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Abstract

The goal of this research is to develop and evaluate a curriculum that teaches ERP concepts and skills using hands-on practical tasks in a globalised context. The curriculum employs Kolb's experiential learning cycle to facilitate student learning about the issues associated with internationalisation and globalisation of business operations and the use of ERP systems. A small pilot study was undertaken to test the assignment and logistical arrangements with some students undertaking an international inter-group collaboration. Students in Australia and Norway play alternating customer and vendor roles in business transactions recorded on a SAP ERP system. A pre- and post-survey (based on a previous instrument by Seethamraju) evaluated students' perceived knowledge gain across five different areas. The Norwegian students showed only a minor gain in perceived knowledge whilst the Australian students showed significant gains. Students involved in the inter-group (international) role play showed better understanding of the transactional aspects of business operations that those who did not.

Keywords

Enterprise Systems, Enterprise Resource Planning, International-Collaboration, Inter-Group, Collaborative Learning Environment

INTRODUCTION

Enterprise resource planning (ERP) systems are applications that support a range of routine work related activities and business processes of an organization. Some examples of core business processes are sales order management, manufacturing, procurement, inventory management and accounting. In addition, an ERP system can support other business activities such as marketing, logistics, quality management and human resource management (SAP UA 2008). Over recent years we have witnessed a significant growth in global business operations (Wild and Wild 2008). Organizations cognisant of this fact are taking advantage of the opportunities thus created and advances in information technology (IT), especially, enterprise systems such as ERP are helping them in their endeavour. Given the increasing importance of enterprise systems universities are obliged to embed ERP concepts into their curriculum. Many universities have already implemented, and some are implementing ERP systems into their course curriculum.

An enterprise system seamlessly supports and automates business processes by integrating the functional areas and sharing data in real time across the organization locally, nationally and globally. Many multi-national businesses invest in ERP and other enterprise systems to support their global operations. AMR Research (2006) and the Aberdeen Group (2007) found that globalization is the most important business issue organizations plan to address with ERP investments. The thrust of globalization, supported by advances in IT, has resulted in convergence of global enterprise activities (Hawking 2007). Two factors that contribute to the growth in the uptake of ERP systems are - the need for global access to data and for the control of international operations in real time (Hawking 2007, Davenport 1998). Organizations such as Texas Instruments, BHP Billiton, Fonterra, Woolworths, National Australia Bank have all implemented ERP systems to support their global operations (Hawking 2007). According to Cutter Benchmark Review (Caruso 2009), more than 33% of respondents in a recent survey indicated that they have implemented an ERP system to support their global operations. Just a couple of years before that review this figure was only 20% (Locke et al 2005).

ERP systems are conducive to global business operations as they encompass all three tiers viz. local, national and international; thereby, complying with financial and legal requirements at each level. Examples of functionalities for global operations that are supported by ERP are currency conversions, time and location adoption, consolidation across diverse accounting standards, multilingual facilities, and legal control. A study by the Aberdeen Group (2007) found that companies using ERP systems in streamlining workflows across multiple

sites gained an additional improvement of 66% in reducing time from ordering to the delivery of a product. Given the importance of ERP systems, as described above, and the fact that most business graduates will manage or interact with such systems, it is imperative that such concepts are not only taught at the graduate level but also practiced with hands-on tasks in a globalized context. The main purpose of this paper is to describe the development of a curriculum addressing these needs.

MOTIVATION

As ERP systems are complex and associated concepts difficult to comprehend, students of enterprise systems need to be given the opportunity to practice using an ERP system in a globalized context. This may be done with hands-on experience and interaction with fictional transnational organizations. This way the students will be able to work through the types of transactions that would take place in a real business setting. This innovative teaching and learning experience is a working example of collaboration between academia and industry. The success of this teaching method has direct implications for graduates' employability and their job readiness for industry (Hawking et al 2005). Another motivation to embed ERP concepts into university curriculums is one that addresses the worldwide skills shortage in IT, specifically in ERP-related skills. For example, SAP recently reported that a global shortage of 30,000 to 50,000 skilled SAP professionals (Wailgum, 2008). To meet growing demand for ERP professionals, companies such as SAP developed and implemented a SAP University Alliances Program (UAP) that helps prepare students for IT careers and providing instructors with training and professional development opportunities (SAP UA 2008). Over 500 universities worldwide were reported to have incorporated SAP in their business curriculum (Hawking et al 2004).

