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Evaluation, Analysis, and Future Issues of a University-wide Learning Management System Concluding a Two-year Initiation Phase

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Abstract: This paper presents the review and evaluation of the two-year introduction phase of a university-wide learning management system at the University of Bamberg. For deeper insights the project settings are described at first and to receive an impression of the success some usage statistics are presented. Subsequently the evaluation accomplished to conclude the introduction phase is sketched. The two parts of this evaluation designed for the most important user groups – students and lectures – are described and the most important results are presented in short. As response to the received results three evolved issues are selected and possible solutions are shown. Finally a conclusion depicting the changes and the new situation after these two years completes this contribution.

1 Introduction

In 2005 it was decided to revise the public presentation of the University of Bamberg. In the course of re-designing the Coporate Identity the website of the university was completely reorganized and hence was no longer intended to serve as exchange platform or learning data like lecture notes, course material, or administrative information concerning particular learning units. This fact determined at least the need for an appropriate substitute. In addition the previous solution suffered from the lack of tools for communication, interaction, and further utilities for technology enhanced learning.

Blended learning and e-learning play an increasing role in today's universities – virtual universities as well as virtual study paths arise and the demands of students for different kinds of learning cannot be ignored. The University of Bamberg itself is part of the Virtual Bavarian University[1] since its foundation in 2000 and also offering a joint virtual study path – the Virtual Master of Science Degree Program in Information Systems – in cooperation with the University Duisburg-Essen since the winter term of 2001[2].

For these reasons it was decided to set up a university-wide learning management system. The goal was to establish a user-friendly and open system placed alongside to the university's website. The initiative was especially aiming at a wide-spread use and acceptance of the system in order to facilitate sustainability.

2 Initiation Phase

Beside the overall aim of introducing a university-wide learning management system, another precondition – the limitation of financial resources dedicated to this project – affected the initiation phase. Of course the choice of an appropriate system was one of the first decisions that had to be made. The requirements mentioned above deduced special constraints that needed to be fulfilled by the chosen system.

The learning management system should be a proved open source learning management system that could be used out of the box with no or very few adjustments needed and provides a vital community for support and further development. The concept of use that should be adopted focused on ease of use for experts as well as beginner. There was no specific didactic concept targeted since giving every course provider the freedom of choice in this respect is considered a crucial success factor. In addition the narrow personnel resources needed to be assigned to system administration on the one hand and user support on the other hand. Since the rationale behind this decision is not meant to be the main part of this contribution we refer to [HW06] for further details.

Due to these preconditions and previous positive experiences the course management system moodle[3] was selected.

[1] Virtual Bavarian University, http://www.vhb.org (last visited May, 27th 2008)
[2] Virtual Master of Science Degree Program in Information Systems, http://www.vawi.de (last visited May, 27th 2008)
[3] Learning management system moodle, http://www.moodle.org (last visited May, 27th 2008)

2.1 Project Design

The time granted to this project amounted two years. At the end of this period a considerable number of users and a certain degree of acceptance were expected to be obtained. The project itself was assigned to the responsibility of the chair of media informatics since the chair gained the mentioned previous positive experiences by operating an own installation for one year. After this first two years the system was intended to be permanently embedded into the universities comprehensive IT infrastructure and hence the responsibilities should be re-assigned. The project started in the beginning of 2006 and the university-wide learning management system was launched as "Virtual Campus (VC)". Figure 1 shows the front page of the system.

A half-time research assistant was allocated as mainly responsible for this project. The technical infrastructure was set up by an own Linux-server including an Apache web server, a MySQL database and a PHP engine (LAMP-infrastructure). The latest moodle version was installed and an adequate backup strategy was built in cooperation with the universities datacentre.

