

**AC 2007-1761: INSTRUCTIONAL DEVELOPMENT IN SUPPORT OF AN
ENTERPRISE RESOURCE PLANNING SOFTWARE APPLICATION FOR A
SUPPLY CHAIN MANAGEMENT TECHNOLOGY LABORATORY: A
GRADUATE STUDENT PROJECT**

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Instructional Development in Support of an Enterprise Resource Planning Software Application for a Supply Chain Management Technology Laboratory: A Graduate Student Project

Abstract

The XXX Program, within the Department of YYY in the ZZZ (ZZZ) at WWW University, has recently developed a Supply Chain Management Technology (SCMT) Laboratory. Supply chain management involves the physical, information, and financial flows to meet customer demand and maximize profit.¹ The SCMT Lab utilizes demonstration and simulation activities that allow students to manipulate equipment and products in a “working warehouse” space. Additionally the SCMT lab allows students to simulate the supply chain activities and information that flow between manufacturers, supplier and distributor partners, and industrial end users. A key challenge for faculty teaching in the SCMT Lab has been the development of instructional materials that are appropriate for teaching “hands on” applications of application software and various technologies that will illustrate the supply chain concepts being taught in the class.

Distribution management software has been donated for use by students in the SCMTL, as well as supporting training materials. In particular, the lab was provided with licenses to an enterprise resource planning (ERP) software that is delivered via a web-based application service provider (ASP), representing a unique trend in the delivery of software applications. Indeed, a primary advantage of this software is the ready access that students have to the system from any computer with internet access. This paper will discuss a project using graduate students in a Global Supply Chain Management course to prepare software demonstration modules to support the teaching of distribution management ERP software. The ADDIE Model (Analyze, Design, Develop, Implement and Evaluate) was adapted for the development of the instructional materials to assure that the needs of the students and objectives of the courses would be met.² This became an active learning project for the graduate students because they had opportunity to learn the software and make meaningful connections to course concepts, as well as provide the needed instructional materials for future lab activities. This paper will detail the steps taken to engage the students in an instructional development project that was both beneficial to the graduate students preparing them and to the students using them in future coursework.

Background

The XXX Program, within the Department of YYY with the ZZZ at WWW University, has recently developed a Supply Chain Management Technology (SCMT) Laboratory. Supply chain management involves the physical, information, and financial flows to meet customer demand and maximize profit.¹ The SCMT Lab utilizes demonstration and simulation activities that allow students to manipulate equipment and products in a “working warehouse” space. Additionally the SCMT lab allows students to simulate the supply chain activities and information that flow between manufacturers, supplier and distributor partners, and industrial end users.

The XXX Program has developed strong relationships with industrial partners that provide multiple benefits for faculty and students, as well as the companies involved.³ The benefits derived by the University from business partners may include: contributions of money for scholarships and internships, gifts in kind, use of corporate connections to encourage legislative support for higher education, and personnel to serve as adjunct faculty or lecturers to enhance and augment curricular offerings.^{4,3}

A corporate partner for the SCMTL donated distribution management software for use by students in the lab, as well as a sample database that could be used by students to support the development of course materials. In particular, the lab was provided with licenses to an ERP software that is delivered via a web-based application service provider (ASP), representing a unique trend in the delivery of software applications.⁵ A primary advantage of this software is the ready access that students have to the system from any computer with internet access

Problem

A key challenge for faculty teaching in the SCMT Lab has been the development of instructional materials that are appropriate for teaching “hands on” applications of application software and various technologies that will illustrate the supply chain concepts being taught in the class. While the new software was relatively “user friendly” in the sense that many options for help were available to student users and it is Windows-based, there was a need for lab modules that could be introduced to students in the lab during relatively limited time periods. More importantly, there was a need to develop lab modules using the ERP software that would support the teaching of a broad range of supply chain topics.

Purpose of Project

The purpose of this project was to engage graduate students in a Global Supply Chain Management course to prepare instructional lab modules to support the teaching of distribution management ERP software. The Global Supply Chain Management course was a course designed to teach supply chain concepts to ZZZ graduate students; it was open to a wide variety of students in the M.S. and Ph.D. programs, as well as senior undergraduate students. *Designing and managing the supply chain*⁵ was the text used in the course. Key objectives for this course included:

1. develop an understanding of the state of the art of supply chain management as it applies to firms with global operations,
2. develop a capacity for analyzing supply chain problems on a functional, business and company-wide basis,
3. develop an awareness of the organizational and channel structures used in global supply chain management and strengths and weaknesses of those structures,
4. develop an understanding of the key criteria utilized in multi-national location site selection, global scale facilities configurations, and international sourcing networks development, and
5. become acquainted with some of the realities of running different types of firms.

