Teaching ERP systems: A multi-perspective view on the ERP system market

Axel Winkelmann
Institute for IS Research
Chair of Business Information Systems
University of Koblenz-Landau
Koblenz, 56070, Germany
Winkelmann@uni-koblenz.de

Christian Leyh
Chair of Information Systems, esp. IS in Manufacturing and Commerce
Technische Universität Dresden
Dresden, 98593, Germany
Christian.Leyh@tu-dresden.de

ABSTRACT

In order to increase the diversity in IS education, we discuss an approach for teaching medium-sized ERP systems in university courses. Many of today's IS curricula are biased toward a few large ERP packages. Nevertheless, these ERP systems are only a part of the ERP market. Therefore, this paper describes a course outline for an additional course on medium-sized ERP systems. Students had to study, analyze, and compare different ERP systems on their own during a semester. The seminar took place at three universities at the same time. The paper introduces a procedure model and a scenario for setting up similar courses at other universities. Furthermore, it discusses some of the students' outcomes and evaluates the contribution of the course with regard to a practical but also academic IS education in a comparison of the three universities.

Keywords: ERP, teaching case, problem-based learning, small and medium-sized enterprises

1. MOTIVATION

Today, standardised enterprise resource planning (ERP) systems are used in a majority of enterprises. For example, more than 92 percent of all German industrial enterprises use ERP systems (Konradin, 2009). Due to this strong demand, there are many ERP systems with different technologies and philosophies available on the market. Therefore, the ERP market is strongly fragmented, especially when focusing on systems targeting small and medium-sized enterprises (S&ME) (Winkelmann and Klose, 2008; Winkelmann, Knackstedt and Vering, 2007). This multitude of software manufacturers and systems makes it more difficult for enterprises that use or want to use ERP systems to find the "right" software and to hire the appropriate specialists for the selected system. Also for future investment decisions concerning the adoption, upgrade, or alteration of ERP systems it is important to possess the appropriate specialized knowledge and skills in the enterprise (Winkelmann and Matzner, 2009). This is essential since errors during the selection, implementation, or maintenance of ERP systems can cause financial disadvantages or disasters, leading to insolvencies of the affected enterprises. Examples of such negative scenarios can be found in the literature (e.g., Barker and Frolick, 2003; Hsu, Sylvestre and Sayed, 2006). In order to prevent this, the necessity arises for universities to transfer the specialized knowledge to their students and graduates, in particular through study courses in the field of information systems (Venkatesh, 2008).

The possibilities and, above all, the need for providing this knowledge by using ERP systems in study courses are frequently discussed in literature (e.g., Antonucci et al., 2004; Boyle and Strong, 2006; Fedorowicz et al., 2004; Hawking, McCarthy and Stein, 2004; Peslak, 2005; Stewart, Rosemann and Hawking, 2000). This clearly states that ERP systems are or should be an important component of the curricula of universities in information system-referred subjects and courses. However, this is not a trivial task as Noguera and Watson (1999) discuss in their study.

One of the goals of using ERP systems in courses is to prepare students for their career by obtaining at least a first insight in ERP systems. A further goal is promoted by ERP manufacturers (especially by making their systems available for university courses) - students shall learn their products as

early as possible, since they, as the later graduates, will work with these systems or will hold positions in the enterprises with an influence on ERP investment decisions. Therefore, it is necessary for universities to offer the appropriate systems, processes, and suitable courses for their students (Brehm, Haak and Peters, 2009; Fedorowicz et al., 2004).

However, there is no standardised approach. The choice of systems and their number as well as the structure and number of ERP courses differ from university to university (Seethamraju, 2007). In contrast, the variety of systems and software manufacturers represented at universities is quite small in spite of the heterogeneous ERP market. Above all, a few large manufacturers dominate courses at universities. In particular, software vendor SAP is represented in numerous universities through its University Alliance program. With more than 400 partner universities participating in this program, SAP is probably the most widely used system in study courses (Hawking, McCarthy and Stein, 2004; Pellerin and Hadaya, 2008). It is reasonable for students to learn this system at least basically, because it is probable that they will be working with SAP systems in their professional life due to SAP's high market shares. To underline the SAP market shares, figure 1 shows as example an overview of the ERP-market in the manufacturing sector of Germany.

