TEACHING BUSINESS PROCESS MANAGEMENT IN CROSS-COUNTRY COLLABORATIVE TEAMS USING ERP

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Abstract

Academia generally employs a strict disciplinary model of education that results in a high degree of specialization within each discipline, while modern business environments require knowledge workers who can address problems and opportunities that cut across disciplines and on a global scale. This paper describes the development and evaluation of a new and innovative educational activity that responds to this requirement. The activity teaches business processes, business process management, and ERP-system skills by running a global supply chain role-play supported by a SAP ERP-system. It employs Kolb's experiential learning cycle to facilitate student learning about the issues associated with inter-organizational business process management supported by ERP-systems. A study was undertaken with students from Australia and Norway forming teams executing inter-organizational business processes supported by SAP. The survey instrument used asked students to report perceived pre- and post- course knowledge and skills across five dimensions. Both Norwegian and Australian students showed a significant gain in perceived knowledge, and students involved in the inter-group (international) role-play showed better understanding of the transactional and management aspects of inter-organizational business processes than those who did not.

Keywords: teaching, business processes, business process management, inter-organizational, ERP systems, cross-country, collaborative, teams, SAP

1. Introduction

Organisations generally create value through their business processes. Examples of core business processes are sales order processing, manufacturing, procurement, inventory management and accounting. Enterprise Resource Planning (ERP) systems are software applications that support and automate a range of routine work related activities and business processes of an organization. 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 businesses and, particularly, businesses with inter-organizational and cross-country processes. According to the World Trade Organization (WTO) the yearly growth rate in international trade from 1960 to 2008 was around 6%, which is higher than the world gross domestic product (GDP) rate of around 4%. The latest numbers from WTO shows an accelerating trend with global trade expected to expand by 9.5% in 2010 (Wild and Wild 2008, WTO 2009; WTO 2010). Organizations cognisant of this fact are taking advantage of the opportunities thus created. Advances in information technology (IT), especially enterprise systems such as ERP systems, are helping them to realise and optimise inter-organizational and cross-country business processes. Given the increasing importance of business processes – the capability of an organisation to execute its strategy, business process management (BPM) – a set of structured methods and technologies for managing business processes, and ERP systems, universities are obliged to embed these concepts into their Information Systems curriculum. Many universities have already implemented, and some are implementing, ERP systems into course curriculum to help teach business processes, BPM, and ERP concepts. Some examples are Delavari (2010) who gives an overview and comparison of courses in Australia, Bandara et al (2010) discuss BPM education in academia, and Targowski et al (2007) who have edited a book describing various approaches to enterprise systems education.

An enterprise system seamlessly supports and automates business processes across and between organizations locally, nationally and globally. Most multi-national businesses invest in ERP systems to support their global business processes. 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 1) global access to data, and 2) the control of international and inter-organizational business processes 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 processes. A couple of years before that review this figure was only 20% (Locke et al 2005).

ERP systems are conducive to global business processes 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 business processes that are supported by ERP are currency conversions, time and location adoption, and consolidation across diverse accounting standards, multilingual facilities, legal control, and import-export issues. A study by the Aberdeen Group (2007) found that companies using ERP systems in managing and optimizing business processes across multiple sites gained an additional improvement of 66% in reducing time from ordering to the delivery of a product. Given the importance of business processes, BPM, and ERP systems, as described above, and the fact that most business graduates will interact with and possibly manage such business processes and systems, it is imperative that such concepts are not only taught but also practiced with hands-on tasks in a globalized context. The main purpose of this paper is to describe the development of a new educational activity addressing these needs and to report on quantitative empirical research using a survey instrument aimed at evaluating its success.

