ENABLING ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS CURRICULUM THROUGH E-LEARNING

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ABSTRACT

Enterprise Resource Planning (ERP) systems offer a software-based system that handles an enterprise’s total information system needs in an integrated fashion. Such systems have seen a significant growth in the last decade in the US, Europe and Australian markets and, more recently, increasing growth in Asian countries. This increase in demand for ERP systems in Asia offers opportunities for the provision of high-quality ERP education programs in the region. This paper outlines the experiences of Victoria University in offering ERP education through a strategic alliance with SAP and extending ERP programs using e-learning services. The e-learning model used blends synchronous and asynchronous content. The e-learning approach provides an avenue for ERP e-learning using a variety of methods to cater for students’ differing needs and learning styles; it is able to provide greater flexibility in offshore subject delivery and to maximise student learning outcomes. This is particularly relevant in response to the changing international environment.

KEYWORDS: Enterprise Resource Planning Systems, e-learning, Application Service Provider, synchronous learning, asynchronous learning, virtual classroom
INTRODUCTION

In a recent study of 92 Australian organisations, Enterprise Resource Planning (ERP) systems were identified as the information technology project which delivered most value to their organisation (Bajkowski, 2003). While there has been a number of ERP systems implementation failures which have received considerable media coverage (Calegero, 2000), ERP systems are considered by many organisations as essential IT infrastructure. A survey of 800 U.S. companies showed that almost half of these companies had installed an ERP system and that these systems were commanding 43% of a company’s application budget (Carlino, 1999). While research into U.S. Fortune 1000 companies found that over 60% have implemented an ERP system (Stein, 1999; Piturro, 1999). The market penetration of ERP systems varies considerably from industry to industry. A report by Computer Economics Inc. stated that 76% of manufacturers, 35% of insurance and health care companies, and 24% of Federal Government agencies already have an ERP system or are in the process of installing one (Stedman, 1999). The global market for ERP software, which was $16.6 billion in 1998, is expected to have a compound annual growth rate of 32%, reaching more than $66 billion in sales by 2003 (Carlino, 1999) and is estimated to have had 300 billion dollars spent over the last decade (Carlino, 1999). The major vendor of ERP systems is SAP with approximately 54% of the market (McBride, 2003). In Australia a recent report (BRW, 2002) identified the top 100 IT companies by usage; this was then compared with the SAP customer list. It was determined that 9 out of the top 12 IT users were SAP customers and 45% of the total list were also SAP users.

Many universities have identified the value of incorporating ERP systems into their curriculum. ERP systems can be used to reinforce many of the concepts covered in the business discipline (Becerra-Fernandez et al, 2000; Hawking, Shackleton and Ramp, 2001). The vendors argue that their products incorporate “world’s best practice” for many of the business processes they support making them an ideal teaching tool (Hawking et al, 1999; Watson and Schneider, 1999). However for many universities it has been a struggle to incorporate ERP systems even though ERP vendors have developed a number of initiatives to facilitate curriculum development. The ERP vendor benefited from these initiatives by increasing the supply of skilled graduates that can support their product thereby enhancing its marketability and lowering the cost of implementation.

ERP CURRICULUM APPROACHES

Universities who decided to introduce ERP related curriculum were faced with a number of barriers. For many universities getting access to an ERP system to provide “hands on” learning environment was not a major issue, however, the lack of ERP related skills of academic staff and accordingly the development of appropriate curriculum material was and still is a major hurdle. SAP, the leading ERP vendor has established the largest ERP university alliance with more than 400 universities worldwide accessing their ERP system (SAP R/3). They have introduced a number of initiatives to facilitate the incorporation of their system into university curriculum. Initially when universities joined the alliance they were provided with free training for academic staff and access to training materials. The amount of training made
available and the restrictions how the training materials could be used varied from country to country and to a certain extent from university to university within the same country.

Many universities tried to transport SAP training materials into their curriculum; however it was not a simple process. The training materials were often version dependent and utilized preconfigured data that was not readily available in the universities’ systems. The SAP training exercises were often just snapshots to reinforce particular features of the system and therefore were not comprehensive exercises illustrating end-to-end processes often relevant in ERP education. For example, staff soon came across the problems associated with opening and closing posting periods that often prevented certain transactions from being completed in the system. This concept is rarely covered in training courses even though it impacts on many processes.

