Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 1999 Proceedings

Americas Conference on Information Systems (AMCIS)

December 1999

Effectiveness of Using Enterprise Systems to Teach Process-Centered Concepts in Business Education

Jose Noguera
Louisiana State University

Ed Watson
Louisiana State University

Effectiveness of Using an Enterprise System to Teach Process-Centered Concepts in Business Education

Jose H. Noguera and Edward F. Watson
Department of Information Systems and Decision Sciences
E.J. Ourso College of Business Administration
Louisiana State University
3190 CEBA Building
Baton Rouge, LA 70803
jnoguer@lsuvm.sncc.lsu.edu
ewatson@lsu.edu

Abstract

A true experimental pretest/posttest design is utilized to measure the effectiveness of using the SAP R/3 System as a supplement tool to teach Enterprise Resource Planning. In particular, the study addresses the question of how to use the system to enhance learning of business/IS concepts such as distributed client/server systems, business process reengineering, supply chain management, and integrated business processes at the undergraduate and graduate level in business schools.

From both a business/IS practitioner and academic research standpoint, the information collected on this study can be used to build a body of knowledge about the students' learning process in the context of Enterprise Resource Planning Systems such the SAP R/3 System.

Introduction

Business education, in particular IS education, must constantly change in order to stay on top of key business and business systems concepts. How enterprise systems support the process-centered organization (Hammer 1997) is a relatively new concept being taught today. A number of business schools have started the process of redesigning curriculums (i.e., information systems, accounting, finance, operations management) and instructional methods at both undergraduate and graduate levels. Many of the educational reengineering efforts are supported by the use of the SAP R/3 system provided by the SAP University Alliance Program (Watson and Schneider 1999).

The state-of-the art SAP R/3 system is an integrated enterprise software system (generically referred to as Enterprise Resource Planning, or ERP). It supports the need for enterprises to move from functional-oriented to process-oriented structures. It has a windows-based interface, a client-server architecture, and a modular (each module is dedicated to a different area of business activities) and expandable structure.

"The SAP University Alliance program provides an academic entity (e.g., a University, College, School, or Department) with a completely functional ERP system for research and teaching at reasonable or no cost. Without such an alliance it is doubtful that an academic unit could provide their students with access to such a system. Such a program provides significant learning opportunities for both faculty and students. What such an alliance offers is hands-on exposure to a real ERP system and a repository of related resources. For academic entities interested in providing an experiential-learning based hands-on approach to ERP systems education, there are a number of issues to consider. For example, what is the objective of an ERP initiative, how is an ERP system utilized by students, how does this enrich the curriculum, what are the benefits, and what are the costs (Watson and Schneider 1999)."

A significant challenge facing business schools educators is to identify how best to deploy a commercial ERP System in their academic environment. To date, the educational benefits of instructional uses of the SAP R/3 system is established on the basis of anecdotal statements from faculty and students rather than on empirical and objectively measured data secured by educational research methods. On the other hand, there is no single research effort focusing on the question related to the effectiveness of using the SAP R/3 system to facilitate knowledge/skills and understanding of contemporary business processes at the undergraduate or graduate level.

Thus, the main objective of this study is to determine whether or not student performance, self-efficacy, and satisfaction are enhanced by a particular

method of instruction. Specifically, the question is whether using the SAP R/3 System as a support tool for instruction facilitates the knowledge and understanding of business processes, focusing on relations among functions, logical connections and SAP system's rules and coverage of the different operating steps.

Theoretical Framework

Three main questions must be addressed when using the SAP R/3 system as a teaching tool in the business education: 1) How do students learn and what should be learned? (learning theory and curriculum development), 2) How should learning be designed? (instructional design), and 3) How will we know if learning occurs? (assessment).

When describing how students learn or think, a particular learning theory has implications for determining how to structure the learning material (curriculum development) and what the role of the learner in the learning process (learning styles) should be (Kolb, Robin, and McIntyre, 1974). On the other hand, determining the effectiveness of computer-related technologies on learning must take place within a theoretical framework to be meaningful (Jarvenpaa, 1985).

The rational of the Experiential Learning Theory (Kolb 1984) is a description of the learning process as a four-stage cycle that includes 1) concrete experience (CE), 2) reflective observation (RO), 3) abstract conceptualization (AC), and 4) active experimentation (AE). The four stages provide two fundamental dimensions to the learning process, the first dimension, CE-AC, provides the basis for curriculum development with respect to the content of instruction. On the other hand, the second dimension, AE-RO, represents the continuum for the instruction methods (Simon et al. 1996).

Kolb's Experiential Learning Theory and Learning Styles (Kolb 1984) provides an approach to learning that emphasizes the fact that individuals perceive and process information in very different ways. The theory implies that the amount of learning experienced by an individual is a function of the fit between the educational experience being provided and an individual's particular style of learning. As a result, the experiential learning theory as well as an individual's learning style has implications for curriculum development, instruction, and assessment.

Instructional design in education is like what architecture is to the building industry (Jegede, Walkington, and Naidu, 1995). In a particular learning environment, the expected outcomes of learning are predetermined and are dependent on an efficient and effective design of instructional materials often undertaken by a group or team using relevant ideas from learning theories (Jegede, Walkington, and Naidu, 1995). The design and development of the course modules for the lessons that comprise the treatments for this study is carried out following an instructional system design (ISD) approach (Rothwell and Kazanas 1998) to prescribing optimal learning performance.

