Using Innovations in Student Teaming to Leverage Cross-Functional and Marketing Learning: Evidence from a Fully Integrated Undergraduate Core

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Abstract

Implementing a cross functional curriculum and team learning are still major challenges for many business schools. This article focuses on sharing the lessons from the Boston University School of Management curriculum’s extensive use of integration mechanisms in its undergraduate junior-level Core during the past 12 years. Our required Core courses consist of traditional marketing, operations, information systems, and finance courses integrated into a unique one-semester sequence via a team-based new product venture, where students develop a comprehensive business plan for a new product idea. We discuss tools we have developed and deployed in team learning to support our cross functional initiatives. Finally, we present some results from our team learning data and its impact on students’ functional marketing knowledge.
For many years, practitioners have advocated that business schools don’t teach the way that decisions are actually made in the “real world”. They argue that business decisions should not be locally-optimized independent choices, but rather part of broader interdisciplinary strategic selections, made across groups of stakeholders, decision makers and functions of a firm. Consequently, many would agree that best practices in business decision making must involve judgments based on system-wide understandings of the connections and interdependencies among the different functions of the organization. In addition, both practitioners and academics espouse that in many cases teams of individuals deliver better decisions and results than individuals alone (although few business schools have been able to develop a rigorous understanding and measure the impact of project teams on students’ learning).

Therefore, it is not surprising that teaming and cross functional teaching has become part of the business education discourse for the last decade. The importance of these issues has been emphasized by business school accrediting bodies, management educators and business practitioners alike (Chonko, 1993). For instance, the American Assembly of Collegiate Schools of Business (now known as “AACSB International”) was making explicit calls for more integrated teaching and the application of cross functional orientations in business school curricula as early as 1991. Also, numerous businesses have supported educational innovations around team-based or cross-functional/multi-disciplinary courses. Amongst these corporate leaders, General Electric has played a key role in supporting education issues worldwide through its GE Foundation (granting $54 million in 2004).

Yet, most business schools continue to teach “stand-alone” courses. It has been our observation that when cross-functional initiatives are deployed, they have often run the risk of
experiencing 1) a limited life in the curriculum due to frequently encountered sustainability and staffing issues (see Corsini et. al 2000 for a discussion of these types of difficulties), or 2) a shallow curriculum penetration, with the integration limited to the efforts of a small group of faculty (e.g., four professors co-teaching a course, DeMoranville, Aurand and Gordon, 2000), to a limited set of target students (e.g., honors sections, Corsini et al 2000), to a restricted number of electives (e.g., two electives working together, Darian and Coopersmith, 2001), or to a capstone course (Marshall, Bolten and Solomon, 2000).

In addition, even though almost all business schools use groups and group projects in their curricula, few appear to fully capitalize on the benefits of bona fide “teams” and collaborative learning. A student group is often just a collection of individuals with a task to be accomplished, but with not much being defined. On the other hand, a team is much more formalized and is considered a true social entity. “A team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable” (Katzenbach and Smith 1993: p.45). While groups are just assembled, teams are constructed and managed. With teams and a team learning approach, the processes and skill sets needed for “teaming,” “team building” and “learning to work together” are as much part of the curriculum as the deliverables linked to the course assignment.

At the pedagogical core is a belief that teams foster cooperative learning. Cooperation leads to greater individual achievements, better reasoning skills, more meta-cognition, and knowledge transfer across members (Tinzmann et al, 1990). Cooperative leadership skills are promoted by giving each team member a measurable stake in the success (i.e., learning) of every team member. In true team learning situations, team members assess how well the team works
together, troubleshoot obstacles, teach and learn from one another, and leverage each other's strengths to address management initiatives to achieve common goals. This type of teaming effort fosters collaborative learning (Nelson 1994). As part of the teamwork, students develop critical thinking skills. Developing and using these skills are what contribute to the collaborative learning (Nelson 1994). Nelson argues that during team tasks, individuals have to learn to articulate and justify why some ideas, suggestions or solutions offered by others are flawed or correct. Nelson believes that this forces individuals to develop a deep contextual and connected understanding of the problem at hand. Through the necessary critical thinking that is needed in order to arrive at a shared team output, members have to find a contextually relative middle ground where they learn how to understand and explain why some recommendations should or should not be followed, all the while deepening their own subject matter expertise (Nelson 1994). However, despite reports on the effectiveness of teaming, collaborative learning in business education – and specifically marketing -- has remained difficult to implement and measure.

