Exploring Process, Enterprise Integration and E-business Concepts in the Classroom: The Case of petPRO

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ABSTRACT

This paper highlights recent curriculum innovations that have occurred in Introduction to Information Systems, a required second-year course for all students completing an undergraduate degree in business or a business minor at the Sprott School of Business, Carleton University. The goal of this course is to highlight the role of technology in business today with particular focuses on enterprise integration and enterprise systems, management decision making in a process-oriented data-driven organization, and the transformation to e-business. The concepts are introduced in lecture and are then brought to life through active learning activities as the students become a company (petPRO) and work in groups to simulate the concepts they have learned. At a second-year level, students have neither encountered all of the functional areas of a business, nor have they seen the interplay among the functions. Through the simulated company experience, students come to appreciate what all the business functions are, and they experience some of the challenges a firm goes through on the road to becoming an integrated, e-business enterprise. Hands-on technology components such as the development of a corporate intranet, a data sharing assignment, execution of the procurement process in SAP, and the course website itself all provide additional mechanisms to bring the concepts to life.

Keywords: enterprise system, active learning, simulation, process, management decision-making, e-business

1. INTRODUCTION

While business schools generally remain functionally oriented, the reality of business today requires an enterprise-level, cross-functional process perspective for effective management decision-making (Hammer and Stanton, 1999; Keen, 2001: Khalakota and Robinson, 2001). At the same time, information technology is no longer the sole purview of the Information Systems function. Business leaders from each function must have a basic understanding of the information technologies being employed in the organization. A quick scan across teaching related literature for various business functions such as marketing, accounting, and operations finds calls to incorporate discussions of enterprise-level concepts such as enterprise resource planning into the curriculum (Boykin and Martz, 2004; Noguera and Watson, 2004; Shoemaker, 2003; Shtub, 2001; Wygal and Harman, 2003). Conversely, IS professionals need to have an appreciation of the various business functions and have an ability to interpret business problems and develop appropriate technical solutions (Noll and Wilkins, 2002).

The implication for the students is that, regardless of which function they choose to focus on in their business school academic career, they must then be able to weave together the functional orientation of the firm with an overlay of integration. The integration occurs through cross-functional processes, information flows, and information technology. One of the modes of bringing these concepts of enterprise integration and e-business to the classroom has been through the introduction of enterprise systems, also referred to as enterprise resource planning systems (ERP). Through programs like the SAP University Alliance, universities world-wide are creating an environment in which students can use an e-enabled enterprise system like SAP R/3 to learn some of the enterprise and process concepts.

A number of papers have been written that give examples of innovative ways of using enterprise systems in the classroom. Shtub (2001) for example, presents a methodology for teaching processes along with a special training aid called the Operations Trainer that "simulates the entire order fulfillment process from customer orders to the purchasing of raw material. Four interconnected functional areas are presented." (p. 569). The focus is on

the traditional management of operations in a functional organization with process and advanced information systems being emphasized. Another example is an industry-oriented initiative developed in Australia (Stewart and Rosemann, 2001). Working with an industry partner, business and information technology graduate students develop an ERP-related reference process model of an actual business. "This project allows students to understand common business functions and appreciate a process view of organizations." (p.240)

This paper adds to this body of literature by describing the case of a particular innovation in a second year Introduction to Information Systems course. Using a variety of active learning strategies encompassed in a simulated company experience, students come to appreciate what all the business functions are, and they experience some of the challenges a firm goes through on the road to becoming an integrated, process-based e-business enterprise. Hands-on technology components such as the development of a corporate intranet, a data sharing assignment, execution of the procurement process in SAP, and the course website itself all provide additional mechanisms to bring the concepts to life.

2. COURSE BACKGROUND

2.1 University Context
The Sprott School of Business at Carleton University has embarked on introducing enterprise integration and e-business concepts into the classroom. The School uses a broad-based definition of e-business - one that emphasizes that e-business is as much about business process and management practice as it is about technology. The definition includes the notion of an integrated enterprise, linked with its customers and suppliers, and with the ability to manage processes and information flows through the use of enterprise systems and internet-based technology.

