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Operations Management Outside of the Classroom: An Experiential Approach to Teaching Enabled by Online Learning

Kristen A. Sosulski & Harry G. Chernoff

This paper describes the design of an experiential approach to teaching operations management (OM) at New York University Stern School of Business. OM students study the design and management of the supply side of business, including how products are produced and how services are supplied. The course discussed in this paper is unique in that students learn operations while visiting real companies and organizations. The foundational concepts are not taught in classroom lectures, but through video minilectures, demonstrations, group work sessions, and practice problems that are available online and can be accessed at any time. This allows for classroom time to be spent interacting with OM leaders in companies throughout NYC. The city becomes the classroom, and students witness the OM processes of real companies through direct onsite observation and discussions with field experts and professionals as well as with their own peers. This approach was inspired and informed by a desire to have students gain experiential interactions with OM professionals and simultaneously learn theoretical models and constructs.

In order to provide an experiential learning course in OM, we needed to completely redesign the onsite course. To realize our vision of learning through experience and observation, we developed online lessons to ground students in the foundational knowledge of the field. The online lessons were designed as weekly modules that included readings, a series of minilectures, an individual assignment, and a group assignment. This structure helped the students develop a theoretical understanding prior to applying their knowledge in real-world contexts, which changed our roles from lecturers to facilitators. The redesign shifted the ownership of the learning from the instructors to the students, who became active participants at the center of the learning.

It was the use of the online learning modules that made this experiential course possible. Using online lessons enabled us to conceptualize the classroom experience and create an authentic learning experience that provided students with opportunities to construct their own understanding of OM by (a) experiencing it in context, (b) engaging in authentic practices within a community of peers (i.e., their classmates), experts (i.e., the course faculty members), and professionals (i.e., business executives in OM roles), and (c) developing a rich understanding of the subject and its relevance to every business.

Literature Review

Constructivist learning theory posits that students construct their own understanding and knowledge (Brown, Collins, & Duguid, 1989; Papert, 1993; Piaget, 1954; Piaget & Garcia, 1991). The focus is

on the process by which knowledge is constructed by the learner rather than on knowledge acquisition (Fosnot, 1996; Jonassen, 1992; Lajoie, 1993). Fundamental to constructivist approaches are "context-rich experience-based activities" (Jonassen, 1992, p. 138). These activities involve attention to the social context and culture in which the learning takes place, the support for the development of knowledge construction, and the opportunities for active learner engagement through authentic practice. The design of both the online and the onsite learning environment for the course needed to support students in this approach, and digital learning resources had to be developed that supported constructivist principles.

The course design followed a learner-centered framework. Learner-centered design (Soloway, Guzdial, & Hay, 1994) focuses on providing students with the necessary scaffolding (Vygotsky, 1978) to help them develop from novices into experts. The online activities in our course also gave students the necessary scaffolding to support the active construction of knowledge, which was further supported through immersion in authentic activities or work (Quintana, Shin, Norris, & Soloway, 2006). Part of the students' weekly online assignment was to address real and current problems that the companies they visited were facing. Students worked in teams on these site-visit challenges to identify alternative solutions and then had the opportunity to discuss their recommendations with the company executives. Situating cognition or learning this way enables learners to see knowledge and its application in context (Greeno, 2006). Specifically, the executives shared insights and the realities of their business that influenced how their companies actually solved these problems.

Discourse is also important to the learning process. Through exposure to professionals in the field, students can "learn (and practice) professional discourse" (Quintana, Shin, Norris, & Soloway, 2006, p. 123). To help learners develop and refine their understandings of the knowledge they are acquiring, it is crucial for them to discuss their ideas and questions with each other and with industry professionals. Finally, students need exposure to the relevant community (e.g., the OM divisions of companies) to understand the culture and environment in which the concepts and principles they learn are applied in the field.

