

Design & Delivery of the Undergraduate Business Program at Boston University: A Cross-Functional, Team Learning Approach

Peter Arnold and Anil Khurana
School of Management, Boston University



Peter Arnold

is an associate professor of operations management at the Boston University School of Management. He holds an MBA and PhD in operations management from Indiana University. His research interests are in the areas of operations planning and control, quality management, operations and business strategy. He has been extensively involved with curricular development and held the position of faculty director of the undergraduate program from 1991 to 1996, during which the undergraduate curriculum was substantially revised. He has published in International Journal of Operations and Production Management, California Management Review, Journal of Policy Analysis and Management and Journal of Business Logistics. (parnold@bu.edu)

operations planning and control, quality management, operations and business strategy. He has been extensively involved with curricular development and held the position of faculty director of the undergraduate program from 1991 to 1996, during which the undergraduate curriculum was substantially revised. He has published in International Journal of Operations and Production Management, California Management Review, Journal of Policy Analysis and Management and Journal of Business Logistics. (parnold@bu.edu)



Anil Khurana

is an assistant professor of operations management at Boston University's School of Management. He has undergraduate degrees in economics, and mechanical, industrial, and electrical engineering, and an MA in economics from India. His MS (industrial and operations engineering), MBA, and PhD (operations management), are all from the University of Michigan, Ann Arbor. In his past life, he has worked as a railroad manager, a production manager, a plant manager, and consultant. Professor Khurana's current research interests are in product development, global operations, operations strategy, factory management, and information technology. He has most recently published in the Sloan Management Review, Journal of Product Innovation Management, and Journal of Operations Management. He is also the winner of the 1995 DSI Buffa Best Dissertation Award, and the 1996 DSI Best Theoretical-Empirical Paper. (akhurana@bu.edu)

India. His MS (industrial and operations engineering), MBA, and PhD (operations management), are all from the University of Michigan, Ann Arbor. In his past life, he has worked as a railroad manager, a production manager, a plant manager, and consultant. Professor Khurana's current research interests are in product development, global operations, operations strategy, factory management, and information technology. He has most recently published in the Sloan Management Review, Journal of Product Innovation Management, and Journal of Operations Management. He is also the winner of the 1995 DSI Buffa Best Dissertation Award, and the 1996 DSI Best Theoretical-Empirical Paper. (akhurana@bu.edu)

The business world is changing in many different ways. One of these is the extensive cross-functionality, customer focus, and teamwork that characterizes the re-engineered process organizations of today. At Boston University, we continue to focus on this shift and its relevance for what we teach future business leaders. This article describes the design and delivery of SM323, the keystone of the School of Management's revised undergraduate curriculum.

In 1990, the school's undergraduate committee—after several discussions with employers, alumni, faculty, and current students—drafted a plan for a radical revision to the school's undergraduate program. (As in many other schools, such exchange is an ongoing process. However, this particular effort called for a concerted, focused dialogue with these constituencies.) The plan called for a four-year program where each year built on previous years' learning linked by the following themes.

1. **Management as a System.** A successful business is not an arbitrary collection of elements loosely connected by some overarching strategy. Instead the components form a network that results in customer satisfaction and ultimate survival in the competitive environment.
2. **Cross-Functionality.** The organizations of the 21st century will be made up of personnel able to think beyond the boundaries of a specific functional area. This theme is consistent with an approach to management as a system.
3. **Collaboration.** The organization of the 21st century will be critically dependent on the ability to leverage human capital

creating synergies achieved through working together.

4. **Ethical Decision Making.** The need for managers trained to think broadly about decision making in order to both understand and respond to the constituencies of the organization is a societal imperative.
5. **Data Driven Decision Making.** While seasoned professional managers may occasionally respond viscerally to certain situations, it is best for managers to act on accumulated facts.