Important in the School's approach to e-business is recognition of the need to think cross-functionally. Integration cannot take place if the perspective remains one of functional silos. This is not to say that the standard functions of business such as Marketing, Human Resources, Production, etc. will disappear. Rather, from a curriculum standpoint, the goal is to have the students appreciate both the functional perspective and the interdependence and interaction which take place across functions in order to complete the core business processes of an organization.

At the undergraduate level, this goal has been particularly challenging given the limited knowledge the students have of the various business functions. By the time students graduate, they are expected to have some depth of knowledge in a particular function such as Accounting or Information Systems and it is expected that they will have touched all of the business functions through their required courses. Students in first and second year, however, have had an introduction to only a few of the traditional business functions. These students have little foundation to

appreciate the complexity of decision-making, data-sharing, and interdependence among the functions required to manage a cross-functional process such as customer-order fulfillment. It becomes critical to provide the students not only the enterprise and process related concepts, but a context in which to explore them. Providing that context is the focus of the curriculum innovation discussed in this paper.

2.2 Course Objectives
Introduction to Information Systems (often referred to as the 'Intro MIS Course' in other universities) is a required second-year course for all students completing an undergraduate degree in business or a business minor. This translates to a broad range of students with interests in a diverse set of business functions, as well as students from such disciplines as Economics, Engineering, and Computer Science. (Prior to this course students have taken an introductory programming course that uses VB.Net.) The course runs for one semester of 13 weeks. Approximately 600 students a year take the course in sections varying in size from sixty to seventy students each. This undergraduate business program core course serves as a building block for upper-level courses in all functional areas of the business school.

As an introductory course, the range of topics covered is very broad. The goal is not depth in a particular IS topic, but rather breadth across a range of IS related topics that reflect the use of information systems technology in business. Topics include but are not limited to: enterprise and functional systems; networks and telecommunications; databases and data enhanced decision-making; e-commerce and Internet technologies; business processes; and systems development and management. The overall learning objectives of the course include:

- Understanding the integrated enterprise
  - o Cross functional business processes
  - o Value chain and extending the enterprise
- Understanding the role of information technology in an integrated enterprise
  - o Introduction to information technologies used in business today
  - o Data-based management decision-making
  - o Cross-functional information flows
- Exploring the application of information technology in a realistic enterprise simulation

A number of different textbooks have been used over the life of this course. (The textbook changes every 1.5 to 2 years.) Consequently the company simulation described herein has been designed such that it is textbook independent. When a new textbook is being chosen for the course, it is evaluated on its ability to support the simulation and the overall course objectives via its coverage of e-business, enterprise systems, process, databases, and data-based decision making. These topics are then covered at the appropriate time in the lectures to coincide with the activities underway in the company simulation. Generally speaking, the textbook is chosen from the suite of available

Introduction to Information Systems offered by the various book publishers.

2.3 Active Learning Strategies

One of the teaching challenges faced in this course is the broad range of student participants. As mentioned previously, students can come from a variety of disciplines or faculties within the university (e.g. Engineering, Journalism, Computer Science, Business, etc.) In addition, while the course is first offered to students with second-year standing, students may delay taking the course until their fourth (and final) year of study. Cultural and gender diversity are also in evidence in the student base.

Anderson and Adams (1992) discuss the possible range of learning styles present in a diverse student population and the implications of that diversity for instructional design. Their general recommendation is to "maximize the climate or conditions for learning in the classroom through the deliberate use of instructional design principles that take account of learning differences" (p. 20.) Active learning, in which students are substantially involved in the course content, has been found to be an effective instructional approach to address a broad range of learning styles (Meyers and Jones, 1993; Cameron, 1999.)

Given the mix of the students' academic and cultural backgrounds and given an appreciation of the different learning styles present in the group of students taking this course, an active learning strategy was employed to support the course objectives. Meyers and Jones (1993) outline the building blocks of active learning as talking and listening, writing, reading, and reflecting. They advocate using these building blocks in a range of active learning strategies such as employing small groups, case studies, cooperative work and simulations. Each of these strategies has been incorporated into the petPRO company simulation and is described in more detail below.