2. Motivation

As the business processes and ERP systems that operationalize them are complex and associated concepts difficult to comprehend, business students need to be given the opportunity to practice using an ERP system and managing business processes in a globalized context (Antonucci et al. 2004, Boyle and Strong 2006). Global business is an important issue and cannot be neglected in teaching. There has also been a call for university programs that are more applied, more professionally oriented and of more international character (Harvard 2008; eSkills Demand 2009). In particular, more focus on complementary competencies in addition to core ICT skills are requested, including expansion of practical training in standard business processes and software in universities (ibid). We addressed this need by developing two collaborative educational activities; one targeting the operational level with students executing business processes in SAP for a global supply chain described in this paper, and one at the management level where we develop the virtual team role play (Rudra et al 2011). Students from Molde University College in Norway and Curtin University of Technology in Australia participated in collaborative teams involving procurement and sales processes in the global supply chain in Figure 1 (see details in section 4). In this way the students worked through the business processes that take place in a real business setting, experienced issues with them, and considered how to manage and optimize them. The key outcome for students was the experience and understanding of the business processes and transactions that are carried out in the global business cycle. The students were exposed to processes involving key players (e.g. customers, vendors) and activities (e.g. purchasing of products and services) in the global marketplace. With the opening up of international boundaries and markets, organizations are faced with diverse complexities such as local business rules, international regulations, global trade, financial management, and cultural differences. This innovative teaching and learning experience is also a working example of collaboration between academia and industry.

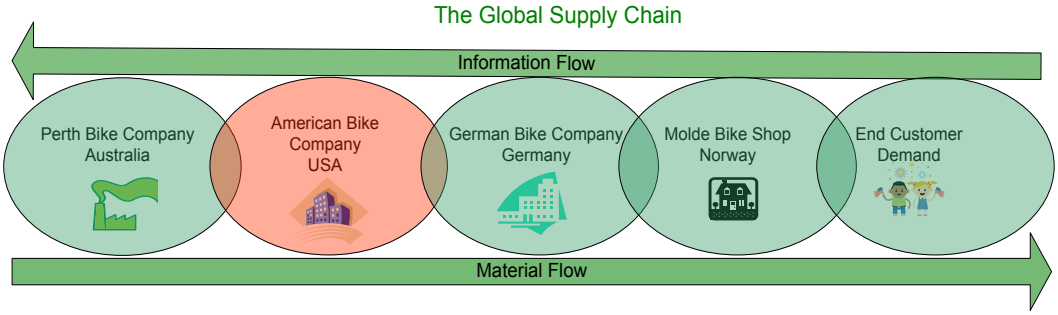

Figure 1. Global Supply Chain used in the Educational Activity.

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 BPM and 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) and WTO reported a demand for competencies in business processes (WTO 2009). To meet growing demand for BPM and ERP professionals, companies such as SAP developed and implemented a SAP University Alliances Program (UAP) that helps prepare students for IT careers and provides instructors with training and professional development opportunities (SAP UA 2008). Over 500 universities worldwide were reported to have incorporated SAP into their business curriculum (Hawking et al 2004). While it is important to include relevant ERP systems such as SAP into a university's curriculum, it is just as important that practical training is provided to the students. A recent report by the European Commission on e-Skills - Demand Development and Challenges (eSkills Demand 2009) highlighted that most graduates have little practical experience and a strong recommendation was to include practical training in working with the most common business software systems. With this, the students will gain a better understanding

of how an enterprise system works and the business skills required to carry out and to manage business processes.

The major downturn in enrolments faced by computing-related educational programs since the dot-com collapse in 2000 has caused deep concern not only to those directly affected at university programs but also to leaders at educational institutions, employers and politicians. These changes have raised a demand for evaluation and modification of education programs. Suggestions for modifications include strengthening the curriculum in relation to the integrated nature of business processes, globalization, and experiential learning (Harvard 2008), likewise towards programs that are more applied, more professionally oriented and of more international character (Helfert 2008, eSkills Demand 2009, SAP Spectrum 2009). 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 (Topi et al 2010). Finally, although, there has been much research undertaken in the area of teaching basic ERP concepts for enterprises (Seethamraju 2007, Targowski et al 2007), research into teaching these concepts in an inter-organizational context with several actors participating in a global supply chain are far and few. Two works in this direction are Pawlowski et al (2008) and Sankar et al (2006). Pawlowski et al (2008) presents a framework for global technology competencies using ERP illustrated by a pilot in an E-Learning context. In the book by Sankar and Rau (2006) the authors present a real case study of an ERP implementation in the company Bosch GmbH. They focus on developing analytical skills by studying the business case. In summary, there is a strong call for change in curriculums. However, how to bring about such a change is still an open question. Our research problem is thus how educational institutions should address the rising demand for educational activities related to globalization, business process management, team collaboration, and information technology. It is our endeavour to contribute towards this need for change by proposing a new educational activity that can be introduced into existing course programs. The new activity being the focus of this paper is Global Supply Chain Management in Cross-Country Collaborative Teams using ERP-systems.

