# THE DEVELOPMENT OF A REALISTIC AND PRACTICAL TRAINING ENVIRONMENT IN A DISTRIBUTION AND LOGISTICS PROGRAM

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### ABSTRACT

Degree programs that include realistic and practical labs that expose students to environments similar to the environment they will be employed in will help prepare students for rewarding careers in their chosen field of study. A large university on the east coast has developed a degree program that has incorporated realistic labs that utilize common software applications, actual inventory, and a warehouse simulation lab designed to mirror a distribution branch and its associated warehouse. This paper will describe the degree program, the use of technology in the program, and the warehouse simulation lab. The paper will also describe some of the practical labs included in the program. A brief discussion of the limitations of the program will also take place. Furthermore, planned improvements to the program and labs will be discussed. The paper will conclude with suggestions for further research.

### **INTRODUCTION**

Hands-on experience in daily business processes, using actual software and equipment, enables future graduates to gain an understanding of the organization's processes, requires less initial on the job training, and reduces the time it takes employees to become acclimated to the new work environment. Furthermore, academic programs that incorporate actual hands-on skills using real world examples enable students to understand how standard business processes actually take place. "Without an appreciation of a company's internal business processes and workflow, it is especially difficult for a newly minted graduate to grasp even more complex inter-organizational supply chains and information flows" (Fedorowicz, Gelinas, Usoff, & Hachey, 2004, page 235). Therefore, academic programs that include hands-on components along with traditional academic coursework prepare students for rewarding careers.

Since hands-on training goes beyond simple simulation and exposes students to real world environments, faculty at a large university on the east coast decided to add a physical laboratory that would expose students to real world examples and exercises by exposing them to physical distribution and material handling techniques and the associated management warehouse management decisions.

This paper will describe the degree program, the use of software and technology in the program, and the warehouse simulation lab. The paper will also describe some of the practical labs included in the program. A brief discussion of the limitations of the program will also take place. Furthermore, planned improvements to the program and labs will be discussed. The paper will conclude with suggestions for further research.

### THE WAREHOUSE SIMULATION LAB

An article published in *Industrial Distribution* (2005, p.1) described the warehouse simulation laboratory as "a practical, working distribution branch simulator, complete with, among other areas, a warehouse space, manager's office, sales areas and a shipping and receiving dock." The physical appearance of the warehouse simulation lab mimics the appearance of an actual work environment. Its appearance does not resemble a typical classroom, where students are seated in rows facing the front of a classroom. Instead,

it consists of several sections setup by function. For example, one section contains a branch manager's office and another section contains the sales counter. The largest section in the lab is the physical warehouse section. It consists of racks with multiple shelves with actual products that are assigned line item numbers. Anyone unfamiliar with the lab would assume it is a typical warehouse. The goal was to create a realistic environment for students interact with.

Since a large percentage of the graduates were finding employment in distribution branches, the laboratory was designed to support all of the day to day activities within a typical distribution branch and its associated warehouse. This approach has helped students learn firsthand the techniques involved in barcode technology, Radio Frequency Identification (RFID), warehouse utilization, and effective branch operations. Most of all, this approach has allowed students to learn management and problem solving techniques while performing tasks they are likely to perform on the job or supervise others that perform such tasks.

Recent additions to the laboratory include a plasma TV, smart board, and multiple computer stations. These additions have enhanced the capability of teaching software applications in this room. Furthermore, the addition of 25 laptop computers used by Distribution and Logistics majors in other courses has improved software availability throughout the program. Students that need to borrow a laptop to complete class projects and homework can do so free of charge.

# **DESCRIPTION OF THE PROGRAM**

With a goal of incorporating hands-on skills with traditional coursework, faculty launched the Bachelors of Science in Distribution and Logistics Program in 1997. The program originally focused on sales and later added a logistics component to its curriculum in order to further address the needs of business professionals. The program currently has over 200 students in the major. Every student in the program is exposed to realistic training that involves real world applications, processes, and management problems in several of the 18 core courses that cover different areas of industrial distribution and logistics. To further students' hands-on skills, they are required to complete an internship in order to graduate from the program. Those unable to locate an internship have the option of registering for a special course where they implement or manage a logistics project that spans an entire semester. Currently, the program consists of 18 core courses that cover different areas in industrial distribution and logistics. Table 1 lists the core courses within the program.

