ERP, Learning Communities, and Curriculum Integration

George Joseph
josephg@savstate.edu

Asha George
ageorge@savstate.edu
Savannah State University
College of Business Administration
P.O.Box 20359
Savannah, GA 31404

ABSTRACT

Several colleges have joined the "SAP Education Alliance" for implementing SAP R/3 in the curriculum. Due to substantial investments in time and resources, this strategy has substantial risks. In addition, volatility and change has been the hallmark of technology, and Enterprise Resource Planning [ERP] may not be immune from such challenges. These factors notwithstanding, ERP has certain features that make it an excellent vehicle for the learning process. Specifically, ERP has the promise to address some challenges facing business education. ERP systems can provide a framework through which learning communities can be developed to inject change into the educational environment. ERP enables integration of curriculums through developing connecting points and providing a nervous system for integration, while removing redundancies between disciplines. In the process, they refine our understanding of the nature of knowledge in areas of business, while optimizing use of technology in the campus setting. This paper, therefore, argues that ERP can be viewed as more than just another technology; rather it has the potential to bring about more effective pedagogy.

Keywords: ERP, Learning Communities, Curriculum

1. INTRODUCTION

SAP AG, through the SAP University Alliance, has achieved substantial progress in encouraging several universities to incorporate ERP into the business curriculum (Fernandez et al. 2000). However, introduction of ERP in education is a major investment in time and money. Technology is characterized by volatility and change. There is increasing pressure on ERP vendors to continue to innovate and modify products as new products are introduced into the market (Borck 2001; Shah 2001). Therefore, investments in ERP made by universities need to be carefully evaluated.

Justification for the introduction of ERP is dependent on the long-term impact on pedagogy. That is, even after ERP systems are no longer the state-of the art, will using ERP as the basis of business education meet the objectives of pedagogy? This paper argues that

ERP systems help to address some challenges facing business education. These challenges can be understood from pedagogical and epistemological perspectives. Colleges are encountering challenges in pedagogy, particularly in enabling students understand, retain and apply material appropriately. In addition, knowledge areas in business education have been criticized due to the widening gap between academe and practice. The divisions between functional areas in business education, particularly in higher levels of education, also contribute to a blurred vision of the broad and interlinked aspects of business activity. ERP systems and learning communities applied to business education have the potential to address these challenges.

ERP-based education and learning communities are complementary, as the nature of ERP-based curriculum requires integration and restructuring of curriculums and cooperation on a scale that does not

exist in current business education. Learning communities address several of these key factors through models that alter existing curricular structures and provide students opportunities for deeper understanding and integration of the material they are learning, while increasing interaction with one another and their teachers as fellow participants in the learning enterprise. Therefore, ERP can benefit through lessons learnt from the creation of learning communities. This paper provides a framework for this integration/interaction. However, the framework is not complete without considering caveats to implementation, which are also discussed.

The remaining paper consists of the following sections. First, the environment of business and the challenges facing business education is examined. This is followed by a discussion of learning communities and ERP systems, and provides a framework that portrays the role ERP technology can play in engendering learning communities and driving educational change in the desired direction. Finally, the areas that require caution and special care are highlighted.

2. CHALLENGES FACING BUSINESS EDUCATION

The challenges facing business education can be examined from two perspectives, the pedagogical and the epistemological.

2.1 Pedagogical

Lee S. Shulman, president of The Carnegie Foundation for the Advancement of Teaching and Professor of Education, Stanford University, has tried to classify ineffectual pedagogy, something he calls "pathologies of learning" (Shulman 1999). He proposes that pathologies of learning can involve "malfunctioning of memory, understanding and application and can be called *amnesia*, *fantasia* and *inertia*".