A further motivation is due to the major downturn in enrolments faced by computing-related educational programs[3] since the dot-com collapse in 2000. This has caused deep concern not only to those directly affected at university programs but also to educational institutions, employers and politicians. These changes demand evaluation and modification of education programs. Challenges include the move towards programs that are more applied, more professionally oriented and of more international character (Helfert 2008, Harvard 2008, SAP Spectrum 2009). Demand is expected to grow for subjects such as enterprise systems and business process management, producing graduates with knowledge of how to coordinate complex information and supply chain networks and project managers who are able to manage global IT projects (Helfert 2008). In particular, academics must focus on teaching students how to think beyond information silos and reduce the specificity of disciplinary skills. Suggestions pertaining how to approach this include strengthening the curriculum in relation to the integrated nature of business processes, globalization and experiential learning (Harvard 2008). The Joint ACM/AIS Undergraduate Curriculum Revision Task Force highly recommends that new courses include a unit on Business Process Management that demonstrates leading ERP systems such as SAP in business process management (ACM/AIS 2008). Finally, although, there has been much research undertaken in the area of teaching ERP concepts (Seethamraju 2007), research into teaching these concepts in a globalized context are far and few. It is our endeavour to contribute towards this need.

EXPERIENTIAL LEARNING – INTER-GROUP COLLABORATION

Organisations worldwide are investing in ERP systems and at the same time recognising the importance of consolidating and integrating their international operations. Many universities have embedded 'internationalisation' and/or 'globalisation' as one of their graduate attributes. In order to provide an overall education experience that encompasses these graduate attributes, and to incorporate inter-group collaboration learning, we have followed David Kolb's (Kolb 1981; Smith 2001) experiential learning model as represented in Figure 1. This model includes four elements of (1) concrete experience, (2) observation and reflection, (3) formation of abstract concepts and (4) testing in new situations.

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[3] Computing related programs include Computer Science, Informatics, Information Science, Information Systems, and Information Technology.
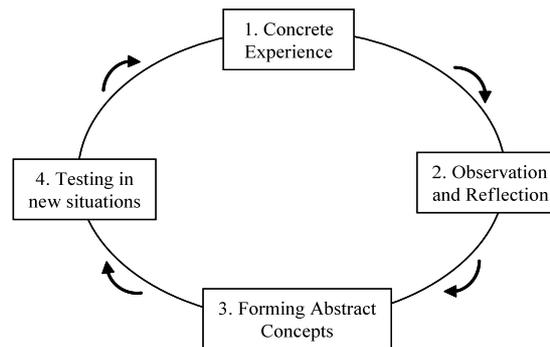
Figure 1: Kolb's Experiential Learning Cycle

This process involves continuous and iterative learning where the learner is brought to a new level of understanding each time the cycle is completed. To achieve the learning of SAP in a globalized context, a student assignment was developed using Kolb's experiential learning cycle. In Step 1 of concrete experience, each student plays a dedicated business role using the SAP system to perform a given business operation. In Step 2 of observation and reflection, each student documents the feedback received on the operations performed in the SAP system messages and e-mails from the collaboration partner in the business process. In Step 3 of forming abstract concepts, the student documents what has been done by developing a Business Process Model of the actions. In Step 4, when completing the first cycle, the student is given another business role before conducting the same business operation again. By completing several cycles with varying roles, students get hands-on experience in a variety of business situations and understand the integrated nature of the business processes.

The 'globalisation' experience in this study is achieved by incorporating the use of SAP into existing Masters-level units (subjects) at each of the universities in Australia and Norway. This new curriculum aims to provide students with the skills to integrate a business model by combining business processes, globalisation and experiential learning (Harvard 2008). This curriculum is designed to bridge the gap between theory and practice by giving students experience of performing business transactions for a company, and for many companies, with transactions that may take place globally. It is hoped that this integration will enable students to learn about an organization's business activities across functions, business units, and geographical areas (Davenport 1998; Klaus et al. 2000). It is envisioned that the students will leverage the experience through this collaborative learning process and develop business skills to effectively cope with today's global competitive environment. This new curriculum and the sales order business role-play between students from the two universities are presented in the next section.

