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How Industry Participates in Enterprise Resource Planning Education

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ABSTRACT

During the last two decades many businesses around the world have adopted Enterprise Resource Planning (ERP) systems. Consequently the growth in the number of ERP implementations has had an enormous impact on the demand for ERP skills. This is one of the main reasons that many universities have adopted ERP in their curriculum. This paper describes a joint effort by industry and the HU at designing an ERP curriculum that bridges the gap between skills taught by academia and those valued by industry.

INTRODUCTION

During the last two decades, many businesses around the world have adopted Enterprise Resource Planning (ERP) systems. ERP systems are enterprise-wide information systems that replace separate systems for such tasks as sales, purchasing, finance, logistics, manufacturing and warehousing. 'They are designed to address the problem of information fragmentation or 'islands of information' in business organizations (Muscatello & Chen, 2008).' In essence, ERP developers claimed to be able to automate all of a company's primary process and also improve them by incorpora-

ting best business practices. Consequently the growth in the number of ERP implementations has had an enormous impact on the demand for ERP skills. This is one of the main reasons that many universities have adopted ERP in their curriculum. Many universities, however, have struggled with the complexity of ERP software and the way in which to incorporate them into the curricula.

ERP EDUCATION IS COMPLEX

Although the use of ERP in education might be coming more common, the problems related to it are far from being solved. Several authors have noted the considerable cost and effort involved with the use of ERP (Becerra-Fernandez, Murphy, & Simon, 2000; Nelson & Millet, 2001; Davis, 2004; Hawking et al., 2005). The software can be acquired at reasonable cost or sometimes even no cost (Noguera & Watson, 1999) but the time and resources needed to maintain the software, acquire the necessary skills to work with it, and to develop a new curriculum is tremendous. It is not only teachers who have to invest a lot of time, but this is also the case for the staff (e.g. IT shared service centers) that is involved. Therefore, these efforts are often dependent on relatively few staff; and once they leave a university or change direction, the curriculum usually flounders (Hawking et al., 2005). Rosemann, Scott and Watson (2000) propose collaboration between universities in teaching ERP courses to overcome this problem; this, however, causes extra problems such as curricula and rosters that need to be synchronized.

Whereas introducing ERP in an educational environment means overcoming barriers, such as the cost of implementing and maintaining an ERP application and a lack of ERP related skills, the most difficult task is often to develop proper course material. Sometimes the ERP software developer provides its own training material, but transforming this to suitable material for educational purposes is not an easy process. Commonly, the provided materials require a pre-configured data set, which might not be made available; and also, commercial training exercises are often just snapshots to reinforce particular features of the system instead of comprehensive exercises illustrating the end-to-end processes that can be supported and that are relevant in an educational environment (Hawking et al., 2005).

Besides the mentioned hurdles that fast moving developments in IT have made, that industry no longer requires employees with just ERP related skills. Today a broader range of skills that support the development, implementation and maintenance of e-business solutions is required due to the continuing evolution of ERP. One of the major trends in ERP is the focus on front-office applications and inter-organizational business processes (McGaughey & Gunasekaran, 2008). ERP skills are just a subset of this. These developments are part of the so called second wave of ERP education (Hawking et al. 2005).

In this paper, a joined effort of industry and the HU University of Applied Science at the development and implementation of an Enterprise Resource Planning minor is described that is aimed at overcoming the mentioned obstacles (such as costs, lack of skills etc.), while at the same time preparing students for the new industry needs. In the following section, the choices made in the design of the curriculum are discussed. Section 3 then describes the process of carrying out the minor for the first time; and in Section 4, the out-

comes and lessons learned are highlighted. The final section gives a discussion on the future of the minor.

CURRICULUM DESIGN

As a start to the project, a study was conducted to find best-practices of other universities about the development of an ERP curriculum to see if the mentioned problems might have already been solved. This still didn't seem to be the case. The study did give us a useful overview of different approaches that can be taken when developing an ERP curriculum. The following four approaches are described by (Hawking & McCarthy, 2000; Hawking et al., 2005; Jensen, Fink, Moller, Rikhardsson, & Kraemmergaard, 2005):

- 1 ERP training
- 2 ERP via business processes
- 3 information systems approach
- 4 ERP-concepts

The first approach is basically instruction or training in a particular ERP system. This is very similar to the training courses that the ERP developers and suppliers provide to their customers and could be done by reusing commercial training material. The second approach focuses on business processes and related concepts (e.g. financial administration or production scheduling and planning) and uses ERP to assist in the presentation and clarification of these methods and concepts. For this approach, commercial training material is not sufficient; and new material will have to be developed. The third approach uses ERP to illustrate information systems concepts. It is very similar to the second approach; only the target group or goal differs. Instead of teaching business students and concepts, the target group will most likely be



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computer science / information systems students and the concepts that are taught are different. Finally, the last approach is to teach about ERP related skills, such as selection and implementation of ERP software. It is not really necessary to use a real live ERP system for this although it could give a clearer picture of the complexity of such systems. Of course, it is also possible to combine aspects of all approaches to create a more hybrid approach.