Introduction to Distribution and Logistics	Security & Risk Management
Warehousing and Materials Handling	Enterprise Resource Planning for Distributors
Distributor Sales and Branch Management	Technical Presentations
Global Logistics	Technical Writing
Supply Chain Logistics	Technical Project Management
Industrial Safety	Quality Assurance Concepts
Transportation Logistics	Industrial Supervision
Strategic Pricing	Distribution and Logistics Capstone
Purchasing Logistics	Distribution Research

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The courses within the program attempt to incorporate curriculum that strengthens students' technical and managerial abilities by exposing them to detailed and complex logistics and distribution issues corporations faced today. Software packages, case studies, hands-on experiences, and leadership games are implemented in these courses only after they are determined to be current and realistic. For instance,

in order to integrate real world examples, where students perform actual tasks undertaken in a supply chain environment, an Enterprise Resource Planning (ERP) software package and training program has been integrated into the current curriculum. ERP software's distinguishing characteristic is that they integrate an organization's processes and systems under one integrated system that spans all facets of the organization such as, sales, accounting, human resources, and logistics (Rosemann & Maurizio, 2005). SAP was chosen as the ERP system to implement, since it is one of the most widely used ERP software packages in the world (Hayen & Cappel, 2003). The Distribution and Logistics degree program joined the SAP University Alliance (UA) program in the summer of 2008. Since then, over 30% of the Warehousing and Material Handling, the Special Topics in Distribution and Logistics, and the ERP for Distributors courses contain SAP training modules.

In the past three years, the Special Topics in Distribution and Logistics course has served as the development test bed for several other courses that will utilize SAP. For example, in one semester, the course was used to ensure proper deployment of SAP in the ERP for Distributors course in the spring of 2009. In the ERP for Distributors course, students learn to manage a variety of ERP and business processes using SAP. The University Alliance (SAP UA) program develops and provides ways to test the software so students understand the concepts used in real world applications. Therefore, students gain real world experience and valuable skills in the use of an ERP system as they progress through the course. The integration of the SAP UA program is producing graduates that are more prepared for rewarding careers, since studies have shown that similar programs have produced successful results (Hayen & Cappel, 2003). In fact, a survey conducted by Rosemann and Maurizio (2005) of 714 university students from eight different countries indicated the majority of students were pleased with their SAP program and realize the value of their training and their future marketability upon completion of the program of study.

Since students were able to assist in the design and testing of the ERP for Distributors curriculum, they were exposed to the new software from a different perspective. For example, they were able to see how an ERP implementation is performed in phases and how one phase can affect another. Furthermore, they learned that user input is valuable throughout the process and that the success of the implementation depends on many variables.

Besides learning to use SAP in a realistic environment, students learn a variety of management skills. They are also expected to perform a variety of labs where they will use SAP to produce logistics reports managers often produce and ultimately analyze those reports to make changes to business processes. For example, one report students are required to produce provides a list of the most requested items. This report is used to enable students to reorganize the distribution simulation laboratory warehouse effectively in order to facilitate easier and quicker picking of orders. Since students use a popular ERP to process an actual physical inventory of approximately 200 line items, they gain valuable experience they will need to secure gainful employment.

Although the SAP UA program is relatively new to the Distribution and Logistics program, plans are currently underway to develop courses that prepare students for industry certification in SAP by utilizing the skills gained in the UA program. As Hayen and Cappel (2003) point out, industry certifications are very valuable in demonstrating students' understanding of the technology. Most of all, in order to prevent some of the problems identified by Seethamraju (2007), where most of the students mastered the SAP software but did not gain as much knowledge in business functions, existing labs and assignments were designed to include as many business concepts as possible. Furthermore, lab and assignment deliverables require students to explain why the SAP steps are necessary for the associated business processes. The goal is to create an integrated learning environment where technology is used to address business processes and problems.

Since the adoption of SAP, the Warehousing and Material Handling course was modified to incorporate a variety of new labs that include SAP and other technologies. One of these technologies is Radio Frequency Identification (RFID). Although RFID is still in its infancy stage, it is expected to become a popular method to identify products during supply chain movement and storage (Bottani, 2008). Despite Bottoni's belief that RFID is still in its infancy stage, it is rapidly expanding in the logistics and distribution industry. RFID technology provides several benefits barcode technology does not. One of these benefits is that RFID tag readers do not require line-of-sight to read RFID tags (Karkkainen, 2003). Another benefit of RFID technology is that it enables the storage of more detailed information than barcode technology (Jones, Clarke-Hill, Shears, Comfort, & Hillier, 2004). Other benefits include less handling of products, identification and tracking of products during highway transit, and warehouse arrival and departure.