TEACHING CASE: GLOBAL BIKE INC

The hands-on exercises are based on a preconfigured model enterprise called the Global Bike Incorporated (GBI) provided by SAP University Alliance Program (UAP). GBI has preconfigured 100 identical Bike America companies as shown in Figure 2. Each student is given the responsibility of one such preconfigured company. By using the pre-configured company each student can run business processes individually for their own Bike America company even if all companies are configured on the same physical SAP server.
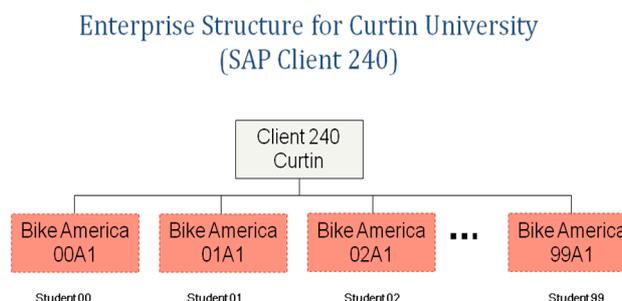

Figure 2: Enterprise structure in SAP ERP system

A sales order business process role play was developed for students to collaborate in pairs to perform the purchasing and sales parts. In the first part of the assignment (see Table 1) the students complete the 4 steps of Kolb's learning cycle. The company run by one student (in Australia) is a customer purchasing from the vendor company run by another student (in Norway). The vendor company responds to the purchase order by

performing the sale, picking and delivery before issuing an invoice to the purchaser. The purchaser receives the goods and pays the invoice. In the second part of the assignment the students swap roles and repeat the process.

Table1. Action Steps in the Sales Order Business Process Assignment.
The steps numbered 1-4 correspond to the steps in Kolb's learning cycle.

| Preliminary	**Prerequisites:** As a student you are teamed up with another student. You will play the roles as assigned by the lecturer.
Step 1	**Run Exercises:** If you are a Vendor, you do the SAP Vendor Exercises, and if you are the corresponding Customer you do the SAP Customer Exercises.
Step 2	**Write Log**: You write a log containing the SAP System messages given for each save-operation and include a copy of e-mails exchanged with your partner.
Step 3	**Draw a Business Process Model**: You include a Business Process Model for the Cross Company Sales Order Process completed in this exercise.
Step 4	**Swap Roles with your partner**: Swap Customer and Vendor roles and run step 1 and 2 again.
Final	**Hand in**: Your log from running step 2 twice, your Business Process Model and the pre- and post-exercise questionnaire.
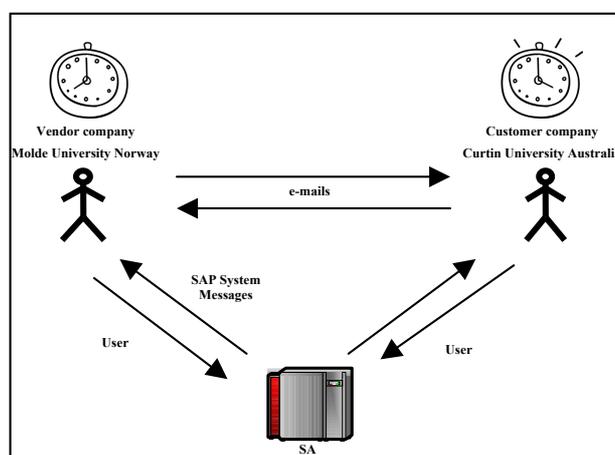
Figure 3: Communications between customer and vendor companies. The role of a customer is played by a student in Australia and that of a vendor by a student in Norway (and in a second iteration roles are swapped).

The communications between customer and vendor companies are illustrated in Figure 3 with the setup of the two companies running on the same physical SAP server hosted at Queensland University of Technology in Australia. Communications between the companies in the form of sales order invoicing, purchase order, invoice payment and acknowledgement are effected via e-mail external to SAP. E-mail is used instead of the internal SAP messaging system because of the different time zones (with there being eight hours difference between the collaborating students). Also, by doing this, the participants do not need to log on to the SAP system to receive business messages.