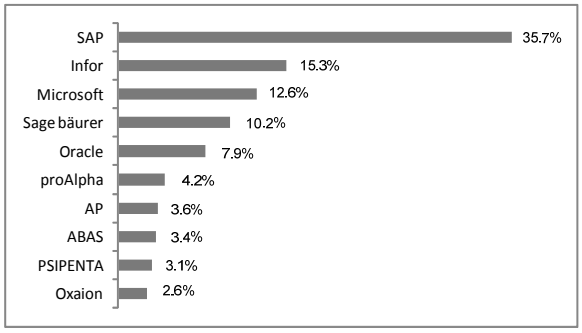

Figure 1. German ERP system market overview (Konradin, 2009)

However, a more diversified integration of ERP systems into education is advisable, especially from the viewpoint of S&MEs. This demand results from the high percentage of these enterprises regarding their total number; for example, in Germany 99.5 percent of all enterprises are S&MEs that employ more than 60 percent of all employees (Schmiemann, 2008). The probability that later graduates will interact with ERP systems within this range of enterprises is quite high (e.g., as system users or as employees of consulting firms). Also the argument to show students more than one or two large systems in order to ensure a market overview supports this demand. Additionally, the differences between S&MEs and large-scale companies (Welsh and White, 1981) will be illustrated to students because they are reflected in the appropriate design of the respective systems (Winkelmann and Klose, 2008). Furthermore, by teaching different ERP systems the students' awareness of functional approaches, process support, interface ergonomics, and architectural concepts will increase. ERP systems and their concepts also can be described theoretically without direct system access. However, the learning experience and understanding are much better promoted by the use of real systems (Watson and Schneider, 1999). ERP systems for small and medium-sized enterprises are to some extent less complex than large scale systems. Therefore, students can learn such systems in a reasonable amount of time.

At this point, the model of a specific ERP seminar described by Winkelmann and Matzner (2009) is useful. An overview about possible approaches of teaching ERP systems or even a comparison between the models will not be given in this article. Furthermore, the aim is to provide an insight in the preparation and execution of the approach from Winkelmann and Matzner (2009).

Based on this model, we describe a problem-oriented, learner-centred approach (Saulnier et al., 2008; Stewart, Rosemann and Hawking, 2000). With case studies, the students train themselves independently in small groups to use different ERP systems and present their findings and experiences through live demos of the respective system, for example. The seminar participants can increase their knowledge through investigating different ERP systems (e.g. scope of operation, surface design, and user friendliness). We have enhanced this concept and simultaneously applied their model to different universities. Therefore, the approach described in this paper takes the seminar model and modifies and extends the concept to use it in parallel at three universities. The groups of students were heterogeneous both with respect to the courses of studies (bachelor, diploma, and master) and to the number of team members. Typically, the bachelor programme in Germany is a three year undergraduate program with an additional two years in the master program. The diploma program is the old university program that is equivalent to a combination of bachelor and master studies. Therefore, the paper analyzes how much influence the number of team members has on the success of the seminar and how the number of completed semesters affects the participants themselves.

Instead of a detailed empirical evaluation that would not be statistically relevant because of the small seminar sizes, our goal is to report on students' and lecturers' experiences in order to make this knowledge available for other universities. Therefore, our paper is structured as follows. The second section describes in detail the procedural model for setting up and conducting the seminar. This model can be considered a foundation for a possible adaptation of the seminar at other universities. The third section presents the analysis of the evaluation of the seminar. Finally, this paper explicates our limitations and summarizes the overall seminar concept and major findings.

