Usability Evaluation of a Learning Management System

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Abstract

In this paper current usability evaluation methods are systematically examined and assessed. Thereupon, suitable evaluation methods are selected and applied in the evaluation of a learning management system. Usability evaluation methods can be distinguished in analytical and empirical procedures with either summative or formative objectives. A case example in the form of a usability evaluation of a learning management system is presented. The co-active e-learning platform koaLA provides teaching and learning material and integrates Web 2.0-technologies such as wikis, weblogs and forums. A cross-sectional survey revealed that although koaLA offers collaborative features, the majority of users of all user groups does not use them. Recommendations for koaLA are derived based on the qualitative and quantitative data from the survey.

1. Introduction

In today’s digital age, e-learning becomes more and more important, especially in the context of teaching at universities. As blended learning techniques become more widely employed, learners should not only always have access to their learning material, but also be able to collaborate with both teachers and other learners in a remote fashion. Conventional content management systems are thus replaced by learning management systems which offer a broader range of functions.

In order to address these new requirements on learning management systems, koaLA was developed. The name koaLA stands for co-active learning and working environment (German: ‘ko-aktive Lern- und Arbeitsumgebung’) and is sponsored by the Federal Ministry of Education and Research project Locomotion (Low-Cost Multimedia Organisation and Production). Since the launch of the test stage which took place in late 2006, the variety of functions has been continuously extended. By summer term 2009 more than 10,000 users are registered in koaLA and approximately 300 courses are listed and available.

The notion of co-activeness was introduced by Keil and Selke (2007). It contains the concepts of communication, coordination and cooperation that are all related to processes that have to be done by the interaction of people. In addition to the retrieval of data files for learning and teaching purposes, koaLA integrates Web 2.0-technologies. The users can communicate via e-mail and on discussion boards, form working groups or create weblogs and wikis. These collaborative features offer several advantages: For instance, users do not have to meet in person since they can communicate within koaLA and if they work in a team with other users they can benefit from everyone’s input.

However, simply the allocation of a co-active learning and working room will not guarantee users’ acceptance and overall satisfaction. If a system shows difficulties in usability and does not seem to be intuitive for its users, the users will be obstructed in their working processes instead of being supported. Consequently, users will not be satisfied by using the system. Considering these circumstances, a usability evaluation for koaLA had to be conducted in order to find out about users’ opinions and problems with the offered functionalities. Based on the findings in the evaluation, recommendations for improvement have to be derived to ensure the quality in the future. These suggestions for refinement are also of interest for other e-learning platforms as they are generally applicable to learning management systems.

The remainder of this paper is structured as follows:
Section 2 elaborates on the term usability. Here, current evaluation methods in the surrounding field of usability are introduced and it is motivated why a usability test and a survey were combined in the case of the koaLA usability evaluation. Comparable usability evaluations of other learning management systems are also presented. Section 3 contains basic facts of koaLA and explains the technical infrastructure opens Team. The various functions of koaLA are explained. In section 4, we argue how the usability evaluation was set up, discuss the most relevant results of both the usability test and the survey and derive recommendations which are also valid for other learning management systems. Section 5 closes this paper with a short summary and emphasizes the recommendations which are transferable to other e-learning platforms. Finally, we provide a brief outlook on further evaluations of koaLA.

2. Usability Evaluation Methods

2.1. Usability

Usability describes the degree to which a product or system can be used by certain users in a given context to achieve their aims in an effective, efficient and satisfactory way (Rubin and Chisnell, 2008). The requirements effectiveness, efficiency and satisfaction are part of the international norm DIN EN ISO 9241, part 11. Nielsen (1993) enumerates the five components of usability as learnability, efficiency, memorability, errors and satisfaction:

- Learnability is one of the most important constituents of usability. Specifically, novice users should be able to deal with a system in order to work effectively in an appropriate time frame.
- Efficiency is a dimension of productivity. A system is efficient when a user only needs to use few mouse clicks or keyboard entries in order to achieve his or her objective.
- The attribute memorability is fundamental for users who work with the system infrequently. For these users it must be possible to remember basic functions after a long time lapses.
- Errors refers to the number of failures and the ability of the system to offer adequate help to correct occurring mistakes.
- The aspect satisfaction reflects the user’s subjective impression of the system and is closely connected to the first four constituents of usability. If these four requirements are not met, users will not enjoy working with the system.

