools which are e.g. open source or with costs.

Beside these rather technical variables there are other important aspects to be examined to answer the questions about effective application of technology in education named before. The following chapter will take a closer look at these.

4. THEORETICAL APPROACH OF THE STUDY

As mentioned in the introduction the aim of this study is to answer questions about the benefits which can be drawn from the application of technology in education and if the implemented technologies are able to offer these benefits. To answer these questions, possible and prospected benefits have to be brought together from literature and be related to the technical possibilities of the used technology. In this chapter the functions of the learning management platforms to be analyzed and the approaches of media in education will be presented.

Basic functions of learning management systems

To clearly define the subject of the investigation the five basic functions of learning management systems were defined [3]:

- *administration* of teachers, learners, courses and more
- *communication tools* (synchronous and asynchronous)
- *presentation of learning content*
- *tools for building exercises*
- *assessment tools*

As there are two different learning management systems in use at the UE Weingarten – the open source program moodle and the DLS for the new developed program of study – the basic functions were detected for each system. To detect the possibilities of these basic functions to support education according to the desired aims, the functions will be rated from the user perspective over time.

Technology in education - perspectives and processes

Because technical functionality does not yet give evidence about educational benefit, the stable support for education has to be surveyed. For analysing the adequacy of the systems and their functions for educational use, relevant aims of different approaches to the use of technologies in education were brought together and formulated [1]. As mentioned before the learning management systems can be regarded from different perspectives of alternating correlation of media and education. Viewed from each of these perspectives, different but corresponding processes in education can benefit from the interaction of media and education. The promotion of these processes by the learning management systems can be observed

and benchmarked. In the discussion about possible, necessary or desirable involvement of new media into education relatively different perspectives have evolved which vary in the perception of the connection between media and education. These differences have been criticised as they are mutually exclusive [1]. The perception of this exclusiveness is the first step before a discussion about impacts of new media on education can begin. For that reason different perspectives were consulted for this study to exclude a one-sided view of the possibilities. To make the grade for the new program of study, the question should be resolved which processes in the area of education respectively teaching and learning at university can be supported by the integration of new media and how they would change. Here, the connection between education and media has to be seen from a didactical, organisational and curricular perspective [4]. In the following the important perspectives and consistent processes for this study are defined.

The didactic approach assumes that the implementation of technology leads to the implementation of new instructional, teaching- and learning methods or even makes them necessary. Changes of processes in the educational establishment are considered important or consequent on the level of teachings. In the context of comparative examination the learning management systems are tested for their adequacy to realise modern teaching and learning methods according to the didactic approach. The concept for building up competence in the new program of study at the UE Weingarten includes virtual lectures for knowledge transfer as well as problem based learning scenarios to enhance competences in problem solving, self-monitoring and cooperation. It is evaluated if the used technology supports the acquisition of these skills. The analogous change of processes of teaching like the change of teachers' and learners' rolls and the changed structure and organisation of information and resource distribution will be reviewed in this context, too.

The organizational approach is also important as it claims organisational changes in educational institutions by the use of technology like more flexible teaching and learning. Although these kinds of changes are often viewed sceptically they are a consequence of comprehensive use of new technology in education. Regarding the teaching methods there is no difference to the didactic approach but regarding the affected processes additional more extreme changes can be considered like the breakup of traditional place- and time dependence of teaching and learning, more change of rolls, the change of course of studying and the tasks of the whole studies organisation. Therefore it is very important to check if the used technology is able to support these processes at the university.

The curricular approach aims at the integration of technology into the curriculum. There is a distinction between technology as a subject to mediate competences in the use of technologies and technology as integral part of each subject used for teaching and learning methods. Processes in the educational establishments are not discussed by agents of this perspective. Curricular change through the application of learning platforms would be allocated in the following areas of a program of study: direct competence building through mediation of theoretical and practical competences for the exposure to new media by corresponding courses and indirect competence building through the adoption of the learning management system for the whole teaching activities that is practical use of new media.

5. METHODOLOGICAL APPROACH OF THE STUDY – A LONG-TERM COMPARISON

The question if these aims can be reached by using the implemented learning management systems will be researched in a longitudinal comparison of the two systems. As mentioned before there is a lack of investigations regarding not only short term aspects like usability but long-term effects like the support of learning and processes of adaption.

Long-term study

The scientific investigation of an object over a longer period of time holds the possibility, to find out if certain effects or factors are stable over time or if there are any changes because of time. Furthermore effects of context variables can be eliminated sooner and contribute to a higher internal validity [5]. As learning platforms are a technical and therefore quite stable object of investigation, a long-term investigation can only give information about technical consistence of the system. However success and failure of technical modification can be explored well. Also the stability of user variables throughout the implementation of a technology can be measured very well. In order to generate first scientific data about long-term effects of technology respectively learning platforms in education this study is planned to last three years.

Comparative study

The aim of benchmarking two systems within a scientific investigation is the determination of differences or similarities of the objects of investigation [5]. In the context of learning platforms differences or similarities concerning the quality and usability of the learning management systems can be detected. In principle this comparison contrasts two different business models for technology in education respectively learning management systems.

