

Partnering with Industry for Providing Experiential Learning in an Undergraduate Class in Industrial Distribution

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Dr. Rodriguez Silva has contributed with recognized international institutions on supply chain management and participated on the implementation of strategic initiatives related to global trade, logistic processes and supply chain integration for the Inter-American Development Bank and the Department of Transportation, to mention some. Among Dr. Rodriguez Silva's professional accomplishments are the reactivation of the container terminal at the Port of Lazaro Cardenas that attracted multi-million investments and her contribution to the Maritime Transportation Security Act at U.S. Congress. Dr. Rodriguez Silva is member of PMI, JLSE, IAME, JIN, NASBITE and has publications in Journals on topics related to transportation, distributor competitiveness and global supply chain.

Research Areas of Interest: •Distribution Best Practices •Distribution Profitability •Growth and Market Share •Sales and Marketing Optimization •Supply Chain Management •Global Distribution •Strategic Planning •Project Management

Recent Significant Research and Teaching Activities: •Talent Incubator Program: Educate and train students for industry project development and execution. Provide talent pipeline for companies' internships and full-time. •Global Study Abroad Program: Business Plan and Project Development for GSA. 2011-2014. •Teaching: Optimizing Distributor Profitability, Pricing, International Sales and Marketing, Global Engineering, Distributor Competitiveness, Distributor Processes, Customer Stratification. •Research: Optimizing Distributor Value Added Services, Optimizing Human Capital Consortia.

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Abstract

This paper presents a case of a senior level course in Industrial Distribution program at Texas A&M University. The course consists of an industry project, which is funded by a building materials distributor. As a part of class requirement, students have to complete the project during the semester, and present their recommendations to the sponsor company towards the end of the semester. In the paper, we discuss the project scope and its findings in detail along with the student learning experience, industry academia collaboration, class activities management (balancing theory versus practice), lessons learned, and several instructional insights with respect to teaching and project management. We believe that these instructional insights are very “portable” to other learning model.

Introduction

The traditional approach of learning is topic-based learning. In this approach, an instructor delivers lectures on series of topics, most likely from a textbook. However, the topic based approach has little correlation with what is the contemporary need of the industry. As a result, students may not be very well prepared (upon graduation) to take on challenges of the real world. Unlike in traditional learning method, in experiential learning students are involved in hands on real world problem solving environment. Thus, in experiential learning student learning takes place based on the experience of the project they work on. Capstone or senior design projects are great examples of experiential learning environment. By realizing the need of project-based learning, the US government has been encouraging the academic institutions to create such learning environment in the STEM disciplines through its funding agencies like National Science Foundation (NSF) [1]. This has generated huge interest among the engineering educators on hands-on freshmen engineering programs [2-3].

The educators and pedagogical researchers have studied many aspects of experiential learning including assessment, delivery, and impact of such model of student learning. Carlson and Sullivan [4] have presented a conceptual framework and case study of integrated teaching and learning laboratory at a major university in the US. The laboratory served as multi-disciplinary learning platform for hands-on engineering in first year engineering design and other courses like computer simulation and capstone design studios for undergraduate students. The laboratory also supported outreach activities. This specific experiential learning model has been reported to be

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very successful serving over 2500 students, 62 faculty members, and 49 separate courses across six engineering departments in one year alone. There are different models of experiential learning mentioned in the engineering education literature. For example, service learning is a type of experiential learning approach in which students can achieve their personal growth and earn professional development education while providing service to community [5]. However, researchers argue that experiential learning that takes place during community service activities is different from the one that takes place in the university laboratories [6]. The reason behind this is that the service activities are not necessarily part of the students' degree plan. However, if a student is engaged in a co-op program that is relevant to student discipline then it can be a part of his/her degree plan. Chan [6] has presented an assessment model for community service type experience learning for engineering students.