3. 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 business processes. As well, many universities have embedded 'internationalisation' and/or 'globalisation' within 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 2. This model includes four elements of (1) concrete experience, (2) observation and reflection, (3) formation of abstract concepts and (4) testing in new situations.

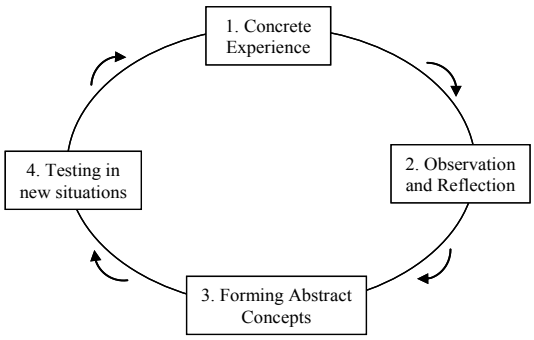

Figure 2. Kolb's Experiential Learning Cycle

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 business processes,

business process management, and ERP systems in a globalized context, an educational activity was developed using Kolb's experiential learning cycle. In Step 1 of concrete experience, each student plays a dedicated business role collaborating internationally with other students using the ERP system to perform a given business process. In Step 2 of observation and reflection, each student documents the feedback received on the processes performed in the ERP system by logging messages and e-mails from the collaboration partner. In Step 3 of forming abstract concepts, each student documents what they have done by developing a business process model. In Step 4, when completing the first cycle, each student is given another business role before conducting the same business processes again. By completing several cycles with varying roles collaborating with various international partners, students get hands-on experience in a variety of business situations. This will contribute towards their understanding of the integrated nature of the business processes, as well as how to manage and optimise these business processes.

The 'globalisation' experience in this study is achieved by incorporating the new educational activity using an ERP system into existing Masters-level units (subjects) at each of the universities in Australia and Norway. The activity aims to provide students with the skills to integrate a business model by combining business processes, globalisation and experiential learning. The activity is designed to bridge the gap between theory and practice by giving students experience of performing inter-organizational business processes in an international context. It is believed that this integration will enable students to learn about an organization's business processes across functions, business units, and geographical areas (Klaus et al. 2000). It is also thought 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. The new educational activity, consisting of a demand-driven global supply chain role-play undertaken by students from the two universities, is presented in the next section.

4. New Educational Activity: Demand-Driven Global Supply Chain Role-Play

The hands-on exercises are based on a customization of the preconfigured model enterprise called the Global Bike Incorporated (GBI), provided by SAP University Alliance Program (UAP), and a pilot study in 2009 where we tested the logistical arrangement of the setup reported in (Jæger et al 2010). GBI has preconfigured two hundred identical companies as shown in Figure 3. One hundred of them represent a company in America (Bike America) and one hundred represent a company in Germany (Bike Germany). Each student is given the responsibility for one such preconfigured company.

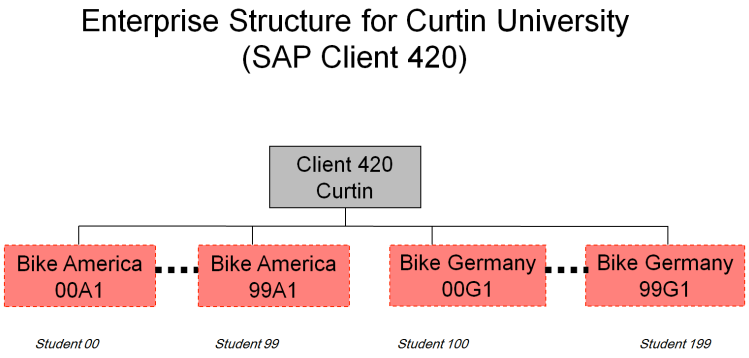

Figure 3. The 200 Global Bike Companies with separate Company Codes configured in SAP

A demand-driven global supply chain (SC) business process role-play was developed for students to collaborate in pairs to perform various purchasing and sales parts. The SC is a global SC network for trading bikes with customer demand represented by the End Customer Demand. Molde Bike Shop do not carry any inventory, when they receive a customer order this order triggers the different steps in

the SC. Molde Bike-Shop sends an order to The German Bike Company which builds a purchase order to their US supplier, the American Bike Company, which finally buys the bikes from its Australian vendor, The Perth Bike Company. The complete global supply chain was shown in the Figure 1.

