SEEING THE FOREST AND THE TREES: BALANCING FUNCTIONAL AND INTEGRATIVE KNOWLEDGE USING LARGE-SCALE SIMULATIONS IN CAPSTONE BUSINESS STRATEGY CLASSES

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The final stone placed at the apex of an Egyptian pyramid was called the capstone. The capstone was placed last, after the rest of the tomb was complete and all the pharaoh's possessions had been put into the tomb. Just as the pyramid's capstone was added last, after the foundation was complete, so too is the capstone course in many college business programs today. In a typical business program, the fundamental elements of the business curriculum (e.g., accounting, economics, finance, human resource management, marketing, organizational behavior, operations) are mastered first. Students then choose a major in which to concentrate, matching, presumably, the field in which they intend to pursue a career. The courses students take in their major help them develop expertise in their chosen field or function (say, accounting) but,

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at the same time, also tend to narrow their view of the organizational world to one seen only through a particular functional lens.

Through the major courses, professors help develop accountants, financial analysts, operations planners, and marketing specialists—strong and tall figurative trees of different varieties. However, it is not until they are all brought together in the capstone course that students can begin to see a "forest." The integration of the trees into a forest is one of the primary goals of the capstone course in business policy or strategy. The wide variety of pedagogical techniques used in such capstone strategic management courses speaks to the notion that integration may be taught in many ways. However, the measurement of whether we are achieving integration in those classes remains a somewhat elusive topic.

The purpose of this article is to assess the extent to which a large-scale simulation (LSS) pedagogy results in students' acquisition of an integrative perspective by the end of the capstone strategy course. We test three hypotheses that specifically involve the use of either a functional or an integrative lens. Our results provide promising evidence that the LSS approach is effective in helping students recognize the importance of integrating functional knowledge and developing an integrative lens.

Linking Theory, Pedagogy, and Practice

It has long been a primary role of the capstone business strategy, or policy, courses to afford students the opportunity to integrate the knowledge they have acquired in their prior coursework. Formal goals often include the strengthening of students' command of the material covered in these courses and enhancing their ability to effectively integrate this knowledge. The latter goal is often pursued by presenting issues and situations that, because of their organization-wide impact, highlight the interrelationships that exist between the various functional areas (Morris, 1995; Watkins, 1996).

This integrative perspective has increased in importance since the resource-based view of the firm has come to be a dominant paradigm in strategic management. The resource-based view links firm performance to a firm's ability to develop competitive advantages based on core competencies, capabilities, and resources that are valuable, rare, and difficult to imitate (Barney, 1991; Peteraf, 1993). Researchers working with the resource-based view consider that imitation by competitors is the greatest risk to a firm's competitive advantage. Consequently, the degree to which a firm's competencies and capabilities are embedded in processes that operate across functional areas has been theorized to provide strong protection against such imi-

tation. This is because cross-functional activities are inherently complex and causally ambiguous and are thus difficult for competitors to duplicate with the same results as the original firm (Barney, 1991).

The importance and difficulty of developing cross-functional, integrative perspectives is supported by other work on tacit knowledge. Kogut and Zander (1992) described how the development of different shared knowledge bases within individual functional areas presents large challenges for coordination and cooperation between these areas. For example, they noted "that identification with a professional orientation conflicts with the need to integrate within an organization" (p. 389). They recommended that organizations must develop a higher order set of organizing principles to facilitate intra-organizational integration. They argued that without these principles, an organization would be unable to replicate its key skills as it expands into new product markets and geographic regions; that is, the firm's ability to leverage its competitive advantages would be compromised (Zander & Kogut, 1995). The question is thus raised: Can these higher order principles be taught, and how is this best accomplished?

If students of business are to learn how firms develop long-lived competitive advantages by exploiting the interrelationships between the functional areas of a business (and be able to do so themselves), capstone strategy classes must provide students with the opportunity to integrate their knowledge of functional areas within a business. Porter and McKibben (1988) noted, however, that most business school curricula were particularly poor at offering students the opportunity to develop such integrated knowledge structures and argued that capstone courses can serve as a basis for remedying this situation. Almost a decade later, the situation has changed very little, although some have noted that students who can address business issues from an integrated perspective are able to add value to their future employers more quickly than those who cannot do so (Schlesinger, 1996).

An effective capstone course must also permit students to actually experience cross-functional integration. Firsthand experience permits students to fully understand how difficult it is to initially achieve integration within a firm and thus for competitors to subsequently imitate it. This experiential requirement demands different pedagogical techniques than the standard lecture format (Teach & Govahi, 1993). Thus, there is a need for research that presents empirically verified results to identify pedagogical methods that are especially good at fostering an understanding of and appreciation for this cross-functional, integrative perspective.

Prior research on the effectiveness of various teaching techniques regarding the integration of knowledge within a capstone business strategy class has produced mixed results, however. For example, Hemmasi and Graf (1992)

asked current and former business strategy students about their perceptions of the effectiveness of computer simulations in helping them develop six different managerial skills that the course was designed to enhance. Their results show that the effectiveness of computer simulations to enhance knowledge integration ranked fourth among current students and fifth (next to last) among former students (current business practitioners) among the six skills they investigated. Teach and Govahi (1993) found that among a set of 41 managerial skills, those related to knowledge integration and the application of that integrated knowledge were rated by former students as most effectively developed through a combination of teaching techniques. For example, the ability to see the big picture was best developed using cases, whereas developing people and teams (which are essential for implementing cross-functional capabilities) was best learned through simulations. Experiential exercises were rated as best for developing capabilities to resolve conflict, exhibit leadership, manage people, and solve problems creatively. The conclusion one can draw from their study is that when knowledge integration and application are involved, multiple methods are required.

Recently, several promising models have employed a range of teaching methods to design undergraduate business courses that try to foster a more holistic or integrative approach to business issues. Alie, Beam, and Carey (1998) described a two-semester course offered at Western Michigan University that places students in a simulated organizational setting to build team skills and acquire a better understanding of management processes. Their approach does not emphasize integrating the functional aspects of business per se (as a capstone course would) but concentrates on more fundamental concepts, such as planning, leading, organizing, and controlling that form the core of introductory management classes. Bucknell University provides another example that is used in introductory undergraduate management courses. Miller (1991) described the course approach as one where student teams run their own companies, essentially creating an organization in the classroom. In this course, though, not all students are business majors, and those who are business majors are in the very beginning of their business coursework. Consequently, the course does not attempt to integrate functional knowledge (which is not yet possessed by the students) but does strive to make students appreciate the bigger picture of organizational life.

