Hybrid Learning: a Powerful Opportunity to Integrate SMEs in Courses as a Third Party

Tobias Fries and Andreas Henrich

University of Bamberg, D-96047 Bamberg, Germany
{tobias.fries,andreas.henrich}@uni-bamberg.de
www.uni-bamberg.de/minf/

Abstract. In typical teaching scenarios students and lecturers are involved. Nowadays, however, learning management systems (LMS) are used intensively to foster communication between students and lecturers and so reduce the need to meet in person in order to communicate. Additionally an increased involvement of practitioners and companies in teaching efforts at universities seems desirable for a variety of reasons. (1) Examples and comments from practitioners can augment teaching content. (2) Students can get in touch early and casually with potential future employers. (3) The lecturer might receive valuable feedback with respect to his/her teaching content and style and potentially more intense forms of co-operation might result. On the company side such co-operation might be especially appealing for Small and Medium-sized Enterprises (SMEs), because large companies usually have other options, as well. Therefore, we set up a project using a university wide LMS as an enabling platform to escalate the involvement of SMEs and their employees in teaching efforts. In the present paper we report on the experiences derived from this project.

1 Introduction

In contrast to large companies, Small and Medium-sized Enterprises (SMEs) cannot afford to run Research and Development (R&D) departments and also are disadvantaged in terms of Human Resources (HR) because university alumni prefer larger companies as employers [12, p. 135] (however, SME employees are more satisfied with their jobs [11, p. 16 and 161]). In addition, SMEs often do not have the time, money, and personnel to provide adequate further education opportunities for their employees. The fact that 99% of European Union companies (and even 99.8% of German companies [10, p. 59]) belong to the SME category and that they generate an estimated 55% to 60% of the economic wealth of the private sector [2, p. 9] helps clarify the seriousness of this issue.

Many authors see solutions to the above mentioned drawbacks of SMEs through inter-organisational networks and co-operation. In car manufacturing, in particular, close co-operation and networks between the big car manufacturers and the upstream SMEs in the value chain (car part producers) have become very common, but a lot of potential co-operation between networks of

SMEs remains unrealized. In recent times the phrase "co-opetition"—meaning co-operating with competitors—has become widespread. It usually means co-operation in one business function in order to realize economies of scale. In a similar manner, SMEs could establish R&D or further education co-operations with their competitors to avoid the costs of installing and running an R&D or further education department for every company. Co-operations with universities also provide two opportunities:

1. SMEs can get cost-effective access to recent research and inventions.
2. They can present their products and themselves to students as an actively recruiting company.

On seeing the benefits of co-operation networks between SMEs and of knowledge transfer between universities and SMEs, national and international institutions (like BMBF[1] and ESF[2]) have begun to fund projects for developing and establishing environments for this purpose. We run a project called "LMS4KMU 2.0"[3] (co-financed by the ESF) in which we study the possibilities of extending existing university courses for knowledge transfer to and from SMEs and for using a university-wide learning management system as a virtual co-operation infrastructure.

In the next sections of this chapter, we explain our motivation for incorporating SMEs into academic teaching and describe the situation at the University of Bamberg prior to the start of our project. We then present our approach to integrating SMEs into courses in Chap. 2, describing in more detail critical success factors, expedient co-operation types and how we implemented the co-operation infrastructure. In Chap. 3 we present the experiences of lecturers and SMEs with our project. The paper ends with Chap. 4, in which we consider the results and offer an overview of future prospects.

1.1 Motivation

In the past decade Learning Management Systems (LMS) have gained more and more importance in supporting learning processes. Nowadays they are widespread in all areas of education and learning. After the beginning of the process, when it was common at universities for different chairs to use different LMS, a phase of consolidation took place and today most universities provide a centrally administered university-wide LMS [8]. As we explained in last year's ICHL paper [7], a university-wide LMS forms a purposive basis for all lecturers and students to move from traditional to blended learning [1]. Since most lecturers and students are already conversant with the usage of their university's LMS and the technical teething problems of the systems are controlled by the computing centres, integrating third parties into these systems seems to be feasible.