The role-play scenario is a situation where the end customer market is increasing for a particular bike product – Kids Bike – that has the unique characteristic of high quality at a low price. In order to stick to the "low-price-high quality" strategy the partners have agreed to optimize the information and material flow along the SC. A major element of the strategy is not to carry any finished product inventory tying capital to inventory along the chain. This will have an impact on all partners in the SC. All partners deliver based on incoming order. The information from the end customer can be directly given to facilitate planning. The roles for the SC partners in the figure are listed in Table 1.

Perth Bike Company Australia	Fictive company, assumed operational by next role
American Bike Company USA	Role played by Australian student
German Bike Company Germany	Role played by Norwegian student
Molde Bike Shop Norway	Fictive shop, customer order generated by the teachers
End Customer Demand	Assumed customer demand

Table1. Example of Roles for Global Supply Chain Partners.

Each role is given a description, e.g. the role played by the Australian student in the first round is as Head of Logistics department in the American Bike Company, located in the US. The customer is The German Bike Company located in Germany, which means that the student must *export* the product from US to Germany. The vendor is the Bike Company located in Perth, Australia. Thus the student needs to *import* from this company. Further, since the Head of Logistics Department wants to look for possibilities to decrease costs the student is asked to run both the purchasing and selling processes. The other roles were given a similar description.

In the first part of the educational activity each student completed the four steps of Kolb's learning cycle. In the second part of the activity the students swapped roles and repeated the process. Communications between the companies in the form of customer order, invoicing, purchase order, invoice payment and acknowledgement was effected via e-mail external to SAP. Each company did its internal business processes in SAP. The SAP exercises consisted of three main parts: initial setup of master data, procurement by doing Material Management (MM), and fulfilment of sales by doing Sales and Distribution (SD). The SAP operative cockpit (SAP Cockpit 2008) was used to guide the management of the inbound business processes (import). The cockpit shows whether replies from the customs authorities are received for any messages sent, and it keeps track of whether any follow-up actions are needed. Similarly, in the monitor for the outbound business processes (export), the cockpit was used to report status with regard to communication with the customs authorities, and of replies from the authorities or indications of business processes that need to be executed.

5. 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 processes 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 processes (in addition to the section on general business process knowledge). 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 for each section of the questionnaire.

I. GENERAL BACKGROUND (GB)
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 (BK)
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 (PK)
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 organizational business processes with those in an enterprise system software
IV. SAP TRANSACTION SKILLS (STS)
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 (GBK)
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

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

6. Discussion, Analysis, and Implications

As result of the pilot study and the recommendation mentioned above the students were only surveyed once at the end of the teaching period (i.e. rather than before and after the teaching period). Students were asked to indicate their perceptions of their pre-course knowledge and skills (by entering a "1" on the 5-point Likert scale) and their perceptions of their post-course knowledge and skills (by entering a "2" on the 5-point Likert scale). It was made clear, with samples, that the entered values could increase, decrease, or stay the same (by entering the "1" and "2" in the same spot on the Likert scale). As mentioned, it is hoped that the students would have a better and more realistic understanding of their pre-course knowledge and skills and the relative change in these after the course (as opposed to before being exposed to any of the material).

1. General Background (GB) – Knowledge of general business work experience and knowledge of ERP/SAP systems.
2. Business Knowledge (BK) – Knowledge of the basic business terminology that relate to various functions and cross-functional relationships
3. Process Knowledge (PK) – Knowledge of various core business processes, their significance and their relationship with information systems
4. SAP Transaction Skills (STS) – Basic software skills in the creation of master data and performing transactions in various SAP application modules
5. Global Business Knowledge (GBK) – Knowledge of multi-national/transnational/global business processes

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

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 five 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 low or non-existent (i.e. a 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.

