Edith Cowan University
Research Online

EDU-COM International Conference | Conferences, Symposia and Campus Events

2008

# Educating Using an Information System as a Cognitive Tool

Richard Fulford
*Edith Cowan University*

Originally published in the Proceedings of the EDU-COM 2008 International Conference. Sustainability in Higher Education: Directions for Change, Edith Cowan University, Perth Western Australia, 19-21 November 2008.
This Conference Proceeding is posted at Research Online.
http://ro.ecu.edu.au/ceducom/15

**Fulford, R., Edith Cowan University, Australia**

# Educating Using an Information System as a Cognitive Tool

Richard Fulford

School of Management
Edith Cowan University, Australia
E-mail: r.fulford@ecu.edu.au

## ABSTRACT

This paper discusses the effective education of internal and external students, concerning business processes and principles, using an enterprise resource planning application as a cognitive tool. The teachings explain a number of core business principles and develop students understanding of how the processes might vary between organisations in differing industries and environmental settings.

The students establish the processes in an enterprise resource planning application, which reinforces the understanding of both operational activities and business management requirements. A cohort of students has been surveyed; the findings demonstrate that education using an enterprise resource planning application as an interactive learning system is both practical and beneficial. The following explains the teaching environment and discusses the survey results.

## INTRODUCTION

This study concerns the education of a unit (semester teachings of a subject) that concerns business operation processes and implementation practices of an enterprise resource planning (ERP) application. The unit explains the business principles and then develops the students understanding into a comprehensive framework that enables them to identify how to implement an ERP application in different types of organisations. The aim is to provide universal outcomes by educating, rather than training, with an information system.

The unit utilises the Microsoft Dynamics (AX) ERP application as the teaching vehicle. Edith Cowan University was the first university in the Southern Hemisphere to enter into the Microsoft Academic Alliance and to utilise the Dynamics suite of systems for education purposes. The teaching outcome prompted the decision to use Dynamics AX, as the previous application, SAP ERP, had not sufficiently facilitated student conceptualisation of business processes. The unit had been successfully taught using Dynamics AX as an internal unit for two semesters prior to being offered as an online unit. This paper first explains the teaching philosophy and processes of educating using ERP as a cognitive tool. It then presents the result of a survey of 74 students.

## COMPUTER TECHNOLOGY

ERP applications are core software used by organisations to coordinate information in every area of business. They help to manage company-wide business processes, using a common database and shared management reporting tools (Monk & Wagner, 2006). The salient and identifying characteristic of ERP systems is their ability to integrate business processes by standardising data and ensuring that this data is accessible to whoever needs it on a real time basis (Strong, Volkoff, & Elmes, 2003). Organisations may adjust their way of working to fit the package (Markus, Tanis, & Van Fenema, 2000), although, most implementations are a mixture of existing ERP processes and customised processes that meet specific organisational requirements.

The Microsoft Dynamics (AX) application utilises the Microsoft SQL-Server or Oracle database systems. The university PCs situated in laboratories operate as, what is termed, 'fat clients', that is to say they pass relatively large quantities of data and functions between the PC and a Server. Internal and external students can access the ERP application remotely, using, what are termed, 'thin clients'. Thin clients require minimal installed functions, with data and programs being passed between the students PC, at work or home, and the server.

This was achieved by installing the Microsoft Dynamics AX Application Object Server (AOS) which provides functions to the remote PC as required. The establishing of the AOS is a relatively simple matter, however, it required changes to the university firewall which is a procedural matter and, surprisingly, onerous. When using the application external students experience very similar responses to on campus students. The application topology is shown in figure 1.

