

# The Evolution of an Entrepreneurship Curriculum Based on Experience and Best Practices

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The entrepreneurship curriculum at the University of North Dakota is under review in order to satisfy two primary goals: 1) To maximize the probability of creating intellectual property and getting product and service innovations to market, and 2) To minimize the “brain drain” of young, educated professionals from the Northern Great Plains. The proposed evolution of the curriculum is based on practical experience with student outcomes as well as the integration of best practices shared by colleagues at national conferences. The entrepreneurship certificate program will be modified specifically to help undergraduate non-business majors prepare creative ideas for the marketplace, including:

- Concept generation & technology entrepreneurship
- Entrepreneurship & the creative process
- Guerilla marketing
- Small business valuation
- Capstone I: Development of product & service innovations
- Capstone II: Entrepreneurial business planning

This sixteen-credit course sequence includes an interdisciplinary study of design, technology, production, business, and law.

## 1. Introduction

The entrepreneurship program at the University of North Dakota has been operating since 1998. Since its inception, the program has seen minor content modifications, but no major curriculum review has taken place up to this point. In January 2005, the program added its first endowed Chair of Entrepreneurship & Innovation, Dr. Jeffrey A. Stamp, an internationally recognized leader in entrepreneurship education and creativity training. As such, the program is now under review in order to satisfy two primary goals: 1) To maximize the probability of creating intellectual property and getting product and service innovations to the marketplace, and 2) To minimize the “brain drain” of young, educated professionals from the Northern Great Plains. To this end, the curriculum will be modified to help students learn about the process of invention as defined by Maurice Kanbar<sup>6</sup>: 1) Solve a problem. 2) Prove your invention/build a prototype. 3) Protect your idea. 4) Manufacture or license? 5) Market with a twist. By learning and practicing this time-tested sequence of steps, students will not only maximize their chances of developing marketable product and service innovations, but they will also be able to start their own ventures that are capable of succeeding in the ultra-competitive global marketplace.

Whenever faculty members mentor their students in learning the processes of invention and business development, many interesting intellectual property (IP) ownership and conflict of interest issues arise. Student-generated intellectual property will be studied beyond the context of “who owns what.” Specifically, the equitable distribution of IP ownership relies on the answers to three fundamental questions<sup>8</sup>: 1) Who formulated the problem statement? 2) Who actually solved the problem? 3) Who provided the resources to accomplish the work? This applies to any partnership, even the faculty mentor/student advisee relationship. This paper describes a research instrument under development to acquire data on the expectations of IP ownership by students under a variety of idea generation and resource allocation scenarios. Additionally, a case study is presented that ponders the question of how much assistance a faculty member should contribute in helping a student-initiated venture conceived in a business planning course become a reality before a share of the profits or equity are offered to the faculty member and/or the university.

This paper is organized as follows: Section 2 describes the current state of the entrepreneurship program curriculum at the University of North Dakota. This includes the courses that are utilized in a degree program, a certificate program, and a graduate cognate/concentration in entrepreneurship. Possible modifications to the entrepreneurship certificate program are presented in Section 3, with motivation provided by experience with mentoring University of North Dakota students on opportunity assessment and business development. Best practices discussed at annual meetings of the National Collegiate Inventors & Innovators Alliance and workshops such as the Experiential Classroom at Syracuse University<sup>10</sup> will be incorporated into the curriculum. Section 4 examines the synergistic topics of student-generated intellectual property and the boundary between teaching and consulting often faced by faculty mentors who help students start their own ventures. A summary of the paper is included in Section 5, along with future directions for studying ownership and conflict of interest issues surrounding student-generated intellectual property.

## **2. Program review: Entrepreneurship curriculum at the University of North Dakota**

The undergraduate entrepreneurship program at UND was originally designed to supplement the curricula of all undergraduate majors, with sufficient content to enable students to start a new business or non-profit venture. Undergraduates are able to complete a baccalaureate degree in entrepreneurship through the UND College of Business & Public Administration, utilizing required coursework in accounting, economics, finance, management, and marketing, as well as the following required entrepreneurship courses (with basic content specified)<sup>1</sup>:

- Entr 385 Venture Initiation (business plan organization and development)
- Entr 387 Venture Growth (small business management)
- Entr 397 Entrepreneurship Internship (real-world experience in a small business)
- Entr 405 New Product Development (technology innovation)

Graduate students in the Master of Business Administration program also utilize the entrepreneurship coursework for concentrations in business planning, usually completing the two-course sequence of Entr 385 Venture Initiation and Entr 387 Venture Growth.