THE PILOT STUDY

Organising and administering an international inter-group collaboration exercise involving students and lecturers in two countries in different time zones, with both parties using a common ERP system located at a third location is highly complex. Acknowledging that this may have issues and implications, we decided to conduct a pilot study to test the logistical arrangement of the technical, transnational, business activities and time zone factors of the inter-group collaboration exercise. The lessons learned from this study will be used to refine the international collaboration exercise for future semesters. To separate logistical issues from the students' perceptions of the collaborative assignment itself, we also ran the assignment in an on-campus class in Australia in addition to the international group. The on-campus group involved all the 32 students in the class while the international group consisted of eight students. Since the primary focus of the international exercise was to get experience with the logistical issues we had purposely kept the numbers of participants in this group low, but still enough to give

valid qualitative feedback on the study. The international group consisted of eight volunteering Masters students; four from Norway and four from Australia, working in four pairs.

QUESTIONNAIRE

In order to evaluate the students' perceived knowledge gain we adapted a questionnaire used by Seethamraju (2007). Seethamraju developed the questionnaire to study the design and instructional strategies in the delivery of ERP/SAP courses. The same questionnaire was also used at Sam M. Walton College of Business, University of Arkansas, USA (Cronan et al 2008). Seethamraju recommended using real-world business activities and experiences when integrating ERP/SAP into a course curriculum. The international inter-group experiential learning in this paper is an example of such a real-world business study. We adapted the questionnaire by removing parts of the "Knowledge of Skills" section and by adding two new sections on "General Background" and "Global Business Knowledge" as shown in Table 3. The section on "Global Business Knowledge" was specifically added to gauge students' perceived experience of transnational business transactions. The adapted instrument as shown in Table 2 consists of 30 questions broken into 5 sections. All the questions used a seven-point Likert scale (None/Very Low, Low, Somewhat Below Average, Average, Somewhat Above Average, High, and Very High). Table 3 provides the definition of each section of the questionnaire.

Table 2. Instrument used for International Inter-Group Study (adapted from Seethamraju 2007)

I. GENERAL BACKGROUND
1. General business work experience (not necessarily IS/IT work)
2. Education in ERP in previous courses or training
3. Work experience involving ERP (with SAP or other system)
4. Your general understanding of how ERP systems work
5. Your general understanding of the value of ERP systems to businesses
6. Your knowledge of SAP
7. Your knowledge of other ERP systems besides SAP
8. Your ability to use an ERP system (like SAP but not necessarily SAP)

II. BUSINESS KNOWLEDGE
1. Knowledge of business terminology in manufacturing and execution process (such as MRP, production plan etc.)
2. Knowledge of business terminology in sales and distribution process (such as sales order, discounts, inco terms, freight, transfer order, goods issue, etc.)
3. Knowledge of business terminology in financial accounting process (such as general ledger, cost centre, journal, adjustment, balance sheets etc.)
4. Knowledge of the inter-relationships and inter-dependencies between various functions (such as accounting, marketing, production etc.)

III. PROCESS KNOWLEDGE
1. Knowledge of the concept of business process
2. Knowledge of business processes and activities in materials management
3. Knowledge of business processes and activities in sales and distribution management
4. Knowledge of business processes & activities in financial accounting
5. Knowledge of business processes & activities in production management
6. Knowledge of the importance of the integrated nature of business processes
7. Ability to map organisational business processes with those in an enterprise system software

IV. SAP TRANSACTION SKILLS
1. Ability to create master data in SAP - Materials management module
2. Ability to create master data in SAP - Sales and distribution module
3. Ability to create master data in SAP – Finance/Controlling module
4. Ability to carry out complete transactions in the SAP – Materials management cycle
5. Ability to carry out transactions in the SAP – Sales & distribution cycle
6. Ability to carry out transactions in the SAP - Account Receivable
7. Ability to carry out transactions in the SAP - Account Payable
8. Ability to carry out transactions in the SAP - General Ledger module
9. Ability to carry out transactions in the SAP – Production Planning module

V. GLOBAL BUSINESS KNOWLEDGE
1. Knowledge of how ERP systems facilitate a Global Business
2. Knowledge of issues associated with a Global Business
3. Effectiveness of SAP practicals at helping you learn about ERP systems
4. Effectiveness of SAP practicals at helping you learn about Global Business Operations

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DISCUSSION, ANALYSIS AND IMPLICATIONS

All students were surveyed before they commenced and after they had completed the practical work. The surveys asked the student to report on their perceptions of their knowledge of various topics related to general business work, knowledge of ERP systems and SAP, and their experience and skill in using ERP systems and

particularly SAP. Paper-based surveys were used in Australia, whereas in Norway the students completed a survey within a Microsoft Word document.

