

An Evaluation of an Online Programming Course

Brendan McCarthy, Victoria University, Melbourne, Australia, Brendan.McCarthy@vu.edu.au

Abstract

Recent developments in the quality of e-Learning tools now make it possible to integrate such technology into teaching programs to provide added value to the learning experience. This paper describes the experiences of Victoria University in adopting e-Learning technologies to teach students in a totally online environment a Masters level Information Systems unit incorporating SAP's ABAP programming language. The involvement of SAP relates to Victoria University integrating Enterprise Resource Planning (ERP) systems into their curricula and research programs through a strategic alliance with SAP. The SAP technical infrastructure facilitates the development of courses using Internet and e-learning technology.

To assist with the delivery of the online unit, an ERP e-Learning model was developed that integrates 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. In 2007 a trial program was conducted using e-Learning tools to deliver a full Masters Information Systems unit to students online. An evaluation of the program was conducted incorporating a student survey and management review of issues raised from the administration of the program. This paper examines the outcome of this evaluation and concludes with recommendations to improve the delivery of future online programs. Institutions planning to enter full online program delivery may benefit from the success factors identified and administrative challenges illustrated in this paper.

1. Introduction

Computer programming still remains an important part of most Information Systems courses. However the emphasis today is on teaching programming concepts and style and using programming languages to support this objective. Most Information System courses include an introductory subject on basic programming concepts and basic problem solving. Educationalists believe that the language chosen should be based on its ability to convey enduring concepts and to demonstrate fundamental programming techniques [4].

Once students have grasped a basic understanding of programming concepts and techniques, such skills can be used as a basis to learning application development in its various guises from developing database applications using SQL to designing web applications using Java.

The Information Systems discipline has a business focus where information systems requirements are matched to an organization's objectives. It is important for students to realize the link between organizational objectives and application development, and IS curriculum should reflect this link. It is often difficult to extend a student's basic knowledge of programming techniques into a business setting. Providing a business environment would allow students to apply and extend their algorithm and problem solving techniques; however such environments are not usually available to university students.

SAP R/3 is a type of software classified as Enterprise Resource Planning (ERP) Systems software. ERP systems offer a solution that handles an enterprise's total information system needs in an integrated fashion. Such systems have seen a tremendous growth in the last decade in the US, Europe and Australian markets with emerging growth in the Asian region.

SAP is the leading ERP vendor with 70 percent of the market. SAP is the largest client/server and mainframe ERP software vendor. Over 400 companies in Australia use SAP. SAP has formed partnerships with universities around the world and part of that arrangement is the free provision of their software to universities for inclusion into their curriculum. 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 [2][3]. 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 [7].

SAP R/3 incorporates its own unique programming language called ABAP. ABAP is an event-driven fourth-generation language. It is a language that is constantly evolving with recent releases incorporating object-oriented capabilities (ABAP Objects). The robustness of the language is evident in the wide range of functionality and high performance capabilities within the R/3 system, allowing applications to process huge amounts of

customer data [5]. SAP R/3 provides an environment rich in tools for developing business applications using the ABAP programming language.

While ABAP is not one of the universally used programming languages like C or Java, it is an excellent language to extend students comprehension of programming concepts in a powerful business environment. Thus it is ideally suited to IS students.

2. Using E-Learning Technologies in Teaching Programming

Teaching a programming language such as ABAP in the SAP R/3 environment does present both teaching staff and students with a number of difficulties. For staff there is the requirement for training, the long timeline for curriculum development and the management of student accounts and assessment. For students there are the difficulties of gaining SAP access and the initial learning curve in working in the SAP environment. We have addressed some of these issues by making use of some web-enabled technologies. There is a growing trend amongst academics to use the Internet to increase access to educational materials in a variety of ways to support the learning process [1]. Application Service Provision (ASP) enables access to the ERP system while the Virtual Classroom technology provides access to the curriculum.