Amnesia is the phenomenon where a vast amount of the information memorized during the student's coursework is forgotten. Fantasia is a more serious situation where students mistakenly feel that they understand a concept. This can result in interference with later good teaching, as "new learning rests on old learning". This pathology can be particularly dangerous when applied in areas such as medicine. Inertia is the learning of facts without knowing how to apply them. According to Shulman, "inertia as pathology describes those states of mind where people come to know something but simply can't go beyond the facts, can't synthesize them, think with them, or apply them in another situation". Shulman adds that

any institution that seeks to take learning seriously must systematically monitor their programs for "amnesia, fantasia and inertia".

Addressing the pathologies stated above is a continuous process. First, the faculty needs to understand inherent pathologies that may stand as a roadblock for change. Shulman calls this "nostalgia", a desire to revert to the old days of "rigor" of lectures, memorization, basic skills etc. After seeing the "light", it is necessary to take the whole scholarship of learning as a viable and necessary area, where issues related to teaching are made public and becomes the object of critical review and evaluation by members of one's community. To this end, the Carnegie Academy for the Scholarship of Teaching and Learning was set up.

2.2 Epistemological

The essential nature of management knowledge, its presuppositions and foundations and its extent and validity, are critical areas that need enquiry. This is particularly so due to an increased gulf between academic research and practice. Traditionally, the generation of knowledge was based on the philosophy of modernism and "empirical positivism" where the observer was separate from the action. Lichtenstein (2000) contrasts this approach with Schon's model of inquiry that provides a mode of "knowing" that is relational, in that it allows for a direct connection between epistemology and reflective practice (e.g., Schon 1983). This interaction results in the creation of new "generative" knowledge, a significant departure from the traditional philosophy of modernism and "empirical positivism". The resultant beneficiary is society at large, as the focus turns from the introverted view of knowledge as the result of empiricism and generation of the general laws, to the knowledge that flows from experience (Lichtenstein 2000).

Holman (2000) describes epistemologies of knowledge from relativism to objectivism, each form drawing attention to the manner in which knowledge exerts power by constraining and shaping action. Holman also points out that the essential nature of knowledge in management education is the experiential, the shaping of action from the generation of knowledge. This is a departure from education in the arts, for example, where cultural, aesthetic or some other form of intrinsic value is bequeathed on the recipient. Wallman (1995), in the context of accounting, points out that "the value and worth of financial reporting and corporate disclosure lies in almost an exclusive way, in its usefulness to users. I would suspect that it is the rare observer who finds an aesthetic benefit from reading financial statements or reads the notes for a clever turn of phrase."(p. 82).

Interviewees in Albrecht and Sacks (2000) criticize the divisions in business and assert that these are artificial boundaries created by academics. These divisions often result from widely dispersed evolutionary phases in the growth of the body of knowledge for each of the functional areas, and their continued separation is not beneficial for effective pedagogy or research. Many areas of linkage may be inadequately addressed or missed altogether as the boundaries widen. If learning has to reflect practice, efforts need to be made to cross the boundaries to enhance the learning process. Therefore, academics need a forum through which they may need to see points of connection, and not disparity. This will enable them to remove redundancies and improve cohesion, rather than build further boundaries when the world of practice demands cohesion.

3. AN ERP- LEARNING COMMUNITY FRAMEWORK

3.1 The Nature of ERP
In the initial years of standardization of application software, the areas most amenable were business areas that were more standard, such as accounting and financials. There were restrictions on substantial sales of such software due to dependency of hardware and software platforms. This changed with the "open systems" wave in the 1980s, when hardware vendors began designing computers that could work on a variety of operating systems and databases. This encouraged application providers to develop application products independent of hardware and software platforms.

ERP systems have benefited from these developments and several years of experience in providing business solutions and computing and managing complex networks. This also resulted in ERP systems replacing custom development of software for large and medium companies. The critical element of these systems is that despite the size of the institution, all the functional areas are knit together into one composite unit. Integration allows for a connected business environment, from the Financials and Human Resources to Manufacturing and Sales and Distribution. Integration means that all the company's business processes are interrelated so that a change in one area of your business will reflect on another area of the business. This integration is achieved through such technologies as multi-tier hierarchy in the client/server architecture, specifically the user interface layer, the business logic layer and the database layer (Hernandez 2000).