Before choosing a development approach, it was decided that the new ERP curriculum would be given in the form of a minor, which is a coherent program of 30 ECTS. Because we wanted a broad minor that attracts students with many different backgrounds, this had to be taken into account when developing the curriculum. For this reason, it was decided to use all of the four approaches mentioned above. Furthermore, to really enhance the learning experience of students, we used a research initiative that was sponsored by the National Science Foundation in the United States to identify the skills required in relation to large information systems such as ERP. In their recommendations, written down in the 'Information Systems-Centric Curriculum Document' (1999), one of the important outcomes was the advice to have ongoing collaboration with industry that also involves students. Additionally, experts suggest three different groups of skills that an industry ready IT graduate should have. The first group is personal skills, such as systematic-thinking, problem-solving, critical-thinking, risk-taking, personal discipline, persistence, and curiosity. The second group consists of interpersonal skills, like communication (oral, written, listening, and teamwork), collaborative skills and conflict resolution skills. The final group consists of technical knowledge skills, which consist of knowledge about enterprise computing architectures and delivery systems, information abstraction, representation and organization, concepts of information and systems distribution,

human behavior and computer interaction, process management and systems development, among other topics. For the minor we developed, it was decided that the personal and interpersonal skills should receive a lot of attention. This decision was based on interviews with representatives from industry that time and again noticed the lack of these skills with our students. Besides due to the different backgrounds of the students that can enroll in the minor, a heavy emphasis on technical knowledge skills is not possible. Because an important part of the minor should involve real life projects for the students and because we hoped collaboration with industry could help overcome most of the identified problems in earlier initiatives, we set out to find industry partners that were willing to participate in this project. The first and foremost important partner would be a supplier of an ERP package. We decided to partner with Microsoft and use their MS Dynamics AX solution. The most important factor that influenced us in making this choice was not that Microsoft provided a better offer regarding their ERP solution (this was basically the same, so free of charge) or that the software is better. Microsoft said they would positively recommend us within their partner network, and we wanted that network to actively contribute to the minor. Because minors are always followed in the final stages of a student's education, the added value to partner companies is high.

PARTNERSHIP

Even with Microsoft's recommendation, it still took several information sessions and visits to interested partners before we had enough participants. In the end, actual partnership contracts were signed with Microsoft for the free delivery of the MS Dynamics Axapta solution. This partnership also gave us free participation to official certification program, Mprise to deliver an ERP training, five companies (SBA, HGH, Accenture, Centric and Avanade), which could provide

ENTERPRISE RESOURCE PLANNING MINOR - INTRODUCTION WEEK				
Period 1 (9 weeks)	Introduction Enterprise Resource Planning	Vision, Strategy and Change	Project Management (by Expecto)	Functional ERP Training (by Mprise)
Period 2 (10 weeks)	Industry Project - introductionperiod	Business Process Management	Customer Relationship Management	
		Industry Project (at either Accenture, Centric, SBA, HGH or Avanade)		

Table 1:

Overview of the ERP Minor Curriculum

guest lectures, sponsorship, and onsite projects for students. Expecto provided training and certification in Prince 2 project management foundations. As stated above, we used a combination of the different approaches available in developing the ERP minor curriculum. In Table 1, an overview of the curriculum is shown. The course started with a week of introduction. During that first week, students got to know each other and the lecturers; they also get to know about the companies via guest lectures and company visits. Because students were expected to come from a large variation of different bachelor studies and a large variance in knowledge and skills was expected, a basic introduction in writing papers and reports (including the topic of plagiarism) was given. On the first day, students have to make teams in which they would be working on an initial assignment during the remainder of the week. Presentations had to be given on Friday, and papers had to be handed in on Monday morning.

First period

After the introduction week, the first period mainly consisted of modules that taught business concepts that can be automated by ERP, as well as ERP concepts. The module, Introduction ERP, covered a wide variety of topics, that ranged from 'What is ERP?' and 'How to select and implement ERP?' to explaining

the business activities that can be implemented, such as material requirements planning, forecasting, distribution, and sales. The module Vision, Strategy and Change covered the broader perspective of how organizations function and what should be taken into account when management decides that the organization should start an ERP project. Because one of the major critical success factors when implementing ERP is a lack of project management skills (Holland & Light, 1999; Muscatello & Chen, 2008), a module on project management was included in the minor. This module consisted of the Prince2 foundation course and was given by consultants from Expecto. Students had the choice of taking the official certification exam as an assessment and receiving the certificate when they pass or taking an exam supplied by the university if they don't want to receive certification. Besides emphasizing the importance of project management by the way in which this module was taught, it also heightened the market value for students if they obtained certification.