Course Content and Design

The Cross-Functional Core, or SM323 as it is known, was piloted in Fall '94, and has been taught as a required semester program for undergraduate juniors. It combines four introductory level business courses in finance, marketing, management information systems, and operations management, into an integrated program. Integration is achieved through a broad-based semester long project—developing a business plan for a new product—while working in “high-performing” teams. The content and delivery of the program of study are intended to provide functional skills (that all managers need), cross-functional and team skills and experiences (so important in today's business), and an understanding of the interdependencies among traditional functional areas (management as it should be). These objectives are captured in Table 1.

The SM323 new product development project is the backbone on which the functional content radiates. Student teams are created by the faculty and bring together students with different skills, perspectives,

1. Challenging students to think

- About how knowledge and skills from different domains are integrated to obtain and allocate resources, to design and manage products and services, to create basic business processes, and to organize a business.
- About how to work in a challenging team setting in order to achieve common objectives and maximize learning.

2. Expanding what students know from a functional and cross functional perspective

- Skills
- Tools
- Understanding
- History & future directions of management

3. Building students' skills (via in-class application of what they learn in class)

- Evaluating customer/user needs and satisfaction
- Developing products & services to meet these needs
- Designing information systems and operations to deliver these products/services
- Allocating resources and evaluating the financial and management risks inherent in introducing these products and processes
- Designing a business plan that is convincing to investors

Table 1: SM323 objectives.

cultural backgrounds, and functional preferences, and asks them to work together on complex tasks under significant time pressure. The project requires students to both directly apply functional skills, and to address the various cross-functional tasks in the project: product design, market analysis, process design, information system design, promotion plan, cost analysis, and financial projections. The project is "paced," with very clear expectations at different milestones (see Table 2). At the same time, it is unstructured enough that when students complete it, they see the advantage to understanding both how to leverage the interrelationships between complex functional decisions and how to work in teams to resolve some of these complex challenges.

The course and project are designed for concurrency. The guiding principle was: "Do the students need this for the project?" Functional content that was deemed critical but not necessary for the project was sequenced in the program such that it did not interfere with the scheduling of project oriented content. Thus, the project directly uses and applies the functional skills taught in the classroom (learning by doing) and the functional courses use the problems and challenges students face while going through the project to motivate the content

of the courses. For example, when doing a rough-cut analysis of their product's potential in week five (one third into the course), students wonder how much their product and components would really cost. The answers come in the next two modules on value chain and capacity analysis. A similar dovetailing is also built into the overall design of the program. For example, the marketing module on segmentation is taught in parallel with the operations management module on new product development and quality function deployment. Figure 1 presents an overview of these linkages.

Figure 1 also highlights the linkages between the formal curriculum and some of the support mechanisms. Students receive support and guidance for the project from various sources. Over the past three years, course faculty have developed a detailed project workbook that provides advice and guidelines for the project content, project milestones, sources of information, working in teams, and project management. Students are encouraged to review a selection of the best projects from prior semesters, which are placed on reserve in the library, and featured on the course website. Also, faculty endeavor to monitor every project and provide other forms of support (e.g., writing letters assuring man-

agers that student teams are not industrial spies). Frequent workshops also provide extensive feedback for project teams (see Sidebar 1). Web resources also have been developed to provide students with a resource on frequently asked questions (FAQs).

From the Instructor's Perspective

SM323 is a complex course, and thus, there is a strong emphasis on course content and delivery standardization. Such standardization is also important because a typical semester brings together a total of nearly 20 faculty members teaching different sections and functional elements. A course coordinator, supported by a "design" team (four faculty, one each from finance, MIS, marketing, and operations management), ensure that the teaching "team" responsible for each section emphasize the linkages across the functional knowledge areas. These linkages are also documented in an instructor's guide and in a set of web-based hypertext documents.

Mutual understanding and ongoing communication are the keys to faculty success in this course. While individual teaching excellence is still recognized and rewarded (using traditional teaching evaluations), collaboration and coordination among the members of the teaching team become important. When students encounter a problem or challenge, they expect a solution from the first faculty person they meet. So, knowing the overall course content, pedagogical approach, and even classroom personalities of the other members of the teaching team is a definite plus. Also, students are quick to see through the presence or lack of such collaborative understanding.