3. CURRICULUM INNOVATION

3.1 petPRO

While the concepts such as enterprise systems, process, and e-business have been covered in this intro course for a number of years, there was a desire to create some mechanism to bring these concepts to life for the students. Telling the students that it is difficult to share data across the organization carries little significance. The goal of the curriculum innovation was to bring a business and all its complexity to the classroom so that, through a simulation, the students could at least, in part, experience some of the dynamics of a business as it tried to transform itself into an integrated e-business enterprise. Early innovation focused on introducing enterprise concepts. More recent innovations have focused on enhancing the business simulation elements and on providing more hands-on technology components, in particular the use of SAP's R/3. See Hajnal and Riordan (2002) for an introduction to the early stages of the curriculum innovation path.

In the first class meeting, students are introduced to petPRO and are welcomed as employees in the company. (The launch point for this portion of the course website can be found at http://busxt01.carleton.ca/petpro/petpro.) All sections of the course run as their own company, though the basic company is the same for each section. petPRO is a manufacturing firm producing and selling various brands of pet food for cats and dogs as well as branding 3rd party pet-related products such as dog collars and leashes. The organization chart is shared with the students along with background on the history of the company and the products it manufactures. At this beginning stage, the firm does not do e-commerce, nor does it have an enterprise system. The instructor (CEO of the firm) is the most senior person in the organization. Below the instructor are two levels of hierarchy – a Senior Management Group (SMG) and a series of functional area groups. In week two, the students are randomly assigned to one of the groups, with the exception of a group of five volunteers solicited for the SMG. In total, 14 groups are created (Senior Management Group plus thirteen functional area groups).

Table 1 outlines the organizational structure of petPRO and the various groups within the organization. The organizational structure was chosen purposefully to reflect a process-oriented organization. For example, the Vice Presidents (VP) of Customer Relationship Management and Supply Chain Management reflect the primary, core processes of customer order fulfillment and procurement. The other VPs represent support oriented roles or secondary processes defined in models such as Porter's value chain (1985).

The potential for overlap in the definition of these functional areas is purposeful as one of the first exercises the students do when they get into their functional area group is to define the roles and responsibilities and core processes of the function. As students share how they have defined their function, overlaps in responsibilities are highlighted and the students are asked to reflect on what types of problems and benefits they think that might mean for the company.

Table 1. petPRO Organizational Structure

Senior Management Group	Associated Functional Area Groups
VP CRM (Customer Relationship Management)	Marketing/Advertising Customer Service Sales Operations
VP Finance	Accounting/Finance Legal/Government Relations
VP Internal Support	IS/Telecomm/Datacom HR/Training
VP Operations	Research and Development Manufacturing Quality Control/Testing
VP SCM (Supply Chain Management)	Procurement Shipping, Receiving & Warehousing Logistics

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3.2 Assignments and Classroom Activities

Table 2 outlines the series of activities that are covered over the course of the semester. The order of the list of activities reflects the order in which they are covered during the semester. In addition, the sequence walks the students through a progression of understanding first their individual functions followed by the interdependence among their functions (process-perspective). Given this interdependence, the next step is an introduction to the complexity of trying to make business decisions and share data using the rather crude method of Access databases and a corporate intranet site. While the students are generally impressed when all the pieces come together for this portion of the course, it is not uncommon for them to comment on how ineffective and inefficient that approach to data sharing seems to be.

In the final elements of the course, having now experienced frustration with trying to share information in an organization, the students are introduced to a new paradigm for information sharing and decision-making. Through the procurement process activity, the students are introduced to an enterprise system (SAP). They explore data sharing and information flows in the context of a cross-functional process and begin to appreciate the value of an enterprise strategy.

Each activity undertaken by the students is described briefly in table 2 along with the outputs expected from that activity. The activity may take place directly and entirely within the time allotted in a weekly class or it may require the students to follow-up outside of class either as a group assignment or in the labs. (See the table for specific indicators of C – in class, A – assignment, L – in lab, for each activity.)

Each section meets once a week for three hours. In most weekly sessions the first half of the class is spent covering the concepts in the textbook for that particular week. The second half of the session involves what is fondly referred to as a 'group hug'. During the group hug, students work in their groups on the activity at hand. The activity may require them to interface with other groups, including the senior management group (SMG). The groups may or may not do a brief report-out in that same week of what they have worked on in their group. Report-outs involve a brief two or three minute improvised presentation to the whole class of what the group has discussed and concluded during the classroom activity.

