

Teaching Scientists Entrepreneurship: A Dialectical Approach

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ABSTRACT

Today, we know relatively well about what should be taught in the entrepreneurship program for non-business majors. However, our understanding of *how* should the non-business students be taught is still limited. To address this issue, we study the entrepreneurship curriculum developed for the Nontraditional Doctor of Pharmacy (NTPD) students in the University of Maryland Baltimore. In principle, the core of this entrepreneurship curriculum resembles a typical business school entrepreneurship course with an emphasis on developing a business or a project plan at the end of a two-semester long, six-credit course sequence. This entrepreneurship curriculum for PharmD has a successful track record. From 1995 to 2003; 35% to 40 % of the business plans developed by the NTPD students have been successfully funded. Although the program is structured in a similar manner as many other short-term entrepreneurship curriculum in non-business programs, its implementation and dialectic approach create a dynamic learning environment that has effectively assisted non-business major graduate students to engage in business venturing activities. The infusion of dialectical inquiry at the NTPD program enables students of pharmaceutical science to exploit their professional expertise while developing competence in business planning. In this research, we reported the design of NTPD entrepreneurship curriculum and the training of business planning. Given the lack of foundation business knowledge and course time limitation in NTPD (and other hybrid programs), we posit that the effective implementation of dialectical inquiry will help students improve the quality of new venture planning.

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INTRODUCTION

The growing interest and media attention on private enterprise and the ownership society have created a new demand for entrepreneurship training for non-business majors. Since 1990s, many American universities have developed entrepreneurship curriculums for students and researchers from non-business disciplinary backgrounds (Katz, 2003).

The increasing demand for such curriculums from the broader university community often shows up in the form of short courses or modules (Gartner and Vesper, 1994). The hybrid programs developed for scientists and engineers present a new challenge because of the embedded differences between academic science and entrepreneurship education. The academic training of scientists and engineers emphasizes the importance of identifying and explaining the “variances” of nature (Mohr, 1982). Although variance-theorizing play an important role in the theory development of management and entrepreneurship research (Chiles, 2003), the training of entrepreneurial management focuses on the process of new organization creation, which requires understanding of potential customer groups and skills to manage a business start-up. In addition, the non-business major students lack the fundamental knowledge of business management. While this gap of knowledge needs to be addressed within a reasonably short period, sufficient time needs to be allowed for students to apply the knowledge gained to carry out business planning. Although there is general consensus of what should be taught in the non-business majors, there is limited understanding of *how* these student should be taught.

To address this issue, we study a successful entrepreneurship curriculum developed for the Non-Traditional Doctor of Pharmacy (NTPD) Program at the University of Maryland School of Pharmacy in Baltimore. NTPD students acquire the fundamental knowledge of the four key functional areas in running a business, marketing, operations, finance, and organizational behavior in the first half of the two-semester sequence. Building upon the functional knowledge, students are required to write a plan to develop a pharmaceutical care service program in the second half of the two-semester sequence. The functional courses were taught by business faculty while the business planning courses were co-taught by a business professor and a pharmacy professor.

In conclusion, this study identified two implications for administrators and educators of entrepreneurship curriculums for non-business majors. First, dialectical inquiry challenges students to validate the underlining assumptions of their business plans and improve the quality of business planning. Second, the NTPD students are mostly interested in creating businesses in the pharmaceutical care industry. The highly homogeneous professional background and a well-defined market segment may have allowed the students to thoroughly understand the dynamics of market.

TEACHING ENTREPRENEURSHIP

The focus of entrepreneurship education is to help students recognize business opportunities and act on these opportunities (Jones and English, 2004). Although small

business management or self-employment management have long been important research subjects in the social science research (Davis, 1968), entrepreneurship as an academic area of training was not widely adopted by American business schools until late 1980s. As successful new ventures are effective integration of an entrepreneur's internal environment (e.g. knowledge or psychological traits) and external environment (e.g. life-cycle of industry, technological trajectory) (Sarasvathy, 2004), it is not surprising that many academic instructors design entrepreneurship courses or curriculums to facilitate the effectiveness of internal-external environment integration. A survey by Hills (1988) reports four objectives of these entrepreneurship curriculums in U.S. business schools:

1. increase awareness and understanding of new venture process,
2. introduce entrepreneurship as an option of career,
3. understand functional business relationships, and
4. recognize or understand traits and characteristics of entrepreneurs.