With the single presentation of the survey instrument we no longer saw the Norwegian students indicating a decrease in knowledge and skills that we saw in the pilot. This is inline with 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 might show participants that they actually knew much less than they originally reported on the pre-survey. 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. The new results thus validate the move to a single survey at the end of the course.

	AUSTRALIA			**NORWAY**		
Knowledge Dim.	Pre-Avg	Post-Avg	Difference	Pre-Avg	Post-Avg	Difference
1. GB	3.34	4.13	0.66	4.34	4.75	0.41
2. BK	3.69	4.38	0.69	4.75	4.63	-0.13
3. **PK**	3.61	4.68	1.07	4.89	4.75	-0.14
4. STS	1.00	3.81	2.81	4.75	5.22	0.47
5. GBK	3.00	5.06	2.06	4.25	5.25	1.00

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

	AUSTRALIA			**NORWAY**		
Knowledge Dim.	Pre-Avg	Post-Avg	Difference	Pre-Avg	Post-Avg	Difference
1. GB	2.81	4.88	2.07	2.67	5.19	2.52
2. BK	3.52	5.23	1.72	3.82	5.36	1.54
3. **PK**	3.42	5.32	1.90	3.58	5.10	1.52
4. STS	1.25	4.27	3.01	1.54	4.78	3.24
5. GBK	3.04	5.05	2.01	2.00	5.00	3.00

Table 5. Full Study Mean Scores of Pre- and Post Survey for Australian and Norwegian students

The Norwegian students, as shown in Figure 5, now 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. The Australian students showed improved perceived learning in GB, BK, and PK and similar in SS and GBK. This may be a result of the particular cohort in Australia. The pilot study was conducted when the subject was marketed more widely in Australia to industry and other faculties. As a result, some of the students had considerably more experience in business, ERP, and/or SAP. The subsequent full study involved only the regular student cohort from Australia, although these were still postgraduate students who usually have some work experience.