Cost-Benefit Analysis

SM323 is an intensive course, both for the students and the faculty. Given this high "cost," the question we asked ourselves right from the beginning is, "Is it worth it? What change do we need to make?" Thus, we have made a conscious effort to evaluate the effectiveness of the course. Initial indications are that SM323 has achieved most of its goals, i.e., cross-functional understanding and team skills while recognizing the significance and impact of

Stage One	Stage Two	Stage Three	Stage Four	
<ul style="list-style-type: none"> • Identify target market • Identify a number of potential products • Develop product concept 	<ul style="list-style-type: none"> • Preliminary product, process, & supply chain designs • Estimate sales and contribution margin • Obtain market intelligence, i.e., industry analysis, competition, customers 	<ul style="list-style-type: none"> • Detailed product and business design: product, process, supply chain, distribution, information systems • Develop marketing and promotion strategy • Develop financial forecast • Develop investment & expense plan 	<ul style="list-style-type: none"> • Final business plan • Present to investors/management (video, brochure, presentation) • Proposed plan for implementation of business plan 	
MILESTONES →	Product Screen	Business Development Workshop	Functional Workshops	Business Plan

Table 2: Project milestones.

Workshops, Presentations and Labs for SM323

SM323 INVOLVES A TOTAL OF SEVEN workshops and one presentation at different times during the semester. The workshops serve five key purposes. First, they set clear milestones for students, and this is especially important for undergraduate students. Second, they are a hands-on exercise for students to help them understand the strengths and weaknesses of their ongoing effort. Third, they provide a means for faculty to ensure that the project teams are making suitable progress and learning. Fourth, these workshops are a venue for an ongoing discussion in the class—between faculty and students, and among project teams. Finally, the students learn a lot about making effective presentations.

Supporting these workshops are a series of “labs,” where hands-on help is provided to the student teams in preparation for the workshops. These labs cater to both the analytical/intellectual and social/psychological needs of the student teams. As the list of labs on the next page indicates, the students have labs pertaining to computer skills, functional/ tool

skills (e.g., data analysis or financial spreadsheets), and also team feedback.

We present a brief description of the four key workshops so as to highlight the nature of these workshops.

Product Screen Workshop. This workshop is held during the second week of classes, and is a setting where student teams present their three best new product ideas (pre-screened by one of the faculty members). Depending on the feedback from the faculty and other students, the team is required to select one or more of these ideas; or, if none of the product ideas is considered viable, the team goes back to the drawing board. Here, the four faculty members act as functional vice presidents of a venture capital company; the students act as a New Product Committee.

Business Development Workshop. This workshop, held in week 7 (mid-semester), focuses on clarifying the product design, understanding the market segment, knowing the competition, and making some sales projections. While detailed information is not available at this point, the discussions are meant to

highlight areas in which the team either needs to gather more data, or to redesign a part of the proposed business.

Functional Workshops. A series of five functional workshops are held during the third quarter of the course, with the intent to strengthening the functional logic of the business plan, and also to ensure consistency between functional decisions and the overall business plan.

Final Business Plan and Presentation. The final business plan is a comprehensive document—often between 50 and 100 pages—that describes the key elements of the proposed business. It includes discussion of the business logic, product, customers, market analysis, value chain design and analysis, flows of products/services and information, and the overall financials. The presentation of the business plan is an exercise in role-playing again. The student team is asked to present their business plan to potential venture capital investors. This presentation is typically a combination of overheads, short video clips, and a business brochure.