Usability engineering encompasses measures related to planning, implementing and controlling a system’s usability. Szwillus (2008) denotes usability engineering as the systematic development of conveniently and purposefully designed user interfaces. In addition to the software engineering process, ergonomic aspects should be incorporated into the development phase.

2.2. Usability evaluation categories

A variety of evaluation methods exists that serve to measure a system’s usability (cf. Sarodnick and Brau, 2006). These methods can be divided into two groups, namely a group with analytical methods and another group containing empirical usability evaluation methods. The first group includes approaches that have to be conducted by usability experts who put themselves in the position of users. On the basis of their expertise and usability heuristics, the evaluators assess the system. These procedures are best suited for early evaluations during the system development phase. The second group consists of usability tests and questionnaires during which interaction with real system users is mandatory. These empirical methods can be employed either if a prototype of the system is available or if the system is already in use. In order to determine the overall usability of a system, a number of questionnaires exist. The majority of them draw on principles that are derived from the international norm DIN EN ISO 9241. Analytical usability evaluation methods usually do not replace empirical evaluation methods but rather complement these in order to come to a holistic assessment. Another distinction can be made by the point of time when the evaluation takes place. Formative evaluations occur during a system’s development, while summative evaluations are usually conducted after a system is completed. Summative evaluations are sometimes also called evaluation of program impact, output or product evaluation (Westermann, 2002, p. 9).

2.3. Analytical usability evaluation methods

Design guidelines, formal-analytical techniques and inspection methods such as the Cognitive Walkthrough Method (CWT) belong to this category (Hollingsed and Novick, 2007). Design guidelines offer instructions that have to be followed during the design process of user-friendly software. Vanderdonckt (1999) names five groups of design guidelines: Design rules contain single, concise instructions. They are presented in such a manner that does not need further interpretation; Ergonomic algorithms gather single design requirements in a rigorous procedure that describes how the design process has to be carried out under certain
conditions; Style guides are rules and standards which provide a framework for the design of user interfaces. In this interface, the content is inserted later on under the objective to harmonize several systems of the same type; Standards cover instructions of national or international organisations to generalize the design of user interfaces. DIN EN ISO 9241, for instance, belongs to these standards; Collections of guidelines offer numerous guidelines for various kinds of user interfaces. This category covers the two subcategories Guidelines for Designing User Interface Software and Research-based web design guidelines and Usability guidelines.

Formal-analytical techniques are conducted by usability experts. They can be subdivided into task-analytical methods and expert guidelines. Task-analytical methods focus on tasks which can be run on the system. These tasks are divided into subtasks to judge each individual step separately and in conjunction. The outcome is data on execution times or sequences. One technique called GOMS-Model (Goals, Operators, Methods, Selection Rules) belongs to this category. It is based on the assumption that every user splits the tasks that have to be solved into subtasks. For every subtask the GOMS-Model provides time intervals that a user is supposed to need to solve the task including cognitive and physical actions. This technique is especially helpful if one wants to find out which one of two design alternatives enables the user to reach his objective faster. Expert guidelines do not concentrate on the task solution but rather on the software ergonomics. Generally speaking, expert guidelines are collections of questions and statements for the design of systems.

Inspection methods can be subdivided into design principles and design task analyses. Design principles are heuristics for optimal system design, which can help to detect usability problems. One of the design principles is heuristic evaluation. Heuristic evaluation is a method involving usability experts who put themselves in the position of users. Each expert evaluates the system independently and only after these evaluations are completed are they merged in order to form an overall assessment. Experts evaluate the system according to certain heuristics among which the following ten are identified by Nielsen (1993, p. 157) as the most basic ones necessary to guarantee a minimal degree of usability: Simple and natural dialogues; Usage of appropriate language; Minimisation of mental effort of user; Consistency; Feedback; Clear exit paths; Shortcuts; Sensible error messages; Error avoidance; and help/documentation. These minimal heuristics have been further developed (cf. Dahm, 2006, p. 154; Sarodnick and Brau, 2006, p. 140). Special forms of heuristic evaluations are participatory heuristic evaluations and cooperative heuristic evaluations.