Course Redesign

The newly designed section of the OM course embodied the principles of experiential learning, authentic practice, and attention to the social context that support a constructivist approach to learning. The context was the real-world business setting. The OM business practices of a company—the ways products are produced and/or services are supplied—were observed in the field. Moreover, the online lessons involved collaborative activities that mirrored the challenges faced by the business being studied. The social context involved the community of OM professionals, the class of students, and a group of OM faculty members who participated in scaffolding students in their learning, online and in the field.

The course was given the title Ops in NYC: An Experiential Section of Operations Management.

It was launched in the spring of 2014 for full-time, first-year MBA students and was cotaught by the authors. Between us, we have experience in education, OM, and business.

The Idea

In March 2013 we developed the idea for the course redesign during a lunch conversation with some of our students who were enrolled in an elective course we coteach, Operations in Panama. In it, we take a group of 25 MBA students to Panama to study the Panama Canal, how business is conducted in Panama, small business entrepreneurship, and real estate development. The students expressed great enthusiasm for this course and reflected on the value of learning on location and hearing from industry experts from inside their workplace. We asked the students to comment on their experience in the prerequisite course, Operations Management. They described the course's content as engaging, but saw it as a missed opportunity to learn more about businesses in NYC. Given that we witnessed such success in the site visits in the Operations in Panama course, we considered whether it would be possible to also take students out of the classroom and into NYC for the OM core course. On the university's website, it states that "NYU, in keeping with its founder's vision, is 'in and of the city': the University—which has no walls and no gates—is deeply intertwined with New York City, drawing inspiration from its vitality" (New York University, n.d., para 3). We wondered whether we could realize this mission by using NYC as our classroom. We knew we needed to teach the foundational content of such a core course and realized that it would be a challenge without regular classroom meetings. However, having had previous experience with online education, we thought it could be possible to teach the necessary content in an online format. Online learning is a viable way to enable students to self-prepare for the learning that takes place in the field.

Solidifying the Course Vision

During the summer and fall of 2013, we worked intensively on the course redesign. Our vision for the course was to use NYC as the platform for learning; class time was to be spent at various businesses. The types of businesses and organizations selected were organized around five themes that we felt represented NYC: food, fashion, finance, real estate, and transportation. Each site visit focused on fundamental topics in OM, including process design and analysis, waiting lines, scheduling, inventory, quality, supply chains, operational risk, project management, simulation, and optimization techniques. The nine site visits ranged from a shipping container terminal to an educational farm, all within the NYC area.

Course Components

As we progressed in our planning, we identified several features of this course that went beyond the traditional OM class: (a) nine online lessons that included the foundational content and collaborative online challenges designed to prepare students for the site visits and (b) nine visits to companies and organizations.

Online lessons. Given the strong emphasis on learning in the field, a series of sequential online activities were designed to support foundational learning and concepts. Online lessons in OM, each of which included three faculty-led videos that ranged from one to seven minutes, were part of the learning environment. These videos helped to strengthen students' understanding of foundational concepts as well as their ability to make OM decisions through accompanying practice exercises. The video sequence followed a simple format: (a) a brief introduction to the topic, (b) a problem-solution demonstration; and (c) an assignment: a challenge related to the topic. The assignments served as the weekly formative assessment. The first video (in Figure 1) is an overview of an OM topic, inventory and inventory models. The second video (in Figure 2) is a problem and solution demonstration by an OM faculty member. The third video (in Figure 3) introduces an individual practice exercise for students to solve based on the second video. Students submitted their work online to the instructors who provided feedback on these assignments to help students refine and improve their work.