2. PROCEDURE MODEL AND DESCRIPTION OF THE COURSE

Following our procedural model, we selected a multi-level procedure for setting up the seminar and selecting the ERP systems (see Figure 2). Therefore, we first defined the topic that students should examine during the seminar (e.g., examination of specific production processes or retail processes) and selected a domain-specific framework to give students some structure and guidance for their experience with case studies and ERP systems. This framework served as a basis for working on the tasks posed (Step 1). Afterward, we selected suitable ERP systems. For that

purpose, we had to gain an overview of the current situation on the ERP market (Step 2) so that we could select the software manufacturers and systems that promised the largest success for learning in line with the defined tasks (Step 3a). Problem-oriented learning has been established as successful concept for teaching information systems (Stewart, Rosemann and Hawking, 2000). Therefore, we chose a scenario of existing processes from enterprises that served as a starting point for the students' evaluation (Step 3b). At the end of the semester, after the analysis of the respective systems (Step 4), students had to present their results (Step 5) at the end of the course. The tutor was responsible for Steps 1 to 3b, while the analysis and presentation were the tasks of the participating students. We divided the large group of students into groups of 2-6 each. Every group had to fully explore one ERP system and take a look at the other systems in order to derive questions for the final presentations.

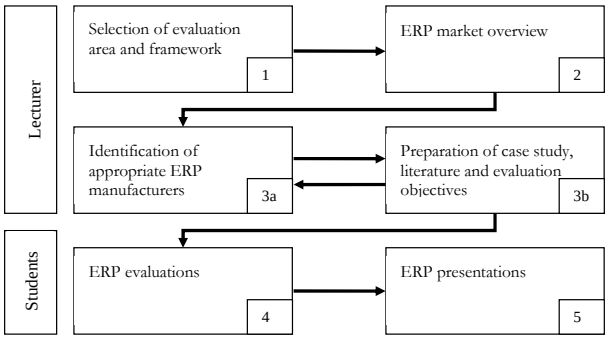

Figure 2. Procedure model for the implementation of the course "ERP systems"

Each team had to present its ERP system in a similar, structured way, but the detailed focus and design of the presentation was incumbent upon each team. The procedural model was applied to three seminar classes held at the same time at the three German universities in Muenster, Dresden, and Koblenz-Landau. This guaranteed that both the approach during the realization of the model and the analyses generated by the students at all three locations were comparable. Besides, the comparability of the results was mandatory to ensure the answers to the questions posed at the beginning of this article, whereby the number of students and the number of completed semesters varied. Table 1 summarizes the general set-up at each university.

In Muenster, three to four and in Dresden four to six students per system worked in teams, whereas in Koblenz-Landau the teams only had two members each. One team even consisted of only one student. Each university deployed the same ERP systems from six vendors. In the case of SageKHK, we provided access to two comparable systems (Office Line and Classic Line) to allow students to compare systems with different programming philosophies and maturities in terms of age from the same vendor. For Microsoft Dynamics NAV, we also included an extension developed by a certified system partner to allow for a comparison between core systems and extended systems. In sum, there were seven ERP systems from six ERP manufacturers. In Muenster, participating students were in the master course of information systems (seven to nine completed semesters). In Dresden, the teams consisted of diploma and master students (seven completed semesters and higher). The participants in Koblenz deviated from the demand for master students in the original approach. Here, bachelor students in the fifth and/or sixth semester participated in the seminar.

	University of Dresden	**University of Koblenz-Landau**	**University of Muenster**
Number of systems	5 (+2)	5 (+2)	5 (+2)
Size of seminar	25	9	17
Size of individual teams	4-6 students	1-2 students	2-4 students
Subject of study	Information Systems/Business Informatics	Information Management	Information Systems/Business Informatics
Students' degree	Diploma/Master	Bachelor	Master
Semester	>6th semester	5th-6th semester	7th-11th semester

Table 1. Seminar participants and general set-up at the universities

2.1 Selection of evaluation area and framework

Even small and medium-sized ERP systems offer complex and extensive functionalities to cover a broad spectrum of functionality for potential customers. Therefore, thinking about the range of real ERP implementation projects and considering the training conditions of the students participating, a serious limitation of the processes that should be evaluated by students is reasonable. The ERP seminar should not result in a frustrating experience of getting to know specific functionality that is hardly represented in the software but should rather aim at providing an understanding of the basic capability of a system.

