The Enterprise Resource Planning System In Support Of Business School Curriculum Integration

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Abstract

This paper describes the use of an actual midrange enterprise resource planning system (ERP) in a graduate-level accounting course to teach process integration issues. Students simulated a manufacturing ERP implementation by organizing themselves as an implementation team, developing an implementation plan, designing a simple product and product structures, populating the master records, and executing a system walk-through. Students also scripted core business processes and developed a demonstration of their implemented system for interested parties in the business school. The paper evaluates the mock implementation project and offers suggestions for enhancing the benefits from such pedagogy. The author also provides observations on the use of a midrange ERP solution in the business curriculum.

Introduction

⫟ wo major management interventions that have become dominant over the latter half of the 1990s are business process reengineering and enterprise resource planning systems (ERP). These closely related paradigms have gathered significant momentum in response to generally-held perceptions that organizations have become too rigid and departmentalized, creating functional boundaries that inhibit innovation, fragment processes, and disappoint customers. Reengineering advocates such as Hammer & Champy (1993) assert that the ineffectiveness of most organizational processes stems from a "division of labor" mentality held over from the industrial era. Traditional accounting systems have also reinforced natural organizational disincentives and the tendency toward "stovepipe" organizations by attemp-

Readers with comments or questions are encouraged to contact the author via e-mail.

ting to assess performance across artificial boundaries and arbitrary time periods (Elliott, 1992). Although hierarchical organizations were fashionable during the industrial era -- perhaps indispensable -- changes in global markets and information technology have forced organizations to re-examine their core processes and eliminate the fragmentation driven by over-specialization and boundary issues. Reengineering looks to eliminate process fragmentation, organize work around key business processes, and exploit the enabling technologies of modern information technology (IT) to link the core processes of the enterprise (Hammer & Champy, 1993).

The emergence of IT as a process enabler and integrator also deserves emphasis. Traditionally, the role of IT has been viewed as merely *supporting* the enterprise. However, in observing the most successful companies in to-

day's competitive corporate environment, it is becoming clear that the role of IT has shifted to that of *driving* the enterprise. Not only could most businesses not function without their information systems, but many organizations have no identity apart from their information systems (Jenson & Johnson, 1999). Enterprise resource planning systems represent the embodiment of process integration (reengineering) enforced by modern information technology. Larger organizations are now implementing these comprehensive enterprise systems to link their supply chains using a shared database and tightly integrated business processes.

The Case for an Integrated Business School Enterprise Systems Strategy

While business schools have recognized the above implications, the traditional business school curriculum remains largely at odds with the emerging integrative paradigm on at least two counts. First, the business curriculum is functionally aligned and integration is problematic. Second, business schools typically fall short of addressing the degree of information systems integration found within world-class organizations. The use of IT in the curriculum tends to be functionally oriented, contrived, and tangential to the concepts presented within each course.

In his seminal article *The Third Wave Breaks on the Shores of Accounting*, Robert K. Elliott (1992) predicted the impact of information technology on both accounting practice and education. With respect to IT impact on accounting education, Elliott wrote:

The new curriculum must integrate technology. Merely giving students PCs and having them learn word-processor and spread-sheet programs is insufficient to prepare them to enter third-wave companies. They need to learn how organizations can enhance the value they deliver to customers through networking. They need the experience of participating in a network. Courses in

a business school should be both complementary and integrative. How can the university give the students a wholehearted and convincing message that networked organizations can create more value for customers if it is locked into the stove-piped structure?

Nevertheless, some innovative approaches to accounting curriculum integration have emerged in response to Accounting Education Change Commission (AECC) initiatives. Brigham Young University reports success in integrating content within its junior-level curriculum across functional accounting areas. Content tends to be organized around business cycles rather than "balance sheet categories." Case materials cover multiple topical areas. Results to date suggest that students show an increased understanding of accounting issues from a number of perspectives (Albrecht, et al., 1994; American Accounting Association, 1999).

A number of recent alliances among universities and ERP vendors suggests that an emerging curriculum integration strategy for business schools may well mirror the integration strategies adopted by many large organizations – namely, using enterprise information systems technology as a chain to link and unify key business processes. Enterprise systems may provide the capability to link students and faculty across functional boundaries (Marsh, 1998). Proponents of ERP curriculum alliances suggest that students and faculty can potentially gain a greater appreciation of processes, flows of data, and conceptual views of the enterprise. Students are able to see the real-time impact of their actions on the rest of the enterprise and how they fit into the "big picture." Also, students and faculty gain experience with an actual state-of-the-art information system used by real-world organizations (Cole-Gomolski, 1998; King, 1997).