Table 3. Definition of the Knowledge Dimensions (adapted from Seethamraju 2007)

General Background Knowledge of general business work experience and knowledge of ERP/SAP systems.
Business Knowledge * Knowledge of the basic business terminology that relate to various functions and cross-functional relationships
Process Knowledge * Knowledge of various core business processes, their significance and their relationship with information systems
SAP Transaction Skills * Basic software skills in the creation of master data and performing transactions in various SAP application modules
Global Business Knowledge Knowledge of multi-national/transnational/global business transactions

Table 4 shows the average scores of the pre and post survey for both Australian and Norwegian students. Australian students perceived their post-knowledge in all 5 knowledge dimensions were somewhat higher than their pre-knowledge whereas the pre and post knowledge among the Norwegian students were generally at the same level. In particular, the Australian students' unanimously perceived their pre-knowledge of SAP Transactional Skills were non-existent or low (score of 1). This is possibly due to the fact that SAP was adopted and integrated into Curtin University's Master program for the first time. In contrast, the Norwegian students have had exposure to SAP in the past and hence the pre average score is relatively high at 4.75.

Table 4. Mean Scores of Pre- and Post Survey for Australian and Norwegian students

Knowledge Dimension	AUSTRALIA			NORWAY		
	Pre-Avg	Post-Avg	Difference	Pre-Avg	Post-Avg	Difference
I. General Background (GB)	3.34	4.13	0.66	4.34	4.75	0.41
II. Business Knowledge (BK)	3.69	4.38	0.69	4.75	4.63	-0.13
III. Process Knowledge (PK)	3.61	4.68	1.07	4.89	4.75	-0.14
IV. SAP Transaction Skills (STS)	1.00	3.81	2.81	4.75	5.22	0.47
V. Global Business Knowledge (GBK)	3.00	5.06	2.06	4.25	5.25	1.00

The Norwegian students indicated that their knowledge and skills in certain areas had decreased across the teaching period (see also Figure 4). It is unlikely that the teaching and practical work had made the students more confused. What was more likely, or a possible explanation, was their prior exposure to general business transactions and their pre-knowledge of business processes were sound. Alternatively, as another view supported by Pratt, McGuigan, and Katzev (2000) who found that respondents often overestimate their level of knowledge on a particular subject when using the traditional pre-survey and post-survey. They found that taking part in a program may show participants that they actually knew much less than they originally reported on the pre-survey. Thus, for such cases they reported that pre-survey / post-survey comparisons were misleading because participants used a changed frame of reference to classify themselves after engaging in the program. Despite the decreased in business knowledge and process knowledge, the Norwegian students perceived that their SAP transactional skills and global business knowledge have increased slightly as a result of the inter-group collaboration assignment.
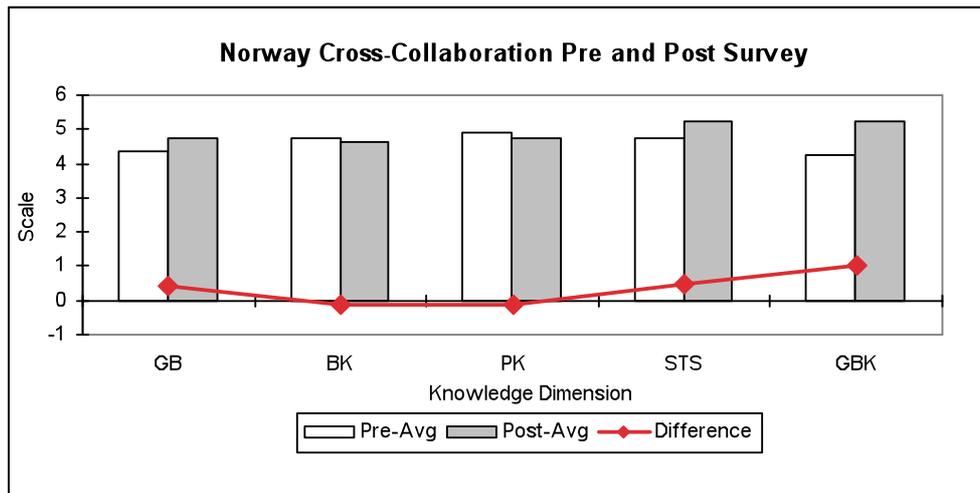
Norway Cross-Collaboration Pre and Post Survey

Figure 4: Norwegian students – Pre, Post and Average Scores

The Australian students, as shown in Figure 5, reported a perceived gain in all areas of knowledge of business transactions, processes, SAP skills, and global business knowledge. In particular, they reported a considerable increase in their SAP transactional skills followed by global business knowledge.