Therefore, technical and domain-specific frameworks are suitable for the selection of suitable ERP systems and as a guideline for the evaluation of student participants. Technical frameworks such as the ARIS house (Scheer et al., 2004) or the Zachman framework (Zachman, 1987) offer formal and highly-structured approaches for the organization of an enterprise or its basic IT-infrastructure. Domain-specific frameworks provide structured data and information concerning a specific domain. Hence, for structuring our scenario, we selected the Retail-H framework (Becker et al., 1998; Becker et al., 2001; Klaus, Rosemann and Gable, 2000), because it is internationally renowned for teaching as well as in the international business community. This framework (shown in Figure 3) serves as reference model for retail firms. It differentiates between functions, data, and processes.

Each function (e.g., contract management, purchasing) is divided into sub-functions that are deposited with best practice processing concepts (modeled with event-driven process chains) and data models (entity relationship models).

The form of Retail-H is based on the logical structure of a retail enterprise. On the left (vertical) side (logically arranged) all functions of the suppliers are positioned and on the right (vertical) side the functions toward the customers are represented. The functions on the horizontals comprise the logistic tasks. Retail-H is particularly suitable for this seminar model, since it permits the view of partial functionalities, whereby only specific functions can be used

depending upon the tasks stipulated. In addition, students become familiar with best practices and the underlying data models. Therefore, they can gain experience with different approaches to the requirements analysis for ERP systems on the data, function, and process levels.

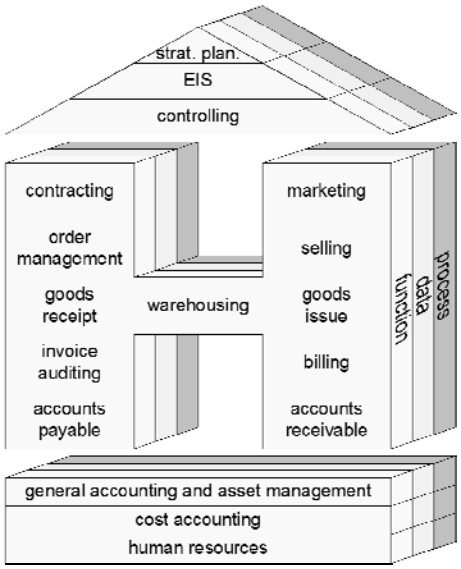

Figure 3. Retail-H on course granular level

2.2 Market Overview

There are numerous possibilities for gaining an overview of the ERP market (shown in Table 2). However, many of the so-called market reviews are often focused only on the large ERP manufacturers (SAP, Microsoft, Oracle, etc.), so that many smaller systems are not part of these market overviews. Winkelmann and Matzner (2009) suggest several methods with which the spectrum of possible ERP manufacturers for the ERP seminar can be extended—personal meetings on conferences or fairs (e.g., CeBIT), articles about ERP systems in technical journals (e.g., ERP Manager), and market review studies and/or platforms for software evaluation (e.g., IT-Matchmaker, ERP Evaluation Centre (erp.technologyevaluation.com)). All of these methods offer a fast and intuitive entrance to the ERP market.

Additionally, a further source was used for this seminar—enterprise case studies. They are characterized by a scientifically founded research methodology that allows the comparison of systems on the basis of a uniform structure (e.g., eXperience research methodology) (Schubert and Wölfle, 2007). The disadvantages of this method are the scenarios used that result from the focus of the case studies. Additionally, only one system is explored and presented in each case. Nevertheless, this method was an expedient addition to the other approaches, since it supported a structured comparison of several ERP systems.

2.3 Identification of appropriate ERP manufacturers

The selection of suitable systems took place according to the following criteria:

- **Size of the enterprise/customer basis**: Reputation and importance of the ERP manufacturer in the market.
- **Functionality**: Range of the functions provided within the system for the scenario.
- **Maturity**: Experience of the manufacturer in the market.
- **Ergonomics**: Efficiency and effectiveness of the system handling for users.
- **Access**: System use at justifiable complexity, either through installation by the students or through remote access.