Commonly used analytical usability methods can be partitioned into three categories: Design guidelines, formal-analytical techniques and inspection methods. Design guidelines include Design Rules, Ergonomic Algorithms, Style guides, Standards and collection of guidelines such as Guidelines for Designing User Interface Software, Research-based Web design and Usability Guidelines. Formal-analytical techniques are Task-analytical methods such as the GOMS model, and the critical incident technique. Finally, inspection methods consist of design principles, e.g. Heuristic evaluation, Participatory heuristic evaluation, and Cooperative heuristic evaluation; Design Task Analyses and Walkthrough methods such as Cognitive Walkthrough (CWT), Pluralistic Usability Walkthrough (PUW), and Socio-technical Walkthrough (STWT).

2.4. Empirical usability evaluation methods

Empirical usability evaluation methods consist of usability tests and questionnaires which are carried out with the help of real system users. These empirical methods can be employed either if a prototype of the system is available or if the system is already in use. Usability tests can incorporate diverse methods such as video feedback, screen recording, log files, the thinking-aloud method, eye-tracking and attention tracking, load progression tests, and conjoint analysis. The most important of these will be elaborated in the following.

Usability tests are conducted with users of the system that needs to be evaluated. The objective of these tests is to identify problems that users face when dealing with the system. Based on the data retrieved from these tests, conclusions can be drawn concerning these problems and suggestions for system redesign can be developed. Rubin and Chisnell (2008, p. 22) describe usability testing as the process of collecting empirical data during which representative users are observed when interacting with the system and carrying out typical tasks. Beier and von Gizycki (2000) judge usability tests as very convenient since these tests enable a precise error identification and description. However, the authors state that usability tests with users should always be combined with another usability evaluation method involving experts. Usability tests can be carried out with the help of various techniques: Video feedback or screen recording can be used to film a user when solving test tasks. This
material can later be simultaneously analysed by the investigator and the user. This technique provides the opportunity to thoroughly analyse occurring problems but is very time intensive. Log files or input protocols document all actions that users perform when operating a system. The exact timing and sequence of events can be reproduced. Since this technique requires substantial preparation, it is less frequently used. The thinking-aloud technique requires the user to verbalise all her or his cognitions when solving the test tasks. Nielsen (1993, p. 195) claims that the thinking-aloud technique is one of the most powerful methods to identify usability problems. However, one disadvantage of this technique is the double stress under which the user is put and which can lead to prolonged answering and task solving times. Since this technique is unnatural to most people, test users might not be able to continuously express their thoughts while dealing with the system. This technique is easily applicable but needs an experienced investigator who is able to adequately conduct the usability test and interact with the test users appropriately. Attention analyses can be subdivided into the two categories attention-tracking and eye-tracking. Attention-tracking requires users to click on those areas in the section which they find the most noticeable. Thus, the mouse is both tool and pointer of focus of attention. Attention-tracking is unfeasible for interactive tasks and has been further criticised since it diverts the mouse from its intended use. Eye-tracking necessitates special equipment with which the users’ eyes and views are tracked and recorded. Later on, which areas of the GUI receive most attention from users, which elements of the system are most distracting or how long the users remain in certain sections of the system can be analysed. The main disadvantage of attention analyses techniques is the immense technical overhead required.

Questionnaires can help to obtain quantitative data on user judgement of a system and can be used for both summative and formative evaluations. Elements of questionnaires are denoted items; questionnaires can contain Multiple-Choice questions, questions with rated scales or open end questions to which participants can freely respond. Fully standardised questionnaires only contain pre-determined answering options; partially standardised questionnaires additionally offer the possibility to respond freely to open end questions. Questionnaires can serve to evaluate an entire system or only partial aspects of a system. Concerning usability evaluations, there are a number of standardised questionnaires, among which are the following: Questionnaire for User Interaction Satisfaction (QUIS), Software Usability Measurement Inventory (SUMI), Website Analysis and Measurement Inventory (WAMMI), IsoNorm 9241/10, IsoMetrics, AttrakDiff and System Usability Scale (SUS). The System Usability Scale (SUS) is based on the norm DIN EN ISO 9241, part 11.