The curriculum employed by universities could be classified into one of five approaches:

1. Training into ERP
2. ERP via Business Processes
3. Information Systems Approach
4. ERP Concepts
5. The Hybrid

The first, which is least preferred by academic institutions, focuses on the instruction or training in a particular ERP system. There has been increasing pressure from both students and industry for universities to offer subjects based on this type of curriculum direction. In the case of SAP, the Alliance specifies that specific training of SAP R/3 is the domain of SAP.

The second curriculum approach retains the focus on business processes but uses the ERP system to assist in the presentation of information and skills development. Most ERP system vendors argue that their particular system incorporates best business practice and, as a consequence, students use the system to enhance their understanding of the processes and their interrelationships, especially in the area of supply chain management.

The third approach is the use of ERP systems to teach and reinforce information system concepts. ERP systems provide students with the opportunity to study a real world example of a business information system, often incorporating state of the art technology.

The final curriculum direction is to teach about ERP systems and concepts. This is different from the first curriculum approach outlined above in that it deals with general ERP issues and the implications for an organisation for implementing this type of information system.

No matter which model universities adopted, the acquired knowledge of academics involved in ERP education is difficult to encapsulate and therefore the curriculum is often dependent on relatively few staff. Usually there is a core of academics who
have spent many hours working on the system, once these staff leave a university or change direction, then the curriculum usually flounders. This has been evident in Australia where from the original thirteen universities involved in the SAP alliance only seven remain. Some universities were able to develop and retain their ERP skills while others struggled.

ERP AND VICTORIA UNIVERSITY

The Faculty of Business and Law on behalf of Victoria University joined the University Alliance Program in 1998. Up until then university alliance members had focused SAP R/3 around one particular department rather than an overall faculty. The faculty approach was believed to be a better method to facilitate the incorporation of SAP R/3 into curriculum. ERP systems support the various business processes within an organization. The respective departments within the faculty teach these processes and therefore the faculty approach enables each department to focus on the aspects of the software which is relevant to them. Since joining the University Alliance in 1998 and has developed a Graduate Certificate, Graduate Diploma and Master of Business in Enterprise Resource Planning Systems as well as incorporating SAP R/3 into several undergraduate and postgraduate subjects. Currently there are 15 staff teaching more than 23 subjects that incorporate ERP systems to more than 700 students.

Many higher education institutions are making plans to globalise their courses. Victoria University is no exception and offers a broad range of academic programs throughout the Asian region. The international programs involve over 3000 students from Hong Kong, Thailand, Malaysia, Singapore, People’s Republic of China and Bangladesh. Many of these universities have indicated that they wish to include ERP related subjects in their courses. While there have been indications that the high growth rates in the ERP market of recent years have somewhat dwindled, good growth has been maintained in many Asian markets with the expectation of continued growth in the foreseeable future. SAP has established a University Alliance Program in many Asian countries to assist with provision of appropriately educated consultants to support this increased market. However even though these alliances have been established many of the universities have had difficulties in developing curriculum due to lack of skilled staff and available resources. Increasingly Asian universities are forming partnerships with western universities in an endeavour to broaden their curriculum offerings and add value to their students. Clearly there are advantages to be gained by both parties in setting up a partnership to teach different aspects of ERP systems. The provider is able to derive income to recoup some of the cost of developing curricula and maintaining systems while the receiver obtains the benefits of their students acquiring ERP education without the need to invest in hardware, staff training and curriculum development.

In 2002 Victoria University commenced the Master of Business in ERP Systems at Sumbershire Business School, Singapore. In addition an agreement has been signed to commence our ERP masters program at the Beijing Jiaotong University, P.R. of China in 2004.

To assist with the delivery of offshore ERP education, an ERP e-Learning model has been developed that blends synchronous and asynchronous content. Asynchronous e-learning does not involve the presence of a teacher. Typically the learning content is
located on a web server that students can access using the Internet. Synchronous e-
learning requires the learner and teacher to be present in the event at the same time. It 
is a real-time, instructor-led online learning event in which all participants are 
available at the same time and can communicate directly with each other. The model 
uses four technologies to facilitate teaching: application service provision (ASP), 
web-CT, computer-based training and virtual classroom technology. The ERP e-
learning model provides an innovative and efficient means to deliver ERP curriculum. 
It is able to provide greater flexibility in offshore subject delivery and to maximise 
student learning outcomes. This is particularly relevant in light of recent international 
medical (SARS) and terrorists incidents.