All systems selected offered functionalities for trade, production, and inventory control. The ERP manufacturers were asked for remote access to their system and three of the five manufacturers provided that access. The other two systems were made available locally on computers at the universities. The appropriate licenses and full versions of the ERP systems were released free of charge for the period of the seminar. In addition, before the seminar started, each manufacturer received information about the goal and the scope of the scenario so they were informed and could adjust their systems in an appropriate manner (e.g., the number of simultaneous user accesses). Seven systems from five ERP manufacturers were evaluated. Several employees from the marketing department or the management (to establish the first contacts) and employees from support (during the realization of the seminar) served as partners for communication between the universities and the manufacturers.

Choice	Examples	Advantages/disadvantages
Face-to-face meeting at conferences or fairs	CEBIT, Hannover, Germany CES, Las Vegas, USA Retail Solution, Birmingham, UK	+ Face-to-face meeting - mostly wrong contact person at fair - incomplete market overview
Discussion of ERP systems in technical or retail journals	ERP Magazine Retail Technology Journal Computer Week	+ detailed ERP lists + reviews and background information - random search for articles - incomplete market overview
Market overview studies and software evaluation platforms	IT-Matchmaker ERP Evaluation Center Gartner studies	+ detailed ERP lists + in-depth functionality overview
Case studies	eXperience research methodology	+ comparability of systems with a continuous structure - different scenarios in case studies - only one system is observed per case study

Table 2. Methods for identifying appropriate ERP products

2.4 Preparation of the scenario, evaluation objectives and literature

The selection of suitable ERP systems and the preparation of the scenario for the students are interrelated tasks. It is unreasonable to ask manufacturers of ERP systems for their cooperation if the scenario only contains retail functionality and processes. On the other hand, evaluating production processes in systems that do not provide these functions is pointless, too.

The scenario chosen contained generic and specific retail processes in the Retail-H that were examined by the students. Additionally, a generic production process that contained the assembly of a product consisting of individual parts was added to the scenario. Originally, only retail processes were intended as a field of examination for the

students. However, during the selection phase of possible manufacturers, it became obvious that according to the manufacturers` data all ERP systems offered functionalities in the domain of production. Therefore, a generic production process was included in the case study to extend the evaluation range of the systems. Because of the lack of space the 13-page case study including the scenario cannot be described in detail. Therefore, Table 3 gives a general overview of the processes and tasks that make up the scenario. However, the complete scenario in English and German can be requested from the first author.

Generic retail process	Enter a framework contract (1,000 PCs for 299 Euro each) Normal purchase price 349 Euro each Order 150 PCs for next month for 299 Euro each Supplier sends a delivery notification Supplier delivers 150 PCs that have to be checked and stored A customer asks for an offer for 10 PCs The customer orders 8 PCs relating to the initial offer Take order amount from the warehouse and ship to the customer
Specific retail process	Check for basic price conditions, transaction based conditions, and subsequent price conditions for purchase and sales (conditions such as basic bonuses, market share increase bonuses, listing bonuses, allowance adjustment bonuses, etc. are given in the scenario) Check if the system is capable of conditions depending on specific objects such as regions, customer loyalty, etc. Check for calculation possibilities in purchase (different gross and net costs, etc.) Evaluate warehouse structures in terms of organization, areas, and attributes such as restrictions in weight or article characters (explosives, chemicals, etc.) Check whether it is possible to split sales offers into orders Check whether it is possible to deliver to different stores with different prices but send all bills once a month
Generic production process	Create a stock of materials Create bill of materials Generate a production order Assembly of the individual parts Assembly of the whole product

Table 3. Scenario for the ERP course (compendium)

By providing the scenario the students should be able to identify the processes that have to be performed within the ERP systems and therefore to define the necessary work packages. Therefore, additional literature is helpful to compensate possible gaps in the students' knowledge (e.g., for retail literature, Mason and Burns, 1998; Becker et al., 2001; Müller-Lankenau, Klein and Wehmeyer, 2004; Sternquist, 2007). Students had to evaluate the ERP systems based on the requirements of the scenario. They had to enter all necessary data in order to properly present the functionality later and had to reproduce the processes based on the functionalities of their ERP systems. If some aspects of the scenario were not supported by the system because of missing functions, students mentioned this during their presentations and in the written documentation. Furthermore, students were asked to picture relevant data aspects. A drawback of the remote access was the lack of direct database access. Therefore, students had to derive data models from functionality and user interface layouts.