[1] German Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung), http://www.bmbf.de, last checked May 12th 2011
[2] European Social Fund, http://www.esf.de, last checked May 12th 2011
[3] KMU is the German abbreviation for SME, http://www.uni-bamberg.de/minf/lms4kmu, last checked May 12th 2011

University-wide LMS can be a powerful infrastructure to support knowledge transfer and co-operations between universities and SMEs, and this is worthwhile for the SMEs as we explained in the first part of this chapter. The question we want to address now is what motivates universities to incorporate SMEs into their LMS courses. One aspect is the legal background: The Bavarian Higher Education Act (BayHSchG), which is relevant for our university, explicitly mentions economic co-operations, knowledge transfer and further education as tasks of Bavarian universities. We will detail this in Sect. 2.1. For universities outside Bavaria similar regulations might apply explicitly or implicitly. In any case the idea that knowledge and technologies generated at universities should be transferred to companies for economic benefits seems obvious. Apart from this macroeconomic point of view, co-operation with SMEs is advantageous for a university and is in the best interest of the lecturers. Besides financial implications in terms of possible donations and contracted research, co-operations can also yield other benefits. The incorporation of companies into academic courses is not limited to knowledge transfer from universities to SMEs, but also implies transfer of knowledge and experiences from practitioners to the university and the possibility for students to tackle real-life problems together with company members.

1.2 Starting Point

Our project is based on the university-wide LMS Virtual Campus[4] (VC) of the University of Bamberg. It is an implementation of the wide-spread LMS moodle[5] and has been established in Bamberg since 2006. Before that time, several chairs at the University of Bamberg experimented with self-developed e-learning systems or provided out-of-the-box web discussion forums, but the majority of lecturers just provided their lecture notes for downloading onto their webpages (password protected by .htaccess files) and did not offer any further e-learning content. With the redesign of the university website in 2006, the chance was taken to divide public information (new website based on the Content Management System (CMS) Typo3[6]) and course-related content (uploaded to the new LMS) [9]. As the new Typo3-based website did not offer the possibility of password protection for the provision of lecture notes to the students, most lecturers accepted the need to create a course in the LMS for each of their lectures and to provide their lecture notes this way. Some lecturers still use the VC for this purpose only, but a lot of them experienced that moodle offers a wide range of intuitive but powerful e-learning tools and make use of some of them. So the usage ranges from the pure provisioning of slides, over discussion forums, video podcasts of lectures, exercises (including uploading of students' solutions and marking), to real interactive e-learning content. For the current summer semester 2011 over 1,400 courses are represented in the VC.

[4] http://vc.uni-bamberg.de/moodle, last checked May 12th 2011
[5] http://moodle.org, last checked May 12th 2011
[6] http://typo3.org, last checked May 12th 2011

2 Our Approach

As the LMS Virtual Campus (VC) is very much accepted by lecturers and students at the University of Bamberg and co-operations and knowledge transfer between SMEs and universities are beneficial for companies, lecturers and students, the logical next step for us was to analyse the potential of partly opening the VC to companies. What we did not want to do was to prepare special further education courses just for SMEs, but to open those of the already existing courses which seemed to be appropriate for co-operations. In Sect. 2.1 we will describe the critical success factors of our approach, including incentives, necessary effort, legal issues and the first mover or critical mass problem when starting a co-operation network. Sect. 2.2 is about the co-operation types we have designed. We suggest in particular what influences assessment of the kind of co-operation to be recommended a particular course, and how we want to guide SMEs to find an appropriate co-operation. In Sect. 2.3 we describe our prototypical implementation, including configuration of the moodle system and development of a co-operation portal for the web, social networks, and smartphones.

2.1 Critical Success Factors

At first, we tried to identify the critical success factors which influence our project. A very important point is to cope with the legal challenges arising, when one provides companies access to the courses of an LMS which has been installed for the use of students and lecturers of a particular university. In Germany university-wide LMS make use of the eased copyright restrictions for the delimited circle of lecture attendees in education and research, which are no longer appropriate when practitioners get involved. Furthermore, we checked whether our approach is in line with the rights and duties of universities and considered data protection and privacy issues, too.

Apart from the legal challenges it is typical for any network, that the benefit one can get by joining is greater, the more people are already in the network. In our case, on the one hand, the more courses are offered the more likely SMEs will find a suitable co-operation. On the other hand, the more that SMEs are willing to co-operate with the university, the better the chance for lecturers to get feedback from practitioners and so increase the practical relevance for their students when they open a course. A crucial task is therefore to convince SMEs and lecturers to join the network from the beginning, by clearly pointing to the incentives and minimizing the efforts for starting and running co-operations.