In many cross-functional contexts, marketing is a discipline central to the decision making process. If one embraces a customer driven view of the firm, it becomes critical to understand how consumer and market knowledge informs issues such as product design, sales forecasting, capacity planning, and financial requirements. While some business disciplines might play more of a support role, marketing is typically central and pivotal in a cross-functional integration initiative. It is therefore imperative that students 1) understand where and how marketing activities and strategies interface with other business issues, 2) not only learn basic marketing concepts, but also gather and analyze the right information in order to support projects’ strategic decision making across all functions, and 3) work effectively as a team so that
these overarching cross-functional objectives are achieved. Since we typically work in educational systems where students have a finite amount of class-credits for which they can register and a finite number of hours they can study, implementing cross-functional initiatives calls for additional teaching demands that have to be absorbed into existing course capacity. In practice, these challenges call for trade-offs and adaptations to typical curricula (e.g., less coverage of traditional “stand alone” issues, but additional teaching of topics that are uniquely designed to support the cross-functional interface).

In the remainder of this article, we describe the scope, content, and points of integration of the cross functional initiative that has been developed at Boston University, providing insights on how we have been able to sustain and deliver this integrated curriculum for 12 years, across thousands of students and dozens of teaching faculty. We then briefly describe the comprehensive teaming tool we developed and use to support cross functional team-based courses. Finally, we offer some qualitative and quantitative evidence of the effectiveness of this program -- addressing a critical area of concern that is often voiced: namely, how does cross-functional teaching impact marketing learning?

Scope, Content, and Points of Integration

At the Boston University School of Management, all students are required to take the “Cross Functional Core” (called SM323) during one of their junior year semesters. It should be noted that this junior course is not the first exposure to integration and cross-functionality for Boston University’s students. This pedagogy has been deployed throughout all four years of the undergraduate program, starting in students’ freshman year where they take a year long integrated “Management as a System” course. However, in this article, we focus on the junior-
level SM323 course where we have been able to achieve the broadest and deepest degree of integration. SM323 consists of four traditional semester-long courses: marketing, operations, information systems, and finance, all integrated into one unique sequence (worth 16 credit hours). Students enrolled in SM323 typically take no other course during that semester. The course is team-taught (one faculty member for each functional area) and team-learned (semester-long team project). The project is the principal mechanism of integration and is a team-based new product venture, where students develop a comprehensive business plan for a new consumer product idea.

The assignment is a 14-week long project, with interim deliverables and workshops (seventeen classes in which student teams present a mini project deliverable) throughout the term. Based on a pre-assignment and the first two weeks of the course, teams develop a new business-to-consumer product concept. In this initial concept development phase, students engage in broad research activities, such as interviews with retailers and potential consumers, assessment of the competitive market, industry research, and a review of relevant US patents. They continue to refine their product concept, segmentation and targeting strategies as they gather more data from focus groups and consumer surveys. They also develop estimates for the costs associated with manufacturing and delivering their product to retailers, and, ultimately the consumer. They must also research and deploy an information system that can support their marketing, operations and financial decisions. Finally, teams develop financial projections, utilizing scenarios and sensitivities analysis.

