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**ERP E-Learning:
If you can't take Mohammed to the classroom,
take the classroom to Mohammed**

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Abstract

E-learning is seen as a “silver bullet” providing a range of learning experiences independent of geographic regions, time zones and individual learning styles. Many organisations are currently considering how best to position this solution. This paper argues that a blended approach which incorporates both classroom based education and e-learning is the preferred option. It adopts a case study methodology to demonstrate the application of a blended approach to Enterprise Resource Planning education.

Keywords

e-learning, Enterprise Resource Planning Systems, Virtual Classroom

INTRODUCTION

E-learning has been considered a panacea for both educational institutions and corporations alike. A cost effective medium to deliver education to participants irrespective of their location or time zone. Deloitte Research (2001) predicted that the annual expenditure on e-learning activities in the US and Europe would be \$13.5billion, an increase from \$3billion in 2000. Even though e-learning is used to describe a wide range of learning activities the predicted growth can be closely aligned with the increased access to the internet and improvements in bandwidth which support many of the e-learning technologies. The advantages of e-learning has been well documented (Kapp and McKeague, 2002; Morrow, 2002, Deloitte, 2001; Parker, 2003) and includes:

- Education is available anytime
- Education is geographic independent
- Accommodates a variety of learning styles
- Cost reduction in education delivery
- Modular delivery
- Access to past lessons

However at the same time e-learning has a number of shortcomings including:

- Isolation,
- Lack of motivation,
- High establishments costs

(Cassiani, 2001; Kapp and McKeague, 2002; Maki, Maki, Patterson, and Whittaker, 2000; Chen, Olfman, and Harris, 2004).

When espousing the benefits and identifying the shortcomings it is important to recognise the diverse range of e-learning technologies. A simple classification from a technological point of view is asynchronous versus synchronous. Asynchronous communication refers to one way communication and includes such technologies as email, listserve and downloaded educational materials. Synchronous communication enables two way interaction and would include technologies such as chat room and video conferencing. Horton (2000) believes that each technology has its own benefits and applications (Table 1).

Synchronous Communication Application	Asynchronous Communication Application
<ul style="list-style-type: none"> • Lengthy discussions between participants required • Improved motivation required for participation in activities. This occurs through peer pressure • Participants share the same needs and have the same questions 	<ul style="list-style-type: none"> • Participants are of different time zones • Participants have inflexible or unpredictable work schedules • Participants have unique individual needs/learning styles

Table 1 Synchronous Asynchronous Benefits (Horton, 2000)

However even using the synchronous/asynchronous classification there are still a broad range of e-learning technologies that can be further categorised. Another technique employed to classify communication technologies is “*information richness*” (Daft & Lengel, 1991). This is the ability of a medium to carry information. Daft and Lengel (1991) believe the level of richness can be assessed by feedback capabilities, communication channels utilised, source, and language. Sitkin et al. (1992) identified two further characteristics of a medium’s ability to carry information. These are the data carrying capacity and the symbol carrying capacity of a particular medium. The ability of a medium to transmit information is its data carrying capacity. While the information about the information transmitted or about the individuals who are communicating is the symbol carrying capacity. The information transmitted is important but the symbolic information which accompanies the message increases the richness of the communication.

Chen et al (2004) believe that e-learning technologies can be classified as to the degree of “*information richness*” and “*social presence*”. The extent to which an e-learning medium enables the participant to experience a degree of psychological presence is referred to as social presence. Using this classification Chen et al (2004) attempted to classify different e-learning technologies (Figure 1).

Information Richness	High	Asynchronous conferencing (Discussion Board, Net chatting and Whiteboard Browser links to Internet sites)	Face-to-Face Video-conferencing
	Low	Download lecture slides Access to workstation applications Indexing systems	Web-casting, Messaging Systems (E-mail or Voice-mail) Download lecture slides with audio or video
		Low	High
		Social Presence	

Figure 1 Information Richness and Social Presence of e-learning Technologies (Chen et al 2004)

It appears from the research that a combination of e-learning technologies is the best approach to cater student's differing learning styles and requirements. Kapp and McKeague (2002) go one step further arguing that to offer effective education there needs to be a blend of instructor led classroom based education as well as e-learning activities. They argued that each had a number of strengths and short comings and by combining the two the shortcomings are limited.

It is important for organisations that have combined e-learning technologies and/or blended e-learning and classroom based education to document their experiences to enable others to learn from these experiences when developing their e-learning strategies. For the purpose of this paper a case study research methodology was used for an exploratory look at the implications of using a blended approach to education delivery methods. In addition a survey was conducted with participants in an education event which used virtual classroom technology to assess its usefulness.