As part of the ongoing curriculum innovation, one of the most recently incorporated activities is the creation of a group portfolio. In the past there was no way to capture the discussion that occurred within the group hugs other than by the brief report-outs that occurred during class time. The purpose of the portfolio is to have a group log its 'group hug' discussions and in so doing, provide a mechanism to demonstrate how its understanding of its own function has progressed or changed over the course of the semester. The group hugs are logged online and are incorporated (hyperlinked) into the appropriate functional area website, which are visible to all members of the class. At the beginning of the semester, each functional area group identifies what it believes to be its roles and responsibilities within petPRO. As the groups start hearing more about the different functions and gain a process perspective, it is not uncommon for them to make changes to their roles and responsibilities.

Twice during the semester an announcement is made from the Executive Suite (the instructor) describing changes in the company direction. In the first, it is announced that petPRO will embrace e-commerce and start selling their products online. At the same time, the company is going to install an enterprise system. In their functional area group, students are asked to explore the impact of this announcement on their respective function. While the reality of the complexity of these types of changes on the organization is beyond the scope of the class, students come to appreciate that management decisions can and do have an impact on the whole organization and that the decisions have both technology and process implications.

The second announcement involves petPRO being bought by Nestlé. As background to the discussion, students read a CIO magazine article (Worthen, 2002) that describes the challenges encountered by Nestlé in their enterprise system implementation. The students are asked to consider the challenges and whether merging petPRO and Nestlé would be subject to the same. The case re-enforces the exploration of both business and technical aspects of technology implementation. Shared data definitions for enhanced decision-making are also explored through this second announcement.

The most intricate of the simulation activities is the database exercise. This exercise is designed to highlight the difficulties of sharing data between functional areas in a large organization. In this assignment each functional area group is required to request a meaningful set of data from three other arbitrarily designated 'partner' groups. The students are instructed to consider what types of business decisions they might need to make within the context of their business function. They should then consider what data would be helpful in making that decision and request those data from the appropriate function which 'owns' that data. The Marketing and Sales group, for example, might ask the Shipping, Receiving and Warehousing group to report on current inventory levels of various products. The data-owners group (Shipping, Receiving and Warehousing in the example) then creates a fictional set of data in a series of Access tables to answer the question. They must also write a set of queries in Access in order to answer the question posed by their partner function in a meaningful way.

A set of required tables must also be produced by each functional area group. These include tables such as a security table that specifies which partner functional areas group has access to which data tables and queries.

Table 2. The Series of Activities Used to Simulate the Complexity of Processes and Data Based Decision-making in a Firm Transforming Itself to an Integrated E-business Enterprise.

petPRO Simulation Activities C/A/L*	Description/Objective	Outputs
Creation of Organization C	Provide context of organization.	Put students into functional area groups including a senior management group.
Function's Work System Definition C+A	Each functional area group is asked to define the roles and responsibilities for their respective groups. The definitions are to include a description of the basic data that the group would create, who their customers are, what technology they would use, and what their main functional processes are. Roles are defined as 'in-silo' activities, whereas responsibilities are defined as 'process-based' involvement.	Students get started in class and then in the next week are asked to make a brief (5 minute) presentation on the definitions they have derived for their function.
Corporate Intranet C+A	Creation of a corporate intranet with a common look and feel. Once developed, the intranet site is intended to be a source of information for the students as they undertake later assignments that require knowing who does what in the organization. http://busxt01.carleton.ca/petpro/petpro	Functional Area Group Web sites (FAWS) linked into an intranet. Websites to include a mission statement of function along with main roles and products or services of function. Individual employee web sites (EWS) also included. Presentation of websites by respective functional groups.
New Corporate Strategy C	Twice during the semester an announcement is made from the Executive Suite (instructor) describing decisions about change in company direction. Scenario 1: petPRO is going "e". The firm is now going to develop e-commerce capabilities, redesign processes, and install an enterprise system. Scenario 2: merger with Nestlé.	Brief (2-3 minute) in-class presentation from each functional area group of what impact they perceive the recent announcement will have on their function. For scenario 2, students first read a case describing Nestlé and its SAP implementation.
Identifying and Sharing Business Data for Management Decision Making C	To demonstrate the complexity of management decision-making and enterprise data, each functional area group identifies the business data they would own. They also identify which functional area groups would most likely request data from them and which functional area groups they would most likely request data from. In all instances, examples of the data are to be supplied.	Brief (2-3 minute) presentation from each functional area group of which other functional groups they would likely go to for data to run their operations effectively and which groups would likely come to them for data. All functional groups are listed on the board. As the groups report-out, arrows are drawn between the groups to represent the sharing of data. The result is a messy spaghetti chart. It is pointed out that this 'mess' involves only internal lines of communication. External communication is an equally daunting challenge.
Database & Data Exchange Development A+C	Exploring directly sharing data and creating databases. Involves first understanding and identifying what types of decisions would be made within a particular function and then what data would support that decision.	Using Access, students create data tables and queries to answer business decision questions posed of their function by three other functions. Students create a set of internal tables (for their function) as well as external tables that are based on requests for data from 3 other functional area groups.
Procurement Process (SAP) C+L	Experience data sharing in an integrated enterprise environment via executing the procurement process in SAP.	Students create vendors and material masters, purchase orders, etc. They then view the data/transaction from several functional perspectives via different modules of SAP.
Future Directions / Technology Evaluation Template A+C	Reflecting back on the semester, each functional area group is asked to identify what they believe are the important criteria to assess (evaluation template) when deciding to implement a new information technology.	Students choose a technology that they believe could be of value for their function. They then use their evaluation template and make a recommendation regarding implementation. Five minute prepared