Legal Issues. First of all, we ensured that our approach does not collide with the rights and duties of universities. The relevant code of law in our case is the Bavarian Higher Education Act (BayHSchG). In Art. 2 (1) and (5) the tasks of Bavarian universities are enumerated as research, teaching, studies, further education, economic co-operations, transfer of knowledge and technology, and to encourage acquisition of additional qualifications in co-operation with

the business sector and the labour administration. Our approach is based on communication over the LMS and co-operations with bidirectional knowledge transfer and teamwork between students and company members, and hence in line with these tasks. As a clear borderline it was defined that in cases where a company member wishes to get a degree, he or she should instead enroll in a distance study programme.

As far as data protection is concerned, the Bavarian Data Protection Act (BayDSG) is relevant. Art. 16 to 18 deal with acquisition, storage, alteration, processing and transfer of personal data. At the University of Bamberg, students register for the VC themselves. They do this to access course contents and to communicate with other students and lecturers. To register, they have to input their real name and a valid email address, which are stored in the system. They also have the possibility of inserting additional personal data after registration. This personal data is visible to other users, enrolled in the same courses in the system. When company members gain access to courses in the system, the students have to be informed beforehand, so that they get the chance to delete personal data or unregister from the course opened to company members. Companies should also be informed, that they are not allowed to transfer personal data about students (e.g. for recruiting purposes) in their company without explicitly asking them for permission.

Last but not least, copyright issues have to be heeded. Of relevance here is the German Copyright Act (UrhG). As long as an LMS course is access protected by a password only known by the students attending a lecture, §52a (UrhG) absolves the lecturer from the need to ask authors of submitted third person content for permission and a framework agreement between the German federal states and the collecting societies covers the payment of compensations. When company members access a course, the lecturer has to hide critical content from them or strictly fulfil the preconditions of citations according to §51 in conjunction with §§62 and 63 (UrhG). More details can be found in our paper about legal pitfalls and circumventions [5].

Incentives. SMEs can take advantage of joining the project as they have the chance to contact universities directly which are in their neighbourhood, get to know students (and with it possible future employees), get a glimpse into fields of knowledge of those possible future employees and get to know results of research. The employees of the companies can increase their knowledge in topics of interest for their daily work and also can learn about new fields, which they can possibly use in their future work.

For lecturers, joining the project can offer the chance to intensify the business relevance of their teaching and research, establish contacts with possible project partners and present their research in a business context. Incentives for students are implicitly included in the incentives for lecturers: they receive more business oriented courses, start a dialogue with companies, gain insight into concrete business projects, problems, and solutions, and make contact with possible employers.

Effort. The incentives for lecturers and SMEs seem convincing, but in order to persuade lecturers to open their courses to companies and offer co-operations, it is also important that the effort of preparing and executing the co-operations is kept as low as possible. If a lecturer wants to let company members access his lecture notes and use a course's discussion forums, he can just enter the phrase "participates in the project LMS4KMU 2.0" in the course description of the moodle system. We have implemented a script, that retrieves all courses from the VC containing that phrase and prepares the courses for the co-operation.

For the SMEs it has to be easy to get an overview of available co-operation offers and to join a co-operation. For that purpose, we have developed a co-operation portal providing all the necessary information, a keyword search as well as an explorative search, recommendations, and direct access to the courses of the LMS (cf. Sect. 2.3).

First Mover or Critical Mass Problem. Convincing incentives, an intuitive search function for co-operations, easy access to courses and automatically adjusted course settings, all form a sound basis but are worthless without co-operation partners. To get the ball rolling, we started a pilot phase with a handful of SMEs which have already had successful co-operations with our university in the past using some lectures of our own and conversant chairs. Among our pilot phase partners were also some of the SME associations acting as communicators.