In the light of the challenges to business education and the characteristic of technology, can ERP be any different from other software? ERP forms the basis for a new approach to education that can address the pedagogical and epistemological challenges facing education. An unrelated development, "learning communities", developed to address issues of pedagogy outlined earlier, may be implemented effectively for those using ERP systems. The two are mutually beneficial to one another. Concepts from learning communities make ERP effective in the business curricula; ERP provides a base for learning communities to function. In addition, ERP also helps attain the objectives of business education from an epistemological perspective in that it displays the links between the different areas of business.

3.2 Interaction between Learning Community and ERP
The concept of the learning community was initially popularized by Peter Senge and later adapted by educational institutions to meet the challenges facing education. Learning communities, in the educational context, have been defined as: "Any one of a variety of curricular structures that link together several existing courses – or actually restructure the material entirely – so that students have opportunities for deeper understanding and integration of the material they are learning, and more interaction with one another and their teachers as fellow participants in the learning enterprise" – Gabelnick, MacGregor, Matthews and Smith, 1990, quoted in Shapiro and Levine (1999).

Learning communities in educational institutions include such features as organizing students and faculty into smaller groups, encouraging integration of the curriculum, bringing faculty together in more meaningful ways and focusing faculty on learning outcomes. As learning communities progress effectively, some features may become interlinked, for example, when integrated curriculums result in faculty from diverse disciplines coming together to discuss modes of instruction, assessment and course content. The underling objective is to create a focused learning environment in which students can better appreciate the depth and breadth of course content and enhance their learning experience.

To understand the interaction between learning communities and ERP, the definition of learning communities provided above (Gabelnick et al. 1990) is divided into its component parts and analyzed to illustrate the links between ERP and the development of learning communities. Specifically, ERP systems can be seen to form a strong basis for furthering learning communities, and also play a role in being a catalyst for change in the proposed direction.

Curricular structures: One of the elements in moving to a learning community is change in curricular structures. Shapiro and Levine (1999) suggest a variety of curricular structures, related to specific learning community models. The models suggested include paired or clustered courses, team-taught programs or residence-based programs. Paired/clustered courses model, for example, require curricular structures that jointly enroll student in two or more courses that are "logically linked based on logical curricular connections and skill areas." Team-taught programs are another model, which entails enrolling students in multiple courses organized around some "interdisciplinary theme." These structures indicate that links in the courses are accentuated through curricular structures.

ERP, unlike previous application software programs, involves all the areas of business. SAP R/3 consists of several applications such as Financial Applications, Human Resource Applications and Logistics Applications. These applications consist of several modules related to all the major areas in business. For example, the Financial Applications includes Accounting (FI), Controlling (CO), Enterprise controlling (EC), Capital investment management (IM), and Treasury (TR) modules, areas in financial reporting, cost accounting, profitability analysis and finance.[1] ERP systems, therefore, provide opportunities for a single problem to be addressed from the viewpoint of several disciplines so that all the various facets of the problem may be addressed. For example, ERP can be used to work through an organizational case study that involves all parts of the value chain. Marketing can operate relevant sections of the Logistics module, Accounting, the Controlling module and so on.

In addition, SAP is also characterized by scalability, which means that SAP's modules can be enabled independently of one another. Therefore, an organization may choose the extent of SAP functionality they wish to enable at any point in time.[2]

[1] The Logistics Applications are the most extensive and contain numerous modules that manage all processes involved in the supply chain of goods: from raw materials procurement to final customer delivery and billing (sales support, shipping, etc.).

[2] However, the true benefit of SAP and ERP emerges when the modules are operated in concert with one another, whereby each module's output becomes available to other modules in a real-time manner. This supports the supply chain concept. The integrated processes are applied through consistent definition of attributes for master and transaction data that allows

Therefore, this feature also enables the educational institutions to be selective in their implementation of ERP and establish consistency with curricular structures. These features of ERP systems help shape curricular structures for learning communities.