Halfway during the first period, a module on functional ERP training started. Again, this module was entirely organized by one of the program partners (in this case Mprise, a Microsoft Gold certified partner in learning solutions). By working together with Mprise, the



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university doesn't have to train teachers who wish to maintain their ERP skills. This module is also commercially available; and again, it was possible for students to receive an official Microsoft certificate. In industry, the most wanted skills are those in trade and logistics; therefore, the module consisted of a basic MS Dynamics AX training. In total, the module consisted of 12 consecutive training days that started at 9 a.m. and ended at 16 p.m. Students received vouchers from Microsoft to take an official certification examination at one of the locations provided by Microsoft. Students were told to take the exam within four weeks after the module was finished.

Second period

The second period consisted of two new theoretical modules and the introduction of the industry period. The customer relationship management module addressed the change in focus of ERP towards the front-office of organizations (as stated by McGaughey & Gunasekaran, 2008). The second theoretical module, business process management, taught students why it is essential to analyze and, if needed redesign, business processes as part of an ERP implementation. Students also learned the basics of process modeling with the Business Process Modeling Notation (BPMN). Because the skills of this course are a prerequisite for the industry project, it was given within 4 weeks by scheduling multiple sessions per week. Finally, the second period started with an introduction to the companies where students would work on real projects. During this introduction period of four weeks, students were present at the company for two days a week; they received an orientation to the company,

were assigned to a company supervisor and given time to discuss the project they would be undertaking. Also a supervisor from within the university was assigned to oversee the project. At the end of the period, a project initiation document (PID), according to the Prince2 standard, was to be handed in to the university supervisor attesting to agreement between students and company supervisor as to their tasks. When this was done, the project started; and students were expected to work at the companies for four days a week. On Fridays, students come back for the CRM course at the university; and if necessary, they could meet with their supervisor to discuss their projects.

The minor ended with a seminar, during which students, teachers and supervisors from both the university and partner companies were present. Students presented their projects and results and discussed these with the audience. Also, official certificates were given to students who had passed the exams. Students who had not chosen to participate in earning certificates took separate university examinations.

OUTCOMES AND LESSONS LEARNED

The Enterprise Resource Planning minor started in September 2008 and finished on January 31, 2009. A total of eleven students participated in the entire minor, and we also had several students that followed a few modules as a replacement for subjects from their major. Students had their backgrounds in five different bachelor courses (commercial economy, logistics and economy, business informatics, industrial management, and software engineering) from three

different faculties. Because students were following different majors, their entry level knowledge on ERP also differed from a low level of knowledge, the student from commercial economy, to an intermediate level of knowledge, students from business informatics.

The industry-based projects provided an active learning environment that enabled the students to bring into practice what they had learned during the first period. Also, the projects gave students a tremendous opportunity to learn a lot from practitioners with several years of experience. As it turned out, the

industry partnership bridged the gap between the skills of university graduates and those required by industry. Also, the projects enabled the university to build closer links with ERP related industry.

Students evaluated the minor very positively. Besides acquiring a lot of knowledge on ERP in theoretical courses, students were highly appreciative of the projects and the possibility to get certificates that are highly valued in industry. Students really found that this minor was able to bridge the gap between the skills taught at a university and those required by industry.

Henk Plessius, voorzitter van de NIOC-stuurgroep, bedankt Sacha Koch voor haar assistentie bij de organisatie van het congres



One of the prime reasons to involve industry in this minor was to prevent the problems existed during earlier initiatives at our and other universities as described in the introduction. So did it work? For the most part, it did indeed. By cooperating with industry, we no longer need to train our staff in ERP; and we were able to teach students competencies that are really valued by industry by using ERP to clarify business and information science concepts. As described at the beginning of the paper, one of the major problems is costs; and while we were able to lower them, they are not entirely gone. Instead of maintaining an ERP knowledge base within the university, we now hire it from industry. For this minor, the partners contributed exactly the same amount of money needed to hire outside trainers. This means that each year these costs and sponsorships have to be budgeted; and if there is a gap, the minor runs the risk of being aborted.

CONCLUSIONS AND FUTURE OUTLOOK

In conclusion, we can state that the way in which the minor curriculum has been developed helped prevent the major problems are involved with using ERP in an educational context and at the same time helps students attain skills that are highly valued by industry.

This does come with a major organizational effort, however. Each year, partners from the Microsoft network will have to be contacted and asked to participate in the minor. However, we expect to solve this problem by negotiating long term partnership contracts. Also, all partners have to offer projects where students can participate; and to maintain the educational quality, these projects have to be checked by the minor manager.



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