2.2 Co-operation Types

To give lecturers an idea of the typical kinds of co-operations mediated by a university-wide LMS and to support SMEs in finding suitable co-operations, we have depicted six prototypical co-operation types:

1. *Insight.* SMEs can limit their access to the lecture notes only and other content provided by the lecturer. They are not able to use the discussion forums and cannot access content provided by the students.
2. *Insight and Discussion.* In addition to no. 1, SMEs can also read the discussion forums and actively write contributions to them. They can also access content provided by students.
3. *Rework by Lecturer.* In contrast to no. 2, the lecturer provides special content for SMEs e.g. related to the current situation of the company.
4. *Rework by Students.* Students provide content for the companies.
5. *Arrangement with SME.* The lecturer includes the actual situation and challenges of an SME as a task for the students in a course.
6. *Prearrangement with SME.* The lecturer and an SME conjointly design a new lecture for the students on a given topic.

Co-operation types 1 to 3 are appropriate for typical lectures, whereas types 4 to 6 are more suitable for seminars, practicals and exercise courses. Combinations are often useful: it makes sense to allow SMEs insight into and discussion with the LMS course of a lecture and to co-operate with one of the companies according

to type 4, 5 or 6 in overarching seminars. If the main co-operating SME permits it, other SMEs can also access the seminar course as co-operation type 2.

The co-operation types differ in activity and intensity of SME involvement. For us, the degree of activity means whether SME members merely download and read content, or if they provide content or problem definitions themselves. The intensity level indicates how often SMEs interact with the system. Fig. 1 depicts the relationship between co-operation type, SME activity and SME intensity on the left. The boxes symbolize the degrees of freedom, depending on the specifications of the lecturer and the attitude of the SME. Co-operation type

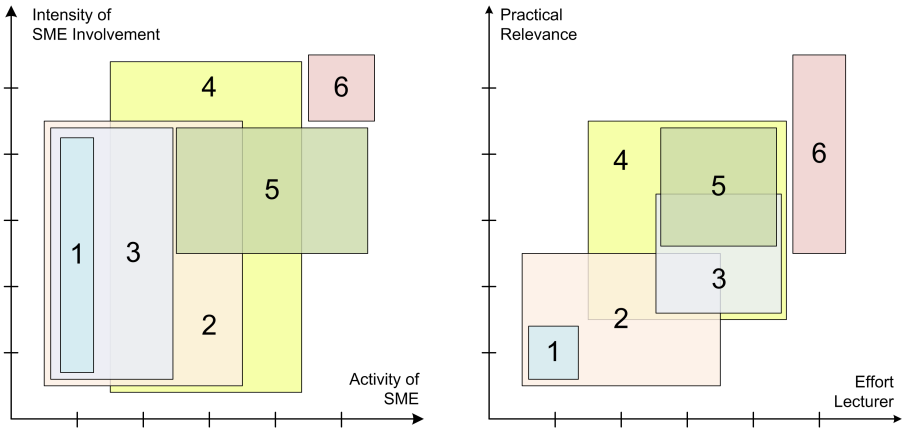

Fig. 1. On the left the relationship between co-operation type, activity, and intensity of SME involvement is depicted. The dashes on the co-ordinate axes always indicate values from *low* to *high*. On the right the relationship between co-operation type, practical relevance for the students, and the additional effort for the lecturer is shown.

1 allows almost no activity of the SME. They only consume content provided by the lecturer. The intensity is up to the SME member: from the date the lecture starts, the member can visit the LMS course and download, read or watch provided content. Co-operation type 2 allows the same range of intensity, but some more activity. The SME member can write postings addressing the lecturer or the students in the discussion forums. Co-operation type 3 allows the same intensity as the before mentioned types. The activity can be higher than in type 1, as discussion forums are accessible, but not as high as in type 2, as the SME and the students see different versions of the content and have therefore no common basis for discussions. Usually a forum just for students and the lecturer and another one exists just for the SMEs and the lecturer. In co-operation type 4, the lecturer has to decide whether the SMEs have to start the co-operation before the beginning of the course and how they have to interact with the students. One possibility is that students rework the content for SMEs in general, and concrete SMEs can give feedback if they want. Another

possibility is that SMEs have to join the co-operation before the course starts so that the students can prepare the content for the concrete companies. In that case, activity and intensity of SME involvement has to be higher. In co-operation type 5, the lecturer arranges the course (or parts of it) together with SMEs. A certain intensity and activity of the SMEs is therefore obligatory. A very high activity and intensity (starting before the beginning of the course and lasting until the end) of SMEs is needed to prearrange a new course conjointly (type 6).