		presentation from each functional area group.
Group Portfolio C+A	To explore how the understanding of their function and the role it plays in the enterprise has progressed over the semester.	After each classroom discussion session, each functional area group is asked to capture their groups discussion on their functional area group website.

* C = Classroom, A = Assignment, L = Lab

Once the databases are received, the instructor imports all the data from the individual databases using a set of routines that rely on the specific format of the student databases. The result is a master database that serves as the backend to an intranet site, and allows function-based access to the data that each group has been allowed to see. An individual student logs into the petPRO 'intranet' website using their student number. The website has embedded logic that allows it to determine of which functional area group a student is a member, and then goes about creating an environment for the student, driven by their group membership. In the specific student's environment they see only the data they are allowed to see, based on the permissions that were set as part of the database assignment. So the Marketing and Sales Group would only be able to see the data that have been explicitly exposed to them by their partner functional area group through the permission table.

3.3 Course Website
The discussion of the curriculum innovation has made reference to a corporate intranet for petPRO. This intranet is an integral part of the learning experience for the students. The course website system not only allows fully granular administration of the various entry, exit and temporal points of the course system, but also serves as a teaching tool by putting into practice many of the core concepts of both an integrated enterprise and, more generally, information systems in business.

Table 3 outlines the functionality, organized by view, provided by the course website. The student view consists of a traditional repository of course material (syllabus, PowerPoint presentations, detailed assignment descriptions, marking criteria and support material) as well as common schedules and dates. In addition, a layered approach allows for increasing specificity in information delivery. Upon arrival at the course website, students are required to select their section of the course.

The system then delivers section-specific information (such as news items and class schedules).

The next level of information delivery is provided by the student logging into 'My Page' using their student number and a password of their choosing. Here, students can view their individual and group grades, along with instructor feedback on assignments at the individual and group level. Moreover, My Page acts as a portal to various other functions such as assignment submission, group contact information, peer evaluation and the mentoring system (students can volunteer to help others with the technical

aspects of the course in exchange for a minimal 'bonus' mark). Finally, My Page allows access to the Portfolio updates that are required as a component of in-class 'Group Hugs.' All individual and group assignment submissions eventually become part of the petPRO view, described below.

The petPRO site functions as a corporate intranet. The basic shell is always there, and can be browsed at any time. This view furnishes basic corporate information and provides a look and feel against which students are expected to design their individual and group content. Product information and corporate logos and graphics are available here. Students are expected to 'brand' their own individual (EWS) and group (FAWS) sites using these style components. Finally, a news page provides timed announcements for the various milestones in petPRO's metamorphosis from traditional manufacturer to e-tailer, corresponding with course content. If, however, students first log into My Page and select to browse petPRO from a link provided on that page, their authentication information is passed to petPRO and the system is able to provide richer content. This content is comprised of two components: 1) the individual and functional group information sharing subsystem, and 2) the data sharing subsystem. The individual and group subsystem is made up of the Employee Website (EWS) and Functional Area Website (FAWS). Every EWS is expected to adhere to corporate look & feel, and must provide links to their respective FAWS, to other FAWS under the same Senior Manager and to the petPRO website (home). The FAWS component provides information at the group level, and acts as a cumulative repository for assignment submissions. Since the students are required to publish their EWS, FAWS and other assignments to known locations on the school's servers, the petPRO corporate intranet actually builds itself as students fill in the content. Ultimately, each student in each section can find contact and role information for any other student and/or group in their respective class (but not to other sections of the course as entry is controlled by their student number). This provides the basis for the data sharing component described below.