Opportunities of deeper understanding: The underlying theme of each of the models is the increase in opportunities for a deeper understanding of the subject themes. The pedagogical issues pointed out earlier stem from an incomplete understanding of the subject and areas dealt with. Inertia, for example, is an inability to apply facts and concepts that have been learnt, and results from an incomplete understanding of the subject matter. Learning communities specifically focus on providing a deeper understanding that can result when applying these concepts.

The integrated nature of ERP provides insight into each transaction and the impact on the various functions within the organization. Seeing a process or transaction through the various stages and seeing the impact on various disciplines/areas provide the student with insights that could not otherwise be gained. In addition, ERP systems match content with technology to fully operationalize the potential of technology. This is done, for example, through the regular institution of "best practices", whereby the latest business processes are provided with each new version. For example, the CO module provides best practices such as the Activity Based Costing and creates Balanced Scorecard reporting techniques. In addition, industry solutions are also provided for several industries, to link the back office applications (financials, logistics, human resources) to the front office in the different industries.

Integration of the material: Focus on processes that cut through the organization and remove artificial barriers. Recent surveys suggest that these disciplines have artificial boundaries created by academics (Albrecht and Sacks 2000). "Our curricula are too narrow, do not expose students to a broad business education, and do not use enough real-world examples" (p.51). Interviewees in the Albrecht and Sacks (2000) study indicate that strategic planning and process improvements were critical work activities for management accountants. The work place is dictating the need for further integration of disciplines. The SAP application is specifically developed for business processes. The application works in an integrated fashion, enabling a business to manage its process flows from one end to another. For example, it could involve receipt of customer order, responding

effective business flow throughout the organization.

by securing materials and resources in a company, and eventually delivering to a customer's original specification. Therefore, ERP provides a clear view of the processes within the organization. This integration of processes across disciplines is a pedagogically sound approach to provide students a view of areas in management.

Interaction with one another and teachers: Another characteristic of learning communities is that they bring faculty together in meaningful ways by encouraging greater faculty interaction as teachers and learners (Shapiro and Levine 1999). Teamwork and inter-personal skills is necessary for jobs in industry, but the divisions in universities have not seen bridges. Working in teams, however, is a pre-requisite for the adequate implementation of ERP systems. Personal ambitions have to be temporarily shelved for the goals of the organization, and incentive systems must be framed such that there is goal congruence between the goals of teachers and the institution.

There is a need to develop critical computing skills in order to implement this area. Therefore, the essentials of a learning community, interactions between students and faculty in multiple forums and seminars are needed. Teamwork is an essential element of learning communities, and this is a requirement for the implementation of ERP based learning environment. There is therefore, a need for a shared vision. "Shared vision is vital for the learning organization, because it provides the focus and energy for learning" (Cathon 2000).

3.3 A Framework for Curriculum Integration
There are several difficulties in any strategy for implementing developing learning communities and integrating the curriculum, not the least of which are the "artificial" boundaries that exist between departments. Figure 1 portrays the functional areas in academe as distinct and separate, without a strategy for integration of the elated knowledge base in the functional areas. This scenario describes the situation in most institutions where territories are difficult to bridge because of lack of interface, and a common point of interaction.[3] Hence, it is important to have a "nervous system" to bring together the diverse elements in the business school. ERP provides such a "nervous system" that can help the different units to see the value of working cohesively. This value is

---

[3] The distinction between functional areas is more pronounced in larger institutions. However, even in smaller institutions where faculty from different disciplines may interact frequently, there is no cohesive strategy to integrate interlinked knowledge areas in curriculum or research.

already illustrated in the practitioners' world and therefore, is a tried method and sound theoretically. Figure 2 illustrates the model where ERP provides the nexus and the interface between the departments that can "pull" the various insulated departments into a common area (darkened circle) that can engender the learning community.