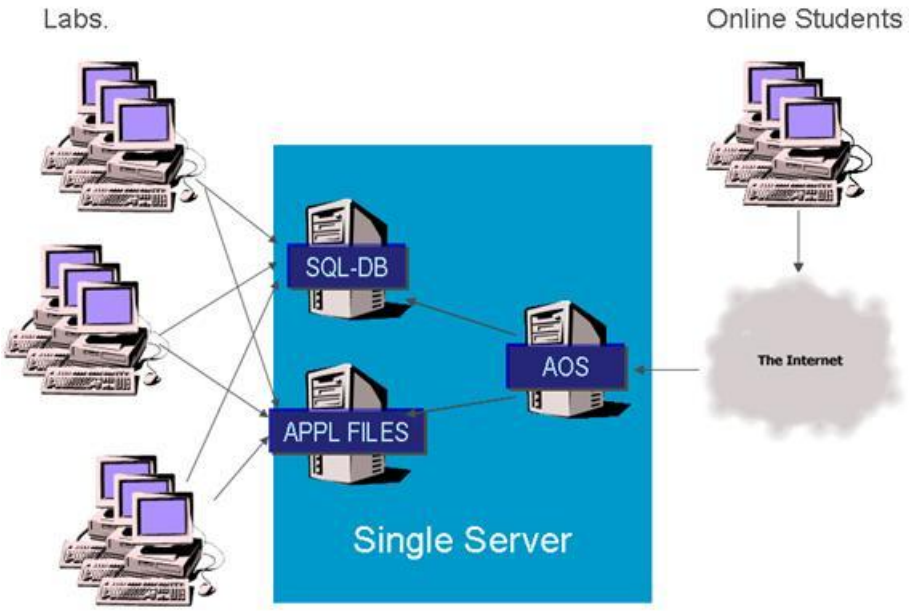



*Figure 1: Computing Topology*

Herrington and Oliver (2000) found that for many students a situated learning framework is not practical with computer-based learning. However, the ease of establishing the ERP educational environment along with the current extensive use of Broadband Internet access demonstrates that this might no longer be the case.

## TEACHING PHILOSOPHY

The aim is to provide an education experience for students that enables the students to relate the setup of an ERP application to the nuances of organisations, and for that experience to provide valuable transferable knowledge. The ERP application acts as a cognitive tool, which empowers students to design their own representations of knowledge (Reeves 1999). The teaching philosophy has its roots in the cognitive domain of Bloom's taxonomies of human learning, where students gain the ability to analyse, synthesise and apply. The aim is to foster critical thinking and to enable students to understand that there is not necessarily a correct answer to business matters, but an array of possibilities with risks, advantages and disadvantages associated with them. The teaching environment enables students to comprehend at different speeds and in varying ways, providing an educational outcome of "deep learning" (Chapman et al., 2005).

The extent of ERP functionality and the diversity of the organisations they support creates a number of complexities for teaching; (1) a student requires some knowledge of business functions, including financial procedures, sales, procurement, inventory control and production, (2) without broad analysis and examples students may become prescriptive about business process and implementation principles, (3) students might associate with the application rather than the implementation and business processes.

These difficulties are perhaps more easily supported with on-campus learning than online studies, particularly because of the inherent difficulty of educating, rather than simply informing, external students (Herrington, et al., 2005). To mitigate these problems the students develop understanding through establishing and varying the ERP representation of organisations. Difficulties and lack of knowledge quickly become apparent through the learning activities and are readily resolved by dialogue and remote demonstration of how to properly establish the business processes. Education material focuses on the processes and principles rather than the application.

## TEACHING METHOD

Students can learn "from" interactive learning systems and programs and "with" interactive learning tools (Reeves 1999). The unit discussed here uses both of these approaches. The "from" is facilitated by the learning management system Blackboard academic suite (Blackboard, 2008), which allows students to access videos, lecture slides, lecture recordings and lab. materials. Some of the videos are Microsoft promotional videos that discuss the attributes of the application and the types of organisations that have implemented the application (Giant bicycles is an example). Other videos are edited exerts of the Australian television program Business Success, which explains some of the features of the application and the benefits to organisations. Lectures are recorded in MP3 format and placed on Blackboard. Signposting is used during the lectures to identify slides and to explain questions so that external students are aware of what is happening.