Although these examples suggest some intriguing guidelines for fostering integrative thinking, they have two limitations that demand attention before such models can be recommended confidently for capstone classes. First, because neither model was implemented in a capstone course, generalizing from these situations to capstone courses is problematic due to a number of important differences between introductory classes and the students in them

and senior-level capstone classes. For example, one key characteristic that differentiates introductory management from capstone classes is that students in the capstone class have been through a business curriculum and are familiar with the specifics of several functional areas, especially the one associated with their major (e.g., marketing or accounting). This grounding presents the additional challenge of getting students to see beyond the boundaries of the box(es) into which most of their academic business training has been placed (Schlesinger, 1996). Second, the evidence provided by the authors for how well their approach achieved course objectives is primarily anecdotal in nature—consisting of (positive) comments from students who took the classes. Objective measures tended to be limited to overall student satisfaction ratings. To determine how well a capstone class achieves knowledge integration across functional boundaries, the measurement and testing of how well a specific pedagogical approach accomplishes this objective is essential.

Recently, the idea of LSS has been put forth as a multimethod technique that enables capstone courses to deliver an integrative experience by focusing on the interdependencies between functional areas of firms and the way in which firms develop cross-functional competitive advantage (Parente, 1995). This article reports on the use of LSS in capstone undergraduate business courses. It provides needed methodological rigor by studying the approach over time and with different instructors. Inclusion of these factors minimizes the possibility that the idiosyncrasies of a particular instructor or a particular group of students account for the success (or failure) of the technique. Furthermore, our use of a sample obtained over 2 years increases the generalizability of our results by increasing its representativeness of the undergraduate business student population. Qualitative approaches such as those used in prior studies provide necessary descriptive detail regarding student reactions to the pedagogical methods. However, empirical analyses that have also met the demands of statistical tests are essential for educators to more confidently recommend and adopt particular teaching techniques.

LSS

According to Parente (1995), LSS integrates theory, simulation, and role-playing into a coherent whole that seeks to provide an active, experiential learning environment. Typical components of LSS include both computer simulation and role-playing within a simulated business environment, which affords students the opportunity to immediately apply course theories delivered through lecture and case methodologies. This combination of teaching

methods permits students to bring information from academia to the real world while also offering the opportunity for feedback that reinforces concepts and builds students' confidence in the skills and abilities they are developing (Parente, 1995; Wheatley, Roberts, & Einbecker, 1990). It also permits students to immediately apply the knowledge learned in the classroom, affording them the opportunity to experience implementation firsthand and gain additional insight into the demands of interdependence among functional areas (Parks & Lindstrom, 1995).

The LSS used by all of the classes included in this study had three major components that were different from a traditional course: (a) student teams that were intact for the entire semester, (b) team competition in a computer simulation, and (c) graded deliverables based on the computer simulation. In this LSS approach, the student teams are formed within the second week of the course. Each team is headed by a chief executive officer (CEO). Potential CEOs are self-nominated and then selected by the professor after individual interviews. The CEOs then conduct in-class interviews with all the remaining students in the class. With this interview information and résumés from all students, the CEOs meet (with the professor as facilitator) and select team members through negotiations. At the end of the negotiation session, each CEO will have a team with each chosen member assuming the title and responsibilities of a vice president (VP) of a specific functional area (finance, marketing, administration, production, or research and development).

Once teams have been selected, each team forms a mock corporation and acts as its "top management team" while competing in a computer simulation and producing the various deliverables required in the course. The computer simulation used is a multi-industry simulation, in which each team manages from three to eight SBUs over 3 years (12 quarters) of simulated time. The simulation specifically allows corporations to establish business strategies for each SBU. It also permits corporations to develop comprehensive corporate strategies through various interdependencies between SBUs. These interdependencies include vertical relationships between business units and having several business units compete in the same industry.

These LSS characteristics embody several teaching techniques that have been shown to be appropriate for the various learning objectives of the course. For example, the experiential team-based nature of the course is essential for students to appreciate the realities of organizational life and the challenge that creating cooperation across functional areas creates (Alie et al., 1998). We employ a simulation that is tied to course theory, providing the opportunity for higher levels of learning that are fundamental for knowledge integration, especially at the application and analysis levels (Parks &

Lindstrom, 1995). In addition, by layering the computer simulation with a role-play of officers in a real corporation, the LSS approach presents students with less well-defined situations, which are inherently more uncertain than the use of a computer simulation alone and thus more representative of real-world organizational situations (Gunz, 1995). Overall, the LSS approach is similar to the organization-in-the-classroom approach (Miller, 1991), but the corporations the teams manage are simulated, rather than ones that produce tangible products and/or services.

In addition to the computer simulation, each corporation is responsible for producing a number of written documents and oral presentations that describe the plans, operations, and results of its various businesses and the corporation overall. These documents and presentations, called *deliverables*, are analogous to the types of reports for which real-world managers are responsible. The deliverables can be subdivided into two primary categories. The first are those that emphasize the skills associated with a particular functional area. Each of these functional deliverables requires the application of specific functional knowledge and skills and is associated with a different position on the team. For example, the job descriptions deliverable requires that the student team describe the tasks that each of the functional VPs will perform, both as VP in their corporation and as a member of their team in the class. This deliverable draws heavily on the topics that students learn in their human resources (HR) course(s). The primary responsibility for the completion of this deliverable is often delegated to the VP of Administration position. This is typically the student in the simulated company who possesses the most knowledge about HR and job design issues.

Interviews for other team members are conducted by the CEOs. As the first (and arguably, most important) part of establishing a management team, they represent a critical responsibility of the CEO. Interviews give CEOs the opportunity to acquire interviewing skills, from the perspective of the interviewer, that they do not obtain in other team-based settings and that can increase their marketability when they look for employment after graduation.

The Environmental Position Paper is the primary responsibility of the VP of R&D. This deliverable draws on functional knowledge regarding workplace safety (Occupational Safety and Health Administration compliance) and the safe use and disposal of hazardous materials. These are topics typically covered in either operations management or human resource management courses. The Operations Plan, the functional deliverable associated with the VP of Operations, requires that students employ their knowledge of the scheduling, staffing, and appropriate design of specific production processes. These are skills typically acquired in operations courses. The Annual Report, with its emphasis on financial statements such as balance sheets,

TABLE 1
Deliverables and Functional Responsibilities

Position	Deliverable	Category
CEO	Interviews	Functional
CFO	Annual report	Functional
VP administration	Job descriptions	Functional
VP marketing	Strategic plan	Functional
VP operations	Operations plan	Functional
VP R&D	Environmental position paper	Functional
No primary position	Board of directors presentation	Integrative
No primary position	Case study	Integrative

NOTE: CFO = chief financial officer; VP = vice president.

income statements, and statements of changes in financial position, draws on the functional knowledge that students gain from accounting and finance classes. The Strategic Plan is presented from a marketing perspective and permits students to use their skills, especially those related to the future development of existing markets or to the diversification of the simulated corporation into new markets. Although each of the functional deliverables requires the contribution of every position in the simulated corporation, these projects are designed so that a functional emphasis is paramount.