A sixteen-credit entrepreneurship certificate program was created at the University of North Dakota for non-business majors, through the integration of foundation coursework in economics, accounting and finance, and marketing and management, as well as the venture initiation and venture growth sequence<sup>1</sup>:

- Entr 200 Concept Generation & Technology Entrepreneurship (one-credit overview of opportunity assessment)
- Entr 201 The Entrepreneur & the Economy (overview of micro- and macroeconomics)
- Entr 301 Accounting & Financial Concepts for Entrepreneurs (comprehension and preparation of financial statements; cash flow analysis)
- Entr 302 Marketing & Management Concepts for Entrepreneurs (introduction to primary and secondary marketing research; introduction to organizational structures and principles of management)
- Entr 385 Venture Initiation (business plan organization and development)
- Entr 387 Venture Growth (small business management)

This curriculum serves as a brief introduction to the world of business, specifically targeting students majoring in all disciplines who have a novel idea for the marketplace but little if any practical business knowledge. In particular, this fast-track small business curriculum places an emphasis on starting and operating a new firm with extremely limited resources, or working as an independent consultant. Note that exposure to important legal issues (e.g., intellectual property protection and business entity formation) is not raised in the existing curriculum, and there is no process evident for creativity stimulation and opportunity assessment from both technical and market perspectives. By utilizing knowledge gained through discussions with colleagues at national conferences, some best practices can be integrated into the curriculum to help the students become more adept at opportunity assessment and business development.

### 3. Evolution of the entrepreneurship curriculum at the University of North Dakota

Over the past decade, a great deal of information has been disseminated on how to develop and run a successful university-based entrepreneurship program. Fortunately, the best programs are quite forthright on contributing to the public domain body of knowledge, describing what works and what does not. Some of the innovative elements that have been studied for integration into the University of North Dakota entrepreneurship certificate program curriculum or supported as extracurricular activities are provided as follows:

- Business Plan Competitions—MOOT CORP Competition, The University of Texas at Austin<sup>7</sup>
- Case Studies and Frameworks—Experiential Classroom, Syracuse University<sup>10</sup>
- Collaboration between Business and Engineering Schools—Olin/Babson College Partnership, Frank W. Olin College of Engineering<sup>9</sup>
- Early Stage Financing for Entrepreneurial Ventures—National Collegiate Inventors & Innovators Alliance Grant Programs
- Engineering Consulting as a Source of Entrepreneurial Projects—Engenius Solutions, Rose-Hulman Institute of Technology<sup>3</sup>
- Exposing Entrepreneurship Students to Legal Concepts—University of Tulsa<sup>2</sup>
- Integration of Technology Development and Management—University of Illinois at Urbana-Champaign<sup>5</sup>
- Social Entrepreneurship—National Collegiate Inventors & Innovators Alliance
- Video Clips from Entrepreneurship Seminars—Roundtable for Entrepreneurship Education, Stanford Technology Ventures Program, Stanford University<sup>11</sup>

The existing courses can be reinvented, so to speak, to capture the essence of these best practices, with extracurricular activities such as early stage angel investing and participation in business plan competitions serving to supplement the coursework with valuable “real-world” experience.

In this section, possible modifications to the existing curriculum will be described, along with their justifications. First, the expected learning outcomes will be listed, in order to motivate the curriculum and content changes. Recall that the two primary motivating factors include maximizing the chances of commercializing student-generated intellectual property while simultaneously minimizing the brain drain from the Northern Great Plains. Next, the entrepreneurship certificate program modifications will be specified, with respect to changes in courses and content.

### **3.1. Expected learning outcomes**

Although the entrepreneurship certificate program at UND has gained enrollment through the years, only three key learning outcomes are actually expected from the students:

- Knowledge of essential business principles (i.e., micro- and macroeconomics; accounting and finance; marketing and management)
- Knowledge of business planning for new venture initiation
- Knowledge of small business operations and strategies for growth

Now in its eighth year, the entrepreneurship program at UND has experienced two complete cycles of student projects and related activities from introductory courses to capstone business plans. A review of best practices, coursework, and student project experiences as well as faculty participation and presentation at regional and national entrepreneurship education conferences have led to the discovery of several opportunities for improvement.

Most influential to the proposed changes are program experiences with business plan presentations and idea generation activities. Students enrolled in Entr 385 Venture Initiation struggle to develop novel and useful ideas, and they often tend to overestimate the uniqueness of their concepts. In addition, students usually overestimate the potential value of intellectual property through patents, but underestimate the value of brand-related IP such as trademarks. When asking questions related to intellectual property, most students focus on “How do I patent?” rather than “Should I patent?” Beyond the direct issues raised concerning IP and concept generation, these weak links have implications related to business development models (i.e., manufacturing versus licensing), forms of ownership, financing/valuation, and exit strategies.