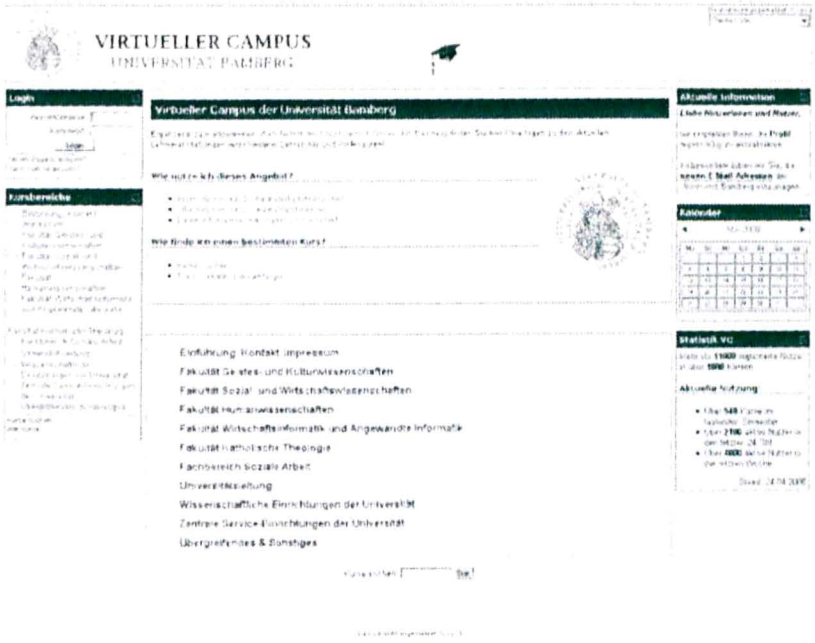

Figure 1: Front page of the VC, http://vc.uni-bamberg.de.

The conceptual design of the project included a short introduction phase in the summer term of 2006 where a small number of committed users were meant to voluntarily examine the system. After this short introductory phase the VC was available as permanent optional offer to support teaching and communications.

2.2 Non-technical Aspects

In addition to the more technical project design the non-technical aspects are very important to successfully complete such an endeavour. In the first instance support on different levels is provided to ensure that users are able to handle the system. The first support level is constituted by two different VC courses that provide basic information for starters and solve the most commonly known problems – one for users in general and one for lecturers in particular. In addition these courses contain moderated discussion forums offering the possibility for more specific questions that can be discussed amongst users and are of course answered by the system administrator. The second level of support includes a more direct care via e-mail and phone. Initially this level is designed for more complex problems.

This allocation has been proven to be meaningful. The majority of all cases is handled in the support courses and need little assistance by the system administrator. Our experiences have shown that most of the users however prefer to help each rather than to consult the official service. This applies especially to students – problem requests on average are below five requests per week.

A sophisticated training concept has also been developed [HW06]. So far trainings are only available for lecturers. Most important is the basic training that enables lecturers to provide courses on the VC. Advanced trainings are also scheduled.

First of all it has to be mentioned that training is not absolutely necessary to handle the system and provide courses. However, especially inexperienced PC users prefer to attend a basic training in order to gain more self-assurance. Second, the advanced trainings suffer from heterogeneous interests and are therefore almost not feasible with the existing resources.

2.3 Usage

The first term, actually meant to serve as test semester, already brought about a surprisingly high number of users. Since the system was open for everybody interested in examining it, a quarter of all chairs and professorships was using the VC after just a few months – more than 200 courses were already requested and used by over 2,500 active users.

In the beginning of 2008, after concluding the fourth semester of use, the figures are even more impressive:

- About 70% of all 129 chairs and professorships use the VC.
- Over 500 courses were set up for and used in the winter term of 2007.
- More than 10.000 active users are now registered at the VC.

There are different types of usage scenarios that evolved over the last two years. Of course, most of the courses are used to support learning settings. The degree of support and usage in these settings varies from basic to very intense use. Roughly, three different groups of usage can be distinguished:

- The basic usage scenario is coined by the existence of a face-to-face lecture and the additional basic use of the VC. In this case the learning management system is in particular used to provide learning materials for download. The forums available are hardly used – normally only the lecturer uses the forum to announce important dates. This kind of usage scenario is applicable to about 80% of the learning courses on the system.
- An extended usage scenario adds intensive system use in general and forum usage by lecturers as well as students in particular to the previously described basic scenario. Furthermore, face-to-face lectures in this scenario are supported by various activities provided by the learning management system. There are two main activities that are used – assignments and choices. Assignments can be used to provide, process, and mark tasks for every student, while choices can for example be helpful in making decisions about available dates. This extended scenario approximately applies to about 20% of the existing learning courses.
- Finally a third group of possible usage scenarios embraces all pure e-learning courses. This group needs to be separated since the usage of the system is even more intense than in the last group due to the fact that the VC is actually the only way of communication. Right now this is a very rare scenario since most of the courses have a face-to-face part. Hence, this kind of usage can just be found in about 1% of all learning courses.

Concomitantly a different kind of use developed. The VC is also utilised to support administrative processes. First of all communication with students not directly related to specific courses is fostered – courses dedicated to the supervision of thesis' as well as courses serving as platform for the examination board can be found in this area. In addition general support courses are part of the VC. Support embraces assistance for a variety of systems like the VC itself or the content management system Typo3[4] used for the general website of the university as well as advice for departments like the university library. After all, the system is also utilised for general administration as for instance the university governance.