Figure 1: Territorial Functional Areas
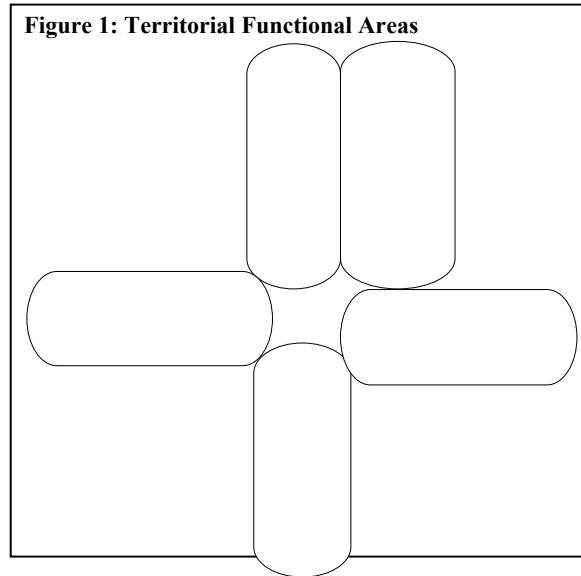
As shown in the diagram, Information Systems plays a critical role that encompasses the whole community, by providing architectural support. Architectural support includes the technology and programming that is critical to run the system. Several major technologies form the basic foundation for the ERP system. Since SAP R/3 is compatible with a variety of hardware and software platforms, areas integral to information curriculums are necessary tools in the ERP framework. For example, the three-tier client-server architecture requires use of client-server technology, understanding of networking, operating systems, databases and presentation front ends (called SAPGUI).

The shaded Learning Community circle is held together through the nexus between ERP and concepts underlying learning communities. While ERP provides the basis for implementation of the principles underlying learning community, learning communities provide the glue that strengthens pedagogy and cohesion among departments. Specifically, the liaison of the disciplines with technology may involve changes in delivery style and content, and require extensive teamwork, which is aided by concepts underlying learning communities.

The benefits of the framework are twofold. First, there would be a positive impact on pedagogy, as concepts are better illustrated particularly through linkages to desired objectives of the business activities. Students will also appreciate curriculum content in their area better when they see the connections with other areas, as ERP systems are process-based and encompass different functional areas. Second, the interlocking relationship among faculty has the potential to create greater opportunities for integrative research across disciplines, and consequently impact the knowledge base of business. For example, the close relationships between production, information systems and cost accounting will become more evident in such an environment and new areas of inter-relationship may be discovered in the process.

3.   LIMITATIONS

While the paper asserts that there are benefits to education from the merger of the technology (ERP) and the concept (learning communities), it is not implied that other factors will not play a direct or indirect role, or that problems may not emerge along the way. Some immediate areas where difficulties may be anticipated and addressed include:

The difficulties of coordination: The departments are already large and sometimes deeply divided. Achieving coordination is a delicate task and must be implemented with care. There are behavioral issues that need to be addressed. Resistance to change is obviously to be expected, and therefore, it is critical that the need for the "shared vision" is not underestimated.

Substance over Form: Unless properly organized, the enormity of the application has a danger of creating a tunnel vision. Sufficient modules must be implemented to provide a broad view of the interaction of the various processes. Another danger is the obsession with the form and not the substance of the task. SAP R/3 is quite a complex system to master, and it is possible that the process and technology may prove to be a great challenge in itself, and few may seek to venture into the underlying concepts. A false sense of satisfaction may be derived from implementation of the form, whereas the content may never be satisfactorily absorbed.

The danger of technological glitches: Technology will be an important factor in the education process, and needs to be carefully addressed. The risks of increased
downtime and uncertainty in the processes will be issues, at least in the initial stages. The necessity of resource allocation also needs to be addressed,
because of the difficulty of attracting personnel in the technology area. In this regard, it may be pertinent to determine the resources available for the project, and whether this niche would form part of the overall strategy of the institution/college of business.