By the end of the semester students deliver a comprehensive business plan -- detailed enough so the team could theoretically approach potential funding sources to start the business. The final deliverables are formal presentations to hypothetical venture capitalists (played by
faculty who are not familiar with the team or their product). The plans and presentations are based on actual projections and decisions that teams have had to generate, refine and revise throughout the term. Projections are based on extensive research, primary and secondary data collection, and optimization exercises. Their objective is to maximize the potential returns from their venture and to fine-tune their overall business strategy and tactics across a large set of interdependent decisions and business systems. In Figure 1, we provide an example of how some of the project marketing decisions are linked with other aspects of the business planning process.

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Figure 1 about here

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What started as a course pilot over 12 years ago has now become the most defining and central component of our undergraduate program. Since the inception of the course, we have graduated over 6000 students (about 940 teams) using this pedagogy. During the 2005-06 academic year, we will deliver 12 sections of the course. This represents (12 sections * 4 disciplines = 48 faculty teaching slots). Needless to say, such an enterprise has forced us to completely tailor our course content and revisit how we deliver our core courses in order to sustain this integration effort over time. While we continue to deliver the fundamental material that is covered in a “standard” introduction to marketing management class, we go much beyond, and have had to remove some content (for instance we do not cover international or business marketing as these are offered in electives). In order to support the course we developed a unique set of features (e.g., organization structure, culture, institutional support, scheduling, curricular content, team coaching) and teaching innovations (e.g., technology, Center for Team
Learning, online resources, use of peer teaching assistants, customized cases) in order to meet SM323’s key challenges (e.g., staffing, work load for students and faculty, long term sustainability).

In terms of the structure of the course, students are enrolled in the four functional courses in which there are twenty three 2-hour sessions (one hour forty minutes of class time) for each function over a 14 week semester. In addition there are six 4-hour common sessions in which all functional faculty are present. Those common sessions are where student teams present major aspects of their business plan and receive feedback from faculty, as well as the other students. Finally, there are three in-class 1-hour sessions devoted to teaming and team feedback (and another 10 hours outside of class in which students’ participate in formal team feedback and reporting).

Each section of the course is taught by a group of 4 faculty members (one from each of the disciplines in the course: marketing, operations, finance, and information systems), and teaching content, material and exams are standardized across all sections. A faculty course coordinator manages overall development and the day-to-day administrative and logistic issues. Curricular changes are developed and implemented through a team of 6 faculty members (the course coordinator, 4 functional area coordinators and one faculty member from the Center for Team Learning). Functional coordinators are responsible for the course content of each discipline. Figure 2 provides a representation of the matrix structure used in the delivery of the course. Course coordinators and functional coordinators are faculty members with extensive experience teaching the course. New faculty members to the course are initially only involved in delivery. Over time, we have been able to transition through four course coordinators and multiple functional coordinators. At this point, the structure is self-perpetuating and has the
capacity to absorb new teaching faculty and to provide relief to veteran members seeking alternative teaching assignments – essentially the course is not dependent on only a few. Because the course is more demanding than a regular stand-alone course, the school’s administration has developed some alternative workload accounting so faculty may both fulfill their research and teaching obligations.

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Figure 2 about here
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Grading is structured to balance the need for students to focus on becoming proficient in each of the four functional areas (marketing, operations, finance, information systems) and to incentivize the team project and team learning. Students receive four grades and must pass each functional area (a common set of mid-term exams, final exams, and class participation) before they can receive credit for the project. The project represents 40% of the student’s overall grade in each course.

Supporting Cross Functionality via a Comprehensive Teaming Tool

As we mentioned, groups are not the equivalent of teams and team learning. Our team learning (Deacon-Carr, Herman, Keldsen, Miller, and Wakefield 2005) approach is guided by five principles:

• Students are assigned to teams; they do not select their own team members
• Each student must demonstrate individual proficiency in the subject matter
• Each student has a measurable stake in the performance of his or her team members
• Students are provided with tools for coaching
• Students are evaluated on coaching and counseling as well as overall team performance
To support these principles and our students’ teaming efforts, the Center for Team Learning at Boston University was formed in the early 1990s and officially funded in 1996 by the GE Foundation. The Center for Team Learning has been instrumental in supporting the teaming activities of SM323. Over the last decade, the activities, procedures, teaching tools, and knowledge developed by the Center for Team Learning have been codified and recently published as The Team Learning Assistant Workbook (Deacon-Carr, Herman, Keldsen, Miller, and Wakefield 2005) along with a suite of electronic resources.