Future RFID technology implementation into the Warehousing and Material Handling course include the retrofitting of the entry and exit points of the warehouse lab with RFID readers. Future plans also include the retrofitting of the roller conveyor system so RFID tags can be read during movement in and out of the warehouse and as they move throughout the warehouse. Several labs have been developed to train students on the use of RFID technology and warehousing procedures. Examples of these labs include the order picking lab and the order shipping lab. In these labs, students pick products to fill orders generated by SAP users and prepare those orders for shipment. Since all of the products in the warehouse will be tagged with RFID tags, RFID equipment will be used to aid in picking, palletizing, and further processing of orders. As shipments leave the warehouse, RFID readers will read the tags, allowing students to complete the order picking and shipping labs without manual scanning of products. Picture 1 shows a student picking orders as requested by the pick sheet.

# Picture 1. Example of student picking items in the lab

Since RFID is not as widely used in supply channels as barcode technology, several barcode development, management, and utilization labs are currently in use in the Warehousing and Material Handling course. The first barcode lab students perform is the identification and creation of various barcode standards using BarTender 9.0. Students learn to generate labels using this specialized software and a dedicated Zebra lab printer. Other labs follow where students, using a variety of barcode scanners, scan products under various conditions to learn proper scanning procedures and to troubleshoot scanning problems.

One such lab is the Barcode Scanning Lab. The purpose of this lab is to investigate characteristics of barcodes and scanners to provide an understanding of the differences in scanners and barcodes. Specifically, this lab investigates depth of field (optimum scanning range), the "X" dimension, barcode symbol density, barcode substrate (background colors), and various barcode symbologies (Excerpt from IDIS 3780/81 Warehousing and Materials Handling Lab course manual). Picture 2 shows a student using a barcode scanner during a lab exercise to scan a pallet of products that just arrived.



# Picture 2. Student using barcode scanner to check in material

In order to create a warehouse lab environment that replicates an actual warehouse environment, a variety of material handling equipment is used in the Warehousing and Material Handling course. Some of this equipment includes a forklift, pallet jacks, racks, and conveyors. Several labs have been developed to show students how to safely and effectively use material handling equipment. Since the operation of a 350,000 square-foot warehouse can cost \$10 to \$15 million a year to operate, it is important for students to understand proper warehousing procedures and concepts, as well as important safety measures that should be taken in this type of environment.

All of these labs require teamwork and different roles rotated among students. For example, the physical inventory lab requires a warehouse manager, two or three auditors, and several teams of two counters. Students perform the lab within their assigned roles and are rotated to expose them to the various roles. The goal is to provide students with real world experience in various work situations. Feedback from students, employers, and the degree program advisory board indicate this method of training is helping to prepare students for rewarding careers in the distribution and logistics field.

Furthermore, virtually every lab performed within the courses requires the use of Microsoft Office. The lab deliverables require students to create management reports, charts, and presentation materials that will be used in future labs. This helps students understand the importance of proper decision making. In addition, reports are created that teach students how to brief upper level management on issues that have arisen in the workplace. Picture 3 shows a student briefing a supervisor during a lab. This requirement encourages students to develop their management skills and to learn to analyze management data. Some of these reports include, but are not limited to, an analysis of inventory accuracy, inventory turnover, and percentage of warehouse utilization.



Picture 3. Students role-playing in the lab environment

# CONCLUSION

In conclusion, the distribution simulation laboratory is an integral part of the learning process in the Distribution and Logistics degree program. Having the ability to use software packages such as SAP and BarTender have given students the opportunity to understand the basic concepts of these application packages to further enhance their learning ability in the workplace.

In addition, by providing technologies and applications such as RFID, Symbol Barcode readers, and hands-on lab exercises, students graduating from the degree program gain real world knowledge and are prepared to begin work upon graduation with less initial training, which ultimately reduces employer costs and aids in the employees' chances of success.

As more SAP modules are developed and implemented into more courses within the program, such as Purchasing Logistics, Global Logistics, Strategic Pricing, and Supply Chain Logistics, students will see how important this software package is in industry and will be able to relate to their current workplace without the need for additional SAP training. The goal is to enhance learning opportunities for all students in the program, making them more marketable and more conducive to the learning environment in today's distribution and logistics fields.

While significant improvements have been made to the program, many more opportunities for improvements exist. For example, additional labs, equipment, software, and additional collaboration with industry partners would further enhance the program. Since financial resources have been limited for the past three years, purchases for new equipment and software have been placed on hold.

Since the inclusion of SAP and the new labs that utilize it are still relatively new to the program, more research is needed to determine just how effective this approach is. While preliminary employer and graduate feedback indicate the program is effective, scientific studies are needed to determine how effective the new changes are. Studies that survey employers and graduates are needed to determine if these changes have help students find and maintain gainful employment and whether the skills they have gained as a result of this exposure to the software and techniques utilized within the program enabled them to be successful. Other studies that can add value to the distribution and logistics field would be studies that look at similar programs that utilize ERPs and simulated warehouses to determine what successes or failures have resulted from such initiatives.

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