In response to the items addressed above, a more diverse set of desired learning outcomes has been identified:

- High degree of creativity in the product and service innovation process
- Knowledge of intellectual property protection
- Knowledge of various business entities and their advantages and disadvantages
- Knowledge of business valuation and investment decision-making
- Knowledge of raising financial capital and hiring human resources
- Ability to decide among business startup, IP licensing, or IP sales as a commercialization strategy
- Strong written and oral communication skills

- Ability to work effectively on interdisciplinary teams
- Ability to think critically

The original learning outcomes were more appropriate for learning about core business principles, not necessarily those needed to take an innovation to the marketplace in the face of ruthless competition. The concept of exploiting an opportunity with minimal resources is central to entrepreneurship education, and this distinguishes it from traditional corporate business education and training, which takes a resource allocation approach. With Dr. Jeffrey A. Stamp recently joining the College of Business & Public Administration as the new endowed Chair of Entrepreneurship and Innovation, the time was right to revisit the learning outcomes. Dr. Stamp is a renowned expert in stimulating creativity, and this will become a cornerstone of the modified program.

Another key learning outcome is having students understand the invention process, so that they do not make fundamental errors in judgment while preparing a product or service innovation for the marketplace. Borrowing from the elegant “Five Steps to Inventing a Success” by Maurice Kanbar<sup>6</sup>, the process of invention is predicated on five core principles:

1. Solve a problem.
2. Prove your invention/build a prototype.
3. Protect your idea.
4. Manufacture or license?
5. Market with a twist.

There is no question that each of these concepts must somehow be incorporated into the entrepreneurship curriculum if one of the key objectives is to increase the chances of student project commercialization.

Educated youth want careers that are creative and challenging, with competitive salaries compared to their peers in metropolitan markets<sup>4</sup>. If the second objective is to minimize the brain drain of young, educated professionals from the Northern Great Plains, then providing them with opportunities to grow their own companies around the most promising business concepts is quite reasonable. Venture initiation, coupled with local economic developers seeking established firms to expand into the Northern Great Plains to help manufacture and market these innovative products/services, can provide employment opportunities for our youth and for those who wish to relocate from more congested urban areas. All workforce personnel must be trained to think more like owners rather than employees, in order to build motivation and loyalty to the process of business development. This transformation can take place through entrepreneurship education.

### **3.2. Modified entrepreneurship certificate program curriculum and content**

In order to maximize the probability of getting product and service innovations to the marketplace and to minimize brain drain, the revamped entrepreneurship certificate program curriculum is presented as follows:

- Concept Generation & Technology Entrepreneurship (existing course, emphasizing opportunity assessment)
- Entrepreneurship & the Creative Process (new course replacing The Entrepreneur & the Economy, including creativity stimulation)
- Guerilla Marketing (modified version of Marketing & Management Concepts)

- Small Business Valuation (modified version of Accounting & Financial Concepts, including legal aspects of business formation)
- Capstone I: Development of Product & Service Innovations (new course replacing Venture Growth, including intellectual property protection)
- Capstone II: Entrepreneurial Business Planning (modified version of Venture Initiation, including fund-raising and comparisons among business startup, IP licensing, and IP sales)

The two-semester capstone sequence is designed to first refine business concepts from both technical and marketing perspectives, and then craft and pitch a corresponding business plan.

The modified course structure was developed through practical experience with the original curriculum for approximately eight years, as well as feedback from stakeholders on program needs. These stakeholders include students, faculty, the campus business incubator director and staff members, and regional industry professionals. In redesigning the curriculum, the competing requirements of minimizing the number of credit hours while incorporating all of the new learning outcomes into the course sequence were taken into consideration.

Within this six-course certificate program, students have the chance to assess their business opportunities critically from both marketing and technical feasibility viewpoints. Note that all of the key elements of the Five Steps are contained within the curriculum—solving an important problem (creativity and opportunity assessment), proving your invention/building a prototype (development of product and service innovations), protecting your idea (intellectual property protection), making a decision between manufacturing and licensing the innovation (comparisons among business startup, IP licensing, and IP sales), and marketing with a twist (guerrilla marketing). Of course, there is no guarantee that any of the concepts that are filtered through this course sequence will actually be commercialized. Education in the process of how to evaluate an opportunity and then build a business around the concept should increase the chances for success dramatically.