Managing change: "You have to infuse your entire organization with the mindset that change is an opportunity and not a threat" (Drucker and Senge 2000). Abandoning pet projects and products are critical to implement change. Again, it needs to be enquired whether this is a part of the niche of the institution. The risks need to be evaluated with reference to their individual market niche and the opportunities available for their graduates before allocation of resources to this venture. This is clearly a long-term strategy, and inadequate planning may result in irretrievable losses.

4.   CONCLUSION

Despite the drawbacks, we can expect the use of this application software to continue to grow because ERP is the better mousetrap. But the rationale for incorporating ERP into the curriculum must be sound. ERP has the potential of enabling business education to overcome some of the hurdles it currently faces, for example the consequences and perils of creating artificial boundaries for functional areas in business education. This involves incorporating some management techniques that have proved successful in industry, i.e., creating a "learning organization".

IS educators play a special role in the creation of learning communities as they form the "glue" that ties these communities together. Their role is to create and maintain the systems architecture that the community will depend on. While the task is difficult, it will not be without benefits, as it will illustrate the "staff" function that IS plays in an organizational setting. Specifically, IS educators will be in a position to illustrate how the usefulness of the system is assessed (e.g., through achievement of organization goals), as well as to expose students to practical problems that they may confront in the implementation of such complex systems. Interaction with other functional areas will re-enforce the point that information systems technology does not exist in isolation and its usefulness is measured to a large extent by its' contribution to the operations, planning and decision-making within the overall system.

It may be wise to heed these words of advice from the guru of learning organizations, Peter Senge (1997, 18): "Leaders must realize that everything is interrelated. The world is becoming more interconnected and interdependent, and business is

becoming more complex and dynamic. We have to change the way we think about learning and

Figure 2: The ERP-Learning Community Framework
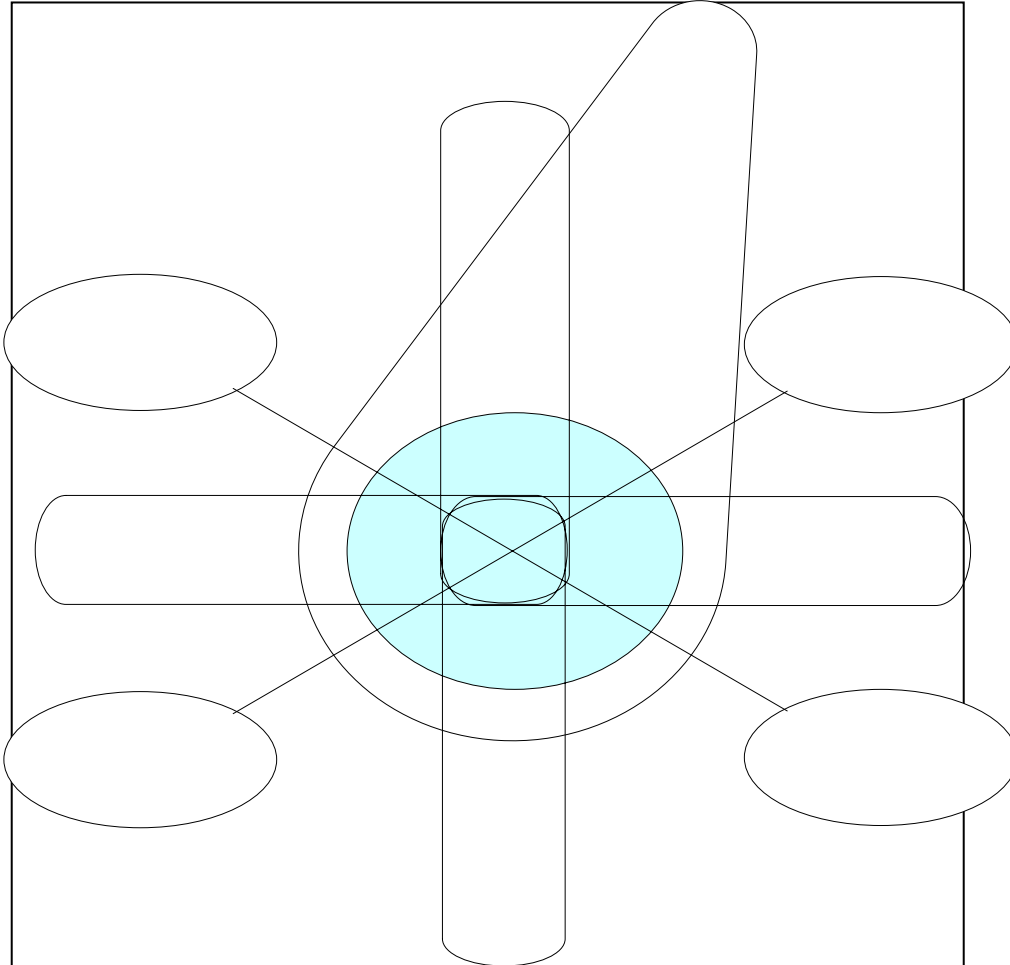
interacting with each other at all levels. We have to develop a sense of connectedness, of working together as part of a system, where each member is affecting and being affected by the others, and where the whole is greater than the sum of its parts."