In addition, the grading structure for the course allocates a larger proportion of a student's overall grade to the particular functionally oriented deliverable associated with the position the student holds on his or her team. Functionally oriented deliverables, along with their associated functional position in the simulated corporation, are listed in the top of Table 1.

The second category of deliverables requires the adoption of an integrative approach. The integrative deliverables, the Board of Directors Presentation and the Case Study, are listed at the bottom of Table 1. By design, these deliverables do not have a primary functional responsibility. These deliverables require the sharing and combining of information and expertise from several different functional areas. They also require active participation and cooperation among all team members to complete the deliverable. For example, the Board of Directors deliverable is an oral presentation that requires that all company officers speak substantively on the past performance and future plans of the various business units within the corporation. Rehearsal is required so that the presentation is done in a professional manner and time limits are respected. In addition, the content of the board presentation requires that each officer play the role of an SBU manager as he or she reports to the board about prior performance and future plans for his or her business.

These reports and plans are expected to be consistent across SBUs, so that information is readily comprehensible and the overall plans of the company reinforce its competitive advantages and the collective performance of the firm.

This consistency requires that team members share information and collectively decide on resource allocation decisions across the various businesses for the coming simulated year (including plans to start new businesses). It also emphasizes the roles that specific functions played in creating the competitive advantages of each SBU that contributed to its performance in the past year.

The Case Study similarly draws on total team inputs and requires the pooling of knowledge across functional specialties. This integrative deliverable provides each team with the opportunity to assess their entire experience in the course, including their experiences on their team and their performance in the computer simulation and on deliverables. In addition, it offers teams an opportunity to analyze the processes they used in producing the deliverables required for the course and in making competitive decisions in the computer simulation. In a real sense, the Case Study asks student teams to identify their own competitive advantage (or lack thereof) for successfully completing the course. Because of the interdependence and collaboration required to complete the integrative deliverables, the grading structure for the course allocates an equal proportion of a student's overall grade to the integrative deliverables (a team grade), unlike the functional deliverables.

It is important to stress that the difference between the functional and integrative deliverables really rests on the extent to which they encourage that an integrative perspective be taken regarding the knowledge and information that is required. All of the deliverables (functional and integrative) require inputs from all team members, so some level of information sharing is expected on each deliverable (indeed, every team member has some part of his or her grade at stake on each functional deliverable). However, the functional deliverables are designed to stress factors that are primarily associated with a particular functional position and area. For example, the Annual Report focuses on the reporting of the financial results of the company and its subsidiaries—which draws disproportionately on accounting and finance skills. The integrative deliverables ask that students describe the interrelationships between these areas (and team members) as the teams report on their businesses and team processes.

Figure 1 presents the components of the LSS arrayed on the time line that the approach uses. There are activities that occur both before and after the 3 years of simulated time. Teams are formed, the computer simulation is run, and teams produce the deliverables based on simulation results. Each column
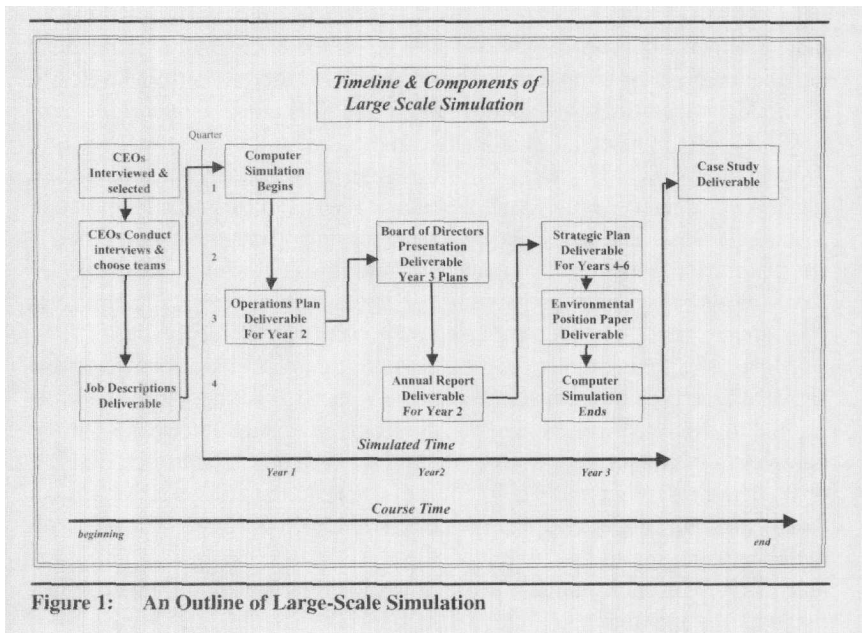
Figure 1:   An Outline of Large-Scale Simulation

of boxes in the figure represents the chronological order of the components of the LSS read from top to bottom. Reading from left to right shows the passage of both the course time and the years of simulation time.

Hypotheses

STUDENTS' PERCEPTIONS OF FUNCTIONAL VERSUS INTEGRATIVE DELIVERABLES IN AN LSS-BASED APPROACH

The goal of the LSS approach is to provide an integrative experience for students in capstone business classes. The aim is not only to give students an opportunity for hands-on integrative activity but to bring to life the fact that interdependence between the various functional areas of a business is essential for building and sustaining competitive advantage. The success of this approach can be measured by observing how students' perceptions of the portions of the LSS model that focus on integration change over the semester during which they experience them.

Undergraduate students typically arrive at their capstone course with only minor prior exposure to the importance of integration between the functional areas of a business and virtually no direct experience of this interdependence. To the extent that students have been made aware of the growing recognition

that sustainable competitive advantages are rooted in cross-functional inter-dependencies, their exposure has been strictly at the theoretical level. For example, in operations management or production courses, concurrent engineering is often presented as an increasingly prevalent method for speeding products to market and meeting customer needs more closely. Students are introduced to the necessary interdependence between functional areas such as market research, research and development, and production that characterize successful concurrent engineering programs. However, students are rarely asked to concurrently engineer a product or service themselves (Carrabine, 1991). The idea is presented in primarily conceptual terms.

Most undergraduate curricula stress work in teams, but to varying degrees. However, the type of teamwork most characteristic of functional courses is limited to discrete projects. That is, students are formed into teams for the completion of one presentation or one case analysis or a final project. The life of the team represents only a fraction of the time the course runs. In such cases, students can, and typically do, grin and bear it if one or more team members is failing to live up to their responsibilities. Because of the short-term duration of such teams, fully participating members find it easier to just live with the problem and do the work themselves than to directly confront the free-riding student. In these circumstances, getting input from each student on the team and drawing on expertise throughout the team is sacrificed to a more expedient solution.