ERP E-LEARNING MODEL

To support offshore teaching a model for ERP e-Learning has been developed and 
applied in Singapore since 2002. It is also used in a limited way in an offshore 
program in Hong Kong. The model blends synchronous and asynchronous content 
and integrates four major technologies which provide a comprehensive medium for 
online learning. The technologies are:

**Application Service Provision**
Application Service Provision (ASP) is responsible for providing the necessary 
technological infrastructure and support to host a particular software product. This 
enables the clients of the ASP to remotely access the software via the Internet. One of 
the barriers to ERP education mentioned earlier was gaining access to the ERP system 
and providing the necessary infrastructure. The ASP model provides a solution to 
overcoming this barrier.

Victoria University has configured one of its SAP servers to support the role of an 
ASP to its partnering universities in Asia. Students from these universities can access 
the SAP software at Victoria University via the Internet once they have installed the 
SAPGUI software on their local PC’s. Students can access the SAP software from 
 anywhere in the world as if they were sitting in front of a PC at Victoria University.

The control and administration of the ERP system is still the responsibility of Victoria 
University and allows our Asian partners to access SAP R/3 without the need to 
purchase an expensive computer server and employ the necessary support staff. 
Through the use of clients in the SAP R/3 the system can be individually configured 
to suit the learning objectives of each offshore institution.

**Web-CT**
Web-CT is a web based tool which acts a repository of learning materials to assist 
students with their ERP education. Web-CT has tools for storing and delivering 
course materials including text, graphics, audio and video. Material can be released 
according to various criteria, such as date and student name.

Web-CT also has tools for organising and enhancing course material, communication 
tools so that chat, “internal” mail, discussion groups and whiteboards can be made 
available for use by students and instructors and tools for monitoring student progress 
and providing feedback.
In terms of ERP delivery the Web-CT site allows students to view and download subject outlines, assignments, past examination material and lectures in various formats. Students can submit assignments via the site and then view their results once the assignments have been marked. Chat facilities can be enabled to allow students to discuss set tutorial questions and discuss issues they have encountered. This interaction may occur between students within their tutorial, university, other Asian universities, or Victoria University.

Web-CT is used as the foundation to deliver the asynchronous e-learning content in the ERP offshore program.

**SAPTutor**

This tool is used for developing interactive tutorials in a simulated SAP environment. It enables the lecturer to record an action or transaction within the SAP environment and capture the screens involved to form the basis of a tutorial. After recording the tutorial, the SAPTutor Editor is used to edit the structure of the tutorial, define alternative paths (branching), edit instructional texts and create additional supplementary descriptive texts. This facility allows educational concepts to be inserted into tutorials using tools such as PowerPoint. The computer-based tutorials enable students to combine ERP theoretical concepts with the appropriate SAP screens and actions. Students can replay the tutorial as many times as necessary to understand the concepts.

The SAPTutor tool enables staff in the Asian location to have access to a repository of ERP educational materials overcoming the lack of resources barrier identified earlier. However these simulations should only be used for short tutorials, approximately 10 minutes as students very quickly lose interest.

**Virtual Classroom**

The virtual classroom tool enables synchronous e-learning whereby the learner and teacher are present in the event at the same time. It is a real-time, instructor-led online learning event in which all participants are available at the same time and can communicate directly with each other. This virtual classroom capability is facilitated by the Centra Corporation’s virtual classroom software (Centra Symposium, refer to Figure 1) which provides the capability to deliver live, instructor-led classes direct to student desktops using fully integrated voice-over-IP technology. This is used to present theoretic concepts related to ERP Systems and practical demonstrations related to SAP software. The remainder of this paper will discuss this technology in far greater detail.