The data sharing component is made up of the results of the database assignment (described earlier). Upon validated entry (from My Page), students are allowed to see information provided to them by their partner functional groups. A mechanism to evaluate the efforts of their partners in furnishing the requested information is also provided here. This peer evaluation functions as a component of the group database assignment mark. The method by which the students' Access databases are uploaded to SQL Server is still somewhat mechanical owing to limitations in the respective software and given

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that students don't always follow the standards set out for them in the assignment guidelines. Any deviation from the requirements throws an exception in the upload process, necessitating manual intervention. Efforts are underway to fully automate this process.

Table 3. Different Functionality and Views Provided in the Course Website.

View	Functionality
Student view Entry point to course	1) Public elements of site including course and assignment descriptions, news items, overheads, and lab information. 2) "My Page" – private access point for students to review grades, receive feedback, connect to their group, and launch corporate intranet.
petPRO view Corporate Intranet	1) Functional Area Group Websites (FAWS) - including portfolio updates 2) Employee Websites (EWS) 3) Data sharing 4) Corporate announcements
Administrative view Course management tools for instructors and teaching assistants (subset only).	1) Grade management 2) Group management 3) Reporting 4) Website management

The Administrative View is by far the most complex of the three systems. Here, all aspects of individual, group and class information are managed. Student and group grades are stored in the SQL Server backend. More complex aspects of grade assignment (such as peer evaluation weights) are handled in code. Course teaching assistants (TAs) have password-protected access to a small subset of the marks administration system, allowing them to enter and maintain marks for tests and assignments for which they have grading responsibility. Fully granular access to all aspects of a student's grades is provided to the instructor. On-the-fly Excel spreadsheets for class and grade reporting are available only to the instructor.

Various mechanisms for providing feedback and news to individuals, groups, classes or the entire semester cohort are available in the administrative system. Such information can appear in any view, as targeted by the instructor. Templates for grading in-class exercises are also provided, but marks captured from these remains a paper-based process. Testing of a wireless system for recording grades and comments is in progress.

The majority of the system was written in Microsoft Active Server Pages (ASP). New development is being done in ASP.Net. Originally, the database backend was provided by MS Access, but the entire backend has been migrated to SQL Server. Much of the administrative functionality is provided by stored procedures in SQL Server. Frontend maintenance for the legacy ASP pages is affected in MS FrontPage, while new development is done in Visual Studio 2003 (using VB.Net as the language).

3.4 Active Learning Revisited
Table 4 below highlights several of the active learning strategies identified by Meyers and Jones (1993) that incorporate the building blocks of active learning: talking and listening; writing; reading; and reflecting. The activities encompassed in the petPRO company simulation are mapped to these active learning strategies to demonstrate that the simulation not only actively engages students, but that it also incorporates a broad range of strategies to fit with the needs of a diverse group of students. While several of the petPRO activities can be classified under multiple active learning strategies, the main emphasis of the activity from an instructional standpoint is indicated in the table.

Table 4. Active Learning Strategies Employed in petPRO Company Simulation

Strategy	petPRO activity
small groups	• group hugs (bi-weekly report-outs in class) • first corporate strategy (e-commerce and enterprise system)
cooperative group project	• work system definition • functional area group website • database and data exchange • Technology evaluation template
case study	• second corporate strategy announcement (Nestlé merger)
simulation	• petPRO • corporate intranet and course website • procurement process (SAP)

4. CHALLENGES AND LIMITATIONS

The main challenge of making petPRO possible each semester is the administrative requirement of running the course. The administration includes both the face-to-face activities with the students along with the backend systems functionality associated with the course website.