Besides its workbook, The Team Learning Assistant provides web-based content and team learning support tools that have been designed to assist student teams in all of the necessary steps of effective teaming. For example, some of these steps include the development of a team contract - which spells out roles, responsibilities, and behaviors expected of each team member, and steps for effective team and meeting management - which includes conflict resolution procedures, giving and receiving effective written and oral peer feedback, developing and using after actions reviews following feedback sessions. Students also provide a confidential rating and assessment of one another at the end of the project. Faculty are then able to access all of this data to determine how well teams' functioned and evaluate students on contribution to content to the project as well as their ability to coach and counsel teammates.

Faculty members assign teams a project grade based on the teams’ business plans and final presentations. Team members are then assigned the project grade as 40% of their overall course grade in all four functional courses. Faculty members can then adjust the project grade for individual students after The Team Learning Assistant data (i.e., qualitative and quantitative peer evaluations) have been reviewed and analyzed. Those team members who did not contribute satisfactorily – as viewed by their teammates – can receive a reduced project grade.
Similarly, those team members who showed strong leadership or team building skills can be upgraded by faculty and receive a higher project grade.

**Evidence of Success**

In this section, we provide statistical evidence of the success and merits of SM323’s pedagogical innovations. First, we would like to offer some evidence based on students’ feedback. While end of semester student feedback has been very strong (averaging well above 4 on a 5 points scale across all instructors involved), we feel evaluations and feedback from our graduates is even more telling. Based on responses to an externally administered survey of graduates (based on two consecutive years of data, n=1100; with data collected 12 to 18 months after the course is taken, 5-point scale of strongly agree to strongly disagree), it appears that 3 of the 4 courses included in SM323 rank, #1, #2 and #4 (out of all core classes across the School) as “most useful courses for personal development.” Also, 86% of respondents agree or strongly agree that “SM323 was an impactful learning experience,” and 83% agree or strongly agree that “SM323 prepared me to work on teams”. Besides these systematic results we also have accumulated countless anecdotal evidence from past students and employers, reinforcing our conviction that students that participate in SM323 are better prepared to face the so-called real world because of the emphasis on cross-functional teams.

Second, we wish to highlight evidence of the learning that takes place in such a course. Based on a data set collected over 4 semesters (165 team projects, 1099 students), we discuss two sets of results: 1) the relationship between performance in marketing exams and teaming quality, and 2) the differential effects of teaming quality for higher and lower academic performing students (as based on incoming GPA). We conducted both team level and student
level analyses. The main dependent measure was students’ performance on marketing exams (midterm plus final) that are administered during the SM323 semester. In any given semester, all students (regardless of section) take the same exams, and from semester to semester, the exam structures are similar (while individual questions are changed or modified). We normalized the exam scores across semester, in order to aggregate the data across four terms. The second measure of focus was students’ cumulative GPA at the beginning of the semester in which they took SM323. Finally, we used data from The Team Learning Assistant in order to gather measures of teaming quality. While teaming quality is a broad concept, and it is difficult to observe and measure, especially a posteriori, we had access to several key indicators: the quantitative, end-of-semester feedback that students provide on their teammates and their own contribution to the teaming effort.

Each student is asked to allocate a multiple of 10 points (based on the number of students on the team) across all of the team members (self included). This is therefore a fixed sum measure across teams. For each team, we computed the variance in individual scores, took the inverse, and obtained a teaming quality score for each team. Low teaming quality scores indicate that there was a high degree of variance across the teaming contribution of each member and that cohesive teaming was not achieved. On the other hand, high teaming quality scores indicate that team members received scores with little variance, and that while team members may have contributed differently to the process, each one contributed based on his or her own abilities, and that everyone worked together to achieve common goals and support one another.