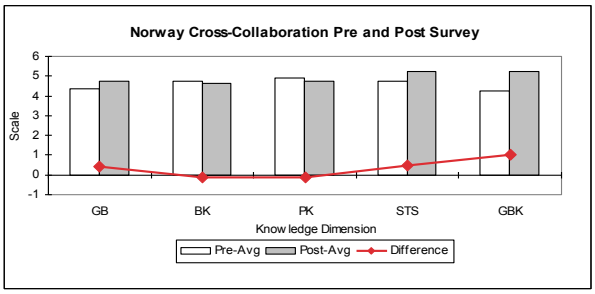

Figure 4. *Pilot Study Norwegian students – Pre, Post and Average Scores*

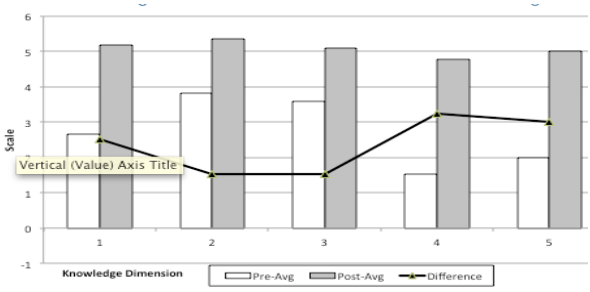

Figure 5. *Full Study Norwegian students – Pre, Post and Average Scores*

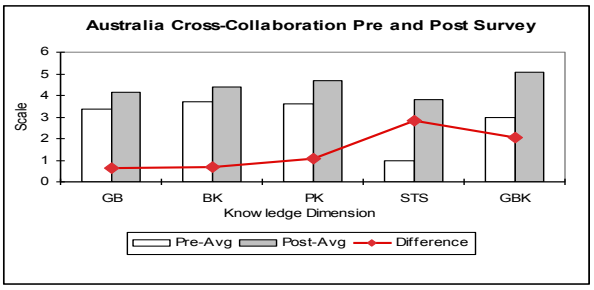

Figure 6. *Pilot Study Australian students – Pre, Post and Average Scores*

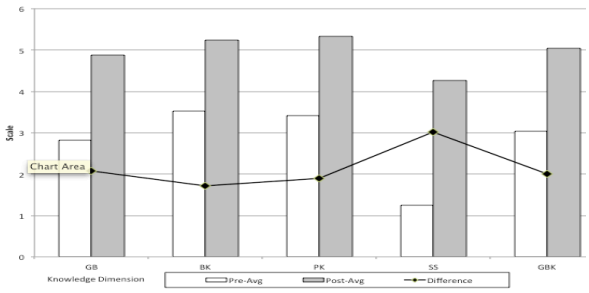

Figure 7. *Full Study Australian students – Pre, Post and Average Scores*

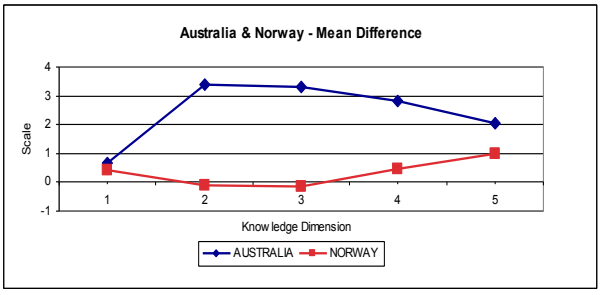

Figure 8. *Pilot Study Australian and Norwegian students – Mean Difference Scores*

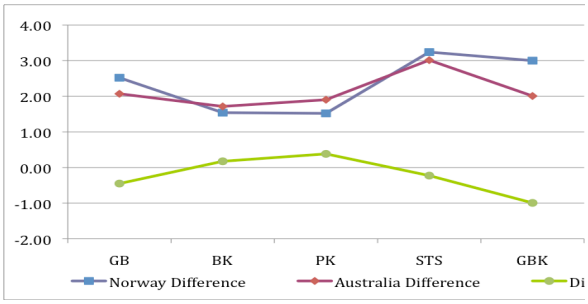

Figure 9. *Full Study Australian and Norwegian students – Mean Difference Scores (and Difference Delta)*

The figures above show that the discrepancy between the learning in Norway and Australia has now been eliminated. The perceived learning of knowledge and skills across the five dimensions are now very similar for the Norwegian students and the Australian students. 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 with the clarity of these concepts. The likely reasons are:

- 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 and purchase orders for transactions.
- 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 further problems when their roles as customers and vendors were reversed.
- The time lag also allowed such students to reflect more upon the problem at hand.
- The separation of tasks enforced by the distributed operations helped to clarify the processes and how they are integrated to complete the overall business process.

Finally, ERP systems generally support and automate standard business processes according to best practices developed over many years. This has the result that ERP systems implementations are generally rigid. On the other hand, contemporary businesses are experiencing increasing pressure to be more dynamic, to continually optimise their business processes, and shorten their lead-time between product releases in an increasingly global and highly competitive environment. An increased knowledge of how to utilize the broad functionality of ERP systems and map their functions to business needs is a crucial part of BPM. These exercises and the overall educational activity directly address this by 1) asking students to do hands-on operation of the business processes of selling and purchasing in an international setting using SAP, and 2) giving them experience in relating to an external business partner in another country in order to complete the inter-organisation global business processes.

7. Limitations and Recommendations

One of the limitations of this study is that there is no real control group or alternative pedagogical approach to which the differential learning as a result of using SAP and the inter-group international collaboration can be compared. Yes, the research has shown that students are learning with this curriculum and international collaboration but it is hard to judge whether similar results would have been achieved without the use of SAP and/or the inter-group international collaboration. Further, it would be better to have some objective measure of learning rather than relying on students' perception of their learning.

The sample size is now better (18 in Norway and 16 in Australia) but the research could still benefit from more data. As well, this paper was written before the students had completed their final examinations and thus it was not possible to compare actual student knowledge and skills with their perceived knowledge and skills. To this end again, it is not possible to judge their actual pre-course knowledge and skills. A future study could perhaps have the students sit a practical and written examination prior to taking the course. It is unlikely, though, that students would be keen to do this, i.e. to demonstrate their lack of knowledge and skills.