Analyses

For the investigation of the adequacy of the used learning management systems for effective exhaustion of potentials of new media for education there will be several analyses. During a period of three years there will be the following analyses.

Analysis of quality: Regarding the quality of the learning platforms it will be explored, if in general there is the possibility to use the benefits of application of technology in education. It has to be scanned if all the basic function of the learning management systems work without technical or operational problems and if these functions are adequate for supporting didactical, organisational and curricular aims of technology-use in the educational institution they are used in. This is important, as technical problems or bad usability may lead to judge the usefulness of the systems to be inappropriate [6]. That would be fatal for the broad application of the systems in the educational institution. Concrete research aspects are:

- *Administration and technology:* Which possibilities for education result out of the structure of the learning management systems?
 - Operability
 - Access and availability
 - Administration of courses and people
 - Administration of user privileges and role definitions
- *Communication tools:* They are important to guarantee a continuous and high-quality support and communication.
 - Availability and Usability of synchronal and asychronal communication tools

- Collaboration tools
- Personalization
- *Presentation of learning content:* The main duty of the learning management systems is the knowledge transfer through learning contents.
 - Authoring tools
 - Presentation and embedding of learning contents
 - Layout and design
 - Instructional tools
 - Access and exchange of materials
- *Tools for designing exercises:* This function can contribute to the learning process of students if it is used.
 - Available tools
 - Usability, utilization and effectiveness
- *Assessment tools:* This function can also contribute to the learning process if used and initialized.
 - Possibilities for evaluation and appraisalment

Analysis of users: By examining the users of the two systems their attitude towards the technology and its benefits are to be discovered. Students as well as teachers will be asked about their satisfaction, acceptance, media competences and motivation [7]. These factors are known to have influence on the use of technology [6] and are therefore important for the successful implementation of the systems. All users, students and faculty staff will be analysed:

- *User characteristics*
 - Age and gender
 - Degree program and accordingly the technology which is being used
 - Media competences
- *User attitude*
 - Interest, motivation and acceptance of learning with learning management systems
- *User behaviour:*
 - Typ of use of the technology
 - Frequency of use of the technology

A cost-benefit analysis: Of course it has to be analysed if the benefits justify the support expenses of operating the learning management system. On the cost-side there are the organisational changes required for the use of the technique, while on the other side there are the positive consequences generated by the fusion of media and education for the didactic, organisational and curricular area. Expected costs and benefits are:

- *costs*
 - licence fees and other financial costs
 - workload for development and actualisation of learning content
 - technical and social support and support regarding contents
- *benefits*
 - promotion of effective teaching- and learning methods
 - flexibility in time and place for all users
 - higher learning success
 - enhancement of media competence of all users

Analysis of the degree of implementation: Regarding the implementation of the learning management system the questions have to be answered if the potentials of the use of technology in education are already exploited completely and if the benefits last for a long period. Another point of investigation has to be if the use of the learning platform gets established over time or not which is important for the

sustainability of the implementation [8]. The longitudinal design of the study over three years allows the objective and subjective research of personal changes initiated by the use of the technology. The following aspects are examined:

- *Analysis of quality:* Does quality and the actual use of the basic functions of the systems stay stable over time or even change positively?
- *Analysis of users:* Does attitude, behaviour and characteristics of users stay stable over time or even change positively?
- *Analysis of costs and benefits:* Does costs and benefits of the systems stay stable over time or even change positively?

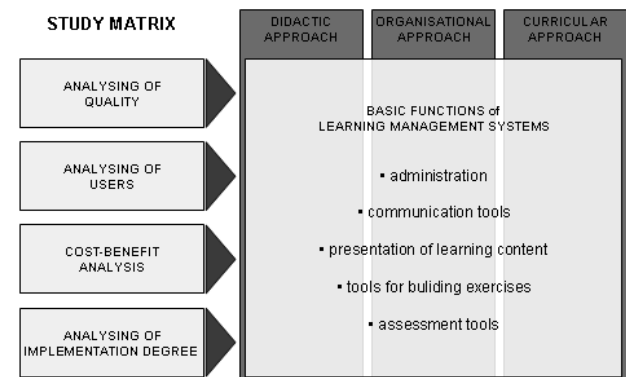


Figure 3: Matrix of the study

6. AIMS AND PROSPECTS

The aim of the study is the systematic and longitudinal investigation of the use of the learning management system at the UE Weingarten to get first data about long-term effects of technology application in education. Main questions to be answered are if the used technologies are appropriate for the application in education? Do they fit the requirements of the UE Weingarten? Another question is if the benefits of technology in education which are prospected in theory will occur and if these effects on education stay stable over a long period of time?

The scientific investigation of an object over a long time provides the opportunity to detect if certain effects stay stable over time or if there will be any changes due to time. Besides effects of context variables can be excluded sooner and contribute to a higher intern validity of data. The researchers wait to get first scientific data about the long term implementation effects of technology use in education by the end of spring 2009. The scheduled end of the study is in the end of 2011.

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