Video 1. Introduction to inventory management by Professor Srikanth Jagabathula (New York University, 2014b). The video is available at: http://youtu.be/kGPr9oeNoMQ
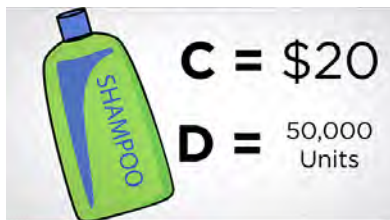
Video 2. Problem-solution demonstration by Professor Jagabathula (New York University, 2014c). The video is available at: http://youtu.be/JCt1IVSjsuM
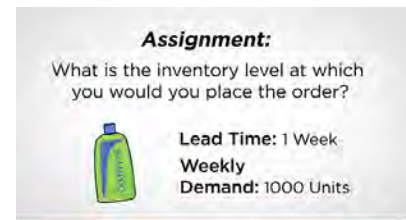
*Video 3. Introduction by Professor **Jagabathula** to a practice exercise for students to solve based on the video referenced in Figure 2. **(New York University, 2014a).** The video is available at: http://youtu.be/pIOzdftXsXc*

The principles of multimedia learning (Mayer, 2001) were applied to the design of the lesson and the videos that comprised it, which were created using animation and narration rather than the typical talking-head format. The introductory and problem-solution demonstration videos were each between five and seven minutes. The assignment video was about one minute. Figure 4 shows the content of a weekly lesson.

Each of the online video lessons was created and led by a different OM faculty member. Inviting other OM faculty to participate in developing content for the course helped us achieve two important goals. First, it served to extend the community of experts beyond the course faculty. We thought this would be a way to highlight and leverage the expertise of the OM faculty at NYU Stern. Second, including others in the course design enabled us to begin a dialogue with our OM colleagues concerning the new course format and to facilitate a culture of collaboration and experimentation in teaching. Our vision was to incorporate an experiential element into every OM core course at NYU Stern.

The online lessons were intended to enable students to study foundational concepts and models

Figure 4. A weekly online lesson for Ops in NYC.

online; to work in teams on real business challenges; and to observe those concepts, models, and business challenges on location at a different firm each week. In the course evaluation, many students commented that the online minilectures had been very helpful, although some students indicated that they wished that additional resources had been provided. Out of the 11 students who responded to the postcourse survey, 90% indicated that they had found the online video lectures and problems at least somewhat important for developing their knowledge of OM, with 72% indicating that the lectures and problems were important or extremely important in that regard. Furthermore, 72% of the respondents indicated that they found the online lessons at least somewhat important for developing their skills in operations consulting, with 54% indicating that the lessons were important or extremely important for that.

In the field, students observed the operational techniques, processes, and strategies employed in a va-

Group Site Visit Challenge #5

After reading the Inventory Control Note and the 3x1 company overview discuss and answer the following questions with your group:

1. Which type of inventory model would 3X1 be using, the multi-period Fixed Order model? or the Single-Period model? Briefly explain why you chose your answer.
2. What type of operating process is 3X1 at 15 Mercer?
3. Attempt to design a Process Flow Diagram for the custom jeans business at 15 Mercer.

Due on 3/10.

Submit Assignment >>

Figure 5. A weekly online lesson for Ops in NYC.

riety of contexts. For example, during one site visit, they learned how a retail store used two different types of inventory models, both of which they had studied and discussed during the weekly online lesson.

Preparation for the site visits. In preparation for each week's site visit, students worked in teams of four to complete an online challenge that typically included a brief case study and questions that helped them analyze the challenges faced by the firm and guided them in their exploration, observations, and questioning during the site visit. (See Figure 5 for an example of a pre-site-visit group challenge.)

To ensure that the students' time on site was used effectively, prior to the site visit students were also required to identify their learning objectives and then develop questions for the industry experts that were designed to ensure the attainment of those objectives.

Site visits. Our initial thought was that every class would be on location. We agreed to hold three in-class sessions to orient students, followed by nine sessions out in the field. The sites visited included JetBlue, Whole Foods, the NYC Taxi and Limousine Commission, and FreshDirect. To emphasize that students were active participants in the learning process, we set the expectation that they were to approach each site visit in the role of an OM consultant, fully cognizant of the major challenges facing the business, rather than as a "tourist" who expected to be shown the interesting aspects of the business.