8. Conclusion

We have explained how the globalization trend in business creates a growing demand for knowledge of business processes and business process management in an international context. We address this need by creating a new and innovative educational activity that is professionally oriented and of international character with both practical hands-on experience as well as theoretical instruction. We have completed a revised set of exercises that were tested by inter-university partners in Australia and Norway. Changes were made as a result of the pilot study and a full-scale study was undertaken. In particular, the exercises were enhanced and amended and only one survey was taken at the end of the course asking students to report on both pre-course and post-course knowledge and skills. Our experience from running the educational activity was that students had to understand both how to do the exact business processes in SAP and how to manage their business processes. The students now

report a considerable perceived knowledge and skill gain in all knowledge dimensions, including process knowledge. 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. We believe this experiential learning approach thus shows considerable potential for teaching Information Systems students about business processes, particularly global business processes, business process management, and the ERP systems that operationalize these processes. Finally, this research provides additional support for the reliability of the measures developed by Seethamraja (2007) and Cronan et al (2008).

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.

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

Antonucci, Y. L., Corbitt, G., Stewart, G. and Harris, A. L. (2004) 'Enterprise systems education: where are we? Where are we going?', Journal of Information Systems Education, 15(3), 227-234.

Bandara, W., Chand, D. R., Chircu, A. M., Hintringer, S., Karagiannis, D., Recker, J. C., van Rensburg, A., Usoff, C. and Welke, R. J. (2010) 'Business process management education in academia: Status, challenges, and recommendations', Communications of the Association for Information Systems, 27, 743-776.

Boyle, T. A. and Strong, S. E. (2006) 'Skill requirements of ERP graduates', Journal of Information Systems Education, 17(4), 403.

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.

Delavari, H., Bandara, W., Marjanovic, O. and Mathiesen, P. "Business Process Management (BPM) Education in Australia: A Critical Review Based on Content Analysis", Business Process Management (BPM), 1, 1-2010.

e-Skills Demand (2009), "e-Skills Demand Developments and Challenges," Sectoral e-Business Watch Study Report No. 05/2009. http://www.ebusiness-watch.org/studies/special_topics/2009/documents/FR05-2009_eSkills.pdf

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.
Jæger, B., Rudra, A., Aitken, A., Chang, V. and Helgheim, B. (2010).Teaching Business Process Concepts Using Enterprise Systems in a Globalized Context. HICSS-43: Hawaii International Conference on System Sciences, Kauai, Hawaii, Jan 4-8, 2010.
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.
Pawlowski, J.M., Schrader, H., Khatami, P., Adelsberger, H.H. 2008. “The Globalization Technology Competency Framework for the knowledge worker – an E-Learning Program for Enterprise resource Planning.” European e-skills Conference, Thessaloniki, Oct. 2008.
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.
Rudra, A., Jaeger, B., Aitken, A., Chang, V. and Helgheim, B. (2011) 'Virtual Team Role Play Using Second Life for Teaching Business Process Concepts', in HICSS-44: Hawaii International Conference on System Sciences, Kauai, Hawaii, Jan 4-8, 2011, 1-8.
Virtual Team Role Play Using Second Life for Teaching Business Process Concepts. Accepted for publication at HICSS-44: Hawaii International Conference on System Sciences, Kauai, Hawaii, Jan 4-7, 2011.
Sankar, C. S. And Rau, K-H., 2006. “Implementation Strategies for SAP R/3 in a Multinational Organization. Lessons from a Real-World Case Study”, Cybertech Publishing.
SAP Spectrum, 2009, Serving Global Markets Locally, SAP Spectrum Magazine http://www.spectrum.sap.info/magazine/2009_03_sap_spectrum_en_screen.pdf
SAP Cockpit, 2008. Retrieved 15 June, 2009, from - http://help.sap.com/saphelp_gts71/helpdata/en/03/323a426ea5b26be10000000a155106/content.htm
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
SAP UAP. 2008. Education Programs, SAP University Alliances, Retrieved 15 June, 2009, from http://www.sap.com/about/citizenship/education/universityalliances.epx
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
Targowski, A., S. and Tarn, J., M. 2007. “Enterprise Systems Education in the 21st Century”, Information Science Publishing, Idea Group.
Topi, H., Valacich, J. S., Wright, R. T., Kaiser, K., Nunamaker Jr, J. F., Sipior, J. C. and de Vreede, G. J. (2010) 'IS 2010: curriculum guidelines for undergraduate degree programs in information systems', Communications of the Association for Information Systems, 26(1), 18.
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.