In contrast to other usability questionnaires, SUS is very short and therefore recommendable to conduct in combination with another usability evaluation measure when the participants already had to spend some time on the other testing procedure. On the basis of these ratings the SUS score of the system can be calculated for each participant. Possible results range from 0 to 100 and indicate the usability of the evaluated system. A score of 0 represents the worst outcome, 100 represents the highest result.

3. Co-Active E-Learning Platform koaLA

The learning management system koaLA was developed to support learning and teaching processes in a university context. The name koaLA stands for co-active learning and working environment and is sponsored by the German Federal Ministry of Education and Research project Locomotion (Low-Cost Multimedia Organisation and Production). Since the launch of the test stage which took place in late 2006, the number and extent of functions has been continuously extended. At the time of research, more than 10,000 users are registered in koaLA and approximately 400 courses are available. The notion of co-activeness was introduced by Keil and Selke (2007). It comprises the concepts of communication, coordination and cooperation. In addition to the retrieval of data files for learning and teaching purposes, koaLA integrates Web 2.0-technologies. Although these collaborative features potentially offer a number of advantages, the benefits can only be reaped if usability of the system and its functions is guaranteed.

3.1. Technical system setup

KoaLA is based on the technical infrastructure openTeam which is an open-source environment for virtual knowledge spaces. The infrastructure openTeam (structuring information in a team) is an open-source environment for the structuring and maintenance of virtual knowledge spaces and provides a range of different mechanisms to support communicative and cooperative learning and work processes. Virtual knowledge spaces bring together synchronous and asynchronous forms of collaboration. Hence, students and teachers can meet in virtual knowledge areas, where they share, arrange, annotate and link documents.
through mutual views. The main focus of \textit{opens}Team is on techniques for distributed knowledge management and establishing of an arena for internet-based methods of cooperation. The concept of self-administration enables the creation of individual knowledge structures for single users as well as for user groups and the development of virtual communities (\textit{opens}Team, 2009).

The infrastructure \textit{opens}Team offers essential functions that support communicative and collaborative learning and working processes. On the basis of \textit{opens}Team any kind of virtual knowledge space can be created. By considering the prevailing corporate identity, specific learning environments can be realized. Consequently, these platforms have different user interfaces that are harmonized with the individual design. Today, \textit{opens}Team represents the framework for a number of cooperative e-learning platforms.

Figure 1 shows the principle of the area structure according to \textit{opens}Team. Three rooms that are connected by gates are illustrated. Users can store documents in the separate rooms, and communicate or move through the gates from one room to the next.

The \textit{opens}Team server consists of various objects. While object can belong to a different class, all objects are derived from the class Object.\texttt{pik}. Furthermore, classes with multiple instantiations are distinguished from classes with single instantiations. The latter comprise modules which provide additional functionalities to the server. For instance, the rights module of \textit{opens}Team is guaranteed by the so-called Security module. The architecture of \textit{opens}Team (Figure 2) shows how \textit{opens}Team cooperates via various protocols with the \textit{opens}Team clients and other clients. Thereby, especially the COAL (Client Object Access Layer) protocol is of elevated importance for which both a JAVA API as well as C++ support exists. Thus, it is enabled to develop various clients for \textit{opens}Team.

Moreover, the connection to the web server is provided by the COAL protocol.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Figure1}
\caption{Area structure of \textit{opens}Team}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Figure2}
\caption{\textit{opens}Team architecture}
\end{figure}

3.2. KoaLA functions

The learning management systems koaLA enables students to access all material related to their lectures, to communication with fellow students on the study material and to create own spaces for studying and interest groups. These virtual rooms serve to support independent cooperation and to work on tasks in small groups. koaLA integrates Web 2.0 and social networking concepts which allow to actively work with study material and to personalize the system. Students can connect based on similar interests, and create, distribute and discuss documents as well as other material.