The "with" is facilitated by the Microsoft Dynamics AX ERP. Students login to the application and establish a trading company. The application does not initially contain any data or parameters, and the students must establish every aspect of the company. The students create a chart-of-accounts, financial periods, customers, suppliers, inventory components, bills-of-materials, production routes, and associated financial posting parameters. The lectures explain the business principles and how they might differ between organisations. For example, how organisations may manage the production environment if it were upstream or downstream of a supply chain push-pull boundary. The ERP is used to narrow the potential void in university education between theory and practice identified by Herrington & Oliver (2000).

The unit uses assessment to reaffirm learning and requires that students alter the processes that they have implemented. The assessments explain business requirements that are different to the ones that are created in the lab. activities, the students must vary the underlying setup of the application to support the new requirements. This requires a clear understanding of organisational processes and how to establish an ERP to represent those processes. The lecturer is able to access each of the students companies to check on progress and advise students. Student support for assignments is limited and, therefore, students have to revisit the labs. to understand what is required.

The assessments are formative, which ensures that students are coping with each aspect of the increasingly complex process. Assessments are marked and feedback given via screens added to the application. Figure 2 shows a screen used for marks and feedback for the first assignment. If there are problems with the assignments, students must resolve them prior to continuing with their studies. This creates the combination of authentic context, authentic activity, and authentic assessment that leads to enduring knowledge (Herrington & Oliver, 2000).

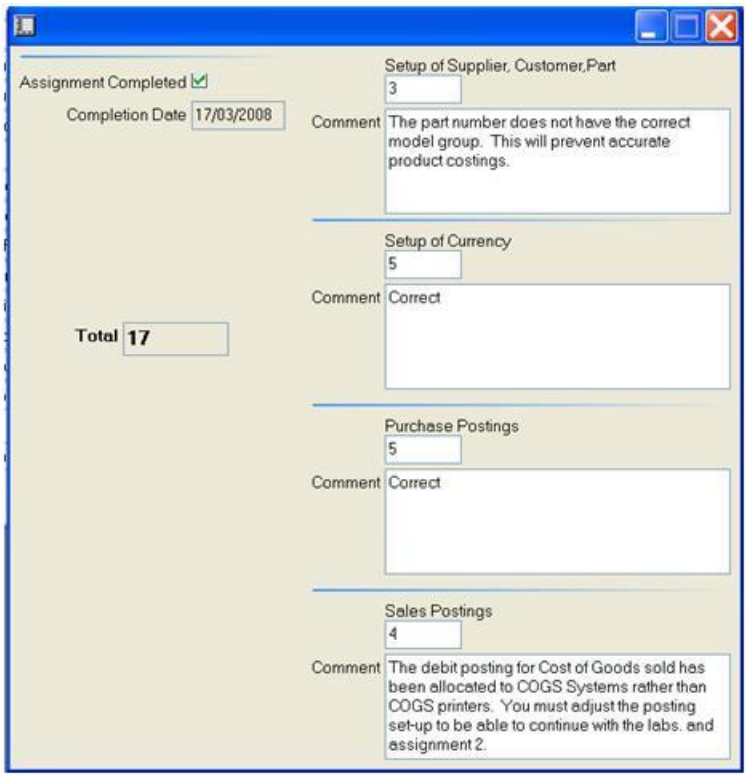



*Figure 2: Assessment Screen*

An example of the detailed discussion that students find helpful is the examination of the accounting function early in the unit. The lecture material identifies principles of accounting. The lab. activities establish, in the application, a general ledger, customers, suppliers and posting criteria for sales invoices and receipt of purchase invoices. These transactions help the students identify how financial postings work in a business and how information systems (IS) facilitates that process. The lectures then broaden the discussion and explore the granularity of information in a general ledger; identifying how to capture sales and costs by region, product ranges and other categorisations.