Yin (1994, p. 35) emphasises the importance of asking "what" when analysing information systems. Yin goes further and emphasises the need to study contemporary phenomena within real life contexts. Walsham (2000, p.204) supports case study methodology and sees the need for a move away from traditional information systems research methods such as surveys toward more interpretative case studies, ethnographies and action research projects. Several works have used case studies (Chan & Roseman, 2001; Lee, 1989; Benbasat et al., 1987) in presenting information systems research. Cavaye (1995) used case study research to analyse inter-organisational systems and the complexity of information systems. The data collection process will include examination of existing documentation, content analysis of internal documentation, interview of actors and direct observations.

CASE STUDY

Victoria University is a large Australian university with a broad range of courses. Similar to many other Australian universities they have realised the potential revenue generation of international students enrolled in Victoria University's courses. This occurs either by students coming to Australia to study, the university forming partnerships with local educational institutions allowing students to study a Victoria University course in their country or a combination of the two. In terms of students studying in their own country the university offers a range of courses in Hong Kong, Thailand, Malaysia, Singapore, People's Republic of China and Bangladesh involving more than 3000 students.

The units are usually conducted by a Victoria University staff member delivering the first twelve to fifteen hours of the units in concentrated mode over one week and the remaining hours are taught by a local staff member using curriculum supplied by Victoria University. All assessment is designed by Victoria University and the final assessment is graded by Victoria University staff.

One area where the University is gaining increased recognition around the world is in the area of Enterprise Resource Planning (ERP) systems education. ERP systems are integrated modular application software that support many of the transactions involved in mission-critical business processes in the areas of human resources, finance, production planning, materials management, supply chain and customer relationship management. ERP systems are enterprise-wide and claim to incorporate best business practice that replaces legacy systems and current business processes. ERP systems are considered by many large companies as a necessary information systems infrastructure. In a recent study of 92 Australian organisations, ERP systems were identified as the information technology project which delivered most value to their organisation (Bajkowski, 2003).

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.

The Faculty of Business and Law on behalf of Victoria University joined SAP's University Alliance Program in 1998. SAP is the leading vendor in ERP systems with approximately 54% of the market (McBride, 2003). Staff developed a number of units across the Faculty incorporating ERP systems and eventually a Graduate Certificate, Graduate Diploma and Master of Business in Enterprise Resource Planning Systems were introduced.

A number of the international partnering universities became aware of Victoria University's expertise in the area of ERP education and indicated that they wished to include ERP related education to their students. 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. Many of these issues can be overcome by forming partnerships with western universities with experience in ERP education. 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 Sunningdale 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 was 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 terrorist incidents.

ERP e-LEARNING MODEL

The model blends synchronous and asynchronous content and integrates our major technologies which provide a comprehensive medium for online learning. The technologies are:

Application Service Provision

An Application Service Provider (ASP) is a third party service provider that supplies organizations with a complete solution to their computing needs (Robinson, 2000). This enables the clients of the ASP to remotely access the software via the Internet. One of the barriers to ERP education is gaining access to the ERP system and providing the necessary infrastructure to support it. 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 synchronous e-learning tool was facilitated by the Centra Corporation virtual classroom software (Central Symposium) which provides the capability to deliver live, instructor-led classes direct to student desktops using fully integrated voice-over-IP technology. Lesson delivery includes integrated full-duplex audio, interactive whiteboards, application sharing, breakout rooms and online surveys and evaluations. The technology allowed the events to be recorded for playback.

The first stage in using this technology involved the lecturer developing the lesson in Microsoft PowerPoint format and then loading it onto the appropriate Centra server. The lesson was 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 Figure 2.

