Innovation Integration and Crossing Disciplinary Borders in Curriculum Assessment and Program Development

Robert DeFillippi
Suffolk University

Laurie L. Levesque
Suffolk University

This paper overviews a faculty team's approach to embedding innovation throughout their curriculum to prepare undergraduate business students for a constantly changing global workplace. The process included documenting the extent and facets of innovation currently learned, creating an integrated framework of essential innovation knowledge and skills, and identifying a definition of innovation that reflected existing programs and future goals. To engage colleagues in this evolving vision of an enhanced and coordinated innovation curriculum, the team shared evidence and examples from industry and higher education through a repository of readings and expert lectures, and planned pedagogical and curriculum development workshops.

INTRODUCTION

A long standing criticism of business school curricula is that they are organized as discipline-specific knowledge silos when what is most needed are cross-disciplinary initiatives that emphasize creatively innovative and integrated approaches toward addressing the complex and dynamic challenges faced by society and business (Bennis & O'Toole, 2005). In response, the Dean of Suffolk University's Sawyer Business School asked a group of senior faculty and administrators from a range of academic disciplines to find ways to ensure innovation knowledge and skills were integrated systematically and cumulatively throughout the curriculum. The self-named Innovation Integration Team (IIT) approached this mandate by first creating an organizing framework of innovation skills and knowledge based on industry experience and research expertise. This was mapped out by content area and level of targeted competence (basic, intermediate, and advanced). The framework will be used to mobilize the efforts of faculty and academic departments to ensure that the full spectrum of innovation skills and knowledge are integrated in the curriculum and coordinated across each year of student matriculation and diverse business disciplines. Moreover, this organizing framework will be utilized to review the existing curriculum to identify opportunities for improved innovation integration.

This paper overviews the processes our team is using to create a framework of integrated innovation knowledge and skills, document the current state of the framework as a curriculum assessment and program development tool, share our evolving vision of an enhanced and coordinated curriculum, and describe the challenges and benefits of deeply involving faculty from diverse academic disciplines in integrating their innovation skills and capabilities.

AN ORGANIZING FRAMEWORK FOR INNOVATION INTEGRATION

Creating a Framework

The first challenge the IIT faced was to integrate the various disciplinary and application perspectives on innovation represented by our five person team. The IIT included two entrepreneurs – one focused on new products and the other on market opportunities. The three academics had backgrounds in operations and supply chain, corporate innovation and strategy, and organizational behavior and mental models. After an inconclusive discussion, we postponed defining innovation until we explored the concept a bit more. One team member reviewed a variety of leading innovation management textbooks (e.g. Tidd & Bessant, 2009) and handbooks (e.g. Fagerberg, Mowery, Nelson, 2005) to identify broad thematic areas of innovation knowledge and skill. Our team then identified preliminary boundaries of the field by articulating a range of key skills and knowledge related to innovation. The lengthy list led to a focus on creating organizing categories around various dimensions of innovation as defined in the literature and we experimented with various ways to classify these dimensions, such as: (1) individual-, group-, organizational- and interorganizational-level dimensions, (2) skills vs. knowledge, and (3) other grouping schemes such as "Innovator Mindset & Skills" and "Innovation Processes & Systems." This assessment was next organized into a robust framework (see Table 1).

Our guiding purpose for this classificatory framework of innovation knowledge and skills was to develop a comprehensive but understandable overview that curriculum stakeholders could easily comprehend and embrace. We dropped a few items that existed in the literature (e.g., National Systems of Innovation, Sectoral Systems of Innovation) as they would be challenging for the typical undergraduate to comprehend given less work experience and thus an underdeveloped context for making sense of the concepts. However, these items would be useful if a similar effort is later made with the MBA curriculum. To this end, we will be working on a rubric that organizes these knowledge and skills into beginner, intermediate, and advanced levels of expertise that can be used to develop specific learning goals for specific course offerings in all majors and levels of undergraduate study (see Table 2).

Defining Innovation

The IIT realized that we needed to select one definition of innovation that accurately reflected our emerging views on innovation. Our dean had expressed his thoughts on the subject. We also reviewed a half dozen existing definitions, ranging from Tidd & Besssant's 2009 definition: "Innovation is the successful exploitation of new ideas" (p. 16) to one widely used by those who focus on corporate innovation: "Innovation is a non routine, significant and discontinuous organizational change that embodies a new idea that is not consistent with the current concept of the organization's business" (Mezias & Glynn, 1993). The IIT discussed the merits of each definition for adoption by our group, followed by a discussion of which phrases and ideas we could extract from each and craft into a definition that captured the uniqueness of our school and programs and still be able to withstand scrutiny by industry and academia. We reduced the various definitions into a short and succinct statement that reinforced the conceptual framework we had developed, yet was inclusive enough that our school's existing initiatives in this area. We came to the following definition: "New ways of creating value from ideas to execution by integrating the creative capabilities of individuals, groups, and organizations."