The Purpose of This Paper

The intent of this paper is to describe an

integrative mock enterprise systems implementation class project recently completed by students in the author's masters-level accounting information systems class. The course featured the use of a midrange ERP software package contributed and supported by a manufacturing software vendor. The author describes the project and methodology used by the students, evaluates student conduct and reactions, offers observations on the use of ERP software in instructional settings, and suggests possible research opportunities.

Project Objectives and Deliverables

The author designed the ERP project to provide an intensive hands-on implementation experience for students and to reinforce many integrative accounting information systems concepts covered within the theoretical content areas. The objectives were to provide students with an opportunity to:

- Better understand the core business processes and their organizational linkages.
- Gain confidence in managing large-scale projects.
- Improve information systems problem solving skills.
- Develop team and interpersonal skills.
- Develop improved communication and documentation skills.
- Improve professional conduct and interaction.
- Develop a working understanding of manufacturing environments.

Processes and Linkages. Students enrolled in the course had previous exposure to business cycles as part of an undergraduate accounting information systems class, a required course in their accounting core. Most students had also had some experience with a small-business integrated accounting software as part of the course. Nevertheless, the author believed that a meaningful hands-on experience with the enterprise system would reinforce these exposures by illustrating the tight linkages enforced by the ERP software. It was hoped that students would learn answers to questions such as:

- Where does this data originate?
- Who is affected downstream by my activities?
- How are these processes linked?

Problem Solving Skills. The project provided significant challenges for both the instructor and the students. Students were required to work through intentionally vague project specifications, team organizational and communications issues, network issues, system security and control issues, and process linkage issues in order to arrive at a deliverable solution. During the course of their business school experience, students have the opportunity study many the significant management theories, analytical tools, systems methodologies, and emerging technologies. However, they seldom have the opportunity to apply these problem solving tools within a realistic setting. The ERP system provides a highly realistic platform within which students can integrate their newly-acquired business knowledge and do it within the context of modern information technology.

Team and Interpersonal Skills. Although the author was present during many of the team activities, the project was directed by two student project coordinators and several functional team leaders. The author acted mainly in the role of outside consultant and spent considerable time observing team activities. While the author would frequently render assistance directly to the team members, he preferred to work through the student coordinators and team leaders, thus providing more opportunity for leadership development.

Communication and Documentation Skills. One of the key activities in most ERP implementations is the development of process documentation (some times process scripting) to guide system users through the processes implemented within the new ERP software. Indeed, this was one of the deliverables of this team project. The scripts to be developed by the implementation team were to be a guide for future students who would access the system. The project deliverables also specified that the team

would prepare a presentation to interested parties in the college describing their methodology and demonstrating the features of the ERP system they had helped to implement. Both activities, it was thought, would motivate students toward the deeper understanding of the system required to develop documentation and presentations for others.

Professional Conduct. The project was designed to emphasize a professional working environment as similar as possible to a "big-five" accounting and consulting firm. It was hoped that the project would encourage leadership, teamwork, professional attitudes and personal accountability. Students were expected to interact with their project coordinators, team leaders, and "client" as they would envision such interaction in the real-world. Students were warned of the various challenges facing them during the project and that they were expected to face these challenges (and inherent frustrations) in a mature and professional manner.

Increased Manufacturing Understanding. Students in the course were required to take both an operations management and a production class as part of their undergraduate business core. However, their previous manufacturing exposure did not include hands-on experience with real-world manufacturing software. Because the featured ERP software was built around a manufacturing environment, it included a rich set of features with which to expose students to issues such as materials requirement planning, procurement, and inventory management as well as more traditional accounting features.

At the outset of the project, the author/instructor emphasized to the students that an ERP implementation plan needs to set forth the *deliverables* (i.e., the product that will be delivered at the end of the implementation process). At this point, the following were suggested to the students as possible project deliverables:

- An operational demonstration system.
- A business case (customers, vendors, processes,

transactions).
- Populated master records.
- Documentation for key business processes (scripts).
- Custom menus for a more user-friendly WinMan environment.
- Demo and presentation for interested COB parties.

The author's main objective with respect to project deliverables was to produce a simple, yet fully functional implementation of the ERP system for undergraduate students to experiment with. This implemented system would contain populated master files (customers, vendors, products, product structures, etc.) that would allow less-experienced students a quicker start with the system. Also important as a deliverable was the documentation of the system (process scripting) that would help in training new users of the software.

Conduct of the Implementation Project

The class, consisting of 14 graduate students, representing both accounting and MBA graduate programs, elected the team leader and associate team leader after nominees were interviewed publicly (in open classroom session). At this point, the newly elected team leader led the class in a discussion to clarify the project objectives, select a product and project environment, and organize the class into functional teams. The class elected to conduct the project in a pre-fabricated utility shed manufacturing environment. After selecting the company environment and product, the project leader facilitated the organization of the students into the following functional teams: sales and marketing, engineering, materials management, manufacturing, and accounting. Each team designated a team leader to interface with the project leader.