2.5 ERP evaluations

At the beginning of the seminar, we described the organizational basics and general conditions of the seminar as well as the idea of the scenario and the tasks that had to be fulfilled. During the seminar, participants worked independently in small groups on the given processes with their respective ERP system. At the end of the semester, they provided a written evaluation of "their" ERP system. Therefore, those processes were modelled that were realizable within the functional range of the ERP system. Additionally, data models for the scenario were developed (e.g., for the warehouse organisation).

In addition to the graphical exposure of the processes and the data models, a summary of the basic technical principles of the assigned system and a concluding upshot that showed the pros and cons of the solution were necessary. There was no training for the students by the ERP manufacturers. The initial skill adaptation training was performed by the students themselves independently after they got access to the systems. Contact with the manufacturers was only necessary if a technical problem evolved and prevented further processing of the scenario (e.g., missing access rights, running out of the license). The mentoring of the lecturers was only required for individual group meetings, during which the teams could ask questions concerning technical aspects or problems with regard to the content of the scenario. Since we offered the e-mail addresses of the teams from the other universities to each ERP team, they were able to solve most technical and economic questions among themselves. However, we also had to send questions to the ERP vendors. Therefore, our seminars provided three tiers of support—among the students themselves (same ERP system teams at various universities), lecturers, and then ERP vendor support.

2.6 ERP presentations

Presentations in a two-day block meeting was practical, since the ERP systems and their functionality were presented in a condensed way during a short period of time and allowed immediate comparison of the different systems. Therefore, each team had 60 minutes for the presentation and an additional 30 minutes for a discussion and questions.

Most of the student teams decided on a presentation of their results combined with a "live demo" of their ERP system. All teams (especially those without a local installation) could perform the demonstrations owing to the stable connections to their respective system. Therefore, the audience could follow the presented processes directly in the system.

For the presentations, the participation of all students was mandatory. This guaranteed that learning outcomes did not remain limited to one system but were extended to the other ERP systems. Besides, at the time of the realization of the seminar, a competition between the three universities was organized to award the team that conducted the best investigation and gave the best presentation.

3. COURSE EVALUATION

3.1 Students' perspective

Since an evaluation of seminars and/or courses in general is of high importance for the improvement of teaching concepts (Seethamraju, 2007), questionnaires were handed out to the students at all three universities to evaluate the seminar after the system presentations. The questionnaires were filled out anonymously. This served to identify possible weaknesses and opportunities for improvements with respect to the seminar realization, scenario, and support from the

universities as well as the ERP manufacturers. Also, the positive aspects that should be repeated in the next seminar could be emphasized. The questionnaire consisted of 23 questions based on scale evaluations (grades 1-5), yes/no, and free text answers. Some of the evaluation results are shown in Table 4. Additionally, feedback discussions were conducted with each team separately to gather further suggestions from the students.

	Average grade per university (1=very high, 5=very low)			
	Dresden	**Koblenz-Landau**	**Muenster**	**All**
Knowledge **before** course	3.16	2.22	3.07	2.93
Interest in ERP issues **before** course	1.78	1.67	2.14	1.88
Interest in ERP issues **after** course	1.58	1.67	2.07	1.76
Motivation for thoughts and opinion building	1.95	2.22	1.93	2.00
Learning atmosphere (**1=very pos., 5=very neg.**)	2.00	1.78	1.75	1.87
Increase of ERP knowledge in general	2.05	2.22	1.93	2.05
Increase of knowledge regarding the respective ERP system	1.58	2.11	1.79	1.76
Increase of knowledge in comparison to other seminars	1.84	1.63	2.07	1.88
Usefulness of the scenario	1.58	1.67	2.29	1.83
Adequateness of the respective ERP system	1.42	1.89	2.00	1.71
Level of difficulty (**2=much too high, 0=reasonable, -2=much too low**)	0.53	0.67	0.50	0.55
Effort needed (**2=much too high, 0=reasonable, -2=much too low**)	0.74	1.89	0.93	1.05
Effort needed in comparison to other courses (**2=much too high, 0=reasonable, -2=much too low**)	0.53	1.89	1.21	1.08