It is clear, that a higher activity and intensity of SME involvement usually means more effort for the lecturer. On the other hand, the practical relevance of the courses will also be higher the more actively and intensively SMEs get involved. On the right of Fig. 1 you can see the relationship between co-operation type, practical relevance, and lecturer's effort.

2.3 Implementation

In this section we describe how we configured and extended the moodle system in order to allow the lecturer to hide content and forums from the company members and also to provide special content and forums only for SMEs. We also explain how we implemented the backend of our co-operation portal and the different frontends (website, social network app, and mobile phone app).

Configuration of the Moodle System. The VC is based upon version 1.9.7 of the open source LMS moodle. In moodle it is possible to define different user groups on the course level. When opening a course for SMEs, it is very useful to define a user group as "students" and another one for "SMEs". The lecturer can assign users to one of the groups manually, but moodle also offers the choice of defining different access keys for different user groups. The lecturer can inform the student of their access key in his lecture, and the access key for SMEs can be deposited in the co-operation portal. When a user matriculates to the LMS course, he will be automatically assigned to the correct user group because of his access key. The lecturer can now easily find out, whether a user is a student or an SME member and define, which group can access forums, questionnaires and other "activities". Unfortunately, it is not possible to hide files and other content from a user group. The solution is the so-called *groupings*, which are declared to be experimental, but these work well in moodle 1.9.7. Groupings are a type of "super groups", which means that groups can in turn be assigned to a grouping. So we enabled the groupings feature in the moodle configuration and now one can create groupings such as "grouping students" and "grouping SMEs" on the course level and assign the corresponding groups. In this way users are assigned to the right groupings transitively and the lecturer can hide copyright protected third person works from the SMEs.

Recently version 2.0 of moodle was released. Groupings are now activated by default, but it is still necessary to enable an experimental feature (this time called "enablegroupmembersonly") to allow files to be hidden from existing groupings.

Co-operation Portal. The co-operation portal has been designed to automate the process of offering co-operations and support the SMEs in finding suitable co-operations, enroll in the courses, and get into contact with lecturers. It allows the SMEs to get an overview of the available co-operations, get detailed information about the lectures, find out how they can get involved, and makes it possible, to join a co-operation directly. SMEs can also use a search and filter function to preselect appropriate co-operations. The use cases can be found in [4].

To minimize the effort for the lecturers and to avoid redundancies, the portal harvests the necessary information from the existing information systems at the University of Bamberg. It establishes a data connection to the VC via the web service extension WSPP[7] which can be added to moodle 1.9.7. WSPP provides most of the required features our portal needs to get information from the VC and to manipulate data inside the VC. The recently released moodle 2.0 offers four built-in web service APIs: AMF (for access from Adobe Flash), REST, SOAP and XML-RPC. The SOAP web service of moodle 2.0 works very similarly to the WSPP extension, but provides only a very limited amount of predefined functions so far. Fortunately, it is much easier to define own functions extending moodle 2.0's SOAP service than it was with the WSPP API in the past.

The portal's backend is a web service, implemented as an extension to the CMS Typo3 and coded in object-oriented PHP. The extension also includes a frontend, consisting of an HTML page serving as container for the actual application, coded in JavaScript and using DOM manipulation for the user interface and communicating with the backend via AJAX requests and JSON responses.

The portal is also available as a social network app using Google's OpenSocial API. In this way we try to exploit the viral effect of social networks to solve the critical mass problem for the collaboration platform [3]. For increased user convenience we are also currently implementing a mobile app of our portal for Android devices.

3 Experiences

We started our project LMS4KMU in October 2008 with seven industrial project partners, four SMEs and three SME alliance organisations (communicators). By the beginning of the summer semester 2009, we had met with our project partners to discuss our ideas and their wishes, roughly designed the co-operation types, prepared the VC for co-operations and implemented a first rudimentary version of our co-operation web portal so that we could launch the pilot phase. Between the summer semester of 2009 and the winter semester of 2010/11 seven lecturers offered 19 co-operations to SMEs, which in sum were joined by 45 practitioners. 10 of the co-operations offered were categorized as Insight and Discussion (type 2), 6 as Arrangement with SME (type 5), 1 as Rework by Students (type 4) and 2 as Prearrangement with SME (type 6). In the next two sections, experiences of the lecturers and SMEs are shown.