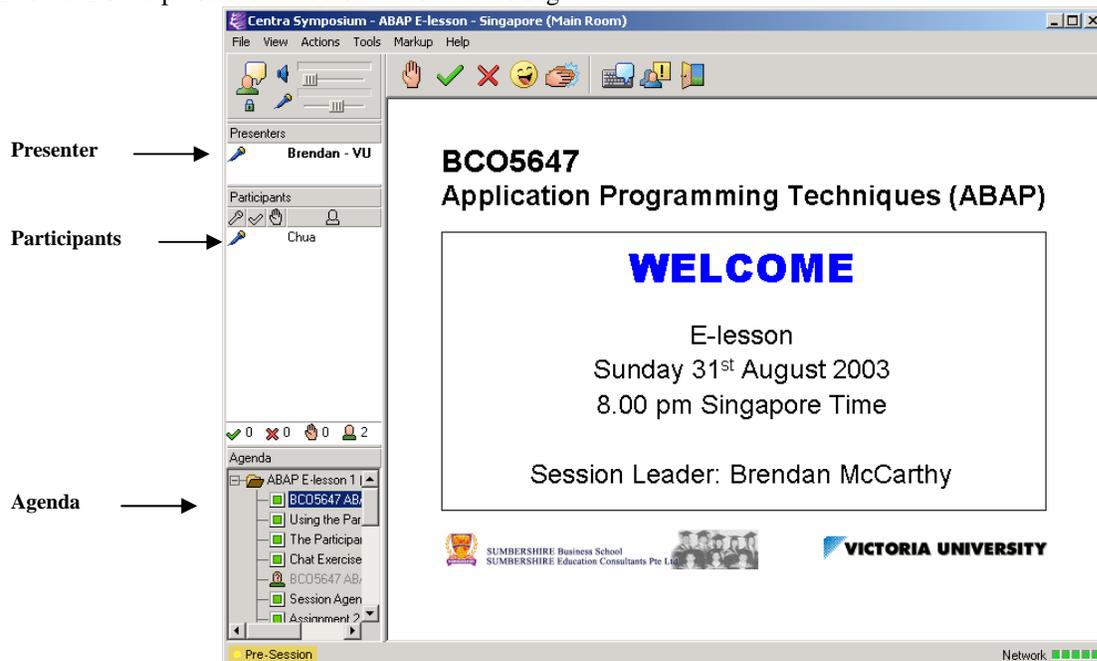


Figure 2: Centra Symposium Participant Screen

The screen is divided into a number of components. The Media Window displays the PowerPoint slides while the Agenda window displays the 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. If a student has a query, they can "summon" the lecturer via the Virtual Classroom and the lecturer can then appropriately respond to the query.

Although the e-learning model has been developed for some time its implementation has occurred in a staged approach. Firstly the ASP was established and SAP Tutor simulations were developed. Late last year full curriculum material was made available via WebCT. The final component of the model is the Virtual Classroom technology. This technology was designed to be used as an enhancement to face to face teaching. As mentioned previously the structure of offshore teaching is that a University staff member teaches 15 hours in concentrated mode and the remaining 21 hours is taught over a 7 week period by a local staff member. Therefore once the Victoria University staff member completes their teaching there is very little interaction with the students. The virtual classroom technology enables the lecturer to interact with students throughout the remainder of the course in an information rich environment.

To evaluate its effectiveness of the virtual classroom to complement the face to face teaching. Two virtual events were conducted with students in an ERP programming subject (ABAP) in Singapore. The nature of the events were to review a practical programming assignment and an exam preparation session. Each event was one hour in duration and attended by the 20 students enrolled in the programming subject. On completion of the sessions an online evaluation was conducted which included both structured and unstructured questions (Table 2).

Question	Excellent	Very Good	Good	Fair	Poor
<i>How would you rate the visual design/layout of the software?</i>	40%	20%	40%		
<i>How would you rate the user interface/ease of use of the software?</i>	20%	60%	20%		
<i>Additional comments on user interface/ease of use</i>	<ul style="list-style-type: none"> - I liked the way you could review slides before the session commenced. - Very user friendly. - The quality is good compared to SAP's video conference and on-line lessons. 				
<i>The session content was appropriate to my needs</i>	60%	40%			
<i>The material transmitted smoothly during the session</i>	40%	60%			
<i>The audio was clear and unbroken during the session</i>	40%	50%	10%		
<i>Additional comments</i>	<ul style="list-style-type: none"> - I experienced lapse in the audio but I am not sure whether it is due to my network problem or the centra network. 				
<i>The session duration was appropriate.</i>	40%	60%			
<i>What did you feel were the most positive aspects of the e-learning session?</i>	<ul style="list-style-type: none"> - Very convenient from the comfort of my home. - Can allow participants to attend their lessons anywhere in the world as long as they can log on to the internet. 				
<i>What did you dislike about the e-learning session?</i>	<ul style="list-style-type: none"> - Bad connection and muffled at times - I would like the presentation material beforehand - Interaction is not as good as actual lesson 				
<i>Rate your overall satisfaction with the e-learning session.</i>	20%	60%	20%		
<i>What kind of connection do you have to the internet?</i>	<ul style="list-style-type: none"> - 60% Cable, 30% ADSL, 10% 56K modem 				

Table 2 Virtual Classroom evaluation

The evaluation included the suitability of the tool as well as the effectiveness of the educational activity. The results indicate the students all found the sessions of value but also indicated some shortcomings in terms of interaction, poor connection and the structure of lesson. It is important to consider the content of the lessons when evaluating the results. The lessons were directly related to their assessment and therefore they had a vested interest in attending and participating. However this does not detract from the usefulness of the tool. The alternative would have been the local staff member interpreting the PowerPoint slides provided by the Victoria University staff member or the use of an alternative tool which may not have been as information rich.

CONCLUSION

The combination of e-learning tools certainly address many of the issues associated with synchronous/asynchronous applications and information richness/spatial presence. However we did not design the e-learning model to replace face to face contact. It was designed to complement and support this mode of delivery. We strongly believe that the blended approach as supported by Kapp and McKeague (2002) is the most suitable delivery mode for ERP education. There may be other situations which lends itself towards a single approach or technology. Too often academics and industry are looking for the “*Silver Bullet*” to satisfy their educational delivery needs. This paper provides an example of one approach for one subject in one country. Due the success of the approach it is now being extended to support other ERP related subjects in other countries. Additionally the faculty has recently awarded a grant for the purchase and implementation of Centra Symposium to support e-learning teaching activities across the faculty.

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