Each semester, a major project is assigned to students that will support the class materials in a substantive way. The new software became accessible early in a summer session and students were assigned a project for developing instructional materials to support it. Such a project would provide students with a learning experience that would help them understand how such software supports the management of operations in the supply chain, and would help students to operationalize supply chain concepts related to several of the key objectives of the course and text. The text used in the course provided a foundation for the key content areas for the instructional modules; it provided a broad overview of subjects related to supply chain (see Table 1) that assisted in breaking the ERP software into broad content areas.

Supply Chain Text Topic	Corresponding Assignments for Software Modules
Logistics Network Configuration	Identification of data used in network design
Inventory Management	Typical tasks of the purchasing manager
Value of Information	Information for coordination of systems
Supply Chain Integration	e-commerce functions
Strategic Alliances	Cust. relationship mgmt. features; partner activity
Procurement and Outsourcing	Inventory risk; volatile demand and availability
International Issues	Territory analysis
Supply Chain Design	Inventory value: lead times, service level, dead stock
Customer Value	Customer profitability: sales functions, profitability
Information Tech. for the SCM	Key product information: forecasting

Table 1 Assignment of Instructional Modules for Software that Corresponded to Supply Chain Topics from textbook

An additional focus for the instructional modules was the definition of supply chain management given by the text “Supply Chain Management is primarily concerned with the efficient integration of suppliers, factories, warehouses and stores so that merchandise is produced and distributed in the right quantities, to the right locations and at the right time, and so as to minimize total system cost subject to satisfying service requirements.”⁵ That is, students were asked to incorporate in the instructional modules supporting demonstration activities that assisted students in making a conceptual link to the supply chain concepts taught in the text.

Methodology

This became an active learning project for the graduate students because they had opportunity to learn the software and make meaningful connections to course concepts, as well as provide the needed instructional materials for future lab activities. While the definition of active learning is somewhat elusive, most researchers agree that it involves student activity and engagement in the learning process rather than passively receiving information; it involves students doing things and thinking about what they are doing.⁶ There has been an increasing emphasis on the use of non-traditional or innovative teaching methodologies, including active learning, in universities as they attempt to create a more effective learning environment for students.⁷

The ADDIE Model (Analyze, Design, Develop, Implement and Evaluate) was adapted for the development of the instructional materials to assure that the needs of the students and objectives of the courses would be met. ADDIE was developed in 1975 by Florida State University and selected by the armed forces for developing training.² It is a general description of most instructional design methods and provided a useful model for teaching the basic elements of instructional design to novices. Visscher-Voerman and Gustafson found that experts of instructional design do not necessarily follow the ADDIE model in strict format, but modified their level of involvement for the different phases.⁸

Analyze Phase

Students were asked to analyze the current situation they were designing the instruction for by considering four areas: environment, resources, constraints, and learner characteristics. The learning environment was defined as the SCMTL with one instructor teaching a three-hour instructional module. The labs would be supportive of three different classes taught in the XXX Program: Purchasing, Warehousing and Logistics; Financial Transactions for XXX; and Transport Logistics. The resources in the lab consist of 4 wireless laptops and 3 desktops, as well as a large LCD panel and whiteboards for classroom instruction. Students may be seated at tables or actively working in the “warehouse” environment. Constraints were considered to be the three-hour time limit of the labs, as well as the limited amount of depth that students would be able to achieve in working with the software due to the large amount of information already taught in the courses. Additionally, labs were typically scheduled for no more than 20 students at a time. Learner characteristics were also considered as highly important when designing the instructional modules. The majority of students would be juniors or seniors and were assumed to have limited or no industrial experience,⁹ but would be using the instructional modules to complement their class work. Computer skills would be above average. The courses are typically required for all students in the classes, and their ultimate objectives are to earn a B.S. in XXX and/or YYY.

Design and Development

Students were queried on their first and second preferences for the instructional content (Table 1) of lab modules they were to develop. Assignments were made and students began by developing familiarity with the ERP software components that related to their assigned content areas. A basic introduction to the software was provided in class. An interesting side note is that more than half of the 12 students in the class had used similar software in a job setting, and 3 of them were highly experienced users of the same. Students were encouraged to work together in developing their modules, but were required to turn in their own instructional modules, as well as present them to the class for evaluation and feedback. A template was provided to the students to assist them in the development of the labs, and to provide for standardization of the materials.

The lab module template required students to include a brief introduction of the lab, a set of instructional objections, a set of procedures for the lab activity and corresponding screen shots for ease of understanding, and a set of questions designed to tie the activities to concepts taught in the course. The definition for instructional objectives was provided to

students with examples that were relevant for this project. Instructional objectives were defined as intended learning outcomes in terms of the types of performance students were able to demonstrate at the conclusion of the instruction.¹⁰

Students were given a relatively limited time of 3 weeks to complete the lab modules due to the short duration of the summer session. Presentations of the lab modules were made by the students and feedback was given to improve them. A partial example of one of the lab modules turned in is shown below.