Table 4. Results of the course evaluation

Based on the results of the questionnaires and discussions we realized that without exception all participants said they acquired more knowledge concerning functional, methodological, social, and technical aspects. Also, the use of the case study was classified as very good.

Regarding the complexity of the seminar and the extensive evaluation of the ERP systems, we noticed that the bachelor students at the University of Koblenz-Landau, more than the master or diploma students in Dresden and Muenster, classified the scope of work the students had to perform higher, whereas the students in Dresden and Muenster were relatively uncritical concerning the complexity. At the beginning of the seminar we noticed that a regular meeting structure with the tutors and support for the bachelor students to improve the individual project organization and presentation techniques was a great benefit at Koblenz-Landau. This was welcomed by the teams from Koblenz, while in Dresden and Muenster constant support was not demanded. Further explanation for this fact can be found in the number of students per team and/or ERP system and the age and/or number of semesters (bachelor students vs. master/diploma students). While in Koblenz-Landau the teams mostly only consisted of two students, the number of team members in Dresden was five students on average, so the work could be divided in an easier way and the knowledge for the respective system could be acquired faster. This was also supported very clearly by the students' comments in the free fields of the questionnaires. The bachelor teams in Koblenz-Landau unanimously complained about the complexity of the case study. They demanded the reduction of the scenario, while this was not requested by the master and diploma students in Muenster and Dresden.

The students could communicate with each other across the locations via e-mail. Therefore, important information for solving problems could be inquired from the teams of the other locations. This was appraised very positively. An active exchange developed between the three universities. Also the competition between the universities with a 200-Euro reward for the best team for each ERP system produced an internal incentive for a good project result and served as encouragement for student communication between locations. Across the teams of the same system, a technical and interpersonal exchange of information was promoted and this improved the students' soft skills.

Winner of the respective ERP system challenges were two teams from Dresden, one team from Koblenz and one team from Muenster. It was not possible to point out a clear winner for the last system. So, this price was shared between Koblenz and Muenster.

3.2 Manufacturers' perspective

This course expands the teaching method described by Winkelmann and Matzner (2009). As such, a contact to several ERP manufacturers already existed. Besides that, one of the vendors offers a program similar to SAP'S University Alliance program. The communication effort for the manufacturers was minimized according to the three-tier-support, mentioned above. Direct contact with the manufacturers was only conducted through the lecturers. So first, the students had to try to solve the problems with the help of the teams at the other universities. If this was not possible and if the lecturer (who did not receive specific system trainings or something like that) could not help as well, the manufacturers were contacted via mail.

However, two of the manufacturers were not familiar with this seminar and had concerns because of potential industrial espionage. In order to address these concerns, it was agreed upon that employees of the manufacturers could attend the students' presentations on their own systems but not the presentations on the competitors' systems. Furthermore, the manufacturers also could restrict access to their systems. Two manufacturers made full versions available with a one-year-license which the teams had to install and implement on their own pc´s or notebooks. The access to the other three systems was made available by an IP-referred remote connection so the teams could work (after gaining their accounts and passwords) with the ERP systems

only on special computers within the universities. Although expanding the seminar to three universities means more effort for the manufacturers of the systems, all six vendors were very satisfied with the results of the seminar and were highly interested in the student evaluations/reports on their systems. The possibility of an internship was offered to some students.