The author turned over copies of the ERP documentation to the project leader for appropriate dissemination to the various functional teams. The author advised the class to adapt the vendor's recommended implementation plan pro-

vided in the documentation. For example, the vendor's sample implementation plan called for:

- A kickoff session to determine the information needed
- The development of an implementation plan
- Installation of the software on the network
- Initial data conversion training
- Initial training
- Advanced training
- Going live
- Specification of customizations
- Customization of programs
- Special reports

Because the class was taught in a four-week accelerated summer term, several adaptations and simplifications were obviously required. For example, the students did not participate in the actual installation of the software. Rather, it was installed by the vendor's consultant several weeks prior to the start of the semester. Also, the students developed their own case data from scratch; there was no existing company data to convert. Nevertheless, students were briefly instructed on the significance of the data conversion process and the tools provided within the software to assist with it. The implementation plan eventually evolved to include the following activities:

- Basic training (system overview)
- Data preparation / conversion
- Process modeling / scripting
- Live walk-through
- Presentation to interested COB parties
- Post-implementation review

Basic Training. All student teams were given the same basic training, an integrated tutorial provided by the vendor and demonstrated by the author. The tutorial led students through core processes supported by the software, including order-entry, materials requirements planning, procurement, manufacturing, shipping and billing. The training database provided by the vendor was populated with the master records needed to complete the tutorial. However, once basic training was completed, the author

loaded an "empty" database instance onto the server. This provided the students with an implementation environment somewhat comparable to real-world projects. That is, the students had two database instances at their disposal – the "training instance" and the "live instance" they were implementing. Students could experiment with the training system before they introduced new changes into the live system.

Data Preparation/Conversion. After basic training, the functional teams went to work to develop the master data required to support their respective processes. Initially, the engineering team developed a simplified product design and entered the product structure into the ERP system. This required the cooperation of the materials management team in order to establish the materials master file. Materials management proceeded to develop vendor master records, and each team proceeded to develop and populate the database with appropriate master records.

Process Modeling and Scripting. As part of the system deliverables, the functional teams were required to gain a detailed understanding of the core processes so that they could prepare process models and scripts that would facilitate future training and systems operations. The teams developed scripts consisting of process overviews and included appropriate procedures, diagrams, and graphics to guide the user through the various core processes.

Live Walk-through. Having completed their data conversion and process modeling phases, the student team was prepared to conduct its live walk-through together as a team. This consisted of following various integrative transactions through the system to determine if the system had been configured properly and noting the integrative impact of the transactions on each functional process area.

Presentation and Post-implementation Review. The project team presented its results in the final class session. In addition to the project

team and the author, five additional faculty members from the college of business were in attendance. This session consisted of a project overview, a demonstration of the ERP software itself, and a post-implementation review. Students also completed a brief post-implementation review questionnaire to elicit their reaction to various aspects of the project.

Project Evaluation

A major objective of the project was to provide an integrative experience in which students gained a better understanding of core business processes and the linkages among them. Overall, this objective appeared to be achieved, at least at a satisfactory level. The configuration activity did force students to consider various organizational process perspectives in setting the system functions. Students readily saw how a comprehensive ERP software could tie the processes of an organization together. One student wrote:

I am a firm believer in the ERP systems approach. I think it could be a very valuable tool to use in teaching if used at the right level. A new undergraduate or mid-level undergraduate would not appreciate an ERP system's power and capabilities. An ERP gives the student a feel for the complete business process – from creating a product, to placing an order, to planning for materials, etc. You get this in other classes, but only in pieces...

While all of the students appeared to grasp the integrative elements of the ERP system, not all of the students felt that the project exploited the integration issue as well as it might have. In retrospect, it appears that a weakness in the structure of the project was that functional specialization (stovepiping) did creep into team activities. Team members were allowed to focus too narrowly on their own functional departments and tended not to become very proficient in the parts of the ERP system that lay outside their boundaries. As another student commented:

The aspect of the project that was the least beneficial was not being able to learn exactly what the other teams did, and how they accomplished what they did. I wanted to see what marketing did and how – what engineering did, and how – what accounting did and how.

This might be overcome in future projects by mandating frequent "transfers" from one team to another and/or from one leadership position to another. With this approach, a student might see several process areas in the course of the project as well as be able to serve in different leadership roles.

The author believed that project management skills would be enhanced by a project of this magnitude. The students were able to adapt the vendor's suggested implementation approach to a somewhat simpler approach that could be accomplished within the compressed time frame. Also, the student project coordinators seemed to be effective in planning and controlling the project. However, as it turned out, leadership opportunities were not equally available to all. As discussed above, it would probably be a better strategy to make periodic reassignments both in functional areas and in leadership positions. It would also appear that the instructor, under a more conventional semester schedule, could introduce more project management tools and techniques for students to use in the course of managing their project to make it more realistic.