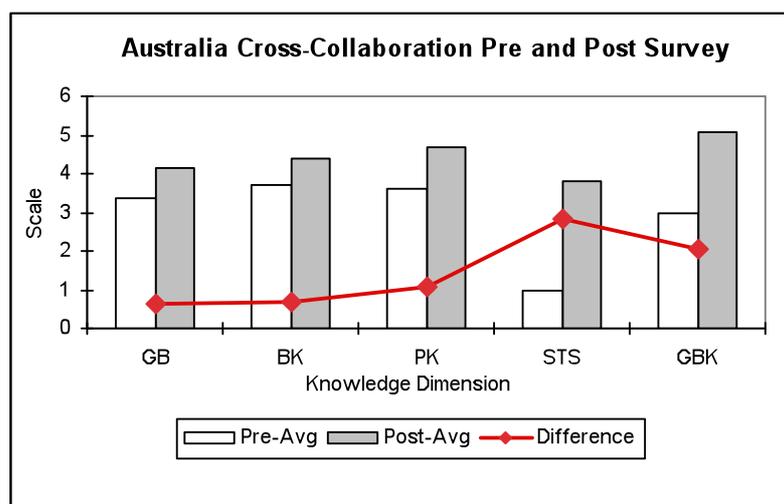**Australia Cross-Collaboration Pre and Post Survey**

Figure 5: Australian students – Pre, Post and Average Scores

Compared to Australian students, the figure shown in Figure 6 gave a perception that Norwegian students did not statistically record a high knowledge gain in the overall sections, the following comments voluntarily provided from 3 students, 2 of whom are Norwegian students, indicated a positive inter-group learning experience.

o   Student A: *"I think this case gave a much better understanding than what we have been doing in our ERP course. It's much easier to understand the different operations and how they interact with each other when they are separated, and done by different persons, playing the different actors in a supply chain. I would recommend this kind of work as a way of learning these systems in the future.*"

o   Student B *"In general the exercises have given very good insight to the system, and an interesting approach to learn the system. Aspects like having to take into account the problems arising of different time zones and being dependent of another part to fulfil its tasks before we can carry out our tasks."*

o   Student C: *"Working with students at a remote location has helped (me to) understand the business process side of things enormously. Can't all other students have such opportunity of working with inter-university partners located at a remote place with just email as the only means of communicating?"*
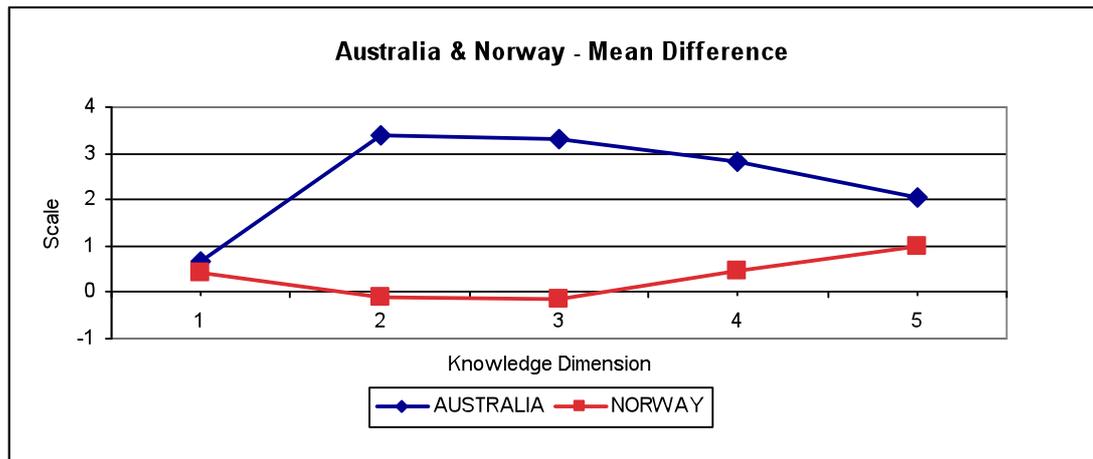
Figure 6: Australian and Norwegian students – Mean Difference Scores