KoaLA’s main features include those of conventional content management systems, i.e. the possibility for teachers to upload learning material, but also a number of functions geared to foster collaborative and communicative processes between teacher and learner and between learners. Within course areas files can be structured in various lecture and exercise folders. Literature reference lists which are cross-linked with the university library system can be offered (\textit{course function}). To provide learners with news bulletins, teachers can use weblogs. Discussion boards, wikis and an e-mail function enable users to contribute and share their ideas and communicate with each other. Updates in any subscribed wiki, weblog or forum will be presented on the user’s main page (\textit{communication function}). Learners can interconnect by founding groups which focus on special topics or courses. Through the allocation of user rights, teachers can decide which users are allowed to read, write or comment in their course area. This can be used by learners who want to restrict access to private groups.
Open public groups, public groups with limited access and private groups are distinguished (group function). Other features include a personal profile with various data and a user photo. Per default, the profile contains all information taken from the general university information system. Further information such as general information, contacts and groups, contact data, and instant messaging data can be added on a voluntary basis (profile function). Users can be located and added to the contact list or contacted with personal messages. This supports keeping in touch with users with whom contact is established frequently. A possibility to introduce users to other users is also implemented (contact function). Meetings can be planned and arranged with a calendar (calendar function). There is a help function as well as the possibility to contact the support team (help function). Finally, system language can be either English or German to accommodate for students whose first language is not German.

Figure 3 shows an example of a personal welcome page of a koaLA user. The screenshot shows the different areas of the site: The box ‘Your Events’ presents the user’s arranged meetings, ‘Your Courses’ contains a list of courses that the user has signed on for in the current term and the ‘koaLA News’ box displays the latest threads of the subscribed weblogs, wikis and discussion boards.

4. Case Example: Usability Evaluation of koaLA

4.1. Usability evaluation setup

As koaLA is a learning management system that was already in use at the time of evaluation, the evaluation is mainly summative in nature, while having some formative elements due to the fact that koaLA is presently developed from a gamma release to a version 1.0. Due to the existence of system users, using an empirical method seemed preferable. In the case of koaLA the usability evaluation was carried out using a usability test together with a questionnaire in order to combine the advantages of different empirical approaches.

4.1.1. Usability test setup. The usability test was geared to obtain qualitative data on the system’s usability based on the statements of only a few test persons. Nielsen (2008) recommends five test persons for usability tests to detect the most serious usability problems. Thus, ten test persons were chosen for the koaLA usability test, five each from the two user groups learners and teachers. The usability test consisted of seven typical tasks that had to be performed by each of the test persons. The test tasks differed in three exercises for the two user groups. During the test the participants were asked to verbalize their thoughts and impressions using the thinking aloud technique (cf. Harms and Schweibenz, 2000). The direct interaction with the system allows users to articulate their feelings towards the system which can lead to valuable insights into system perception and enable suggestions for refinement. In addition to the thinking aloud technique, a screen recording software was used to record the participants’ activities and comments while solving the test tasks. After having finished the test, participants completed the questionnaire which was also used for the survey as presented in the following section.

4.1.2. Survey setup. The questionnaire consisted of two parts: The first contained both open and closed questions and dealt with users’ judgement concerning the usability of koaLA. As common usability questionnaires are usually designed to measure overall usability rather than usability of particular functions, the first part of the questionnaire was constructed. This part was produced in two versions reflecting the different functions that are available to learners and teachers. It intended to reveal the degree of utilization and the participants’ attitude towards koaLA functions. Closed-ended questions that limit the respondents’ answers
to a fixed set of options were inserted as well as scaled questions with rated answers (cf. Mummendey and Grau, 2008). Participants were also offered the opportunity to freely write about obstacles and desires relating to every function in open-ended questions (cf. Moehring and Schluetz, 2003). The second part was a slightly adjusted standardized System Usability Scale (SUS) questionnaire and aimed to reveal overall system usability (cf. Brooke, 1996). Altogether the questionnaire consisted of 32 questions. In order to maximize the size of the test group, the survey was accessible online on the koaLA website. Both versions of the survey were available such that both learners and teachers could participate. The survey was accessible over a period of 30 days. Implementation of the survey and automated compilation of results was realized using the tool SurveyMonkey.

