Modeling ERP Academic Deployment via Adaptive Structuration Theory

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INTRODUCTION

Academic/industry collaboration can change learning processes and improve outcomes by integrating resources and creating opportunities not otherwise attainable (Wohlin & Regnell, 1999). However, each institution's culture and organizational objectives influence the collaborative relationships developed as advanced information technologies (e.g., computer aided software engineering tools, enterprise resource planning [ERP] systems, and database tools) are adopted. The challenge is to facilitate mutual understanding and acknowledge distinctions in addressing each organization's goals. The aim of these relationships is the appropriation of ERPs in a manner that enriches educational experiences, while providing industry benefit.

There are many quandaries associated with this phenomenon. How does the deployment of ERPs facilitate educational processes? To what degree should these resources be utilized? What tools and methods should be used? What is the role of the ERP vendor? Can academic independence be maintained?

Without a framework to identify relevant variables, it is daunting to begin to assess the impact of varying degrees of adoption, identify effective processes of deployment, and move toward assessing costs and benefits. Though some frameworks address academic/industry collaboration (Mead et al., 1999), few have considered the implications of ERPs on the evolution of inter-institutional collaborative relationships. This exposition augments a framework for understanding the forces at work when integrating ERPs into educational settings (LeRouge & Webb, 2002, 2005).

We begin our discussion by reviewing adaptive structuration theory (DeSanctis & Poole, 1994) as the foundation for the academic/industry ERP collaboration framework (LeRouge & Webb, 2002). We discuss academic/industry collaboration constructs and their relationships within the context of ERP systems and then integrate examples, findings, and issues from recent research.

USING AST TO MODEL ERP DEPLOYMENT IN THE ACADEMY

Adaptive structuration theory (AST), an extension of structuration theory (Giddens, 1982), has been used as a framework to study organizational change processes during advanced information technology adoption (Poole & DeSanctis, 1992). Adaptive structuration takes a socio-technical perspective. Human actors and organizational context are introduced within this perspective as moderators of technology impact. The adoption of an advanced technology, therefore, is a process of organizational change resulting from the mutual influence of the technology and social processes.

The premise at hand is that in academic settings, human actors and organizational context collectively moderate the processes by which ERPs are appropriated. Such dynamic processes affect not only institutional and industry outcomes resulting from the appropriation, but also the evolution of the relationship between industry and academia. The number of academic institutions adopting ERPs is increasing (Rosemann & Maurizio, 2005). However, use is not a perfect proxy for effectiveness, as ERPs serve some institutions better than others (Antonucci, Corbitt, Stewart, & Harris, 2004).

ERP system adoption within the context of colleges of business is of interest and has considerable impact for a number of reasons: market demand, level of commitment required, interdisciplinary functionality, and level of system sophistication. To provide insight, we reintroduce our AST-based model for organizing constructs and relationships for this phenomenon (see Figure 1). We augment this model and understanding by providing recent research examples, findings, and issues related to construct attributes (provided in Tables 1 through 9).

Advanced Information Technology Structure

Two ways to describe contributing social structures offered by advanced information technologies are "structural features," referring to the types of rules and resources embedded in the system, and "spirit," the intended purpose and utilization of

Table 1. Advanced information technology (ERP) structure and spirit attributes associated with ERP curriculum

Attributes (LeRouge & Webb, 2002)	Examples, Findings, and Issues Related to Construct
♦ *Structural features*—(Restrictiveness and Comprehensiveness) ♦ Capturing Spirit	EXAMPLES • *Capturing spirit*: Create learning modules focused on decision-making using data-rich business processes in an ERP environment—not software features (Strong, Johnson, & Mistry, 2004) • *Working within structure*: Students run a range of ERP functions in complex multi-semester business simulations (Draijer & Schenk, 2004) FINDINGS • *Working within structure*: Ensure students understand the business environment and avoid the "not seeing the forest for the trees" problem (Fedorowicz, Gelinas, Usaff, & Hachey, 2004) • *Capturing spirit*: Student background in understanding underlying business processes is critical to ERP classroom success (Rosemann & Maurizio, 2005) ISSUES • *Structural Features*: Complexity of ERP subject matter is a challenge (Rosemann & Maurizio, 2005) • *Capturing Spirit*: Recognizing there is a curriculum gap in engineering-based information technology programs—a failure to emphasize business processes (Peslak, 2005)

the system (DeSanctis & Poole, 1994). Regarding structural features, an ERP is a comprehensive database structured to support diverse organizational processes through a large number of application modules. Each module is geared toward a functional or industry-specific process. ERP systems challenge colleges with a level of cross-discipline sophistication and flexible feature sets that require substantial training.

The spirit of ERP systems can be described as the intention to process operational level transactions, support multi-level decisions, and aid strategic management of major corporations. The goals of ERP use in colleges of business are primarily educational and exploratory in nature and often focus on discipline-specific subsystems rather than cross-discipline business processes. With respect to technology spirit, the potential exists for a gap in appropriation between business use and academic use of ERP systems. This gap in system goals and values may have implications for academic/industry collaboration unless innovative cross-discipline approaches are taken as shown in Table 1.

External Environmental Structure

The demand for graduates to work with ERP systems is strong and acts as an external structuring force (Rosemann & Maurizio, 2005). Other external sources of influence are detailed curriculum guides for computer science (Lidtke & Stokes, 1999) and information systems (Gorgone & Gray, 2000). Table 2 highlights critical success factors and issues related to external structure.

Technology Infrastructure

Technology infrastructure is a major cost consideration for academic adoption of ERP systems (Becerra-Fernandez, Murphy, & Simon, 2000; Watson & Schneider, 1999). These systems typically cannot be deployed or maintained without considerable support. Industry may facilitate appropriation through donated services; however, colleges face additional costs. Table 3 lists collaborative relationships such as SAP's University Competence Center (UCC) hosting program, which is becoming a critical success factor for academic adoption (Rosemann & Maurizio, 2005).

Educational Organization Structure

The philosophies of appropriating ERP systems among educational entities vary widely. The overall philosophic quandary involves balancing conceptual technology education and the development of technology-specific skills. Table 4 identifies a number of critical success factors affecting educational organization structure.

Education Process

Structuration has at its core motivated and practical actions. Rules and resources embodied in social institutions are appropriated by participants and enter into the production and reproduction of a social system (Poole & DeSantis, 1992). Academic/industry collaborative interaction is embodied in the appropriation of the ERP into the educational process. Educators determine the curriculum strategy and the degree of appropriation for ERP systems. While the degree of appropriation has been addressed by academic institutions in a variety of ways ranging from inclusion of exemplary material within courses to new course creation to establishing new degree programs, issues related to the educational process remain (Table 5).