An Organic Organizational Change Process

Envisioning a revamped curriculum and coordinated faculty effort around a programmatic theme was daunting. Although the IIT members all had extensive leadership experiences across a variety of settings, none could suggest a structured outline for approaching what would essentially be a massive bottom-up organizational change effort. It was recognized that in order to achieve the overarching goal of "integrating innovation across the curriculum," several unstructured tasks needed to be addressed simultaneously. As a result, an organic process emerged that we consciously did not attempt to structure.

The conversations themselves were not linear. We found ourselves identifying needs and next steps simultaneously with the discussions of innovation knowledge and skill domain and its breadth and

variety. Concurrently, we commented on how to engage more faculty to initiate and coordinate this curricular and culture overhaul. After the first few meetings, a team member pointed out our parallel and nonlinear conversations; the group decided to continue in such a manner. The reasoning was that the meetings had felt productive, though not in any way an outside observer could measure. The sense of progress came from a shared belief that exploring the facets of innovation was helpful for arriving at a shared understanding of the field and how it fit with our students and faculty.

We were aware that in order to draft implementation plans for infusing innovation, it would be necessary to understand which existing courses and co-curricular experiences developed students' knowledge and/or skills in innovation. However, with so many ways that the word innovation is used in college programs, the IIT had also to define the scope and focus of innovation in a way appropriate for these students, our faculty's expertise, industry demand, and the like. At that point, the IIT decided to continue vacillating among the multiple tasks as conversation naturally dictated. This encouraged creative exploration in defining the scope of the integration effort, while not losing important implementation insights that emerged during these discussions. Explicit support for the process allowed us to continue to use it without feeling beholden to more normative meeting formats for task forces. However, we did generate action items that were helpful in organizing the information discussed or for continuing the discussions and ideas offline between meetings.

The aforementioned semi-structured meeting format would not work well for every school attempting to implement a large scale curriculum change effort. Faculty who learn and think via linear processes would struggle with the rapid leaps made when members creatively built upon or moved the conversation across topics, levels, and purposes. For example, the definition of innovation arrived at by the team involved leaping between a wide range of proposals offered by project team members and this process was often digressive, with personal stories interspersed with literature references. We also reviewed and rejected many ideas proposed by team members. It just so happened that the five IIT members were familiar with each other's styles as well as their potential level of contribution in brainstorming sessions. Combined with a high level of mutual respect, this familiarity fostered patience with leaps of logic, diversions, and criticisms of proposals, and it was supported by a belief that ideas could be returned to without personal egos intruding. This comfort level with temporary chaos was also possible as two of the members were known to distill a seemingly disorganized discussion down to its essential points and rein the group in with summary statements and recaps.

The Business Case for Innovation and Pedagogical Examples

The IIT determined that it needed to rely upon external research and best practices in three areas, each of which is described in more detail below. Our team received a summer faculty development grant to study these and build repositories or articles that include research articles, reports of best practices, and academic resources and articles on the teaching and learning of innovation.

First, the IIT looked at empirical and theoretical research regarding innovation's impact on personal, group and organizational performance. This body of research is critical for determining what current students should learn in order to be well educated and prepared for their careers, regardless of the field. We collected and summarized published studies of innovation tools, techniques, and processes and their impact on outcomes. These articles were organized for the IIT and colleagues to use as resources. Each area of innovation is being supplemented with a primer and suggested reading list for colleagues who need to get up to speed fast. The repository also lends empirical credence to the pedagogical needs and boundaries of this initiative.

Second, the IIT continues to identify practitioner evidence to make a business case for employees who are innovative or capable of fostering innovation. We realized that some faculty are less willing to engage in change efforts and a clear and compelling argument would be needed to convince, and hopefully motivate them, to partner with us in this effort. Many of our advisory boards have provided anecdotal evidence that innovation is critical when they met with academic departments; they have explained the importance for graduate to have a capacity to adapt to, anticipate, and be comfortable with constant change. According to the Association of American Colleges and Universities (2008), 70% of

surveyed employers would like colleges and universities to emphasize the ability to be innovative and think creatively. About the same number wanted an emphasis on critical thinking and analytical reasoning skills. Calls for enhanced innovation and creativity in business curriculum point to the fundamental skills graduates must have (Kao & Mao, 2010).