To accomplish these objectives, a prevailing practice is to design the entrepreneurship course as a discovery process in which students are encouraged to identify a viable business opportunity and to pursue this opportunity through coached business plan writing (Fiet, 2001).

As entrepreneurship becomes a mature discipline in the business schools (Katz, 2003), the rest of the academes start to systematically explore the potential impacts of entrepreneurship on non-business areas. Many entrepreneurship programs were established in the 1980s to encourage scientists and engineers to exploit laboratory discoveries for business potential or to create new platforms of research. However, university scientists and engineers do not see commercialization of business opportunities as the only reason to engage in entrepreneurship. For example, a survey of academic life scientists shows five types of entrepreneurial activities in universities: 1. creating large scale scientific projects, 2. earning supplementary income, 3. gaining industry support for university research, 4. obtaining patents, 5. commercialization of new discoveries (Louis, Blumenthal, Gluck, and Stoto, 1989). The differences of interests between business and non-business academics illustrate the inter-disciplinary distinctions embedded in the social institutional environments. While business school academics and students have interested primarily in exploring entrepreneurial opportunities in the market place, academic scientists and engineers pursue entrepreneurship in both market and institutional settings.

Academic entrepreneurship traditions based in science and engineering, create obstacles for commercialization of its technology. First, university-based scientists and engineers appear to be more comfortable exchanging ideas and concepts with colleagues rather than venturing forth into the private sector. Although there have been administrative measures to encourage university-industry technology transfer in the last decade, the results have been disappointing (Markman, Gianiodis, Phan, and Balkin, 2004). Second, even for those interested in pursuing commercialization, their lack of knowledge in business operations and interaction between market and for-profit organizations has proved to be a behemoth challenge (Markman, Phan, Balkin, and Gianiodis, 2005).

As the number of universities interested in commercialization of research grows, hybrid entrepreneurship programs are created and housed in school of engineering or school of science. Such organizational arrangement aims to mitigate students' uncertainty about new venture initiation in the market place. These programs also bring entrepreneurship skills and knowledge to academic scientists and engineers who are inspired to pursue opportunities in the market place.

ENTREPRENEURSHIP TRAINING IN NTPD

The objective of the Non-Traditional PharmD program is to provide licensed pharmacists, who have a Bachelor of Science in Pharmacy degree, the opportunity to earn the Doctor of Pharmacy degree. The objective of the entrepreneurship module in the doctoral program is to give knowledge and appropriate skills to the students that are both useful and "actionable" (Argyris, 1993). In principle, the core of this entrepreneurship curriculum resembles a typical business school entrepreneurship course with an emphasis on developing a business or a project plan at the end of a two-semester long, six-credit course sequence. This entrepreneurship curriculum for PharmD has a successful track record. From 1995 to 2003; 30% to 40 % of the business plans developed by the NTPD students have been successfully funded.

The structure of the curriculum

Although the program is structured in a similar manner as many other short-term entrepreneurship curriculum in business and non-business programs (See Meyer, 2001 for a brief review of current state of entrepreneurship education), its implementation and dialectic approach create a dynamic learning environment that has effectively assisted non-business major graduate students to engage in business venturing activities.

The dialectic approach, or dialectical inquiry, has long been an important element in strategic planning (Mason, 1969). In the early stage of strategic planning, managers exchange opinions and raise constructive challenging perspectives to reach consensus.

The Non-Traditional Pharm.D. program recognized early the need and importance of a management track in an otherwise technical doctorate. Argyris (1993) promotes actionable knowledge; knowledge that individuals can use in which a commitment to personal responsibility and a dedication to effective action and learning are paramount. The intent in the program was to give knowledge to the students that were both useful and "actionable". The management pathway included four key functional areas of business: marketing, operations, finance, and organizational behavior.

The Two Course Sequence

The management pathway was designed as a two-course sequence with an objective of providing students with the business language and tools. Both courses were 16 weeks in duration.

First Course

This course, labeled PHNT 511, provided a business foundation which includes marketing, finance, operations, and organizational behavior with each of the four subject areas lasting for a total of 12 hours taught over a three-hour session over 4 weeks.