One of the assignments has students alter the configuration of their company to post financial transaction with a greater level of detail and with different attributes, enabling their organisation to be analysed from different perspectives. This helps students not only understand how the different modules interface but how to vary the interface to meet business requirements. The application then becomes a cognitive tool that supports the deep reflective thinking that is necessary for meaningful learning (Reeves 1999). Financial ratios, which have been learned in previous units, are re-examined and students have expressed that, for the first time, they have had a clear understanding of the aims of the ratios.

A text book could not be identified that sufficiently supported the educational aims. Weekly readings are provided from books, journals and other articles. A comprehensive study guide has been created that includes lecture material, lab. activities and explanation of business processes. The business processes in the study guide include examples of outcomes: two examples are ABC (Perito) stock classifications, and actual versus standard costing methods. The book is available on Blackboard as Pdf files and can be purchased via the university bookshops for a nominal fee that is aimed at recovering production costs.

## STUDENT SURVEY

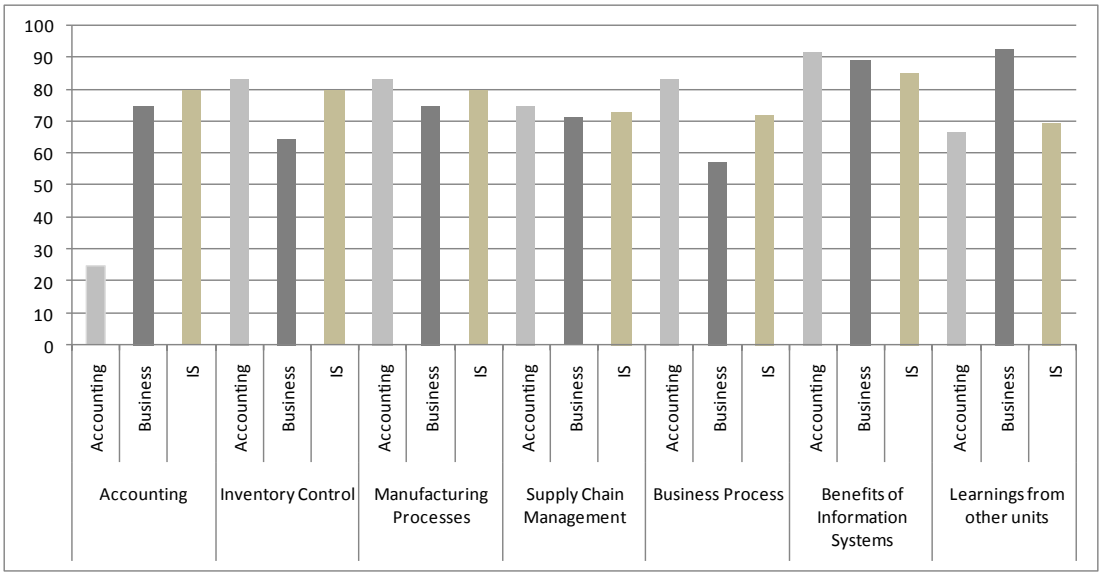
The survey instrument was designed to identify if students found the unit enjoyable and to understand how the unit, in the students' opinion, addressed the core knowledge domains. The following table shows the survey instrument.

*Table 1: Student Survey Instrument*

| | ***Strongly Agree*** | ***Agree*** | ***Neutral*** | ***Disagree*** | ***Strongly Disagree*** |
|---|---|---|---|---|---|
| The unit was enjoyable | | | | | |
| The unit improved my knowledge of accounting | | | | | |
| The unit improved my knowledge of inventory control | | | | | |
| The unit improved my knowledge of manufacturing processes | | | | | |
| The unit improved my knowledge of supply chain management | | | | | |
| The unit improved my knowledge of organisation wide business process | | | | | |
| The unit improved my knowledge about the use of information systems | | | | | |
| The unit improved my knowledge about the implementation of information systems | | | | | |
| The unit improved my knowledge of the | | | | | |
| The unit helped me put in perspective leanings from other units | | | | | |
| The learnings are relevant to my course: | | | | | |
| My overall satisfaction with the unit is high | | | | | |

The survey was completed anomalously and either left in the classroom or posted to Blackboard. A total of 74 students responded to the survey. All but one of the students strongly agreed that the unit was enjoyable (the single student being neutral).