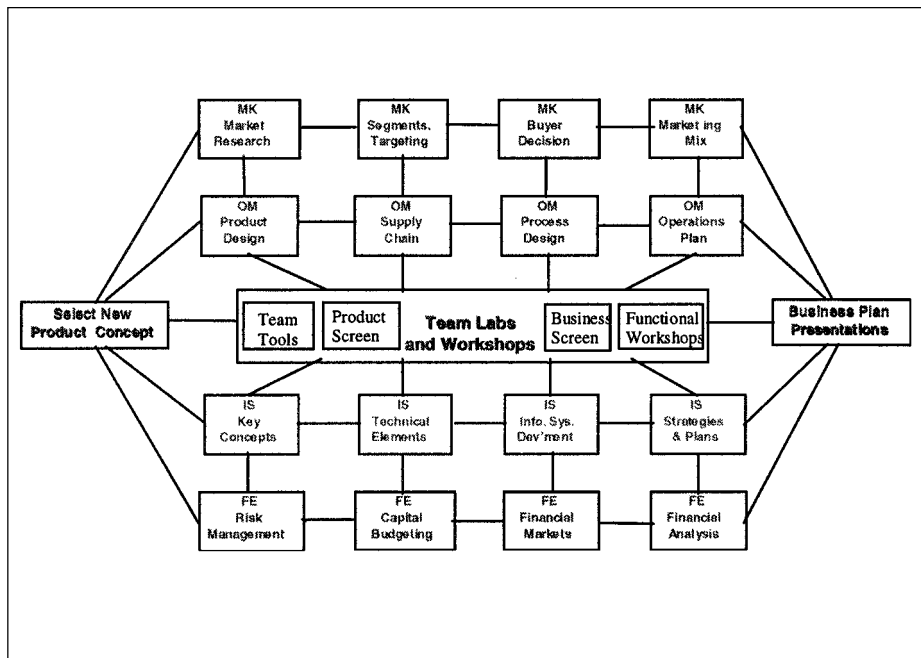


Figure 1: SM323 program linkages.

functional skills. Sidebar 2 highlights some of the key benefits that we have observed and measured.

Conclusion

SM323 is an important innovation for five key reasons. First, it is driven by a highly-integrated, semester-long, student-team project involving preparing a business plan for a new product introduction. Second, the sequence of material delivered during the semester in each of the four courses is consistent with students having the capability to achieve intermediate objectives along the way to project completion. Third, the delivery of the materials for each of the four functional course is carefully orchestrated, and each instructor not only knows exactly what is being taught in the three other courses, but also highlights and builds

upon the cross-functional linkages, and linkages with the course project. Fourth, all this is achieved via a carefully managed team learning process, where the team structure, processes, incentives, and feedback are managed in such a way that students cooperate with each other, complement each others' skills, manage each other, and very importantly, teach each other. Finally, the course has been successful in achieving its goals.

Acknowledgement

The authors would like to thank their colleagues at the School of Management for the joint cooperative effort that this article reports on. The Center for Team Learning at Boston University supports this and similar teaching efforts at the School of Management. ■

Observed Effectiveness of SM323

- Students from our school who have taken SM323 have better job decision-making and team skills compared to students who have not taken SM323 (as viewed by employers).
- SM323 made a major contribution to students' understanding of management and business as a cross-functional system. SM323 students have cross-functional and team skills that put them ahead of their peers
 - A comparison of SM323 students with non-SM323 students suggests that SM323 students perform better in the capstone management policy/ strategy course that requires an integrative perspective.
 - Student feedback indicates that SM323 enhanced the "value" of other courses, i.e., as observed by faculty teaching electives.
 - SM323 enhanced the "functional preparedness" for all functions because students understood the importance and relevance of all functions.
- SM323 students learn how to operate and cooperate in teams.
 - SM323 students indulge in extensive team learning, i.e., they teach each other during the semester, and later in their business careers when they work with colleagues.
 - Employers tell us how well SM323 students perform in teams in their first jobs.
- SM323 is a stable and robust course with regards to teaching impact and student benefits.
 - SM323 has achieved high student satisfaction on both intellectual and pedagogical standpoint.
 - We now have a core of faculty who want to teach this course, despite the additional effort involved