The primary goal of evaluation is measurement of student's learning outcome. Bostrom, Olfman, and Sein (1988) developed a model to investigate the training/learning process. Their model was based on concepts from cognitive psychology, educational psychology, information systems, and computer science. According to Bostrom, Olfman, and Sein (1990), in general there are two types of learning outcomes: understanding (measured through learning performance) and motivation to use the system (measured through attitudes toward the system). Instruments to measure outcomes depend upon the task for which an individual is instructed. Outcomes may be measured before and after the instruction to determine the effectiveness of the instruction method.

In summary, this research uses the Experiential Learning Theory (Kolb, 1984), instructional system design (Rothwell and Kazanas 1998), and a research model for End-User Training (Bostrom, Olfman, and Sein 1988) as platforms to investigate the learning effectiveness of using the SAP R/3 system as a teaching tool in business education.

Methodology

This study tests a number of research hypotheses (H1-H5) in order to investigate the effectiveness of using the SAP R/3 system as a support tool to facilitate the knowledge and understanding of integrated business processes, focusing on relations among functions, logical connections and SAP system's rules and coverage of the different operating steps.

H1: There will be no difference in *performance scores* between the group that receives hands-on SAP R/3 System support instruction and all other groups.

H2: There will be no difference in *Self-efficacy* between the hands-on SAP R/3 System supported instruction group and the simulated hands-on SAP R/3 System supported instruction group.

H3: There will be no difference in *end-user satisfaction* between the hands-on SAP R/3 System supported instruction group and the simulated hands-on SAP R/3 System supported instruction group.

H4: There will be no difference in *performance scores* between individuals with high *self-efficacy* and those with low *self-efficacy*.

H5: There will be no difference in *performance scores* between subjects who are more *satisfied* with the learning process and those who are less *satisfied*.

To address the above hypotheses, a true experimental pretest-posttest design is implemented. Subjects (n=300) are randomly assigned to either the control or the two computer-based instructional methods. Subjects consist of undergraduate students enrolled in Management of Information Resources, Operation Management, and graduate students enrolled in an Operations Strategy course.

Three delivery instructional methods are compared. A traditional instruction method acts as the control (lecture plus reading/exercises). The second and third instructional methods are computer-based methods (hands-on R/3 system, and simulated hands-on R/3 system via Web, respectively). In the second method, hands-on R/3 system, students receive traditional lecture, but also have full access to hands-on R/3 system transaction exercises. In the third method, students receive traditional lecture, but also have full access to simulated hands-on R/3 system transaction exercises (i.e., ScreenCam movies). The three instructional methods use the same lecture format and instructor.

The dependent variables are student performance as measure by the scores on a posttest, self-efficacy (Compeau and Higgins 1995), and user satisfaction (Doll and Torkzadeh 1988). A number of covariates, learning styles, attitude toward computers, and demographic characteristics , are also included in the study.

Data Collection and Analysis

This study uses a two-phase methodology for investigating the effectiveness of integrating SAP R/3 into the business curriculum. First, a preliminary field experiment (BDAM 7120, n=60) was conducted to ensure an appropriate research design (i.e., choice of variables, techniques for reducing error, and randomization of subjects). The pilot testing was carried out in consultation with faculty, industry, and students for critical evaluation of possible limitations, internal/external validity issues, cost, logistics, etc.

A number of control measures where taken: a) all subjects were given a similar set of activities to perform (reading/writing exercises, and R/3 system based transaction exercises were provided to the control and computer based groups, respectively), b) pre-test and post-test measures as well as selection of significant levels where established, c) data was collected on a number of variables to be used as covariates (i.e., learning styles, attitude toward computers, age, GPA, Major, etc), and d) a multiple-choice and true/false test was developed to measure performance. The test was provided to Information Systems faculty knowledgeable on the domain (ERP and core Business Processes such as Order-to-Cash Cycle, Manufacturing Planning and Execution) to be revised for further use. In addition, previous developed and validated instruments were used to measure self-efficacy and satisfaction.

In the second phase of the study, subjects consist of undergraduate and graduate students enrolling on courses in Management of Information Resources (ISDS 3100) and Operation Management (ISDS 3115). Inferential analysis will be performed using Analysis of Covariance to test the Hypotheses previously proposed. Study conclusions will be presented during the presentation of this paper.

Contribution of the Study

From both an IS practitioners and academics research standpoint, the information collected on this study can be used to build a repository about students' learning process when learning about Enterprise Resource Planning Systems such the SAP R/3 System. It answers an important question: how does the use of the SAP R/3 system improve student learning of particular concepts/skills and help overcome particular misconceptions about IS? E.g., what kind of hands-on R/3 exercises work best in developing the idea of particular concepts such as distributed client/server systems, business process reengineering, etc. Results of this research study along with the base of knowledge on the use of information technology to enhance education, will help universities rethink what in business education/information systems is most important to learn, how it should be taught, and what evidence of success one should seek.

References

References available upon request from (first) author