[4] Content management system Typo3, http://typo3.org (last visited May, 29th 2008)

3 Evaluation & Analysis

In order to give this project a suggestive ending and to set the foundation for a continuation, a comprehensive evaluation was implemented. The evaluation focused on learning settings since supporting learning is the main purpose of the VC. Hence the relevant user groups are students and lecturers [Wo07] and each user group was questioned separately. A detailed description and particularised results of the evaluation can be found in [Sc08][5]. The following information – especially concrete numbers – also originate from [Sc08].

3.1 Students

For the user group of students the method of choice was a formal questionnaire provided within the VC in order to easily reach an appropriate number of students [BD06]. A predefined number of courses were selected by a random number generator and participants of those courses were invited to join the evaluation and work on the questionnaire. 795 students in 29 courses were chosen. 178 students completed the questionnaire that is a response rate of 22.4 % which is quite acceptable. For the overall number of users this means that about 1.7% of the users evaluated the VC. The questionnaire presented to the students was divided into five categories:

- *Previous experiences with learning management systems*
  The questions located in this area cover previous experiences with the VC as well as know-how gained with different installations of moodle just as experiences with different learning management systems like StudIP[6].
- *Virtual Campus usage and usability*
  The second category of questions covers technical and non-technical aspects of use – on the one hand questions like the available bandwidth or technical usage questions, on the other hand questions concerning issues like the frequency of usage.
- *Virtual Campus activities*
  The third category of questions deals with particular possibilities offered by the VC. What kinds of activities are actually used and how useful are these activities considered to be, are questions concerning the present situation. The future desired situation is tried to be addressed by surveying the requested future use of activities.
- *General remarks*
  This section is characterised by so-called free text questions were no answers are pre-defined but students can answers at their convenience. Aspects questioned in this area ask for critique and suggestions for improvements.
- *Statistical data*
  The last part of questions collects statistical data in order to classify the results.

[5] Detailed information about the evaluation can be found in a corresponding course of the VC at http://vc.uni-bamberg.de/moodle/course/view.php?id=1515. (last visited May, 29th 2008)
[6] Learning management system Stud.IP, http://www.studip.de/ (last visited May, 26th 2008)

Overall, responses were very positive. Figure 2 shows the rating of the benefit students' conceded to the VC. Students in general regard the VC as improvement of their student-life – about 70% of the queried stated that they use the VC at least every second day but usually even more often. The most dominant request concerning possible improvements was the need for a more intensive use of the VC. The request is primarily composed of demands for more lectures and lecturers to use the VC in general but also includes particular needs for a more intensive use in already existing courses.

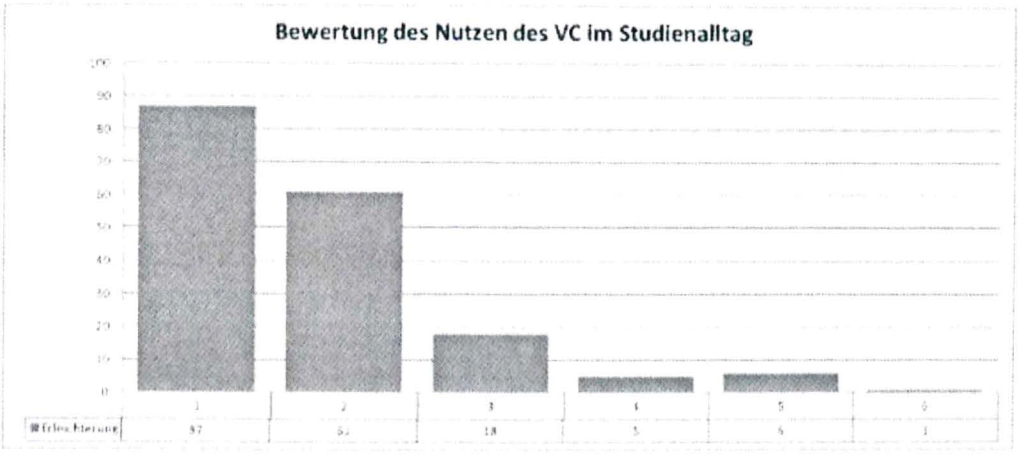

Figure 2: Evaluation of the benefit of the VC for students' daily routine; number of selections from 1(very positive) to 6 (very negative).

More precisely the evaluation confirms the assumption that most of the courses can be assigned to the basic usage scenario. Therefore the basic activity *forum* was the only activity used by more than 50% of the users. Two more dominant activities – *assignments* and *choices* – follow with about 40% and 30%, all other activities scale from 20% down to 0% of usage. However, most of the activities are considered useful by the majority of users and desired to be used.