The author intended for the students to gain a better understanding of the information systems aspects of manufacturing. In this regard, the author believed it was important that students be able to relate to the product and business processes associated with the manufacture and sale of a given product. For this reason, the author allowed the students to select the product, in this case a pre-fabricated utility shed. In hindsight, this proved to be less than satisfactory because the components represented in the this particular product structure tend not to be discrete. In other words, the representation of lumber, nails, and

shingles as discrete parts in the parts master is somewhat problematic, especially for the procurement process and inventory management. Where most students are not experienced with manufacturing systems, it is probably advisable to have students not only choose a product that they can identify with, but also a product with a relatively discrete and straightforward bill of materials. Clearly, more instructor guidance in this area is warranted.

Overall, the author would rate the experience as a qualified success with most project objectives being achieved at least at a satisfactory level. Nevertheless, several aspects of the project, as noted above, leave considerable room for improvement. An obvious limitation of the project described in this paper is that it took place within one class within one academic department (accounting). Naturally, a major barrier to reaching the potential of a business school curriculum integrated through information systems is overcoming the traditional boundary issues. The integration of enterprise software into the business school curriculum not only requires a significant investment of resources but also require a change to a significantly more integrated curriculum view.

Selecting an ERP Platform

Enterprise resource planning systems require the dedication of significant organizational resources for both implementation and ongoing maintenance. The same is true for instructional implementations of these systems. Prior to the adoption of the midrange ERP software platform featured in this paper, the author led an ad hoc committee within his business school to consider the adoption and implementation of one of the large ERP software packages, sometimes referred to as the JBOPS (J.D. Edwards, Baan, Oracle, PeopleSoft, and SAP). However, after representatives of the committee attended a vendor alliance conference and learned of the resource requirements to implement and maintain these systems, train faculty, and design new cur-

riculum to integrate the ERP software, the college adopted a "wait and see" position with respect to college-wide involvement. At this point, the author made contact with a midrange ERP vendor to negotiate an alliance agreement that provided a 50-seat multi-user license for educational use.

The author observed that while the midrange ERP platform used in this course project presented significant challenges to both the students and instructor, its relative accessibility (when compared with the JBOPS) allowed students to participate more fully across a wider range of systems activiities, ranging from systems implementation, through systems maintenance as well as various business process issues. This accessibility allowed students to get close to the system and better understand the relationships among the core processes of the business. From a technical resource perspective, it is important to note that the software is relatively compact, uses a (comparatively) modest amount of disk space, and performed well in multi-user mode on a shared Novell server. Also, the author/instructor was able to handle most software administration tasks without undue burden.

There is a potential tradeoff that is made with the decision to adopt a large (high-profile) ERP system versus the decision to align with a mid-range vendor with a less resource-intensive software product. It is difficult to dismiss the rationale that an alliance with one of the JBOPS is likely to enhance the image of a school as well as the market demand for students. However, with the void of published research into the effectiveness of such ERP-driven curricula, it is premature to conclude that the major ERP products, or ERP products in general, are the best vehicles for teaching integrative business concepts.

Educational alliances may also raise concerns that college and universities are becoming training grounds for ERP vendors, or that schools may place too much reliance on the ven-

dors (Cole-Gomolski, 1998). Arguably, the most critical concern, however, is the appropriate level of influence that ERP vendors may exert on the curriculum.

Conclusion

The use of enterprise resource planning systems may offer a viable platform from which to teach and reinforce enterprise process integration, including cross-departmental integration. Moreover, an ERP-integrated curriculum may provide students with a better understanding of how their discipline fits within the composite business blueprint and how their activities impact on the organizational whole. In addition, an ERP alliance has the potential for providing opportunities for students to interact with cutting edge ERP software and develop highly marketable systems integration and management skills. Additional benefits would include the opportunities to enhance information technology competency and public perceptions of the business school as well as to build partnerships outside the university through internships, staff training, and student placement. Faculty members are likely to benefit from additional research and consulting opportunities.

Suggestions for Future Research

Because the use of ERP as a pedagogical strategy is still in its infancy, there would appear to be significant research opportunities available. Clearly, schools are still struggling with the integration of this challenging technology into their curricula. Consequently, beyond a few panel discussions at academic conferences, little has been published on the subject. Yet, many research questions need to be answered. For example, schools need to be able to assess how effective the ERP concept is as an integrative strategy within the business curriculum. Studies could examine the role ERP experience plays in a graduate's placement success. Similarly, studies might examine the impact of various alliance strategies on perceived program quality.

Also, because ERP alliances represent significant investments for universities, it would be important to attempt to measure the return on such investments.

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