As shown in the Table, whether the data is analyzed at a team (regression model 1) or individual (regression model 2) level, our empirical results show that (1) as expected, past academic performance is a predictor of future academic performance (positive effect of GPA on
MK exam grade), but 2) and more importantly, students perform better on marketing exams when they also engage in quality teaming (positive effect of teaming quality on marketing exam grade). In addition, as shown in the Table (regression model 3), there is an interaction effect between incoming individual GPA and teaming quality. So, while there is still a positive effect of incoming GPA and teaming quality on individual marketing grade, this effect is not constant for all students. In fact, the lower incoming GPA students are actually helped more than the higher incoming GPA students by being part of a high teaming quality team (this finding is shown in Figure 3). Further, students with high prior GPAs perform well on marketing exams regardless of their teaming experience, however lower prior GPA students seem to benefit by gaining new knowledge and functional proficiency as a result of their active participation in a high quality teaming effort. This finding is further reinforced by the results of the last two regression models (see models 4 and 5 in the Table), where the lower third of the incoming GPA students receive a boost in their marketing exam score by participating in a high teaming quality team (regression model 4), whereas shown in regression model 5, the higher incoming GPA students receive no such exam score boost from teaming.

It should be noted that these results do not mean than high achieving students (as measured by prior GPA) do not benefit from participating in high quality teaming efforts. Quite the contrary, they too benefit. Even though the effect might not be statistically detectable in their marketing exam performance, we also know (from other analyses performed) that high teaming quality leads to better project grades and, therefore, this is a route through which higher prior GPA students get rewarded for high teaming quality. Further, we should recognize that performance on an exam is only a partial and incomplete measure of learning, and therefore it is quite probable that these students may learn more with respects to skills that the exams do not
capture (e.g., managerially relevant skills such as coaching, or the development of a more critical understanding of the subject matter). Or, that there could be a ceiling effect on exam performance that does not allow us to completely capture the full spectrum of increased learning.

Thus, we show that while past GPA is a predictor of individual level performance on individual marketing exams, this relationship is moderated by the cohesion during the team experience. In other words, student members of teams that are cohesive (e.g., where true sharing of information takes place, where all are involved, or where information is discussed) perform better on their own individual marketing exams -- in fact this is true across all four disciplines -- even after accounting for incoming GPA levels.

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Table and Figure 3 about here
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Conclusion

We believe that the Boston University School of Management is one of the few institutions that have been able to achieve and sustain deep cross functional integration and team learning. For over a dozen years, we have deployed, grown and evolved an integrated curriculum (starting in the freshman year), with the fullest integration achieved in the junior year sequence. As any institution who has tried to implement similar changes knows, this is a difficult journey to undertake. Integration efforts of this type require important commitments from the faculty and the administration. As functional specialists, faculty members can be reticent to become involved in such a program and might prefer to remain in their functional “silos.” One of the success factors of our course has been that from the onset, cross-functional integration was a priority both of our Dean and administration and of a group of faculty members. Besides this
simultaneous convergence of wills, the second success factor has been that the school and our Dean have recognized that traditional workload accounting was not appropriate for this type of course. Therefore, the school provided incentives such as extra teaching credits for faculty willing to engage in this process (see Bradshaw 2005, for a recent interview in the Financial Times in which Dean Lataif discusses these issues and challenges).