[7] WSPP was developed by OKTech and further developed by Patrick Pollet at INSA de Lyon (http://prope.insa-lyon.fr/∼ppollet/pp.ssi)

3.1 Lecturers

On the VC forum for course tutors we posted information about our project and announced that we were looking for lecturers to join the pilot phase in early 2009. To our surprise only three lecturers were willing to participate. One opened the VC course of his seminar on business ethics, so that companies could post a question to the forum and students answered the questions in a report. A freelance marketing consultant joined the co-operation and provided the topic "compliance", which was assigned to a student for his report as it matched the general topic of the seminar. A lecturer from the history department wanted to digitalise a historical document with his students and was looking for a company with experiences in document management systems and electronic publishing formats. The seminar was held as a co-operation between the history and media informatics lecturer including students of both fields of study. One SME member joined the VC course because of personal interest in the topic, but no company with experiences in document management systems could be found. Another history lecturer wanted to prearrange courses with SMEs (type 6), but as he did not clearly describe what the topic of the co-operation would have been or what the involvement of the company would be, no industrial co-operation partner could be found. We had expected some lecturers would just open some of their courses for Insight or Insight and Discussion (types 1 or 2) as these were meant to be low-threshold entry co-operations without much effort for the lecturers. We opened our courses Web Engineering, Multimedia Techniques and Information Retrieval for Insight and Discussion. All of them contained the lecture notes, video podcasts of the current lectures and exercises. The Information Retrieval course was designed completely new, including additional interactive applets and other e-learning content [6], but Web Engineering was joined by many more SMEs. To find more lecturers to participate in our project, we sent personal emails to those who had courses that seemed to be interesting for SMEs to us. The chair for marketing offered co-operations of type 2 and 6 and the chair for communication sciences of type 2 and 5. SMEs joined the type 2 co-operations, but not those of types 5 and 6. The chair for cognitive systems offered a usability study for software developing companies. Two SMEs made use of the chance to present themselves and their software to the students and get a profound feedback about potential for increasing usability and customer satisfaction.

The fact that only very few lecturers allow Insight and Discussion indicates that many fear being exploited by the companies. It seems difficult to convince them of this co-operation type as an easy opportunity to get into contact with SMEs and as entrance to more sophisticated co-operations. The small number of participating SMEs is a problem, as lecturers can get into trouble if they plan to arrange or prearrange a course together with SMEs and no appropriate industrial partner can be found. In the case of the usability study, two appropriate companies applied and the lecturer divided the students into two groups. The students were critical, that the workload was higher in contrast to former courses, when only a theoretical problem had to be solved, but the benefits compensate that:

the lecturer could establish a mutual trust with one of the companies for further co-operations, student apprentices and tutored bachelor theses.

3.2 SMEs

The feedback from our industrial project partners is largely positive. Apart from one person, everyone felt they had learned interesting new knowledge and the majority acknowledged the benefits for their job. Many also appreciates that they could get direct and fast benefit for low input. On the other hand, many participants regretted that they had not become part of a network. While this is not true for the SMEs participating in co-operation types 5 and 6, it is unfortunately true for co-operation type 2. Almost none of the SME members took the chance to use the discussion forums for talking with lecturers and students. Some SME members asked about the possibility of receiving certificates. As we explained in Chap. 2, certificates are at the moment only available for enrolled students. This may change in the near future, when the prospective so-called "modular studies" for company members becomes part of the study forms defined in the Bavarian Higher Education Act (BayHSchG).

We have seen that SMEs only joined co-operations that promised direct benefits. Two companies, which develop and sell document management systems were not interested in joining the co-operation about digitalising ancient documents, although they could have highlighted the merits of their software and tried to find future customers or employees. In contrast, both participated in the usability study and were impressed by the professional feedback and the concrete recommendations on how to improve their user interfaces. One of the companies offered to coach a bachelor thesis, where one of the students could design a web user interface according to the findings of the usability study, but when a student was found, the company withdrew because they were trying to gain a large new customer and had therefore no time to continue with the web user interface and the bachelor thesis. Such problems are typical for co-operations with SME.