The teaching challenge was obvious - in a typical business school, undergraduate students spend up to four years learning about each of these subjects; we were providing the basics in 12 hours, systematically examining key issues in the four functional management areas.

Each module was taught by an instructor who was usually not a pharmacist but had a health care background – consulting service, professional service provider, operations professor in a business school. One of the key qualifications for the instructor was their considerable experience in business or academia. The second qualification, perhaps even more important than the experience, was instructors' ability to convey concisely and succinctly the most important ideas and concepts in each functional area; precision and brevity were critical.

In each of the four modules, students had opportunities to test ideas about a pharmaceutical care project such as: health care service feasibility, new service / product development and implementation related business plan, chronic disease education service, and medications compounding service for children and elderly.

For example, in the marketing module the students could create a brief marketing plan and get feedback from the instructor; in the operations module, many students designed a "business-process" related to their pharmacy practice site suggesting ideas for improvement.

The module grades ranged from "A" to "C". The required written work was typically submitted by the students at the end of each module; and instructor's comments along with an appropriate grade were returned to the students within a week. Feedback was exhaustive, rapid and frequent. Students were also asked to report on an occasional Fast Feedback in the middle of the modules; this feedback was used by instructors to make mid-module corrections. At the end of each module students were also asked for their "lessons learned."

Second Course

The second course was designed to give the Non-Traditional Pharm.D. students a hands-on experience in the development of a business plan with an eye toward its implementation possibilities. These submissions were comprehensive and included all relevant sections of a typical business plan. In contrast, submissions in the First Course were focused primarily on each functional area.

The students were required to develop business plans that were "practical" with lots of real data and hard evidence supporting their plans – we continually asked, "how do you

know' question that had to be satisfied with both primary and secondary data and literature search.

Thus the planning process afforded students opportunity to develop a well documented paper mimicking a business plan or a feasibility study that explored relationships between the business aspects of the plan and the pharmaceutical care outcomes for the target patients.

Dialectical inquiry

In NTPD, the dialectic approach is used to assist students in their Second Course that helps the students develop new ventures. The dialectical inquiries help students apply the functional business knowledge to the pharmaceutical care context; well implemented dialectical interactions help students see the potential results of each event and each intended action.

This second 16-week long course created a forum for "structured debate" in which students are forced to consider alternative interpretation of their assumptions. The course meets five times during the semester. The course meets weekly during the first two weeks. The third session of the course takes place four to five weeks after the second session and six to seven weeks into the semester. The fourth session is generally scheduled for the 10th or the 11th week. The final session takes place during the 16th week when students submit their final plans. The spacing of the meeting classes is intended to allow students prepare and submit work-in-progress to the instructors.

The students are required to submit completed sections of their plans as the semester progresses. Each submission is returned promptly to the students with extensive comments for rewriting and regrouping the information submitted in the reports. Most of the exchanges take place face-to-face during the five scheduled sessions or via fax or e-mail.

In this milieu, these not-so-frequent sessions serve two purposes: first, the ample time between sessions allows students to gather material, rewrite sections and allow time to revise and resubmit sections. And second, the face-to-face sessions allow the students to discuss challenges facing them – the questions comprise a simple “how do I prepare a budget” to a much more nuanced question about identifying a subtle opportunity targeted toward a particular ethnic segment of the population.

Students were repeatedly asked to revise and resubmit their draft plans. The most important question that drove the discussion was: How do you know?

For example, in developing a marketing module we asked the students how did they know there was a ‘market’! The question got to the heart of two critical data: first it forced the students to remove all unnecessary clutter surrounding their research (they had to focus on the task at hand); and two, it forced them to link business assumptions (how do you know you have a market? How do you know somebody will pay for the service? How do you know how much demand there is?). Furthermore, in marketing sections, the

students, first, had to demonstrate, using appropriate published literature, that there was a need. Having established the need they had to collect data – either directly via meetings and surveys in the target community with their target market segments or from precisely collected secondary data published in public records and private papers.