The first stage in using this technology involves the lecturer developing the lesson in Microsoft PowerPoint format and then loading it onto the appropriate Centra server. This server can be either based in the Centra Corporation or can be established within the university. The lesson is then scheduled and the details distributed to the students. To access the lesson students require a PC with an internet connection and a set of headphones and microphone. After logging onto the server and the specified lesson a software wizard calibrates the audio settings. The students are presented with a screen similar to below.
Figure 1: Virtual Classroom User Interface

The screen is divided into a number of components. The Media Window displays the PowerPoint slides while the Agenda window displays all the slides in the presentation. The additional windows are used to identify the presenter and other participants in the lesson. As the presenter conducts the lesson and progresses through the slides, the students’ screens change according to the slide, and they hear the presenter’s voice in real time. The presenter can also use the Media Window to demonstrate and share an application such as SAP R/3 with participants.

The Toolbar provides a number of tools to enable students to interact with the presenter. They can alert the presenter that they have a question or comment. On the presenter’s screen, all the participants are identified, and individuals are highlighted who wish to interact with the presenter. The interaction can occur via a text chat facility or by students speaking into their microphone. It can be a private interaction or something which can be shared amongst the other participants. This obviously requires some coordination based on the number of simultaneous questions from the participants. However, the presenter has control over who he or she allows to interact and in what order.

An alternative technique which has been trialled is rather than requiring one computer per participant. Students can attend a classroom which has a video projector connected to the main computer. The lesson would be then projected on a large screen, and students could interact via a roving microphone. This presentation method requires a leader at the partnering university to supervise the process.

Centra Symposium has a number of other features to facilitate interaction between the presenter and participants as well as between participants. These include a facility whereby the presenter can create an online survey or questions which participants...
respond to and then the results can be displayed. There is a “whiteboard” capabilities which allows the presenter to create images and text on screen to highlight certain points in the presentation. To facilitate interaction between participants there are virtual “breakout rooms” which allow participants to be involved in a chat forum to discuss issues. Of particular note is the “Application Sharing” tool that allows an application stored on the presenter’s PC to be viewed on the students PCs. The presenter can demonstrate features of the application to students in the session and also give control of the application to individual students and allow them to utilise and manipulate the application. This is a very powerful feature and quite unique.

Victoria University has trialled this tool throughout the university and have conducted ERP related lessons in Singapore. At the moment we are surveying the students as to the value of the tool. One of the advantages of Centra Symposium is that lessons including participant involvement can be recorded and then accessed by others at a later stage. We intend to use the tool for specialist lectures where it is impractical for a lecture to travel overseas for one session. Also it has been used for reviews before final examinations. The trails within the university have resulted in a considerable investment to establish an internal server and to expand the software usage to support other off shore locations.

There has been much hype about e-learning and many academics are looking for a “silver bullet” but from our experiences there is no one tool which satisfies all our needs. We never intend our e-learning model to replace face to face teaching but more to enhance and support it.

CONCLUSION AND FUTURE DIRECTIONS

The four e-Learning technologies that blend synchronous and asynchronous content are not unique but combining these technologies to present ERP education is unique. They provide an avenue for ERP e-Learning using a variety of methods to cater for students’ differing needs and learning styles. The ERP e-Learning initiative could provide a model for similar ERP e-Learning activities to be developed elsewhere. It is particularly relevant where recently issues such as SARS and terrorism have acted to inhibit and disrupt offshore education.

We are using the ERP e-Learning model with our partners in Singapore and Hong Kong. We are still in the early implementation stage. Once fully implemented we will carefully analyse the effectiveness of the model. If we find it successful we plan extend our ERP e-Learning initiative to include our other partnering universities throughout the Asian region. Beyond this we would explore the possibility of offering ERP education to anybody who enrols online into any of the subjects on offer. This would be true e-Learning as it provides the accessibility and flexibility to overcome the geographical barriers, ideologies, work commitments and traditional course structures that have prevented people from acquiring ERP knowledge and skills. Students would have the opportunity to complete the necessary assessment requirements to gain accreditation for the subject at Victoria University and appropriate certification. The successful completion of subjects would provide accreditation into a number of courses throughout the world.
The initiative has the added advantage of developing ERP knowledge of academics in the partnering universities. This has the potential to encourage future collaboration where ERP curriculum becomes a two-way process with academics from all partnering universities contributing to curriculum development.
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