Advocating the merits of cross-functional integration and team learning can sometimes feel like saying “Trust me, it might be a bit painful, but it will be good for you!” Instead of asking for leap of faith, we can now let the data “speak” and have empirical evidence to support that indeed this is a sound pedagogy. Our results provide evidence that it is possible to navigate the tension between wanting students to learn the basics of a functional area (marketing) and recognizing that marketing decisions impact many other areas of the organization -- thus, not having to sacrifice one skill set for another. We also show that team management tools can provide the students the structure and processes to leverage the teaming experience and learn from one another. When well executed, cross functional integration and team-based learning can be a very rewarding experience. Students and faculty enjoy it, recruiters are impressed, and above all effective teaming benefits individual learning.
REFERENCES


Deacon-Carr, Sandra, Ellen D. Herman, Sandra Z. Keldsen, Jeffrey G. Miller, and Patricia A. Wakefield (2005), The Team Learning Assistant Workbook, McGraw Hill Irwin.


This figure is by no means exhaustive as there are multiple points of integration within the marketing elements and between marketing and other functions.
FIGURE 2

Course Delivery Structure

6-Member Course Design Team

Overall Course Coordinator

Marketing Faculty Coordinator + TA
Finance Faculty Coordinator + TA
Operations Faculty Coordinator + TA
I.S. Faculty Coordinator + TA

Team Center Coordinator

Section Coordinator
4 Faculty Member Teaching Team

Section Coordinator
4 Faculty Member Teaching Team

Section Coordinator
4 Faculty Member Teaching Team

Up to 14 sections per year

Section Coordinator
4 Faculty Member Teaching Team

Note:

1 The Course coordinator and each of the functional area coordinators are typically members of one or two teaching teams in each term.

2 One member of each section teaching team is designated as section coordinator. Section enrollment is currently capped at 48 students. Typically, Course, function, and section coordinators are assumed by different faculty members in order to minimize workload per faculty.
FIGURE 3

Effect of Team Quality on Marketing Exam Performance for High and Low Incoming GPA Students

Individual Marketing Exam Scores

Low Teaming Quality  High Teaming Quality

High Incoming GPA Student
Low Incoming GPA Student
## TABLE

### MULTIPLE REgressions RESULTS

**Effect of Prior GPA and Teaming Quality on Marketing Exam Grades**

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Regression Model 1: Team level analysis with main effects and all teams included</th>
<th>Regression Model 2: Individual level analysis with main effects and all students included</th>
<th>Regression Model 3: Individual level analysis with main and interaction effects and all students included</th>
<th>Regression Model 4: Individual level analysis with main effects and only lowest 1/3 GPA students included</th>
<th>Regression Model 5: Individual level analysis with main effects and only top 1/3 GPA students included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Average Incoming GPA</td>
<td>.442**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual Incoming GPA</td>
<td></td>
<td>.576**</td>
<td>.655**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaming Quality</td>
<td>.135*</td>
<td>.063**</td>
<td>.358*</td>
<td>.173**</td>
<td>.052</td>
</tr>
<tr>
<td>Individual Incoming GPA x Teaming Quality</td>
<td></td>
<td></td>
<td>.313*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**F-statistic for the regression**

<table>
<thead>
<tr>
<th>Regression Model 1: Team level analysis with main effects and all teams included</th>
<th>Regression Model 2: Individual level analysis with main effects and all students included</th>
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<th>Regression Model 5: Individual level analysis with main effects and only top 1/3 GPA students included</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.50**</td>
<td>282.37**</td>
<td>189.59**</td>
<td>11.34**</td>
<td>.95</td>
</tr>
</tbody>
</table>

**Degrees of freedom**

<table>
<thead>
<tr>
<th>Regression Model 1: Team level analysis with main effects and all teams included</th>
<th>Regression Model 2: Individual level analysis with main effects and all students included</th>
<th>Regression Model 3: Individual level analysis with main and interaction effects and all students included</th>
<th>Regression Model 4: Individual level analysis with main effects and only lowest 1/3 GPA students included</th>
<th>Regression Model 5: Individual level analysis with main effects and only top 1/3 GPA students included</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,165</td>
<td>2,1099</td>
<td>3,1099</td>
<td>1,369</td>
<td>1,357</td>
</tr>
</tbody>
</table>

Standardized betas are shown in table.

**Note:**

* significant at (p<.05)
** significant at (p<.10).