4.2. Discussion of results

During the usability test it could be observed that many of the test persons had difficulties in solving two of the seven test tasks, viz. tasks involving the calendar and the help function. The obstacles in solving the tasks could be traced back to problems with the navigation through and errors in the system. Considering the five components of usability, at least two were not fulfilled; errors and efficiency. The recurring complaint of users that they were having problems finding various functions indicates that a restructuring of the navigation scheme should be considered. It also became clear that the test persons had problems in understanding the html tags which are used inside the calendar and other forms of communication. However, this problem depended on the users’ knowledge base. While people with more extensive computer and internet experience had no problem using html tags, novice internet users were unfamiliar with the html tag concept. Clearly, a WYSIWYG approach is advisable in a learning management system to ensure that internet novices can also get along easily with the system. Other issues found during the usability test included ambiguous button labels, lengthy and barely comprehensible field labels and descriptions, redundancy of fields in the group function and a lack of sorting and searching possibilities in the course and groups functions. Concerning the SUS questionnaire which was conducted during the usability test, the following result could be achieved: The highest SUS score observed during the usability test was 82.5; the lowest was 50. The average SUS score in the teacher group was 72, while learners’ average SUS score was 56. Thus, an overall average SUS score of 64 could be observed during the usability test.

During the survey period of 30 days, 72 teachers and 552 learners participated in the survey. Among these, 60 teachers (83.3%) and 440 learners (79.7%) completely filled in the questionnaire, leading to a total number of respondents of 500. Not all of these 500 respondents answered every question of the questionnaire since the possibility was foreseen to omit certain questions if the participant was not able to respond to them due to unfamiliarity with the respective function. As there are roughly 10,000 registered users in koaLA, the sample of 500 participants represents 5% of total koaLA users, thus constituting a very satisfactory response rate considering that due to privacy protection reasons it was not possible to inform all koaLA users about the survey by sending them an e-mail. Also, among the total number of 10,000 registered users a number of inactive users who do not use koaLA anymore can be assumed since they were no longer affiliated with the university but still had an active account.

As described above, the questionnaire consisted of 32 questions in total. Here, we only present the results of selected questions which yielded the most interesting results. The main focus of the data evaluation was put on the open-ended questions since the answers to these revealed problems that users had when working and interacting with koaLA. Question 1 in the questionnaire was a closed end question about users’ experience with koaLA. The majority of teachers (50%) and learners (62.1%) classified themselves to the group of users who were moderately experienced with koaLA. Question 2 targeted on the login frequency. In majority, both user groups stated that they logged in several times per week. In question 3, users had to rate the extent to which they use koaLA. A significant finding was the fact that most of the learners only use koaLA to download files but not to get in contact with other learners or even work with others (Table 1). The large majority of learners (83.5%) only download files. The remainder stated that they were not using koaLA for other activities. On the other hand, a majority of teachers (64.6%) declared to use koaLA for other activities as well (Table 2).

Correlating with this result, the frequency of utilisation of single functions revealed a similar pattern. The question “How often do you use the following functions offered by koaLA?” uncovered that the majority of learners only use the course function frequently or very frequently (66%) and all of the other functions rarely or never (range for single functions between 63.3% and 93.3%). The calendar function is the least used (never: 80.1%), followed by the help menu (never:
A closer look at the open end questions revealed some easier to use” was ranked with a score of 4 or above by 82.3% of learners. “I think the course function is useful” was also rated with a score of 4 or above by 86.2% of learners. “I think that the course function work without any difficulty” was rated with 4 or above by 80.5% of learners. The statement “The file downloads completely agree). The majority of teachers agreed on a scale from 1 to 5 (1 = completely disagree to 5 = completely agree). The majority of teachers agreed with the first two statements “The file upload works without any difficulty” and “I think that the course function is useful” and rated them with a score of 4 or above (82.3% and 91.2% respectively). The third statement "I think the course function is easy to use” achieved a rating of 4 or above by 74.1% of teachers. Nearly the same results could be observed for the user group learners. The statement "The file downloads work without any difficulty" was rated with 4 or above by 86.2% of learners. “I think that the course function is useful” was also rated with a score of 4 or above by 82.3% of learners. “I think the course function is easy to use” was ranked with a score of 4 or above by 72.9% of all participating learners.