Project based learning is another form of experiential learning. In this approach, students are engaged in the active-learning. It also requires time and resource management and work breakdown structure. Therefore, it may take relatively longer time than the traditional topic based learning approaches require [7]. Ho et al. [8] define the project based learning as a learning approach in which students apply, learn, and integrate their knowledge in a coherent and meaningful way. The authors cite a senior design project in electrical engineering as an example of project-based learning environment. Robinson [9] argues that project-based learning can be a motivating factor for students especially in STEM discipline if they can see how a product or system works in real life. The author has implemented project based learning model in analytical chemistry. Most recently, Felder and Hadgraft [10] discuss different types of teaching and educational research in engineering. In their paper, the authors discuss the necessity of reforms in engineering education practice in detail.

While it is very common to have a hands-on senior design course in all traditional engineering and engineering technology programs, it is not so common in other disciplines like industrial distribution (ID) even if they are housed in a traditional engineering/ engineering technology department. A part of the problem is that many people (both students and instructors alike) perceive ID as "Technical Sales only" major. However, the ID curriculum is comprised of several courses in logistics, supply chain management, quality, and several engineering and common body of knowledge (CBK) courses. Likewise, many ID graduates pursue career paths in operations and supply chain management, not just technical sales.

This paper presents a case study of experiential learning model in a senior level undergraduate class in industrial distribution program at Texas A&M University. In addition to a company sponsored project, which is central to providing experiential learning environment for students, the paper discusses the course objectives, learning outcomes, and grading policy, and class assignments. How these class assignments have enhanced the student learning is also presented. The paper also describes the case study and its main findings. In the end, it discusses the feedbacks received from the project sponsor and the students who participated in the class.

Course Objectives

This course focuses on new research defining distribution strategy in changing marketplaces. Students are exposed to the latest applied research initiatives and how companies are successfully implementing these initiatives. In other words, it emphasizes the understanding and implementation of best practices to improve distributor competitiveness. The students are to work on a real world company sponsored research project in collaboration with Talent Incubator Program housed inside the industrial distribution program. The main objective of the class is to provide the students with an “in-class internship” opportunity thereby making them “job-ready” upon graduation. Students are required to perform independent and collaborative research activities and execute the class project by employing a scientific and project management approach. In addition to sponsored project (also described in this paper as “case study”), the course covers concept, methodologies, and implementation strategies of recent distribution research focusing on sales and marketing optimization, customer stratification, and pricing optimization. These topics are in alignment with the case study thereby helping students to better understand the research problem at hand.

Learning Outcomes

Upon successful completion of this course, students are able to: i) develop an understanding of the basic concepts and techniques of Distributor Sales and Marketing Strategies; ii) develop an understanding of the linkage between the customer stratification and distributor sales and marketing strategies; iii) apply a scientific approach in solving complex problems facing the real world distribution industry; iv) apply project management skills to solve the large and complex research projects; v) enhance team skills for successful project execution; vi) perform the independent and lifelong learning activities beyond the classroom; and vii) improve levels of professionalism and communication skills relating to real world problem solving.

Assessment of Learning

In this course, we use a number of assessment methods to assess the student learning. These methods include daily quiz, application oriented home work assignment, discussion board, project report, presentation, and team work. In the following paragraphs, we describe the purpose of these assignments and assessment techniques.

Boundary spanning daily quizzes: The objective of daily quizzes is to provide students with an additional opportunity to demonstrate the mastery of the topics and improve their performance beyond the other assignment. The quiz requires students to think beyond what is being described in the text. A number of in-class short quizzes (5-7 minutes) are administered throughout the semester, which can occur at any time during the class. The quizzes are unannounced and no make-ups are given for missed quizzes. If a student has a University approved absence on a quiz day then that quiz is dropped.

Online discussion board: Depending upon the class size this can be individual or team assignment. There are two topics assigned on the discussion board during the semester. In order to help students with their project, the discussion topics can be related to the company sponsored project during the semester. Each team is required to contribute to the board by posting their thoughts and ideas in a timely manner. Each discussion topic carries some points towards students' final grade. A team which makes quality posts to the discussion board on a regular basis is likely to get maximum points in this assignment. The quality of the post is judged based on how well it is researched and whether or it is based on well established facts. Merely opinion based posts are not considered as quality post.