The unit is included in a number of IS courses and may also be selected as an elective by accounting and business students. Only six accounting and 14 business students completed the survey. The survey results have been graded as strongly agree 100%, agree 50%, neutral 0, disagree -50% and strongly disagree -100%. The results by knowledge component across the three cohorts are shown in Graph 1 (results could range from -100% to 100%).




*Graph 1: Survey agreement percentage by knowledge domain and student major*

The data indicates that that the unit significantly improved students understanding of all of the surveyed types of business processes and functions. Not surprisingly accounting students learned less about accounting practices than other students. The course bias of prior knowledge is demonstrated in all categories. Nonetheless, one of the major findings was how the unit reaffirmed learnings from other units. Presumably this is because it helps students internalise the information using tasks situated in realistic contexts which, according to Reeves (1999), results in meaningful learnings. The overall satisfaction of the unit was 83%, with one student strongly disagreeing that they were satisfied! The student did not comment further.

The survey also allowed students to comment upon the elements they like the most, the elements they liked the least and add additional comments. However, there were disappointingly few comments. One student's comment was that they appreciated the "hands on approach and lots of tutorials", another that they enjoyed the "practical use of Dynamics", yet another that "I have got something new and different which will be very useful for my career" and "I like the assignment which provides practical knowledge". Pleasingly, one student commented that they "enjoyed the balance of theory and practice" another that "the small activities in the class, helped them understand business processes".

The negative comments included "confusion early on of which buttons to press and what's going on", one student did not like the separation between concept (lecture) and application (lab). Additional comments included "I always like to do practical units rather than theoretical ones. This unit is very helpful and enjoyable", and "show more short videos – powerful visual and interactive tool".

A group of students were asked why they found the unit reaffirmed other learnings. They explained that much of university education is concerned with macro business principles, such as strategy processes, and that it is often assumed that students understand more detailed business principles that are not actually fully understood.

## CONCLUSION

The teaching of business process and implementation methods for ERP applications can be effectively provided by an authentic software learning environment. Students readily engage with the material and enjoy the sound educational outcomes. The unit reinforces Reeves (1999) assertion that " the real power of interactive learning to improve achievement and performance may only be realized when

people actively use computers as cognitive tools rather than simply interact with them as tutors or data repositories" (p. 17).

## REFERENCES


Blackboard (2008). http://www.Blackboard.com. Retr. 1 March 2008.

Bloom, B.S., et al, Taxonomy of Educational Objectives: Handbook I: Cognitive Domain, Longmans, Green and Company, 1956.

Chapman, C., Ramondt, L. and Smiley, G.(2005). 'Strong community, deep learning: exploring the link',Innovations in Education and Teaching International,42:3,217 — 230

Herrington, J., Reeves, T. & Oliver, R. (2005). Online Learning as Information Delivery: Digital Myopia. Journal of Interactive Learning Research. 16 (4), pp. 353-367. Norfolk, VA: AACE.

Herrington, J., & Oliver, *R. (2000).* An instructional design framework for authentic learning environments. Educational Technology Research and Development, 48(3), 23-48.

Markus, M. L., Tanis, C., & Van Fenema, P. C. (2000b). Multi-site ERP Implementations. Communications of the ACM, 43(4).

Monk, E., & Wagner, B. (2006). Concepts In Enterprise Resource Planning. Boston, Massachusetts, US: Thomson Source Technology.

Reeves, T. (1999). A Research Agenda for Interactive Learning in the New Millennium. In B. Collis & R. Oliver (Eds.), Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 1999 (pp. 15-20). Chesapeake, VA: AACE.

Strong, D., Volkoff, O., Elmes, M. (2003). ERP Systems and the Paradox of Control. Americas Conference on Information Systems 2003.