Consequently, the concept of interdependence that forms the heart of capstone business strategy classes is likely to be relatively new to students, especially from an experiential perspective. They are unlikely to grasp its full measure upon reading the syllabus or sitting through the first several classes. They will fail to appreciate the importance of the topics to be covered and how critical they are to business performance.

The arguments above present a situation where, at the beginning of a capstone business strategy course taught in an LSS framework, students are unlikely to recognize the importance of integration or appreciate how components of the LSS approach will permit them to understand and use integration throughout the course. Consequently, students are likely to perceive that these components are of relatively low importance. Indeed, this situation is exactly the one that the LSS approach attempts to meet head on.

As a function of their prior course work, students are likely to be more familiar with the functional perspective and better able to relate their previous experience to what the functional deliverables are asking of them. This may be so even though the descriptions of the deliverables are equally clear and straightforward.

Students are also concerned with making sure they master functional skills before graduation. This is the very perspective that capstone courses have to overcome to raise students' awareness of the critical importance for business of integrating activities across functional areas (Lehmann, 1998). We noted earlier that to be marketable to prospective employers, students must develop the skills associated with a specific functional area. Although employers are increasingly looking for employees who can excel within cross-functional environments, they also require a basic skill set for a specific position. As a consequence of their need to demonstrate competency in specific functional skills, students are more likely to grasp the immediate benefit of the functional deliverables regarding this goal. So students are likely to perceive initially these deliverables as more important, in a relative sense, than the integrative deliverables.

In a capstone business strategy class taught within an LSS framework,

Hypothesis 1: At the beginning of the course, students' perceived importance of the functional deliverables required in an LSS-taught capstone course will be greater than their perceived importance of the integrative deliverables.

STUDENTS' PERCEPTIONS OF INTEGRATIVE DELIVERABLES IN AN LSS-BASED APPROACH

Once the student has completed a business strategy course taught with the LSS approach, the situation is likely to be very different. The LSS approach is intensively team based. Instead of just a single-project team, in the LSS model teams exist for the entire semester. Teams are responsible for many projects that would be impossible for one or only a few team members to complete on their own. Thus, the team members must address the issue of free riders—because the issue will recur again and again during the semester. Team building becomes essential.

The team must also learn how to use multiple skills, drawn from the skills and resources that the team members bring to the group. This includes technology skills for preparing reports, charts, and financial statements as well as for operating the computer simulation. It also requires drawing on the oral and written presentation skills within the team because the integrative deliverables draw on both of these dimensions. Finally, as students prepare their Board of Directors Presentation or reflect back on their team's performance during the Case Analysis, they must draw on and assess the role that each individual and each functional position played in their overall success during the course. Thus, the LSS approach provides a holistic approach to management. All aspects of the businesses operated in the simulation must be consid-

ered. But just as important, the team's own functioning must also be evaluated and assessed.

The LSS approach also permits students to implement the interdependence that lies at the heart of competitive advantage. The LSS approach goes beyond presenting the topics in a lecture format with a follow-up examination. It requires that students actually implement their ideas and report on their success through use of the computer simulation and the deliverables that document simulation performance.

Finally, the LSS approach provides students with multiple points for feedback. This continual flow of information from the professor permits the team to evaluate its processes and business ideas. Feedback from the computer simulation permits the team to assess its business performance.

The above discussion suggests that at the beginning of a capstone business strategy course taught in an LSS framework, students will be less receptive to the importance of the deliverables that stress the integrative nature of business and the team's own operations. At this point, they are unlikely to fully appreciate the key role that interdependence plays in business success. Once the course has concluded, however, their experience should change their perceptions of these deliverables from those they held at the beginning of the course. By the completion of the course, students will see the connection between the theoretical emphasis on interdependence and the way this is embodied in the integrative deliverables. They will also have firsthand concrete experience of the way in which interdependence can produce better performance, both in the simulation and in the course (Alper, Tjosvold, & Law, 1998; van der Vegt, Emans, & van de Vliert, 1988).

Similarly, we would expect that the LSS approach also reduces the incidence of parochialism as the students experience the LSS components. Consequently, no matter what functional position the student occupies on his or her team, the importance of interdependence and the integrative deliverables that best illustrate this critical attribute will be perceived once the LSS has concluded. The above reasoning leads to our second hypothesis about the efficacy of the LSS approach in fostering an awareness of and appreciation for the importance of cross-functional interdependence within today's business enterprises.

In a capstone business strategy class taught within an LSS framework,

Hypothesis 2: At the end of the course, students' ranking of the importance of the integrative deliverables required in an LSS-taught capstone course will be higher, regardless of position, compared with their ranking of these deliverables at the beginning of the course.

STUDENTS' PERCEPTIONS OF FUNCTIONAL DELIVERABLES IN AN LSS-BASED APPROACH

As much as the LSS approach attempts to redirect student attention to issues of integration and interdependence, it is embedded in the typical academic curriculum and subject to the typical constraints. As such, it is potentially affected by expectations that students have about what they should spend most of their time concentrating on. Goal-oriented business students are likely to focus on those aspects of the grading structure of a course that are perceived to have a large potential impact on their own grades. Most business programs have some kind of requirement that students have to be evaluated on an individual basis for some portion (often the majority) of their grade. Consequently, it is likely that differences in students' perceived importance of the deliverables in an LSS framework would reflect their perceptions of the degree to which a deliverable constitutes a higher individual component of their grade.

The fact that the LSS approach assigns students on a team to particular functional positions and then associates these positions with particular functionally oriented deliverables can skew perceptions of the importance of these deliverables (Wech, Mossholder, Steel, & Bennett, 1998). This possibility becomes even more likely because each functional position has more potential points available on the functional deliverable associated with the position. For example, the student holding the CFO position has a larger portion of his or her grade at stake on the Annual Report than do other positions on the team. Students arriving at a capstone business strategy course are likely to readily perceive this association—especially after they have accepted a particular functional role on their team. The result is that students are likely to rate the importance of their (i.e., their role's) functional deliverable quite high at the outset of the course.

An additional factor supports this contention. Most students taking the capstone business strategy class are in their final semester of business school. At most, others may be one semester away from graduating. For both of these types of students, obtaining a (good) job upon graduation is a particularly important concern. They are encouraged to make sure that they have strong mastery of whatever particular skills their disciplinary major has taught them. Accountants must be completely versed in the details of financial statements. Likewise, marketing majors must be knowledgeable about advertising principles. At this time, then, students are quite concerned about being able to demonstrate to their prospective employers that they have mastered the skill set associated with their discipline. To the extent that the functional areas of the teams in the LSS approach provide students the opportunity to

hone these discipline-based skills, they are likely to be seen as important, especially at the beginning of the course. We would expect, then, that because of concerns over grades and the acquisition of particular functional skills, students in an LSS-based capstone business strategy course will perceive the functional deliverable associated with their position on the team as important.