The visits to companies and organizations involved a presentation by a company executive and a

discussion with the decision makers, a tour of the plant or office facilities, and a question and answer session. The quality of the students' questions was evidence of the efficacy of our approach to the preparation for the site visits. The student's role during the site visit was to observe the operational processes and participate in the discussion with industry experts. Through observation, students developed an understanding of how the different models and operational strategies were employed.

Results & Refinements

In the traditional classroom-based OM course, it was difficult for students to experience operations in context and impossible for them to engage in discourse with the OM community of experts and practitioners beyond their peers and their professor. In the redesigned course, the online video lessons presented students with expert voices from OM faculty, while the site visits presented viewpoints of practitioners and industry leaders.

The interest level in OM increased with the new experiential format. The course was fully enrolled and had a waiting list, which is rare for classes in this subject at NYU Stern. They also demonstrated evidence of being able to transfer OM concepts from one context to another through their experiences during the various site visits; although a different aspect of OM was addressed at each site, it was clear that students could see that all aspects of OM studied in the course were present during every site visit. The in-class midterm exercise also provided evidence that students could identify and reflect on all operational topics covered in the course and successfully transfer their knowledge of OM from one business setting to another. In addition, the operations consulting project at Sylvester Manor Educational Farm provided an opportunity for students to apply their learning from the course to a set of ill-structured problems—i.e., those that tend not to have one definitive or correct solution—and accordingly apply their collective knowledge in identifying a set of solutions and alternatives in operational decision-making and strategy for the organization.

Reflecting on the class, several students expressed their preference for learning in an authentic real-world setting. One student commented:

> *I'm a hands-on learner...This class was perfect for my learning style. As a future brand manager, I'll be overseeing so many parts of the process, from advertising and marketing to operations and supply chain management. This class showed me how operations fits within the larger business. Having been on an in-depth visit to Maher Container Terminal, I now have a better understanding of why goods take a certain amount of time to ship, for example...The complexity of coordinating different departments in a company, as well as running an effective assembly line, became real and relatable to me. (NYU Stern, 2014, para. 3)*

Another student said:

> *I took this class because I wanted to see operations from more of a strategic aspect…In this class, we took the theory and put it into practice in the real world…This class offered a rare opportunity to hear first-hand from senior executives, who actually spent up to three hours of their time with us. We didn't get all the answers from them; we learned to think more broadly and ask the right questions. (NYU Stern, 2014, para. 4–5)*

Students had two options for the final course assessment. The first, which more than 85% of the students selected, was to individually pursue further study of new OM topics through additional online lessons that we provided. The second, which fewer than 15% of the students selected, was to synthesize their previous learning throughout the course. This suggests that most students were confident and comfortable learning OM concepts on their own after the course and that they used the final assessment as a way to continue their learning. This course redesign afforded students the opportunity to construct their own understanding of OM and challenge that understanding by interacting with faculty experts, OM executives, and their peers. A major contribution of this course was its participation in the development of business professionals who see their role not just as individual practitioners, but as members of a larger community. Business education at the graduate and undergraduate levels has been slow to adopt constructivist practices. This course redesign demonstrates an approach to professional education that can extend into many disciplines within a business school and beyond. It is well known that online learning is often implemented at institutions of higher learning as a way to reach new student populations and to offer students flexibility in their schedules. However, Ops in NYC provided an alternative lens through which to view online learning. The course was exclusive, taken by only 25 full-time MBA students. The online portion of the class was not in that format for purposes of convenience; it was essential for this type of experiential course. Without online learning, it would be difficult to give students a real-world experience and also provide them with the necessary scaffolding to learn the foundational concepts. In this course redesign, we presented a pedagogical reason for online education. We saw an opportunity to transform the lecture-style format of a core course into a live, interactive learning experience within a community of industry experts, faculty, practitioners, and peers.

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