An interesting aspect that came up with this evaluation was the request of students for own and self-managed courses. Students suggested the establishment of courses for smaller groups of students for example courses for study groups or personal learning courses.

Despite the confirmed ease of use the most prevalent point of criticism was the unclear navigation concerning the personal courses every user has. A solution to this problem is presented in section 4 Future Issues.

3.2 Lecturers

In contrast the lecturers were queried in individually performed personal interviews [We98]. The lecturers were chosen manually in order to get sufficient interview partners that are willing to communicate their experiences and provide options for improvements as well as a critical analysis. In addition interviewing participants individually allows a more detailed questioning.

Two lecturers were chosen from each faculty of the university so that ten interviews needed to be performed in sum. A guideline depicting the general contents served as foundation for each interview in order to ensure the comparability and soundness of the resulting issues. Each interview was scheduled with an estimated duration of 20 to 50 minutes. Following general recommendations, the interviews were recorded to allow a profound evaluation of these conversations afterwards.

Areas covered in any case were:

- *General questions*
  The survey started with some general questions on the frequency and kind of usage. Specific questions considered for instance the number of actual courses offered or the structure and type of content of these courses.
- *VC know-how*
  The second section deals with the personal estimation of one's skills concerning the VC on the one hand and a discussion of existing and desired trainings to improve the own know-how on the other hand.
- *Feature requests*
  Each queried lecturer also got the possibility to elaborately express criticism and compliments. In doing so general ease of use as well as technical possibilities could be evaluated, opposed, and requested.
- *Response to the results of the students' questionnaire*
  Since the students' inquiry took place in advance, questions concerning these results were included as well. That way it was possible to get a direct feedback to previous findings from a different point of view.

Again feedback from all participants was very positive in principle. Lecturers generally are convinced of the necessity and usefulness of such a system. Almost all of them are open to continue and intensify the use. The number of courses managed by one chair varies from one to ten, on average four to six courses. In contrast to students lecturers use the VC even more often – on average the system is used at least once a day. Individual results scale from hourly checks to checks several times a week.

Lecturers possess good computer literacy according to their own estimation – there are no problems in basic functions of the VC because of the undoubted ease of use and a very high usability. In large parts lecturers provide learning materials for download in their courses and use them to disseminate information to their students. Discussions among students are rare but though desired by plenty of the lecturers. In contrast advanced features are mostly unused by now but there is an increasing interest in these features.

Lecturers in general acknowledge the intention to widen the existing offer. In support of this endeavour the retention of basic trainings – especially for new employees – is required. In addition special trainings are desired in order to enable the use of advanced features. Hence lecturers and students agree that the use can and should be extended.

Besides this agreement the demand of the possibility to independently create courses in an assigned area was most prevalent among the queried lecturers. If this request is denied at least a better integration into the system landscape is desired in order to minimize the necessary effort for course requests. This problem is also discussed in section 4 Future Issues.

To take into account the fact that four lecturers tested the VC for one semester but quit these involvements by now, two of these lecturers were also considered – it was planned to interview them in order to get an even more critical review of the system. The short response though was simply that the termination was motivated by the fact that there was and is no need for such a system. The functionality of the VC was no determining aspect.

4 Future Issues

Overall, the evaluation was very positive and the mentioned crucial issues were not very surprising since it has already been worked on some of these issues. Three selected issues and their possible solutions are presented in this section.

The first selected problem concerns navigating in the system and has been claimed to be in need of improvement for both questioned groups – students as well as lecturers. After logging onto the system every user is provided with a customized navigation. An individual navigation bar is always shown on the left side of the screen while the user is logged in. This navigation bar contains an entry for every course that the user is enrolled for. Since the system is meant to accompany students through their whole student-life the number of courses increases with every semester. Similar developments apply to lecturers as every semester brings about additional courses as well. So far the sorting of all courses in the navigation bar did not have an obvious system since an internal database id determines the sorting.