3.3 Lecturer's perspective

The expansion of the seminar to three universities was a good opportunity for the lecturers to foster the exchange with colleagues of the same research area. They could explore and discuss in which ways the student of the other were educated in the field of information systems. Furthermore, a direct comparison of the performance of each team was enabled because the lecturers of each university attended each presentation block. This fact also created a competitive pressure among the lecturers because every lecturer wanted his teams to win. So this increased the motivation for a good and high-quality mentoring of the teams at every university. Therefore, the expansion of the seminar to more than one university was regarded as a good idea among the professors and lecturers of the respective universities and should be repeated.

Also, the lecturers (professors and assistants) gained a valuable insight into ERP systems previously not known. Therefore, the seminar also offered a chance to increase the individual ERP horizon.

4. LIMITATIONS AND CONCLUSIONS

The idea of the original course was to create an additional education unit for the application of ERP systems (for small and medium-sized enterprises) at one of the universities. This idea was taken up, continued, and extended by the seminars in Dresden, Koblenz-Landau, and Muenster. Although we regard this type of course as very successful, there are some limitations. First, we are only able to handle a small amount of ERP systems and are not able to fully cover the market. However, we do not see this as a disadvantage. As experience shows, students are not able to compare and walk through more than five to seven systems in the presentation sessions. Furthermore, not all ERP systems on the market are suitable for such an ERP course. For example, older systems are often very complicated in their installation procedure. Also, ERP systems for large companies may also not be very suitable as they may be too complex for unsupervised student exercises. We tried to keep the workload at the same level for all ERP student groups. However, some groups may have to invest less work due to better ERP documentation, better usability, or more help from internet forums. The seminar turned out to be very popular among students. However, we always feared too few students and hence skipping some of the systems. This would have meant disappointing some of the ERP manufacturers who had invested time in advance to our seminar.

With the expansion of the seminar to three universities, we created the possibility to adapt basic conditions to measure their influence on the success of the seminar and on the perception of the seminar from the students' viewpoint. This proved that a small group size (as in Koblenz-Landau) is not reasonable for this seminar. If the group size is too small, students classify the scope of work as too high and the seminar is regarded as a burden rather than an opportunity. Therefore, a clear dependence can be detected between seminar success, the scope of work, and the number of team members. However, this could not be validated statistically due to the small team numbers. During the feedback discussions three-person teams and/or larger teams turned out to be adequate for simultaneously working on the systems and for segmenting the tasks. Also, the students' number of semesters influences the seminar. In the feedback discussions following the system presentations it turned out that higher semester students regarded the seminar more suitable, while students of lower semesters had to invest substantially more work into not yet completely developed skills such as project management and presentation techniques. From their point of view the seminar was too intensive and time-consuming in comparison to the knowledge attained. However, this can be compensated with intensive support from the lecturers/tutors as was done in Koblenz-Landau.

In conclusion, for both students and lecturers/tutors, the seminar offers a good opportunity to gain a deeper insight into ERP systems and extend their knowledge about a variety of ERP systems and sharpen awareness of system differences.

The future steps of this seminar are the repeating of the university-spreading approach each winter semester at the three universities and expansion to even one or two additional universities.

5. REFERENCES

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AUTHOR BIOGRAPHIES

Axel Winkelmann temporarily accounts for the chair for business software at the university of Koblenz-Landau, Germany. In addition, he is a researcher at the European Research Center for Information Systems (ERCIS) where he is involved in various ERP and process management projects. After his studies in business administration in Muenster and Birmingham (UK), he became a researcher at the institute of IS at the University of Muenster 2001. He also served as a consultant in ERP projects. He has written numerous articles and books on business process engineering and ERP management.

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Christian Leyh is research assistant at the Chair of Information Systems; esp. IS in Manufacturing and Commerce at the Technische Universität Dresden. He graduated from the University of Applied Science Schmalkalden information systems program and completed his Masters Degree in business and engineering at the Steinbeis University Berlin. Currently, he teaches in both the undergraduate and graduate IS programs. His research interests are centered within the field of ERP systems, esp. ERP systems for small and medium sized enterprises.

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