However, to the extent that the LSS is successful in raising students' consciousness about the importance of integration and cross-functional interdependence, it is likely to dampen any tendency students have to increase this perceived importance of functional deliverables at the end of the course. Although concerns over grades and postacademic employment are unlikely to diminish by the end of the LSS, the student will be aware of the balance that needs to be struck between functional expertise and cross-functional interdependence. One way this awareness should manifest itself is that students' perceptions of the importance of the functional deliverables should be no higher than they were at the beginning of the course. That is, the perceived importance of functionally oriented deliverables within an LSS approach should stay the same or decrease from the beginning to the end of the course. Again, we would also expect that this should not be affected by the functional position a student holds on his or her team.

In a capstone business strategy class taught within an LSS framework,

Hypothesis 3: At the end of the course, students' ranking of the importance of the deliverables required in an LSS-taught capstone course that are tied to specific functional areas should remain the same or decrease, regardless of position, compared with their rankings of these deliverables at the beginning of the course.

Figure 2 shows the conceptual model containing our hypotheses. The figure shows that the functional deliverables are perceived to be more important than the integrative deliverables pre-LSS (Hypothesis 1). We expect that the integrative deliverables will increase in perceived importance (Hypothesis 2), whereas the functional deliverables will either not change or decrease in perceived importance (Hypothesis 3).

Method

An LSS approach (Parente, 1995; Wheatley et al., 1990) was used in several capstone courses in undergraduate Business Administration programs between the spring 1994 and summer 1996 semesters, inclusive. This study was conducted after the approach had been in place for three full semesters,
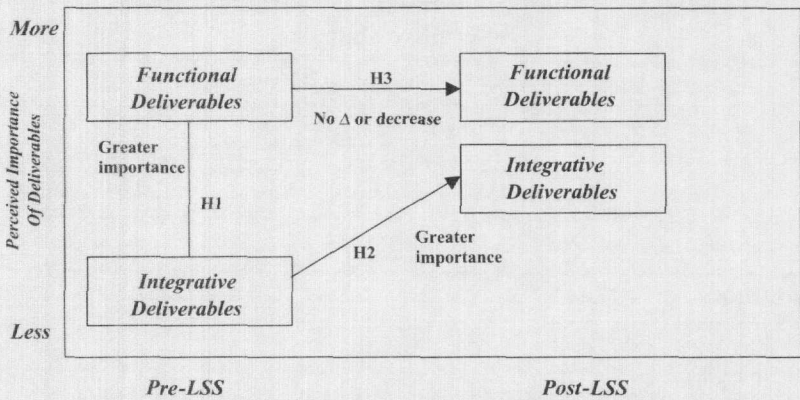
Figure 2:   Conceptual Model
NOTE: LSS = large-scale simulation.

allowing many of the introductory issues to be resolved. Students completed a questionnaire (in class) at the beginning of the semester, just after teams were formed but before team norms could be developed (the presemester survey), and a second questionnaire at the end of the semester, after all assignments were completed (the postsemester survey). This second questionnaire was completed in class at the time of the final examination. These questionnaires assessed students' perceptions of the importance of the deliverables required in the course along with a number of other measures. In all, matched pre- and postsemester surveys were received from 502 respondents. The sample was 57% men and 43% women. Eighty-six percent had fewer than 5 years of work experience, 9% had between 5 and 10 years of experience, and 5% had more than 10 years. The average grade point average (GPA) was 3.11, with a standard deviation of 0.37. The sample included students in capstone courses taught by four different professors.

Teams were organized during the second week of the semester after in-class interviews. Following team formation, the presemester survey was completed by all students. The survey contained the list of the deliverables (which were course requirements) and asked students to rank the deliverables in order of how important each deliverable would be to their learning during the course (perceived importance). Rankings could range from 1, representing most important, to 8, representing least important.

The postsemester survey contained the same list of deliverables and asked students to rank them again, using the same ranking scheme. The instructions were modified slightly and asked students to rank the deliverables in order of

TABLE 2
Descriptive Statistics

| | Deliverable Rankings | | | | | |
| | Presemester | | Postsemester | | | |
Variable Name	Mean	Standard Deviation	Mean	Standard Deviation	Minimum Value	Maximum Value
Interviews	5.98	2.17	5.94	2.11	1	8
Annual report	2.81	1.68	3.17	1.59	1	8
Job descriptions	4.93	1.80	5.03	1.72	1	8
Strategic plan	2.41	1.66	2.43	1.71	1	8
Operations plan	3.78	1.91	4.08	2.19	1	8
Environmental paper	5.67	1.86	6.26	1.48	1	8
Board presentation	4.72	2.12	3.84	2.04	1	8
Case study	5.53	2.15	5.16	2.37	1	8
Average of functional deliverables	4.26	0.50	4.48	0.52	1	5.5
Average of integrative deliverables	5.13	1.42	4.50	1.53	1	7.5

how important each deliverable was to their learning in the course. All surveys were coded with a unique identification number that included the semester, year, and professor. Inclusion of the unique identification number on both pre- and postsemester surveys allowed for matching responses. Descriptive statistics for the main ranking variables in the study, pre- and post-LSS, are shown in Table 2.

Control variables. In addition to the main variables in the study, we included a number of control variables to rule out possible alternative explanations. The controls fell into three basic categories: contextual variables, individual difference variables, and group-process variables.

Contextual controls. The data for this study were collected from capstone courses taught by four different instructors over a 2-year time period. Consequently, we control for professor and the semester in which the course was offered.

Individual difference controls. We included a control for the number of years of work experience each student had that captured the extent to which students with more real-world work experience might be more receptive to the importance of cross-functional integration. Work experience was

measured on a 3-point scale (1 = *less than 5 years' work experience*, 2 = *5 to 10 years of work experience*, 3 = *greater than 10 years of work experience*). We also controlled for students' academic major. For example, HR majors receive significant exposure to the difficult realities of managing people in real-world organizations. Thus, they might be able to more readily grasp the importance (and challenges) of integration. (Possible majors and the percentage of the sample in each were as follows: accounting, 29%; finance, 18%; marketing, 26%; general management/HR, 20%; and management information systems, 6%.) In addition, we controlled for students' gender to capture the possibility that women might be more accepting than men of the cooperative demands associated with cross-functional integration (Dennis, Kinney, & Caisy Hung, 1999). Finally, we included students' GPAs at the start of the course to hold constant students' self-motivation and ability.

Group-process related controls. We included a control for students' perceived extent of cohesion on their team to control for the possibility that cohesive teams, who are more likely to share information, were the driving force behind our results. We used students' own perceptions of cohesion because what students themselves felt about their team is likely to be the best indicator of whether such cohesion (or lack thereof) had an effect (Wech et al., 1998). We used an adapted scale from earlier works on cohesion (Wellington & Faria, 1996; Wolfe & Box, 1988). The measure is a five-item scale describing the friendliness, openness, and trust of the team atmosphere. A high score indicates that members of the group were supportive and felt that all could participate in the operation of the group. The reliability of this scale is 0.83 and is consistent with prior studies.