Application Service Provision

An Application Service Provider is a third party service provider that supplies organizations with a complete solution to their computing needs [6]. Application Service Provision is a technology that provides 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 for our students was accessing our SAP system outside university class times and the university environment. The ASP model combined with the infrastructure of the Internet provides a solution to overcoming this barrier.

Victoria University has configured several of its SAP servers to support the role of an ASP and provide access to SAP, not only to local students but also students enrolled in our offshore program running in Singapore. Students can access the SAP software via the Internet once they have installed the SAPgui software on their local PC's. This means students can access SAP at their leisure to work on programming exercises and assignments without the need to physically attend the university computer laboratories.

Synchronous e-Learning

Synchronous e-Learning technology is Internet based and allows the two-way delivery of education in real time. Students are able to log into a virtual classroom based at Victoria University. They hear the lecturer's voice in real time while viewing lecturer controlled slides on their screens. If a student has a query, they can "alert" the lecturer via the Synchronous e-Learning tool and the lecturer can then appropriately respond to the query. This two-way communication facilitates the interaction between the lecturer and student thus enhancing the learning process.

The technology allows lecturers to teach the necessary programming concepts and then demonstrate these concepts using the SAP system via the Synchronous e-Learning technology. The lecture can also be recorded and replayed at a later stage, however this option does not support the advantages of two-way interaction. Once students have completed the lecture they can access the SAP system via the ASP to practice programming concepts that were covered in the lecture. This technology is most suited to distance learning and was the subject of a trial in an offshore program running in Singapore.

Blackboard

Blackboard is a Learning Management System (LMS) used as a single point of entry for students to access online material and media. It is used to supplement face-to-face teaching. The tool allows students to view and download subject outlines, assignments, past examination material and lectures and to execute e-Learning modules. Students can submit assignments via the tool and then view their results once the assignments have been marked. Teaching staff can interact with students via a discussion board and chat facilities to enable students to discuss set tutorial questions and discuss issues they have encountered. Staff can also communicate with students by direct email links and global email facilities.

3. Online Case Study

In 2007 four masters level ERP units were delivered fully online. One of these was a programming unit using SAP's ABAP programming language. Delivery was enabled by using a synchronous e-Learning tool to broadcast twice weekly "live" lectures and demonstrations. Each event was one hour in duration and attended by 16 students enrolled in the programming unit. Synchronous delivery was supported by an asynchronous tool being the Blackboard LMS.

The synchronous e-Learning tool was facilitated by the Saba Corporation virtual classroom software called 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, 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 Symposium 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 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. Refer to Figure 1.

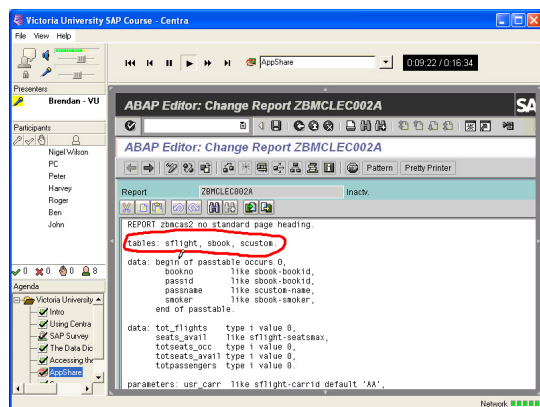


Figure 1: Symposium Participant Screen

At the end of the unit delivery, an online survey was conducted. An extraction of some relevant survey questions and results are displayed in Table 1.

Table 1: Online Survey Results

Question	Result
<i>How would you rate the usability of the Symposium Virtual Classroom tool?</i>	90% <i>Very easy to learn and use</i> 10% <i>Fairly easy to learn and use</i>
<i>Were you able to access Blackboard and Symposium when you needed to, and without any bandwidth constraints?</i>	50% <i>Always</i> 50% <i>Usually</i>
<i>Was the anything in the course delivery technologies that you wish to comment on?</i>	- <i>All good</i> - <i>Sometimes the microphone was too loud, writing words on notes are clearer then drawing. Having the links for the lectures in Blackboard was useful</i> - <i>Symposium teaching mechanism is very convenient. It was very intuitive and comfortable tool to use.</i> - <i>Would suggest using the discussion group tool to be more active inclusive of the lecturer to increase the interaction between students.</i>
<i>Please note any additional feedback here. Include any comments on the content, its delivery, and any suggestions for improving the unit.</i>	- <i>All good.</i> - <i>Overall feedback about the course and everything is great. It has been a good experience and I would highly recommend it to others looking for online courses.</i> - <i>Lectures were well structured.</i> - <i>Wanted the online courses to be increased including more of function modules.</i> - <i>All great.</i>