On the student front, managing the groups and processing the assignments can require considerable instructor attention. Well-trained teaching assistants to run the labs for the hands-on components are also a must. The teaching

assistants have contributed considerably to the creation of documents, available through the course website, that serve as aids for each of the assignments.

The course is currently designed for sections of approximately 70 students. This may not be large enough to satisfy class sizes in other institutions. The simulation could be expanded to accommodate greater numbers of students through the addition of more functional areas groups. The current number of area groups is 14. A maximum of 16 area groups is suggested with no more than 6 students per group bringing the possible section size to 96. Beyond this size, the quick report-outs and coordination across groups would become unruly.

Conversely, if the section has considerably less than 70 students, it may require dropping one or more of the functional areas. This is however not recommended given the cross-functional core process orientation of much of the discussion. At the same time, the exercises are designed for groups of 4-6. Reducing the group size may result in a heavier than intended workload for the smaller number of students.

While this paper has described the specific case of petPRO, the company simulation is not limited to that organization. Other schools wishing to try this simulation in their classrooms can create their own company. Having multiple layers to the organizational structure along with representation of multiple functional areas are the key elements. It is possible to use a services-based organization, however the use of a manufacturing company generally lends itself well to the kinds of process discussions and examples provided in the textbooks. In addition, the materials supporting the SAP training database reflects a manufacturing company.

The company simulation can be run without the course website if certain technology elements are dropped. For example, the corporate intranet portion of the course website provides the engine for the data sharing across functions. Either a more manual approach would need to be taken or this element would need to be dropped without the website. Leaving the website elements out does represent a logical first step in implementing this innovation to the classroom. The introduction of a company, the group hugs, and the corporate strategy announcements can serve as valid starting points for bringing process, enterprise integration and e-business concepts to the classroom.

Assessment of learning outcomes is anecdotal at this point. Attendance has been a problem in this course in the past. The new format has resulted in near full attendance at all sessions. The level of activity in the classroom suggests that students are grasping the complex concepts. They get down to business in their group hugs and are very serious about the discussion. An increased level of sophistication in exam answers has been noted by the instructors. A typical exam question now asks students to compare and contrast the procurement process in petPRO before and after the implementation of an enterprise system. Students can also be asked to comment on the advantages and disadvantages of data-sharing using the Access based method versus an enterprise data-sharing environment such as that found in R/3.

5. FUTURE DIRECTIONS

While the data sharing activities and assignments of the course enable students to appreciate the complexity and interdependence of information flows in an enterprise situation, students continue to have a hard time determining which data their particular function owns and what type of business decisions might be related to their particular function. Curriculum innovation for the future will be directed towards enhancing this management decision-making element of the course by introducing students to corporate performance management tools such as the business intelligence software from Cognos. Schools already using SAP could consider the use of mySAP, ERP analytics products such as Strategic Enterprise Management (SEM) or the Business Warehouse (BW). These performance management systems sit on top of the enterprise application core and provide enhanced capability for analyzing and reporting on business data. Envisioned are assignments that require students to explore standard corporate reports appropriate for each functional area and then manipulate a datacube to drill-down into the numbers and understand which core processes are generating the data. An additional innovation being considered is a mid-stream reorganization (business process redesign) of functional area groups along process lines as the enterprise goes through its metamorphosis from a traditional manufacturer using traditional retail channels to the e-enabled enterprise.

Ongoing upgrades to the course website are planned as well. Currently the loading of the Access databases into the corporate intranet site requires a considerable amount of manual intervention. Automating this as much as possible will reduce some of the administrative load currently associated with the course. In addition, uses of the school's existing infrastructure to provide functional area chat and newsgroup capability are in the planning stage.

6. CONCLUSIONS

The management concepts behind e-business and enterprise systems are as important as the technologies associated with the concepts. Through the use of the petPRO simulation, second-year students get to know all the functions of an organization and they begin to see how the silos operate and how they need to interrelate with each other in order to accomplish core business processes. At the same time, students experience how technology can both help and hinder the flow of necessary information in an integrated environment.

Whether the student who has been a part of petPRO has plans to be a marketing manager, a procurement specialist

or a CIO, he or she leaves the course having an appreciation of the role a particular function plays in the enterprise and the role that data and information systems play in accomplishing the goals of any function.

7. REFERENCES

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