For all of the analyses, missing values for a student's ranking of a particular deliverable were replaced with a ranking lower than the lowest ranking value used by the student. This choice makes logical sense because if a student did not rank a particular deliverable, then the unranked deliverable is, at best, less important than the least important of the ones that were ranked. This replacement is the most conservative (as opposed to replacement with the average rank) and maintains an equal number of respondents ($n = 502$) for all overall tests.

Because the primary data consists of ordinal rankings (of the various deliverables) and tests showed that the assumptions of normality were not met for the deliverable rankings, tests of our hypotheses were conducted using nonparametric methods. We employed the Wilcoxon Signed-Ranks Test (the nonparametric alternative to the parametric, Student's *t* test for paired samples [Gibbons, 1993]) to assess changes in the rankings of the various deliverables from the presemester survey to the postsemester survey.

Because our hypotheses were predicting specific directional changes in the importance rankings of the various deliverables, we employed one-tailed tests for significance.

As an additional check on our results, the pre- and postsurvey rankings could be considered repeated measures. We reran our analyses using ANOVA with repeated measures. The results were identical to those reported here. Because it was not possible to include controls in the signed-rank tests, analyses including the control variables were conducted using ANOVA with repeated measures. The fact that the repeated measures analyses (without controls) yielded identical results to those using the signed-rank tests makes us confident that our analyses and interpretation of the effects of the controls are appropriate and not a function of the methodology.

Results

Hypothesis 1. Hypothesis 1 predicted that the functional deliverables would be perceived as more important than the integrative deliverables at the beginning of the semester. As shown in Table 2, the average ranking of the functional deliverables in the presemester survey was 4.26, and the average ranking of the integrative deliverables was 5.13. This difference was significant ($Z = 9.49$, $p < .001$), supporting Hypothesis 1 (because lower rankings mean greater perceived importance).

Hypothesis 2. If the LSS approach is successful in teaching integration, rankings of the integrative deliverables should be higher (i.e., a lower number) at the end of the course than at the beginning. As shown in Table 2, the average ranking of the integrative deliverables in the presemester survey was 5.13, whereas the average ranking postsemester was 4.50. The results of the Wilcoxon Signed-Ranks Test are shown in Table 3 and were significant ($Z = 6.96$, $p < .001$), supporting Hypothesis 2 (because lower rankings mean greater perceived importance). In addition, the results of the Wilcoxon Signed-Ranks Test are shown for the individual integrative deliverables and provide strong support for this hypothesis. When considering all positions together (column 1 in the top half of Table 3), both the board meeting and the Case Study had significantly higher rankings at the end of the course than at the beginning.

Hypothesis 2 also stated that this change in the perceived importance of the integrative deliverables would show up within all functional positions as well. This essentially extends the previous test to each of the functional positions, individually. The results of the Wilcoxon Signed-Ranks Test by posi-

TABLE 3
Change in Ranking of Importance of Integrative and Functional Deliverables (Z scores are reported)

Deliverables	All Positions (n = 502)	CEO (n = 107)	CFO (n = 90)	Administration (n = 88)	Marketing (n = 90)	Operations (n = 79)	R&D (n = 48)
All integrative deliverables together	6.96***						
Board presentation	7.05***	3.03***	1.55	4.06***	3.07***	3.65***	1.76*
Case analysis	2.75**	3.06***	0.27	0.72	1.07	1.13	-0.13
All functional deliverables together	-7.23***						
Interviews	0.47	1.16	1.38	-0.82	-1.38	1.02	-0.31
Annual report	-3.91***	-3.36**	-1.11	0.05	-2.27**	-1.67*	-1.33
Job descriptions	0.82	-0.83	1.47	-0.13	0.15	-0.87	-2.28*
Strategic plan	0.12	-1.13	-2.03*	0.18	1.70*	-0.20	1.78*
Operations plan	-2.46**	-1.38	-1.17	-1.40	-1.17	-1.70*	1.03
Environmental paper	-6.39***	-3.62***	-1.57	-4.77***	-1.61	-2.06*	-1.94*

NOTE: Bold indicates significant increase in importance rankings.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$; one-tailed significance.

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tion are shown in columns 2 through 7 in the top part of Table 3. Five of the six positions ranked the board meeting significantly higher at the end of the course than at the beginning, providing partial support for this portion of Hypothesis 2. Only the CEOs gave the Case Study a significantly higher importance ranking at the end of the course than at the beginning. With the sole exception of the VP of R&D's change in importance ranking for the Case Study, across all positions, all of the integrative deliverables increased in importance at the end of the semester, even if the change was not significant.

Hypothesis 3. This hypothesis predicted that across all students, the importance rankings of the functional deliverables should either remain the same or decrease at the end of the course compared to the beginning. Reading from Table 2, the average ranking of the functional deliverables was 4.26 presemester and 4.48 postsemester over all positions. The results of the Wilcoxon Signed-Ranks Test are significant ($Z = -7.23$, $p < .001$). The negative sign indicates the decrease in importance rankings in the functional deliverables on average. The results of the Wilcoxon Signed-Ranks Test for the overall sample on each of the six functional deliverables are shown in column 1 in the bottom half of Table 3 and provide strong support for Hypothesis 3. Of the six functional deliverables, three (Annual Report, Operations Plan, and Environmental Position Paper) had importance rankings that decreased at the end of the course compared to the beginning, whereas the remaining three deliverables had importance rankings that did not differ significantly between the beginning and the end of the semester.

Hypothesis 3 also stated that changes in the evaluation of the functional deliverables would not differ by functional position. The results of the Wilcoxon Signed-Ranks Test are shown in columns 2 through 7 in the bottom half of Table 3. No significant changes in perceived importance occurred across any of the functional positions for the Interviews deliverable. For the Annual Report, Job Descriptions, Operations Plan, and Environmental Position Paper, several of the positions reported a reduction in perceived importance for the deliverable from the assessment made before the LSS. For example, students in the CEO, VP of Marketing, and VP of Operations positions all significantly reduced their assessment of the perceived importance of the Annual Report after having experienced the LSS. For the Strategic Plan, students in the CFO role significantly reduced their assessment of the importance of this deliverable. These results are completely consistent with Hypothesis 3.

For the Strategic Plan, however, two positions (marketing and R&D) actually increased their assessment of the importance of this deliverable compared with that made at the start of the course. This result is inconsistent with

Hypothesis 3. One explanation for this inconsistency may be that students, including and especially the VP of Marketing, typically have little previous knowledge or experience with this deliverable, even though it is primarily a marketing function. Thus, changes from pre- to post-LSS in perceived importance of the functional deliverables appear to be somewhat mixed.