Application oriented homework assignments: Homework assignments are designed to reinforce and expand students knowledge of the topics discussed in the class. Students are encouraged to discuss/interpret the homework solutions by highlighting potential managerial implications. The homework assignment can include both essay type and numerical analysis depending upon the course topic.

Sponsored project: As mentioned earlier, this course includes an analysis of industry sponsored project. In order to encourage the students to engage in the project, the industry project has relatively higher contribution (about 35%) towards their final grade. However, the project grades are broken down to several smaller assignments such as project plan, progress assignment, discussion board, project report, in-class presentation, and final presentation to sponsor to minimize the subjectivity in grading and as well as to minimize the grade inflation.

Case study of a Building Materials Distributor

Company sponsored project is the key element of this class. In Fall 2013, the students worked on a project sponsored by a national level building materials distributor headquartered in the Midwestern United States. The company was a multi-billion dollar wholesaler that also had its manufacturing arm. In order to protect the identity of the company, in this paper we refer to it as the XYZ Supply. The goal of the project was to analyze the current services and assess future value added services opportunities for its customers. There were 70 students in the class. Majority of students were in their final semester before graduation. Because of class size, the main project topic was divided into ten sub topics. Each topic was assigned to one team with seven students in each team. Table 1 presents the list of research topics/questions for each team.

Table 1: Project topics

Team Number	Team Topics
1	Conduct literature review to determine the number and types of services a distributor provides to its customer in general, and a building materials distributor in particular?
2	Conduct general industry survey (plus follow up phone interview with at least 30 companies) to determine the number and types of services a distributor provides to its customer in general, and a building materials distributor in particular. Note: some of this knowledge may already exist in TIP's knowledgebase because of customer services consortium.
3	What are the service selection criteria a distributor should use? Is a service type dependent on the customer type? What strategies a distributor should follow to develop services?
4	How should a distributor manage its service portfolio?
	a. Cost benefit analysis of services
	b. Service mix strategy
	c. Tracking the service key performance indicators
5	What is service lifecycle in the context of a building materials distributor? How and when should a service be developed, continued, or retired?
6	What are the deficiencies in the current services offering of XYZ Supply? Rank order them based on the order of importance (value) to customers. Note: this may vary depending upon the customer type.
7	List all the services that are currently provided by XYZ Supply. How does this portfolio compare with that of their key competitors in the building materials distribution? How about that with distribution industry in general (including other channels)? Provide a list of new services that XYZ should develop for short term, medium term, and long term.
8	Estimate the potential cost and benefit of the new services (recommended in question 7) that XYZ may develop in future. Develop an implementation strategy of new services for XYZ.
9	Create a service improvement strategy for XYZ based on the current industry best practices. The recommendation should be based on ROI analysis and other service portfolio management strategies developed by an earlier team (see question # 4).
10	What kind of marketing message should XYZ create to promote its brand and services? Develop a viable marketing strategy for XYZ to successfully roll out the new services recommended in this project?

Project Planning and Execution

Like any other project, planning phase for this project was the most crucial phase. The instructor and his team had series of brainstorming sessions with XYZ supply during the late spring and summer of 2013. These meetings helped us to finalize the project main topic and the sub topics

as shown in Table 1. Student team selection and the topic assignment were done by the instructor by consulting the other instructors who had taught the students in other courses. The idea was to form balanced team in terms of students' background (e.g., prior internship experience) and their prior academic performance in other classes. Each team was asked to identify their leader and designate that person as contact point with industry. Similarly, a contact person from the company was assigned to each team to facilitate the data collection and other queries students may have during the execution of the project. We felt like such arrangement was necessary as the project was supposed to be completed within the semester. There were frequent interactions between students and their industry counterpart almost on a bi-weekly basis. It may be noted that several topics in Table 1 (e.g., topic # 7 and 8) are interdependent upon each other. In such cases, students were suggested to have joint meetings so that they can work on their tasks simultaneously. In order to provide an outside perspective (or industry benchmark) on the project, the instructor had invited guest speakers to the class from the similar industry and researchers in the distribution field. The guest lectures were very helpful and generated a lot of interesting discussions in the class. Each student team had five types of deliverable throughout the course of the project that included project plan, project progress report, in-class presentation, final report, and final presentation to the sponsor.