5. REFERENCES

Albrecht, W. S., and R. J. Sacks [2000], "Accounting Education: Charting the course through a perilous future." Accounting Education Series, Volume No. 16, American Accounting Association.

Becerra-Fernandez, I, K.E. Murphy, and S. J. Simons [2000], "Integrating ERP in the business school curriculum." Association for Computing Machinery, Communications of the ACM, April, pp.39-41.

Borck, J. R. [2001], "ERP faces rocky road." InfoWorld, May, pp.100.

Cathon, D. A. [2000], "The learning organization: Adapted from the Fifth Discipline by Peter Senge." Hospital Material Management Quarterly, February, pp.4-10.

Drucker, P., and P. Senge [2000], "Meeting of the minds." Across the Board, Nov/Dec, pp.16-21.

Hernandez, Jose A. [2000], SAP R/3 Handbook, 2nd edition. McGraw-Hill, New York.

Holman, David [2000], "Contemporary models of management education in the U.K." Management Learning, June, pp.197-217.

Lichtenstein, B. M. [2000], "Generative knowledge and self-organized learning: Reflecting on Don Schon's research." Journal of Management Inquiry, March, pp.47-54.

Schon, D. [1983], The reflective practitioner. Basic Books, New York.

ERP

Logistics Module

Senge, P. M. [1997], "Creating learning communities." Executive Excellence, March, pp.17-18.

Shah, J. B. [2001], "ERP Losing favor as businesses re-evaluate what to target – SCM, CRM Software now more in demand." Ebn, June, pp.4.

Shapiro, N.S., and J. H. Levine [1999], Learning Communities. Jossey-Bass Publishers, San Francisco.

Shulman, L. S. [1999], "Taking Learning Seriously." Change, July/August, pp.11-17.

Wallman, S. M. H. [1995], "The future of accounting and disclosure in an evolving world: The need for dramatic change." Accounting Horizons, September, pp.81-91.

Society.

AUTHOR BIOGRAPHIES

George Joseph is an Assistant Professor at Savannah State University. George has a Ph.D. from Temple University, Philadelphia. His research interests include ERP and financial Accounting Information Systems, among other areas. He has published in Advances In Public Interest Accounting and Accounting Enquiries and has proceedings in several meetings including the Information Systems Section of the American Accounting Association and the Production, Operations and Management Society.

Asha George is an Instructor of Computer Information Systems at Savannah State University. She obtained a Master of Science degree in Business Administration majoring in Information Technology at Temple University, Philadelphia. Her research interests include ERP, Online Teaching & Learning issues, and she has presented at meetings of the Association for Information Systems and the Production, Operations and Management

Information Systems & Computing
Academic Professionals

EDSIG
Serving Information Systems Educators

STATEMENT OF PEER REVIEW INTEGRITY

All papers published in the Journal of Information Systems Education have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.