Example Lab Exercise

Lab Title: Inventory Management **Student Name:** _____

Introduction: In this lab, you will navigate the decision support software to perform three tasks of the purchasing manager.

Instructional Objectives:

1. To become familiar with the software interface and learn key operations used by the purchasing manager.
2. To be able to demonstrate how to look up current inventory levels and turnover data for multiple inventory items.
3. To be able to request a transfer

Exercise 1: Turnover Rate

Procedures:

1. Log in as Purchase Manager (see figure 1)
2. Go to REPORTS > INVENTORY ITEMS > INVENTORY TURNOVER
3. Set the period to "THIS YEAR"
4. Set Location to "ALL"
5. Scroll down....

Questions:

1. What is the cost, turnover rate, average day on hand, average value on hand and average number on hand for the file cabinet?
2. What is the turnover rate? How is it calculated?
3. How does this turnover rate compare to...

The projects were graded and the development of the lab modules into a User Guide for use in the SCMTL was completed by one of the graduate students in the course. Because the quality of the modules was varied, the primary task was to bring the level of all of the modules up to a single standard for easy use by students. For example, additional screen shots were added, instructional objectives were standardized, and grammar corrected. Some of the modules were combined with each other because the materials were closely related and

provided enough material for one lab session. A total of five usable lab modules were placed in a SCMTL ERP Software User Guide.

Implementation and Evaluation

The first implementation of the lab modules will be during spring of 2007. Students will be asked to provide feedback on the labs as they use them which will be used to make further improvements in the lab modules.

Project Results

This instructional development project was both beneficial to the graduate students preparing them and to the faculty whose courses will be complemented by them. This set of lab modules is considered an important first step in developing instructional materials for using the software in the labs. This software, as is typical of ERP software in general, has an extensive number of applications and would easily require a 3 credit hour course or more in order to use the majority of the functions available in it.

The student reaction to the project was very positive as reported in their presentations, and in teacher evaluations. The use of the computer applications they worked on “brought to life” many of the concepts in the text. It was also a good exercise for many of the students in the class who plan to become academicians. Many of them commented they learned a great deal regarding how difficult it is to plan good instruction that would be illustrative of course content.

Conclusion and Recommendations for Future Work

The conclusion drawn from this project is that the use of graduate students to develop instructional modules both as an exercise in their own active learning and as a service project is recommended. Recommendations for improving the project include:

1. Increase the amount of time for students to work on the lab modules.
2. Provide an example model lab template for students to use as a guide and as a standard for what they are creating.
3. When possible, provide a subject matter expert to provide a thorough introduction to the software, and to be available for questions as they arise.
4. Rather than have students present their lab modules to the class for feedback, have the students “swap” their modules and work on using the modules as a formative evaluation step in order to determine any weaknesses in the instructional material for revisions.¹¹ This step would also assure that students would be more familiar with the content of the labs than if they had simply listened to the presentations.

References

1. Chopra, S. & Meindl, P. Supply chain management: Strategy, planning, and operations, Second Edition. Pearson Prentice Hall, New Jersey. (2004).

2. Clark, D (2004). ADDIE – 1975. Retrieved from http://www.nwlink.com/~donclark/history_isd?addie.html. (January, 2007).
3. Newton, K.A. & Schmidt, E.K. “A successful partnership between an industrial trade association and education at WWW University.” 2003 Conference for Industrial and Education Collaboration Proceedings, Tucson, AZ. (January, 2003).
4. “Exploring common ground: A report on business/academic partnership.” Washington, D.C. American Association of State Colleges and Universities. (1987).
5. Simchi-Levi, D., Kaminsky, P. & Simchi-Levy, E. Designing and managing the supply chain (concepts, strategies and case studies), Second Edition. McGraw-Hill/Irwin, New York. (2003).
6. Gruden, C., Apul, D., & Diza, M. “Teaching concepts on softening: Observations from active versus passive instruction in an undergraduate and a graduate level course.” 2006 ASEE Annual Conference Proceedings, American Society for Engineering Education. (2006).
7. Felder, R. M., Stice, J. E. & Rugarcia, A. The future of engineering education: Part 6. Making reform happen. “Chemical Engineering Education, (2000), 34(3), 208-215.
8. Visscher-Voerman, I., & Gustafson, K.L. “Paradigms in the theory and practice of education and training design.” “Educational Technology Research and Development,” (2004), 52(2), 69-89.
9. Sinclair, A. “Assessing the Impact of Teaching Methods on Learning Outcomes.” An unpublished M.S. Directed Project Report, WWW University College of Technology Graduate Program, (2006).
10. Gronlund, N. E. How to write and use instructional objectives, Sixth Edition. Prentice Hall, New Jersey. (2000).
11. Smith, L. S., & Ragan, T. J. Instructional Design. Third Edition. John Wiley & Sons, New Jersey. (2005).