At the end of 2007 a comparison was made results from the online class and the on-campus class. This can be viewed in Table 2.

Table 2: Result Comparison: Online Vs On-campus

	<i>Theory Exam Average</i>	<i>Practical Exam Average</i>	<i>Overall Average (incl assignments & exams)</i>
<i>Online</i>	74%	81%	82%
<i>On-Campus</i>	70%	67%	76%

The evaluation outcome was overwhelmingly positive to online delivery. Students clearly suggest the technologies were easy to use and access while the “live” sessions added value to the learning experience. The results outcomes are significantly better for students undertaking the unit online compared to students taking it on-campus.

4. Administrative Issues

Our experiences in online delivery have identified a number of administrative and procedural issues that work to impede the smooth operation of fully online delivery:

- Online Enrolment Process. There needs to be a stable university system in place where a prospective student can apply to enrol into an online subject or course.
- Online Fee Structure. There are currently legal restrictions on being able to apply a different fee for fully online subjects at the university. While flexible delivery modes can be used it is essential that there is the same flexibility in regards to setting fees.
- Online Payment Process. A prospective student should be able to view details for an online course/subject, enrol online and when approved, pay online. The university has only recently introduced an online payment facility.

The above administrative impediments have worked against the smooth implementation of the online ERP program. However, significant resources are now being employed to address these barriers.

5. Conclusion

The experiences of Victoria University in adopting e-Learning technologies to teach SAP’s ABAP programming language to students in a totally online environment has demonstrated that such an approach is not only viable but also very successful in terms of student outcomes. While the technical delivery proved very successful, a number of administrative issues worked to impede the management of the program. These impediments have been identified and action taken to resolve these in future online delivery programs.

6. References

- [1] Aoki, K. (2004). “Gloalization of E-Learning: Issues and Opportunities for International Collaboration”, published in proceedings of E-Learn 2004 Conference. Washington DC, USA, November 2004.
- [2] Becerra-Fernandez, I. Murphy, K. and Simon, S., (2000) “Enterprise Resource Planning: Integrating ERP in the Business School Curriculum” Communications. ACM 43, 4, April 2000.
- [3] Hawking, P., Shackleton, P., Ramp, A. (2001) “IS’97 Model Curriculum And Enterprise Resource Planning Systems.” Business Process Management Journal, Vol. 7 No. 3, 2001.
- [4] Johnson L. F., (1995). “C in the first course considered harmful”, Communications of the ACM, May 1995, Vol. 38 No 5, pg. 99(3).
- [5] Kretschmer, R. & Weiss, W., (1996). Developing Sap’s R/3 Applications With Abap/4, Sybex, 1996.
- [6] Robinson, D., (2000). “ASP As Soon As Possible”, People Management, 13 April 2000, Vol. 6 Issue 8, pg. 51.
- [7] Watson, E. and Schneider, H., (1999) “Using ERP Systems in Education”. Communication of the Association for Information Systems, 1999, 1(9).

Copyright © 2008 by the International Business Information Management Association (IBIMA). All rights reserved. Authors retain copyright for their manuscripts and provide this journal with a publication permission agreement as a part of IBIMA copyright agreement. IBIMA may not necessarily agree with the content of the manuscript. The content and proofreading of this manuscript as well as and any errors are the sole responsibility of its author(s). No part or all of this work should be copied or reproduced in digital, hard, or any other format for commercial use without written permission. To purchase reprints of this article please e-mail: admin@ibima.org.