Contrasting to these overall satisfying results, a closer look at the open end questions revealed some crucial problems with the usability of the system. For instance, difficulties occurred with the search and filter functionalities, the navigation structure and the minimum number of clicks that are necessary to achieve the download of a desired file. Furthermore, more comfortable and simultaneous downloads, extended news bulletins that not only informed about updates in wikis, weblogs and forums, an omission of the upload file size limitation of 8MB were asked for. Also, desires for the possibility to synchronise the calendar with other frequently used calendars and an improved help function were expressed. Both learners and teachers expressed their wish for extended and manually adjustable privacy protection. Furthermore, the desire for more options regarding course searching and sorting as well as more communication functions such as an integrated chat function were frequently mentioned.

5. Conclusion and Outlook

The usability evaluation of koaLA has been carried out as a combination of a usability test with a survey which enabled to assess the usability of koaLA from different perspectives. Having discovered that the majority of users do not distinguish between wikis, weblogs and discussion boards, it becomes obvious that these features need to be meaningfully integrated in teachers’ courses in order to provide the intended benefit. In fact, many of the functions offered by koaLA were judged either unnecessary or undesired. This is an indicator that these functions have so far not successfully been integrated into learning and teaching processes. It became clear that a profile function is not required, possibly not even wanted, in the context of learning and teaching at a university due to the number of commercial and widely spread alternatives such as Facebook, Flickr, MySpace and other social networks. On the basis of the results of the usability evaluation an adaptation of koaLA has been launched. In order to monitor changing user requirements, a usability evaluation will be repeated in periodic time intervals. Thus, user satisfaction with the system will be kept at a high level and necessary changes can be identified before usability of the system is impeded.

While usability methods for evaluating software systems and usability evaluations of websites are widespread, there are few studies that deal with the evaluation of usability of learning management systems. As learning management systems in the context of learning and teaching at universities are more and more commonly used, ensuring usability of such systems becomes an increasingly important issue in

Table 1: Extension of use (learners): To what extent do you use koaLA?

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<thead>
<tr>
<th>Answer</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>- I only use koaLA for downloading files that teachers offer for my courses.</td>
<td>83.5%</td>
<td>457</td>
</tr>
<tr>
<td>- I use koaLA for other activities.</td>
<td>16.5%</td>
<td>90</td>
</tr>
</tbody>
</table>

Table 2: Extension of use (teachers): To what extent do you use koaLA?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>- I only use koaLA for uploading files that I offer for my courses.</td>
<td>35.4%</td>
<td>23</td>
</tr>
<tr>
<td>- I use koaLA for other activities.</td>
<td>64.6%</td>
<td>42</td>
</tr>
</tbody>
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74.1%) and wikis (never: 73.4%). Possible reasons for this phenomenon will be explained later in this section when discussing the results of the open end questions. Similar results could be observed in the teacher group. Teachers also frequently or very frequently use the course function (70.8%), but they also use e-mails (frequently or very frequently: 39.3%). All other functions are seldomly used (rarely or never: range between 58.5% and 95.4%). In the teacher group, the calendar function is also used least (never: 90.8%), followed by wikis (never: 77.4%).

These introductory questions which intended to reveal users’ habits when dealing with the system were followed by questions with related to the particular functions. At first glance, the general judgement of the course function seems to be satisfying. Three statements related to the course function had to be rated on a scale from 1 to 5 (1 = completely disagree to 5 = completely agree). The majority of teachers agreed with the first two statements “The file upload works without any difficulty” and “I think that the course function is useful” and rated them with a score of 4 or above (82.3% and 91.2% respectively). The third statement "I think the course function is easy to use” achieved a rating of 4 or above by 74.1% of teachers.
system design, development and maintenance. Only if a system supports the requirements of heterogeneous user groups in an effective and satisfying way, will it achieve the desired degree of user acceptance and satisfaction. The kind and extent of offered functions and services need to be carefully balanced with users’ interests and requirements. Functions not used by teachers in their respective courses will not be used by learners even if they seem to provide a general benefit in a learning and teaching environment. The danger exists that features of learning management systems are used solely due to their existence and not purposefully and didactically integrated in courses. This is especially true for Web2.0-technologies which are widely promoted but will not lead to user participation per se without proper training. Training for both teachers and learners is crucial in order to support user acceptance of such systems. Further research need exists with respect to studies from a didactics point of view on how e-learning systems can best be employed considering the various requirements of different subjects at universities.

References