Observations from the lecturers were that those students who participated in the inter-group role play exercise have performed better and have shown better understanding of the transactional aspects of the sales order processing while those working locally have had some issues in the clarity of these concepts. The likely reasons for this are:

o   Those working with inter-university partners spent much more time with their exercises. They had to wait till their partners could post items such as invoices, purchase orders and payments for transactions.

o   Having faced difficulties associated with being in another time zone those working with inter-university partners had to work on their own to figure out how to organize their work better to avoid or reduce the incidences of further problems when their roles as customers and vendors were reversed.

o   The time lag also allowed such students to reflect more upon the problem at hand.

o   The separation of tasks enforced by the distributed operations helped to clarify the operations and how they are integrated to complete the business process.

LIMITATIONS AND RECOMMENDATIONS

One of the limitations of this study was the small sample size of the cross-country group, although it was a decision that was made deliberately to test logistical aspects in addition to the exercises on hand. Only preliminary data analysis was performed so far. One of the other difficulties was with the self-evaluation of the student's knowledge and skills. Some students found it difficult to evaluate themselves with the pre and post-unit knowledge and skills.

Based on our findings from the pilot study we will make adjustments and enhancements for future implementation of the globalization assignment and, in addition, we would like to consider doing the following:

o   Including SAP Foreign Trade Exercises

To further address global business issues we recommend that an additional exercise be included using Foreign Trade and Customs application by SAP. This application is integrated with purchasing by Materials Management to handle imports, with Sales and Distribution for exports, and it is also integrated with Financial Accounting for posting import purchases and export sales. In order to handle the increased complexity, students should run a simple international exercise developed in the pilot test. Once they have successfully completed that a more realistic foreign trade exercises should be implemented together with lectures on foreign trade issues.

o   Expanding the questionnaire to include student experiences with the logistical aspects
Questions on this should be added to the questionnaire to gain more knowledge on how well the inter-university student communication works.

  o Collaborating with other universities on ERP for global business

There are other universities who are members of SAP UAP and worldwide over 500 universities have access to an ERP system (McCarthy et al 2005). Cross collaboration assignments to address global business issues is possible if agreement is reached between some of these universities. For example, the Kelly School of Business in US collaborates with Brandenburg Technical University in Germany on how to streamline business operations in merged companies running SAP (SAP INFO 2007).

CONCLUSION

We have shown that the globalisation trend in business creates a growing demand for knowledge on business operations in an international context. We address this need by creating a course that is professionally-oriented and of international character with both practical hands-on experience as well as theoretical lectures. We have completed an initial set of exercises that were tested by inter-university partners in Australia and Norway. Although the results of the pre and post-survey did not report a considerable knowledge gain, the students who participated in the pilot study gave positive, verbal and informal, comments about the inter-group collaborative assignment. The lecturers affirm the valuable experience gained on how the exercises were set up, the actual contents and the overall learning experience encountered by all parties. The exercises used in this pilot study will be enhanced based on the students' feedback and the amended exercises will be used in an upcoming full scale study and further improvements will be incorporated to maintain the quality of the assignment.

REFERENCES

Aberdeen Group, 2007, "The Role of ERP in Globalization," Retrieved 5 July, 2009 from http://www.aberdeen.com/summary/report/benchmark/RA_ERPRoleinGlobalization_CJ_3906.asp.

ACM/AIS. 2008, "Business Process Management Course Description," *Joint ACM/AIS Undergraduate Curriculum Revision Task Force,* Draft December 2008, Retrieved 14 June, 2009 from http://cis.bentley.edu/htopi/BPM_IS2008_Elective.pdf

AMR Research. 2006, "The Enterprise Resource Planning Spending Report," *AMR Research Inc. 2006-2007*. Retrieved 20 June, 2009 from http://www.amrresearch.com/content/View.aspx?pmillid=20844

Caruso, D. J. 2009, "The Global ERP Backbone Is Becoming an Industry Standard," *The Cutter Edge Newsletter, Cutter Consortium*, Retrieved 17 April, 2009 from http://www.cutter.com/research/2009/edge090407.html

Cronan, T.P., Douglas, D. E., Schmidt, P., and Alnuaimi, O. 2008, "Using an ERP Simulation Game: Learning and Attitudes toward SAP (Draft Report - ERP Student Sample)," *ITRI-WP123-1008,* Sam M. Walton College of Business, University of Arkansas, USA.