This relentless questioning comprises the principal activity during face-to-face and email communications. The business school professor provided the framework that included questions about projects' business models as well as necessary detail establishing a market, development and writing of management experience to carry-out the project, details including site selection and business processes governing the operations of the plan and needed financial analysis and pro forma statements. The pharmacy school professor provided the necessary pharmaceutical care knowledge - it didn't hurt at all that the pharmacy school professor had operated a pharmacy himself when young and continues to run, as the founder-executive director a very successful service organization providing direct pharmaceutical care.

Often there are students who have already passed this 'stage' of their research and writing and quite willing to help their peers - the class as a whole acts as a large "consulting" practice; the conversations are quite animated, providing tidbits of advice and suggestions for improving each other's paper. It's a delight to see 'ahas' emerging from these conversations as the give-and-take during the class builds confidence in those students who may be having a problem getting started with their plans or those who may be encountering writer's block.

This practice of continual sharing of experiences and question-driven participation produces uniformly superior written reports. They are well written and reality-based having ample justification for the markets being pursued along with appropriate financial and managerial information. Since the reports are developed by practicing pharmacists there is a lot of realism and plain language that avoids jargon. These reports invariably show that they have the necessary management experience and the expertise to carry out the proposed project. Finally, these reports are written with a passion suggesting superb confidence in one's expected results if the plans were to be implemented. Time and again we hear that these plans have been accepted by their "superiors" or that the request for money has been granted by the funding agencies.

DISCUSSION

The recent boom of hybrid entrepreneurship programs in American universities reflects a strong drive to encourage scientists and engineers to take an active role in identifying and pursuing potential business opportunities. While the functional knowledge such as accounting, marketing, and operations management remains an essential foundation of knowledge for future entrepreneurs, our observation finds that training of business planning may play a significant role in improving the quality of opportunity identification and resource mobilization.

Dialectical inquiry planning approach improves the quality of business planning (Mason, 1969) and increase the satisfaction of planning process (Schweiger, Sandberg, and Ragan, 1986). The dialectical inquiry process provides a forum of structured debates (Mason, 1969). The implementation of dialectical inquiry in NTPD indicates that such structured debate facilitate the students' understanding and appreciation of new venture planning through three mechanisms.

First, the dialogue between the instructor and the students enables students to validate the assumptions. The instructors of the entrepreneurship course may not be the experts of the specific venturing contexts proposed by the students. However, as non-experts in pharmaceutical science, the business instructors are able to provide alternative interpretation of any assumptions adopted in the business plan. To address these questions, students may have to either validate the existing interpretation of assumptions or to re-evaluate the validity of the alternative perspectives. Although not all business plans demonstrate apparent improvement of quality, students reported to have gained better understanding of assumption validation and new venture planning.

Second, entrepreneurship courses only accounts for a small percentage of overall curriculum requirement in non-business programs. For example, the NTPD entrepreneurship curriculum consists of two courses in a 16 course degree program. Although it is feasible to cram functional knowledge and the training of planning in one semester or shorter, such course design does not allow students sufficient time to reflect to engage in productive debate with the instructors. We found that the one year course sequence seems to be sufficient to NTPD students. However, more analyses will be necessary to determine the impact of lag time and the learning effectiveness.

Finally, hybrid entrepreneurship programs tend to be restricted to specific contexts (Katz, 2003). The narrowly defined context of business venturing is designed to fit the professional specialty of students. In addition to the NTPD program, notable examples include the Entrepreneurship for Artists in Maryland Institute College of Arts; Entrepreneurship for Physicists at Case Western Reserve University. We found such curriculum design effectively engages students to the dialectical debates. Since the students have expert knowledge in the technology and delivery of products/services, the debates tend to be more focused on the creation of business organization and the validity of underlying assumptions.

CONCLUSION

As public interests in entrepreneurship increases, the number of hybrid entrepreneurship program in American universities has been on the rise. The spill-over of entrepreneurship education from business schools to other academic disciplines presents a new challenge to educators. The infusion of dialectical inquiry at the NTPD program enables students of pharmaceutical science to exploit their professional expertise while developing competence in business planning. In this research, we reported the design of NTPD entrepreneurship curriculum and the training of business planning. Given the lack of foundation business knowledge and course time limitation in NTPD (and other hybrid

programs), we posit that the effective implementation of dialectical inquiry will help students improve the quality of new venture planning.

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