From the testimonials of various entrepreneurship directors, getting science and engineering students excited about developing business opportunities is paramount to university entrepreneurship program success. Science and engineering are where high-value technical concepts are often conceived and reduced to practice, and these are a critical resource needed by the entrepreneurship program. Typically, science and engineering students work on research, development, and design projects that may have significant commercialization potential. However, they also face relatively inflexible schedules each semester that only allow for at most one or two elective courses. To bring their technical ideas into the entrepreneurship curriculum, a three-course “mini-minor” in entrepreneurship is under consideration for science and engineering students (specifically for seniors working on undergraduate research or a capstone design project, or M.S./Ph.D. students working on research for a thesis or independent study):

- Guerilla Marketing
- Small Business Valuation
- Capstone II: Entrepreneurial Business Planning

The science and engineering students are not required to take Development of Product & Service Innovations, since they are already developing their own technical concepts through other coursework and research activities.

#### 4. Intellectual property ownership of university projects

Business development opportunities emanate from a wide range of sources, especially if creativity is fostered among students studying a diverse set of disciplines. Interdisciplinary projects that study problems at the interface of several fields can be the most fertile ground for ground-breaking research and business opportunities. Some of the highest-value ideas on a college campus come from the science and engineering disciplines, especially today in the areas of biotechnology, nanotechnology, and information technology. This requires that the entrepreneurship program be highly visible within the colleges of science and engineering. At the graduate level, virtually every major discipline requires some form of graduate research project, independent study, thesis, or group project that may result in student-generated intellectual property. At the undergraduate level, a number of required capstone design and entrepreneurial business planning courses are taught to senior-level students that also have the potential to create new business opportunities.

If the instructor of a graduate or undergraduate project-based learning course has a true understanding of the discipline focus, as well as an eye for related business opportunities, then that person can help make the connections across campus with the entrepreneurship program. Project and team selection typically take place at the beginning of each semester, and collaborative opportunity assessment at this early stage can result in student projects with true commercialization potential.

In this section, issues related to the ownership of intellectual property generated by students with faculty advisement are considered. Specifically, a research instrument is described that will be utilized to determine student and faculty perceptions surrounding joint IP ownership. Additionally, the boundary between faculty mentor and consultant will be examined in the context of helping student-initiated concepts get to the marketplace.

##### 4.1. Student-generated intellectual property

The authors are developing a survey to gain a better understanding of student-generated intellectual property expectations and how to best manage the interaction of students, faculty, and the private sector related to product/service commercialization. While the concepts of ownership, recognition, and reward are central to any discussion on intellectual property, they do not tell the whole story. Dr. Steven Nichols, associate vice president for research at the University of Texas at Austin, is a leader in the areas of intellectual property and conflict of interest as they relate to university research activities. According to Dr. Nichols, three fundamental questions must be answered to equitably determine ownership within a student-faculty mentor-private sector partnership<sup>8</sup>:

1. Who formulated the problem statement?
2. Who actually solved the problem?
3. Who provided the resources to accomplish the work?

As part of a larger study addressing these questions, the authors of this paper have started developing a research instrument to help learn more about what students believe they own in a variety of partnering relationships under different idea generation and resource utilization scenarios.

The research instrument development process began with a literature review and an in-depth interview with industry leader Steven Nichols. Using this background information as a guidepost, the authors began enumerating and organizing the many partnering relationship combinations that might be encountered in a university commercializa-

tion environment. The Nichols interview helped set the framework and focus for the survey, leading the authors to pursue respondent attitudes and beliefs about IP ownership as it relates to “who identified the problem, who solved the problem, and what resources were used.”

The data collection process is divided into several components, which began with a non-probability convenience sample. Students in an entrepreneurship course took the survey to test-run the instrument. Some preliminary results emerged from this activity, but the main purpose was to gather feedback on content and survey flow. Several modifications will be made to the instrument as a result of this test run, and a more extensive public institution pilot study will be conducted throughout the eleven-campus North Dakota University System. Preliminary results and feedback from the pilot study will be used to modify and improve the survey as well as further clarify the research questions. Final steps will include a probability sampling technique to a national audience, with reports on the results submitted for publication in peer-reviewed journals.

The analysis of data gathered from small-scale surveys of students enrolled in select university classes taught by the authors has shown three interesting, although not entirely unexpected results:

1. A majority of students believe they should own the work that they do, even if they did not define a particular problem statement and used the resources of others to accomplish their tasks.
2. Students felt less ownership if they were paid to define or solve a problem, even though no level of salary was defined.
3. Students placed very little value on faculty input and refinement support in the context of concept development and venture initiation, believing that the faculty were simply “doing their jobs,” no matter what level of support or expertise was provided.