Third, the IIT is concurrently focusing on best practices in the teaching of innovation skills and knowledge in colleges or in businesses. In doing so, we hope to find examples for embedding an innovative mindset and culture into companies within a variety of industries. This requires information on how industry addresses innovation as both knowledge and a skill, as well as what assessment tools and metrics are used. Our IIT sees critical thinking and analytical reasoning skills as best developed when students apply these skills to complex problems that require them to integrate their knowledge and skills from multiple disciplinary perspectives. The goal is also to find best practices in teaching and learning innovation in the workplace and share these instructional resources with faculty.
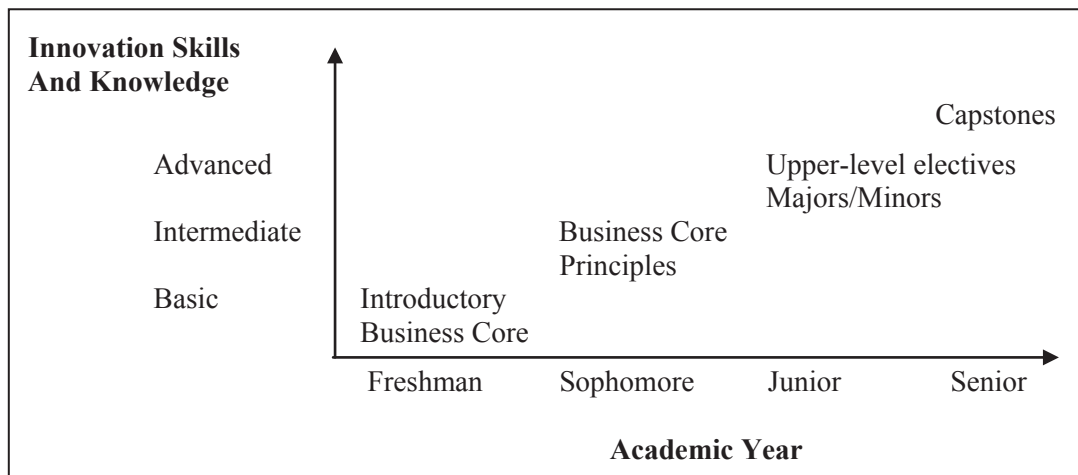
EMBEDDING INNOVATION INTO CURRICULUM

Innovation Parsed by Year and Skill Level

We took a preliminary snapshot of content/tools/skills within our undergraduate business curriculum by reviewing the syllabi of required courses and speaking to course coordinators and faculty. These discipline-based core business courses create borders that our innovation integration project will attempt to cross and link more synergistically.

Using a model (see Figure 1) suggested by our Dean we aim to incorporate all areas of the undergraduate business degree in this effort in a coordinated manner. We recognized that a change on this scale would require faculty to have a clear understanding of the overall effort and goals. We began to build an understandable, user-friendly framework for presenting to faculty the scope and depth of innovation and knowledge skills we should inculcate into the curriculum.

FIGURE 1
INTEGRATING INNOVATION INTO AN UNDERGRADUATE BUSINESS DEGREE

Basic Level

The introductory business core courses, which are designed for Freshmen and Sophomores, would provide basic knowledge of how innovation can be integrated with business skills in simple case and experiential learning exercises. Some of the knowledge and many skills in Table 1 would be introduced in these courses.

Intermediate Level

Sophomores and Juniors take "Principles of…" courses that provide opportunities to work in teams on problems that are based on real world organizations but do not require direct interaction with an external client (Gijselaers, 1995). Others courses in these years incorporate interaction with local organizations with real projects that are limited in scope.

Advanced Level

All senior year students take a project-based capstone course in their major where they work in teams with external client organizations on a negotiated project and set of project deliverables (DeFillippi & Milter, 2009; Wankel & DeFillippi, 2005).

Outcomes Assessment

Integrating innovation goals into the core curriculum will require subsequent assessment of students' success in achieving the stated learning goals. However, it is necessary that we develop this into a broader effort to ensure that our faculty supports these goals. The IIT outlined preliminary goals:

- Systematically develop a foundation of innovation skills and knowledge with few or no gaps
- Progress to the advanced skill and knowledge levels in all key areas
- Experience innovation concepts across various disciplines
- Develop knowledge needed to recognize, promote, and develop innovation within teams, departments and organizations
- Understand individual and group level innovation skills
- Develop a mindset of innovative thinking and continuous improvement

Measurement tools will need to include assessments of skill, knowledge and attitudes. Developing interim performance standards will allow students to understand their progress through the levels of beginner and intermediate as they work toward achieving expertise as defined within their program.

To this end, the final framework the IIT created, but deliberately left unfinished, includes the aspects of innovation at the individual, group, and organizational levels, grouped by the two organizing categories we previously identified, and set up to have descriptive performance standards at the beginner, intermediate, and advanced levels (see Table 2). The plan is to recruit a larger group of faculty to complete this assessment rubric, which can then be used as a guide for courses, within majors, and across the overall degree.

Business School Culture Supports Innovation Initiatives

The Business School already has several non-integrated innovation educational initiatives in place. To encourage faculty acceptance of innovation as the underpinning of the entire curriculum, the IIT will need to show how each either supports or reinforces the innovation integration initiative.