Davenport, T.H. 1998. "Putting the Enterprise into the Enterprise System," *Harvard Business Review,* (76:4), pp 121-131.

Davis, G. A. 2003. "Using a Retrospective Pre-Post Questionnaire to Determine Program Impact", *Journal of Extension*, (41:4), August. Retrieved 20 June 2009 from http://www.joe.org/joe/2003august/tt4.php.

Harvard 2008. Harvard Business School Discusses Future of the MBA, *Harvard Bulletin*, Retrieved 23 June 2009 from http://www.exed.hbs.edu/cgi-bin/wk/6053.html

Hawking, P. 2007. "Implementing ERP Systems Globally: Challenges and Lessons Learned for Asian Countries," *Journal of Business Systems, Governance and Ethics*, (2:1), pp 21-32.

Hawking, P., McCarthy, B. and Stein, A. 2005. "Integrating ERP's Second Wave into Higher Education Curriculum," *PACIS 2005 Proceedings*, Retrieved 17 June 2009 from http://www.pacis-net.org/file/2005/178.pdf

Hawking, P., McCarthy, B., Stein, A. 2004. "Second Wave ERP Education," *Journal of Information Systems Education*, (15:3), Retrieved 17 June 2009 from http://findarticles.com/p/articles/mi_qa4041/is_200410/ai_n9464916?tag=rbxcra.2.a.2

Helfert, M. 2008. "Business Informatics: An Engineering Perspective on Information Systems," *Journal of Information Technology Education*, (7:1) pp 10-25.

Klaus, H., Rosemann, M. and Gable, G.G. 2000. "What is ERP?" *Information Systems Frontiers* (2:2), pp 141-162.

Kolb, D. A. 1981. "Learning styles and disciplinary differences," A. W. Chickering (ed.), *The Modern American College*, Jossey-Bass, San Francisco.

Locke, B, Shepherd, J., and Davis, W. 2005, "The Enterprise Resource Planning Spending Report: 2005-2006." *AMR Research*. Retrieved 20 June, 2009 from http://www.amrresearch.com/content/View.aspx?pmillid=20844.

McCarthy, B., Hawking, P. and Stein, A. 2005. "Integrating ERP's Second Wave into Higher Education Curriculum", *Proceedings of the 9th PACIS Conference, Kasetsart University*, Thailand.

Pratt, C. C., McGuigan, W. M., & Katzev, A. R. 2000. Measuring program outcomes: Using retrospective pretest methodology. *American Journal of Evaluation*, (21:3), pp 341–349.

SAP Spectrum, 2009, Serving Global Markets Locally, *SAP Spectrum Magazine* http://www.spectrum.sap.info/magazine/2009_03_sap_spectrum_en_screen.pdf

SAP UAP. 2008. Education Programs, *SAP University Alliances,* Retrieved 15 June, 2009, from http://www.sap.com/about/citizenship/education/universityalliances.epx

SAP INFO. 2007. "Leaving the Ivory Tower," *The SAP Magazine,* Retrieved 15 June, 2009, from - http://www.sap.com/about/citizenship/pdf/Education_Meets_Practice.pdf

Seethamraju, R. 2007. "Enterprise Systems (ES) Software in Business School Curriculum – Evaluation of Design and Delivery," *Journal of Information Systems Education*, (18:1), pp 69-84.

Smith, M. K. 2001. "David A. Kolb on experiential learning." *Encyclopedia of Informal Education,* Retrieved 25 June, 2009, from http://www.infed.org/b-explrn.htm

Wailgum, T. 2008. "SAP skills shortage, CIO." Retrieved 20 April, 2009 from http://www.cio.com/article/393663/ SAP_Skills_Shortage_Costs_SAP_s_Customers_Partners_and_Ultimately_SAP_AG

Wild, J. J., Wild, K. L. 2008. *International Business: The Challenges of Globalization*, Cambridge, MA, Pearson Education.

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