Collaboration with Talent Incubator Program

The industrial distribution program at Texas A&M University has an in-house talent incubator program (TIP) primarily funded by industry sponsored research. The TIP laboratory current has over a dozen undergraduate students working on different research projects related to distributor competitiveness. There were two student researchers working on XYZ supply project at the TIP lab in parallel with the class. The deliverables for TIP lab was more stringent in comparison to that of the class because the lab had about 9 months to complete the project. Their work was independent from but complementary to the class project. The collaboration with TIP lab helped students in coordinating with company and also in data collection. The TIP lab is managed by a professional researcher who has PhD in logistics. The project manager of TIP lab was also the co-project manager for the class project. This joint management model and collaboration with the TIP lab provided a "win-win" situation for both class and the lab.

Results and Discussion

Project findings

All teams completed their work on time. Overall, students' findings were taken in very positive light by the sponsor. There were many out-of-box ideas that the company had never considered before. Here are some key findings of the project:

- Students suggested adopting the Stan shih curve to create the value-added service during the distribution phase of product life cycle.
- Generally customers of XYZ were satisfied with their current service offerings. Customers requested for more technical support for online business transactions such as price visibility, order placement and invoice payment.

- Students suggested creating a loyalty program to better manage the service portfolio for strategic and potential core customers.
- The class was able to profile key services of the company on the service lifecycle map. It was discovered that many of their services were already matured as a result those services were not enough to earn new business. The class recommended offering new services to retain the current core customers and attract the new ones through service innovation. One such suggestion was to create mobile app and make active presence in social media to capture the attention of new generation of customers.
- The class built a cost benefit analysis model based on both qualitative and quantitative factors.
- Students evaluated the current practice and make recommendation to move it to best practice, where applicable. For example, the XYZ has large number of transportation fleet but currently the route is determined manually based on experience. The students suggested an easy to manage software package to compute the optimal route. Students had done detail study on managerial implication of such decision.
- Lastly, implementation of best practices and marketing strategies were recommended to the sponsor company.

Student learning and company feedback

Besides direct assessment in the class on their learning of the class room materials, student engagement and learning were also assessed indirectly. The indirect method consisted of attendance trend, and students' feedback on the class. For example, in comparison to similar senior level class, this class was able to draw more students in the class although the attendance was not mandatory. Students were very much engaged in class participation and also on discussion board by offering suggestions to other teams.

Similarly, three executives from the sponsor company were present during the final presentation. They were also requested to evaluate the works of students. A part from three teams, the industry executives gave all the other teams A grade in their style and content of the presentation which demonstrated that the executives were very satisfied with the class work.

Conclusions

This paper has presented a case study of experiential learning in an undergraduate industrial distribution class at a major university in the U.S. The course materials and the sponsored project topics were complementary to each other that helped student to learn better in the course. The class project was sponsored by a building materials distributor. Overall, 70 students attended the class which was divided into ten teams for project management purpose. The project topics were focused on service lifecycle and service portfolio management. Students compared the current services provided by the sponsor company and mapped those from the perspective of service lifecycle curve. They also interviewed the multiple competitors of XYZ supply and identified the gap and made recommendation. The recommendations were analyzed with respect to their

potential risk and return on investment. The project experience has motivated the students to come to class and also significantly enhanced their learning of the subject. In addition, it has provided an “in-house” internship for students thereby preparing them for the real-world job. Lastly, the collaboration among talent incubator program, class, and industry was received very highly from the sponsor company as students were able to deliver a quality output.

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