The first is an annual New Product Innovation competition that involves teams of students who develop new product concepts and commercialization plans and present their proposals to panels of experienced entrepreneurs, venture capitalist and angel investors. Last year over 250 new product proposals were generated by Suffolk university student teams.

The second effort is the annual Global Leadership in Innovation and Collaboration Recognition Day, which is hosted by our Center for Innovation and Change Leadership. The recognition day provides an opportunity to learn best practices from a globally innovative firm's top executive or innovation officer. That individual spends the day at Suffolk sharing best practice challenges and best practice solutions with faculty, students, alumni and invited guests in a variety of venues. Additionally, a team of Center faculty are developing case studies of these best practices in cooperation with the recognized organizations. The first is focusing on the collaborative innovations between Xerox and Proctor and Gamble.

Third, our undergraduate entrepreneurship major provides the foundation for students to launch ventures, and will be expanding to help participants in the New Produce Innovation take their ideas to execution (I2E) thus converting these innovators into entrepreneurs.

Fourth, a required sophomore experience around leadership and social responsibility has teams of students develop new solutions to real challenges faced by local not-for-profit organizations. Other courses across the curriculum include similar experiential and applied problem solving.

Fifth, we are in the process of identifying experts to speak to faculty and students on cutting-edge innovation topics. The goal is to broaden the conversation and engage people within their disciplines in order to encourage them to consider cross-disciplinary solutions to the complex, changing business world.

NEXT STEPS

The execution of the above innovation integration project activities is intended to strengthen the Business School's competitive position and reputation (brand) as an institution committed to innovation integrated business education. The full realization of the innovation integrated curriculum initiative will require the development of the innovation integration assessment approach into an operational tool for transforming the business school curriculum and its faculty and students into effective innovation integration co-learners. This process will require a sustained set of activities that include the development of a repository for best practices of innovation pedagogy and instructional content, a systematic assessment of current gaps in innovation pedagogy across the curriculum, a set of educational initiatives to develop faculty competence and commitment to innovation integration within their disciplinary courses, and a set of student orientation programs to alert them to the role of innovation in their educational experience at Suffolk and its value to their post Suffolk careers. Finally, the Sawyer Business School will need to support these initiatives internally as well as to market and promote these initiatives externally as part of a business school's distinctive branding of its educational offerings.

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TABLE 1
INITIAL LIST OF INNOVATION SKILLS AND KNOWLEDGE

Individual Level
I1: Creative thinking skills (brainstorming, idea elaboration, developing the unexpected)
I2: Mindset of continuous innovation/improvement (what can we do differently/better?)
I3: Develop forward thinking mindset, what's the next thing?

Group Level
G1: Collaborative/group decision making skills (how to spur creative open thinking, encouragement)
G2: Need to build coalitions, support for changes, understand buy-in
G3: Awareness of groups/others affected by change/innovation and need to help them before/after

Organization Level
O1: How to build a culture of innovation, sustain creativity
O2: Awareness that innovation leads to disruption/system change; needs to be managed/planned
O3: Inter-Organization: Vertical and Horizontal Partnerships Alliances and Networks
O4: National Systems of Innovation
O5: Sectoral Systems of Innovation
O6: International/Global Innovation
O7: Innovation Strategy
O8: Virtual Innovation Teams and Virtual Innovation Networks
O9: Innovation Planning Tools
O10: Product Development and Product Portfolios
O11: Innovation as Decision making under uncertainty
O12: Innovation as Risk Management
O13: Users as Innovators and Co Creators of Value
O14: Innovation by Observation
O15: Innovation as Entrepreneurship
O16: Public and Private Returns from Innovation|
O17: Innovation as a knowledge creating and learning tool

TABLE 2
INNOVATION RUBRIC*

Innovator Mindset and Skills		At the beginner level...	At the intermediate level...	At the advanced level…
Indiv 1	Creative Thinking Skills			
Indiv 2	Recognition of Opportunity or Disruptive Innovations			
Indiv 3	Idea Evaluation and Enhancement			
Indiv 4	Continuous Improvement Mindset			
Group 1	Collaborative/group decision making skills			
Group 2	Building coalitions and support for changes			
Group 3	Intra- and inter-group effects of innovation			
Innovation Process and Skills		**At the beginner level...**	**At the intermediate level...**	**At the advanced level…**
Org 1	Planning and managing disruption/system change			
Org 2	Decision making under uncertainty in innovation			
Org 3	Building organizational cultures that sustain innovation			
Org 4	Organization learning for sustainable innovation			
Org 5	Innovation strategy			
Org 6	Virtual innovation teams and virtual innovation networks			
Org 7	Managing risk in the innovation process			

* The cells of the rubric will be completed by an ad hoc faculty team; they will identify various levels of skills and knowledge for each area.