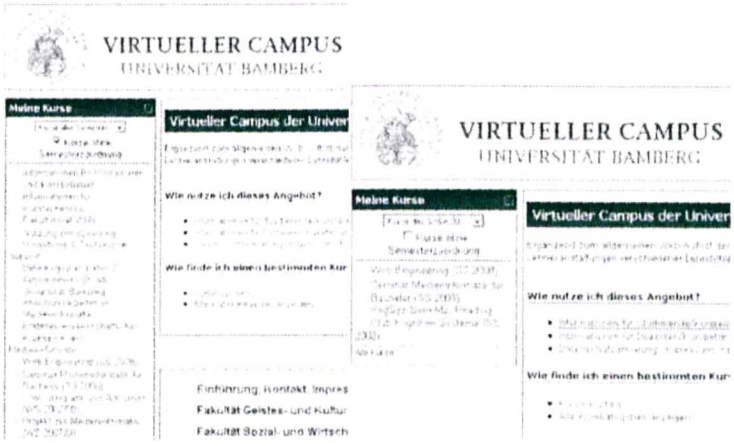

Figure 3: Improved navigation possibilities of the VC (improved variant on the right side).

An add-on to solve this issue has been developed and integrated by now. First of all the distinction of semester courses and courses not related to a specific term has to be mentioned. To improve the situation the second group of courses can now be hidden. In addition the user has the choice of showing just the courses of a particular term. This distinction and hence navigation is supposed to be very helpful in this context since students as well as lecturers are normally interested in the courses of the actual semester. Figure 3 shows the navigation in traditional view on the left side and the new navigation with "non-term courses" hidden and the selection of the actual semester on the right side.

The second issue came up on the lecturers' side and is concerning the administrative effort needed to request a course. To understand this, the actual process needs be described briefly first. Due to the incremental development of the university IT infrastructure the system landscape is quite heterogeneous. Various systems are needed to manage the administration of students, teachings, and exams. Therefore in addition to registering the course in the schedule of lectures and the exam administration system, the lecturer is required to send an email in order to request a new course on the VC. This process is so far not covered in any of the existing systems where lectures are normally administrated.

The solution of this problem requires an approach enclosing not just the VC but aiming at a better integration of the complete system landscape. An all-embracing concept to approach this problem has been presented in [HSW07]. Related projects at other universities are for example InteLec[7] or elecTUM[8]. The idea of this project is to use the main system – the schedule of lectures – to request a VC course as well. In order to enable this connection the existing system was slightly adapted. A flag that can be set when a course is registered results in the automatic creation of a new VC course. In addition the lecturer is assigned as responsible for this new course. Furthermore the system enables the re-use of existing courses by simply specifying the course id of the old course. This optional offer entails the copying of the existing content into the new course. Since the schedule of lectures has to be completed up to a specific date the necessary data can be transferred shortly after this date – hence the transfer needs to take place once a semester and no complex matching is required. Of course this solution applies only for semester courses since only semester courses are part of the schedule of lectures. Courses that are not related to a particular term are required less often and an automatic processing is almost impossible due to the fact that the corresponding circumstances are multifaceted. Additionally it has to be mentioned that those courses typically last a longer time period than one semester. The solution has been implemented and tested – it is planned to utilise it for the winter term of 2008.

[7] Intelec – http://www.intelec.uni-passau.de/iz07.0.html (last visited May 27th 2008)
[8] elecTUM – http://portal.mytum.de/iuk/electum/ (last visited May 27th 2008)

Finally, the third dominant request is of a more informal character. Students in general are pleased with the offer of the VC, so one of the most desired improvements is "just" a more intensive use of the existing system. This desire covers two directions to intensify the use – a quantitative dimension that represents the number of courses actually offered as well as the percentage of lecturers willing to actively use the VC on the one hand, and a qualitative dimension that represents the degree of utilisation, that is the extent to which a lecturer of a specific course makes use of existing functionalities like communication tools, tools supporting tests, or further benefits of technology enhanced learning, on the other hand.

This request requires some activities for the lecturers' side in order to expand the existing offer that can then be used by students. The quantitative dimension is supposed to be fostered by trainings. As mentioned basic trainings already exist, an extension of those trainings is planned. The advanced trainings in contrast are also related to an extension of the qualitative dimension since the existing use is intensified by additional features and possibilities. Opportunities and deliberations for improving the qualitative dimension with sophisticated concepts are for instance presented in [HS07].

5 Conclusion

The two-year initiation phase is now completed and it has been decided to permanently embed the university-wide learning management system into the universities IT infrastructure. The department responsible for the university's website has been assigned to be in charge of the VC. This seems reasonable due to the fact that the public image of the university is formed by the website and the VC jointly concerning the representation on the internet. In order to provide an integrated offer for teaching a new group called "IT support for teaching" is about to be created. Digital content creation and maintenance as well as evaluation of teaching will then also be integrated into and supported by this group. In addition to two existing half-time positions two new full positions have been created to increase the personal resources. That way support can be raised – the outlined ideas for improvement of system integration and advanced trainings can be realised.

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