Analyses using control variables. To rule out possible alternative explanations, we ran analyses including the three categories of control variables: contextual, individual difference, and group process. Each control variable was individually added to the models used to test our primary hypotheses. The addition of the control variables did not alter the results we report. That is, the same relationships were significant, of the same form, and at the same significance level when the control variables were added. This was true for results collapsed across all positions as well as those reported by position.

The results of the analyses including the control variables increase our level of confidence that it was the LSS approach itself that accounted for the changes that students reported in their perceptions of the relative importance of the integrative and functional deliverables after having experienced the LSS method. Our results of the analyses using the controls rule out specific contextual, individual, or group-related phenomena as possible alternative explanations.

General Discussion

This article reported on the use of LSS as a pedagogical tool for helping students to integrate their prior knowledge and develop an understanding of the importance of the integrative nature of businesses in today's competitive environment. By permitting students to directly experience how interdependence between individuals and business functions contributes to competitive advantage, LSS offers a unique opportunity for faculty who teach capstone courses in business strategy to demonstrate effectively the critical role of cross-functional cooperation. At the same time, it highlights some of the challenges inherent in creating competitive advantage from such interdependence. By combining a number of pedagogical techniques and placing students within a simulated business setting comprised of the various functional areas found in businesses, LSS appears capable of making the interdependent nature of these functions more salient than the use of any single technique. It appears to offer an effective way to both deliver an integrative experience and permit students to appreciate how crucial integration is to the success of a business.

Our results show that over the course of a semester, students were able to recognize the importance of integrating the capabilities found across functional areas and the interdependence this both requires and creates. The LSS approach required that students complete a number of deliverables, two of which were specifically integrative in nature. Students' evaluation of the importance of both integrative deliverables increased from the beginning of the term to the end. Perhaps most interestingly, the board meeting deliverable actually increased in perceived importance to the point where, at the end of the LSS, it was perceived as more important than all of the functional deliverables taken together.

A key aspect of the integrative nature of the LSS approach is that it is capable of reducing the parochialism that can accompany an emphasis on functional specialization. Our results show that as a group, the deliverables that were more strongly oriented to specific functional areas showed no increase in perceived importance from the beginning of the LSS to the end. Providing even stronger evidence that LSS can overcome excessive functionalism, several of the functional deliverables actually declined in perceived importance from the beginning to the end of the course. The Annual Report, Operations Plan, and Environmental Position Paper all were perceived as less important at the end of the course than at the beginning. By requiring students to complete assignments that stress the integrative nature of business organization, through a simulated situation that requires that the students themselves integrate their various talents and knowledge, the LSS approach appears to be able to encourage students to see beyond the narrow boundaries of individual concerns. It also appears to help students develop an awareness of the importance of this for business success. As such, the LSS approach offers students an opportunity, in a classroom setting, to begin to develop the skills necessary to foster integrative environments in the organizations they will eventually join.

However, a few differences did emerge regarding changes in students' perceived importance of some deliverables as a function of the specific role (or functional position) they played on their simulated corporation. In the case of the integrative deliverables, students in all roles except the CFO ranked the board meeting deliverable as significantly more important at the end of the LSS than they did at the start. The results were less robust for the Case Analysis deliverable. Only the CEO role ranked the Case Analysis as significantly more important at the end of the LSS than at the beginning. One possible explanation for these results may be that CEOs have a different mindset going into the LSS and are more sensitive to the importance of integrative activity whenever and wherever it manifested itself, once they are

exposed to it. If so, there may be some self-selection bias introduced by the LSS approach because students self-nominate for the CEO position.

It is also interesting to note that CFOs were the only group that saw no significant increase in importance in either integrative deliverable. Because the CFO role was predominantly held by accounting or finance majors, it could be that these students have stronger functional biases than others, making it particularly difficult for them to embrace an integrative perspective. The fact that other team members often rely heavily on the CFO for his or her analytical skills (as strong analytical skills appear to be a somewhat scarce resource) may also have increased the CFO's focus on his or her functional role.

Differences by position also emerged in changes of the ranked importance of the functional deliverables. Certain roles reduced their assessment of the importance of specific functional deliverables more than other roles. For example, the CEO and marketing roles ranked the Annual Report as significantly less important at the end of the LSS than at the beginning. The CEO, VP of Administration, and VP of Operations ranked the Environmental Position Paper as significantly less important at the end of the LSS. In no case did the role most responsible for the particular functional deliverable evaluate the deliverable as significantly less important at the end of the LSS, but even these roles reduced their assessment of the importance of their primary functional deliverable to some extent.

The fact that at the end of the LSS, the ranked importance of the functionally oriented deliverables as a whole was not significantly different than that of the integrative deliverables (as a whole) points to a key challenge faced by the LSS approach (and businesses). This challenge is to find a way to encourage people to focus on the bigger picture—the interrelatedness of the various business functions and the overall success of the business while allowing them to excel in their respective functional areas (Lehmann, 1998; van der Vegt et al., 1988). Businesses and capstone courses face a similar dilemma in that both need to get their constituencies to see both the forest and the trees. This requires individuals to delicately balance their attention between immediate concerns (their natural tendency) and larger organizational demands. Business can use reward systems to redirect attention away from parochial concerns toward organizational-wide issues (Kerr, 1975, 1995). This is also a possibility in capstone courses. However, many schools require that students be evaluated individually for a significant majority (often above 60%) of their grade. This constraint on the reward system in a capstone course makes it particularly difficult to balance students' functional orientation (which is typically rewarded on an individual basis) with the need to increase the awareness of the value of interdependence (which should be rewarded at the team level).

Although beyond the scope of this article, this issue highlights the difficulties academics and practitioners alike have in addressing the desire that employees have for individual recognition while fostering the integrative thinking, structures, and reward systems that empirical results have shown to yield better firm performance. It represents a key area for pedagogical research.

The LSS approach attempts to balance the necessity for recognizing individual achievement with the importance of emphasizing the integrative nature of business. By requiring that students work in teams for the entire semester, it continually puts cooperation and collaboration at the center of students' concerns. Rather than focus on integration for one section of the course, the integrative deliverables are spread across the course, with the Board of Directors Presentation occurring about midway through the term and the Case Analysis at the end. In this way, it continually reinforces integrative concepts and requires that students revisit them throughout the semester. The results presented here indicate that the LSS approach has some success at achieving this balance.