The intellectual property questions raised previously carry important implications for faculty, individual students and student teams, and universities at large. The authors believe that the crux of the issue does not simply lie in “who owns what,” but in how all the parties involved can agree on the fair disbursement and management of joint ownership. The research instrument must be refined and then approved for use by the local institutional review board before anything more than anecdotal evidence and interpretation of the results can be reported. This leads to another interesting issue surrounding the role of a faculty member in student-initiated business development, particularly for the most promising concepts that result from classroom and extracurricular projects.

#### **4.2. Where is the boundary between teaching and consulting?**

Most entrepreneurship programs include a venture initiation/business planning course where students are challenged to conceive and develop a novel business concept for potential execution. As part of the teaching process, most faculty members help students first refine and improve their business concepts, and then properly prepare and present these concepts in the form of a business plan. Through experience with the venture initiation classroom environment, several important issues regarding the dividing line between professor/mentor and paid consultant have arisen as faculty work to help students commercialize their ideas. The anonymous case study presented here is an actual experience stemming from a venture initiation class, and it has been taught in several courses to help students understand the roles of all partners affiliated with a particular project.

As part of a venture initiation class, a student created a concept for the delivery of a niche/specialty service to an open market space. While the service itself was not novel, the student and faculty member both believed its market placement and growth strategy were novel and contained significant harvest potential. In this case, the faculty member teaching the venture initiation class happens to have significant private sector business experience in helping startup businesses develop branding materials (i.e., company name, logo, creative platform, marketing plans with media buying schedules, etc.). The student, knowing the background of the faculty member, asked for support in developing critical branding materials for the classroom-generated concept. The regional fair market value of the brand development services ranges from \$5,000 to \$10,000. Wanting to help the student find success and having knowledge of the student's limited financial resources, the faculty member agreed to help refine the business name and brand, effectively developing the logo, public signage, and tagline/positioning statement. These items constitute the bulk of a branding package and are critically important for this niche business, since the service itself is not novel. In this particular case, the company's value is almost entirely dependent on the marketing of the brand and its trademark protection. The faculty-developed branding package was implemented and opened to strong reviews as the venture began. While many factors will ultimately play a role in the future success of this venture, the branding materials created by the faculty member in this case will definitely play a significant role in the harvest value of the business.

This case study raises several important questions regarding the faculty/student advising relationship. Where is the dividing line between professor/mentor and consultant? If faculty support moves outside the scope of teaching/mentoring, how should it be administered (e.g., as a consulting fee in the short-term or as equity over the long-term)? What responsibility does the faculty member and/or university have in providing support to the students, and how can they be effectively managed and applied in widely varying circumstances? Although there are no unique answers to these questions, the authors believe a reasonable solution lies in the fundamental framework questions concerning who identified the problem or opportunity, who solved the problem or figured out how to exploit the opportunity, and what resources were utilized. One key aspect of managing university- and student-driven IP effectively and fairly involves an open discussion about potential conflicts of interest and commitment that also come into play in these types of situations. The authors also believe that the faculty member and the university should share in the profits and harvest of a successful student-initiated venture when it was created with university resources, which include a substantial portion of the faculty member's time, expertise, and professional network.

## 5. Conclusion

The entrepreneurship program at the University of North Dakota is growing stronger in reputation and enrollment each year. The existing curriculum is dominated by foundation classes in economics, accounting and finance, marketing and management, and business planning. Although effective for educating non-business majors in the principles of entrepreneurship, the program curriculum could use fine-tuning to satisfy the primary goals of maximizing the probability of getting new product and service innovations to the marketplace while simultaneously minimizing the brain drain from the Northern Great Plains. Through the injection of a creative process, opportunity assessment, and intellectual property protection into the entrepreneurship certificate program, as well as encouraging students to religiously practice the process of invention, these goals can be achieved.

The initiation of the student-generated intellectual property research project was made possible with financial support from the North Dakota Small Business Development Center (SBDC) and the UND College of Business & Public Administration. Significant further development will take place on the research instrument, as student-gener-

ated IP is a fruitful area for discovery. As part of its mission to serve small business, SBDC is looking for results from this survey to lead to the development of a practitioner's manual on how private developers and small businesses might best interact with the university system, students, and faculty to collaborate on the commercialization of new product and service concepts and effectively manage intellectual property. Upon approval by the institutional research board, the student-generated IP survey will be pilot tested within the state of North Dakota. After any required modifications have been implemented, the survey will be administered on a national scale.

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