4 Conclusion and Outlook

The experiences of the last four semesters show that a university-wide LMS can enable successful co-operations for the benefit of SMEs, lecturers, and students. Co-operations of type 2 can be set up very easily without noticeable extra work for the lecturers, but to achieve network buildung and bi-directional knowledge transfer more effort is needed. In the cases when participating SMEs could be found, the effort of the lecturers to arrange or prearrange courses with SMEs has been beneficial and had pay-offs in increased practical relevance for the students, job offerings for student apprentices, bachelor theses and the establishment of a co-operative culture.

As a next step, we will analyse the wishes and reservations of SMEs and lecturers concerning co-operations and knowledge transfer by interviewing them directly. We will then adapt our approach accordingly, so as to reach the critical

mass of participants of both lecturers and SMEs to guarantee the sustainability of our project.

References

1. Chew, E., Jones, N., Turner, D.: Critical review of the blended learning models based on Maslow's and Vygotsky's educational theory. In: Proceedings of the 1st Int'l Conf. on Hybrid Learning and Education. pp. 40–53. ICHL '08, Springer-Verlag, Berlin, Heidelberg (2008)
2. Farvaque, N., Voss, E.: Guidelines for vocational education in small and medium-sized enterprises (SMEs) (in German). Amt für Veröff. der Europ. Union, Luxemburg (2010), Ms. abgeschl. im Aug. 2009., http://dx.doi.org/10.2767/33248
3. Fries, T., Boosz, S., Henrich, A.: Integrating industrial partners into e-teaching efforts – using social networks to support the initiation of co-operations (accepted for publication). In: Int'l Symposium of Information Science (ISI) (in German). Hochschulverband Informationswissenschaft and IuK-Initiative Wissenschaft, Hildesheim (2011)
4. Fries, T., Henrich, A.: Integrating industrial partners into e-teaching efforts – a portal to support the initiation of co-operations. In: IADIS Press (ed.) Proceedings of the IADIS Int'l Conf. E-learning 2010. vol. 1, pp. 89–96. IADIS Press, Freiburg (2010)
5. Fries, T., Henrich, A.: Integrating industrial partners into e-teaching efforts – legal pitfalls and circumventions. In: ICWE GmbH (ed.) Online Educa Berlin 2010. ICWE GmbH, Berlin (2010), STA72 Legal Challanges
6. Henrich, A., Sieber, S.: Blended learning and pure e-learning concepts for information retrieval: experiences and future directions. Information Retrieval 12(2), 117–147 (2009)
7. Henrich, A., Sieber, S.: Hybrid learning:"neither fish nor fowl" or "the golden mean". In: Tsang, P., Cheung, S.K., Lee, V.S., Huang, R. (eds.) Hybrid Learning, 3rd Int'l Conf., ICHL 2010, Beijing, China, August 16-18, 2010. Proceedings. Lecture notes in computer science, vol. 6248, pp. 82–93. Springer, Berlin (2010)
8. Henrich, A., Sieber, S., Wolf, S.U.: Integrating a university-wide LMS into the system landscape of a university – a pragmatic approach (in German). In: Dötsch, V., Hering, K., Schaar, F. (eds.) Flexibly integratable e-Learning – Near future or utopia? (in German). pp. 57–76. Dötsch, Volker and Hering, Klaus and Schaar, Florian, Leipzig (2007)
9. Henrich, A., Wolf, S.U.: Virtual Campus of the University of Bamberg: a comprehensive eLearning system based on moodle (in German). In: HTWK Leipzig und Fachbereich Informatik, Mathematik und Naturwissenschaften (ed.) WEL'06. HTWK Leipzig, Leipzig (2006)
10. Renker, C.: Marketing in Medium-sized Businesses – Requirements, Strategies, Activities (in German). Schmidt, Berlin (2009), 3., neu bearb. Aufl.
11. Wegmann, J.: Business Economics of Medium-sized Businesses – Textbook for Practitioners (in German). Oldenbourg, München, online-ausg. edn. (2006), `http://dx.doi.org/10.1524/9783486593082`
12. Wesel, M.A.: Corporate Governance in Medium-sized Businesses – Requirements, Specialities, Implementation (in German): Univ., Diss. Osnabrück, 2009., Management und Wirtschaft Studien, vol. 69. Schmidt, Berlin (2010)