Pedagogical implications. One of the most important issues regarding the use of LSS is the demands it places on both student and professor. This is a time- and effort-intensive experience. Students will be completing more work during a course taught in an LSS framework than perhaps they ever have before. Similarly, the professor's load will increase, as he or she will be responsible for making sure the various aspects of the course progress smoothly. For example, the students will need to get feedback in a timely fashion. Graded deliverables must be returned promptly to provide feedback before the next assignment is due. Although deliverables are turned in on a team basis, some can easily run to 20 or more pages. Turning these around quickly is essential for students to understand what they need to work harder (or smarter) on in future efforts. Those using an LSS must therefore be fully committed to the method and prepared for the additional workload it entails (although more recent use of this method has involved some restructuring to reduce this burden while maintaining the LSS benefits). This issue of added work will need to be made clear to curriculum and administrative personnel so that expectations are clearly established and understood by students, faculty, and staff alike. Similarly, faculty must clearly communicate expectations to students at the outset, with fully developed syllabi and deliverable descriptions.

Some of the findings of the study, particularly those involving the relative importance of the integrative deliverables compared with the functional ones, have implications for pedagogy within an LSS approach as well. The fact that the Case Study, unlike the Board of Directors Presentation, did not exceed the

functional deliverables in perceived importance at the end of the LSS, raises several critical issues. The first relates to the timing of such assignments. Spacing these deliverables across the full semester arguably helped to keep integrative concepts alive in the students' mind. However, recognizing and responding to the importance of interdependence is an ongoing process. The fact that the Board of Directors Presentation had a larger change in perceived importance may in part be due to its placement in the course. By coming about midway in the course, it offered students the opportunity to take the insights gained from this project and apply them in later work in the course.

This placement gave the students an opportunity to engage in some second-order application of knowledge. Students had to develop and apply integrative concepts for the Board of Directors Presentation, but they also could then take what they learned from the presentation and reapply it to the remaining deliverables, team tasks, and course assignments. It may have been this additional opportunity to see how the integrative nature of the concepts contained in the board presentation played out over time (and in other contexts, including the Case Analysis) that really cemented in students' minds the importance of such concepts and of the board presentation itself.

Conversely, because the Case Analysis came at the very end of the course, it offered little opportunity for students to digest its implications and incorporate them in ensuing situations. This timing difference suggests that instructors wishing to emphasize integrative topics would be well advised to give students ample opportunities to revisit the issues involved several times over the course of a semester. To wait until the end of the course to tie everything together may rob students of the needed chance to experience how various aspects of key topics interrelate. This opportunity may exist not only in formal course requirements but also in informal student conversations and teamwork. Having had an initial opportunity to implement integrative ideas themselves may motivate students to attempt to bring these ideas into later aspects of the course at their own choosing. Such additional application opportunities undoubtedly enhance students' retention of integrative issues and their appreciation of their importance.

The second issue relates to differences in the particulars of the two integrative deliverables. The Board of Directors Presentation required a number of different skills to complete successfully. Students had to master presentation software (such as Microsoft's PowerPoint), assemble and rehearse a professional-quality presentation, drawing on their presentation skills, and apply integrative concepts in the presentation content. All members of the team had to participate in a meaningful way, as all were required to speak substantively on aspects of their simulated corporation. No team member could hide behind the facade of "computer operator" or "technical wizard." The length of the

presentation itself (between 35 and 45 minutes) also meant a comprehensive coverage of material was expected. This structure ensured that all students had to be fully in command of the material they were to present but also aware of what their teammates were presenting. Students had to apply that material, first to the particulars of their team/corporation and then in the context of an oral presentation to a group of others (including the professor, but potentially business people, other faculty, etc.). The structure of this deliverable required students to both analyze and synthesize their knowledge as they prepared and rehearsed their presentations.

On the other hand, the Case Study was a written deliverable and presented far fewer opportunities for all team members to stay actively involved for the entire preparation of the deliverable. The typical approach was for the team to brainstorm ideas about how their team and corporation functioned, select the best ideas, and then delegate writing assignments to various team members. This work was then assembled into a final product. The process probably resulted in some team members having less opportunity to revisit and reconsider the information contained in the deliverable over a period of time. Thus, the exposure of individual students to critical interdependence issues may have been considerably less than that during the board presentation preparation.

The difference between these two deliverables (and the differing results we obtained regarding changes in their perceived importance) highlights another pedagogical concern. When attempting to teach ambiguous subjects such as cross-functional integration, it may be necessary for students to have the opportunity to experience and apply the topics repeatedly and in different modes in their course assignments. The fact that the board presentation required initial drafting, in written form, of the content and then for students to orally deliver this material after several rehearsals may have contributed to the effect that the assignment had on students in the study. The use of multiple modes of presentation development (oral and written) also permitted students to develop their individual contributions in a manner with which they were most comfortable. The board presentation also had an analytic component similar to that of the Annual Report (students were required to report financial results), which added another learning modality to the deliverable. However, the combination of this with the other aspects of the deliverable quite likely minimized students' perceptions that the presentation was another functional exercise and increased their attention to relevant interdependencies. On a process level, the cooperation among all team members that was required to complete the deliverable reinforced the integrative nature of business activities.

A final concern is that in an effort to underscore the importance of integration across functional areas, an LSS course structure might go too far and unbalance the curriculum to the disadvantage of functional issues. Although LSS strives to increase students' perceptions of the importance of the role that interdependence plays in modern organizations, it is possible to carry this too far. Striking the appropriate balance between allowing students to reinforce their mastery of functional skills and recognizing that business functions must increasingly cooperate is essential. Instructors must be aware that without the trees, there is no forest.

Those teaching with the LSS model would be well advised to make sure that students have ample opportunity to improve their grasp of functional knowledge and skills. This opportunity can provide the appropriate context for introducing the demands of interdependence and cross-functional integration. First, it mirrors the reality that students will likely face in the real world. Students will need to draw on their functional skills and will be competing with others in similar circumstances. Consequently, they will be in an ideal position to understand the difficulties businesses face in developing cross-functional integration. Second, successful demonstration of their functional capability can provide students with the needed motivation to tackle the more difficult terrain of interdependence. Expectancy theory (Mathieu, Tannenbaum, & Salas, 1992; Snead & Harrell, 1994; Vroom, 1964) has shown that individuals must perceive that any effort they expend toward a goal will actually produce the desired result (and that they will be rewarded for it, of course). An appropriately balanced LSS can offer the opportunity to demonstrate functional competence. By experiencing competence, students can build on this success and conclude that they will also be able to handle the additional demands of interdependence.

Conclusion

This study examines the degree to which the LSS approach in a capstone business course is able to foster an understanding of the importance of cross-functional integration in organizations. The results provide promising support for the capability of this pedagogical technique to achieve a critical objective of capstone business courses. The LSS approach forces students to work collaboratively and experience cross-functional activities that help students to recognize the importance of integrating functional knowledge. Despite its demands, LSS represents a teaching methodology that offers real potential to help business schools produce graduates who are better able to make significant contributions to their future employers more quickly.

Instead of focusing solely on the concerns of individual functional areas, students exposed to the LSS approach appear to be able to recognize these specific issues while also understanding the necessity of fitting them into the demands of the larger organization. They appear to emerge with a solid capability to see both the forest and the trees.

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