AC 2012-3938: DEVELOPING AN ENTREPRENEURIAL CONSULTING PRACTICUM WITH A LARGE, ESTABLISHED COMPANY AT THE UNIVERSITY OF MARYLAND

Dr. James V. Green, University of Maryland, College Park

James V. Green leads the education activities of Mtech at the University of Maryland as the Director of Entrepreneurship Education with responsibilities for the Hinman CEOs Program, the Hillman Entrepreneurs Program, and the Entrepreneurship and Innovation Program. As a Senior Lecturer and Associate Director with Mtech, Green designs and teaches undergraduate and graduate courses in entrepreneurship and technology commercialization. He leads Mtech’s international entrepreneurship education initiatives to include establishing and managing partnerships in Abu Dhabi, UAE. Green’s research interests include entrepreneurship education and the psychology of entrepreneurship. Prior to Mtech, he provided business development and product management to WaveCrest Laboratories (acquired by Magna International, NYSE: MGA), an innovative start-up in next-generation electric and hybrid-electric propulsion and drive systems. At Cyveillance (acquired by QinetiQ, LSE: QQ.L), he served in operations, client service, and product development roles for this software start-up and world leader in cyber intelligence and intelligence-led security. While at Booz Allen Hamilton, he provided technical and programmatic direction to the DARPA Special Projects Office (SPO), Army Research Lab (ARL), Defense Technical Information Center (DTIC), Information Assurance Technology Analysis Center (IATAC), and other DoD clients. Green earned a doctorate of management and a M.S. in technology management from the University of Maryland University College, an M.B.A. from the University of Michigan, and a B.S. in industrial engineering from the Georgia Institute of Technology.

©American Society for Engineering Education, 2012
Developing an entrepreneurial consulting practicum with a large, established company at the University of Maryland

Abstract

Launched in 2009, the Entrepreneurial Consulting Practicum at the University of Maryland provides select undergraduate students the opportunity to engage in short-term consulting engagements with a large corporate partner in the region. The program is managed by Hinman CEOs, a program of the Maryland Technology Enterprise Institute (Mtech) in the A. James Clark School of Engineering. The scope of projects addresses engineering and science challenges.

At the start of each semester, the corporate client proposes approximately six eight-week long consulting projects that students may apply to join. Projects are focused on entrepreneurial topics, to include market assessments, competitive analyses, industry forecasts, and related entrepreneurial topics. Each project team of three to four students is assigned a corporate mentor.

For a period of eight weeks, students are expected to work no less than 8 hours per week, hold at least one weekly team meeting to discuss progress, and send minutes of these weekly meetings to their corporate mentor and the University. At the end of the term, each team presents their final report and submits a detailed written report on their assigned project to the corporate client and the University.

Each student is supported with a $1,000 assistantship funded by the corporate client and payable upon successful project completion and positive peer evaluation feedback. With $20,000 dedicated annually to student assistantships plus $5,000 allocated for University project management, 20 students may be supported each year.

Based on 16 projects completed to date, Mtech has developed a proven model that places entrepreneurial students with a large corporate partner not traditionally defined as entrepreneurial. With five semesters of projects completed to date, student feedback is strong, with a number of students reapplying to join subsequent projects. Corporate mentor feedback is positive, citing that the deliverables are above expectations and valuable to the company. This model is replicable for universities seeking to connect students with large companies to pursue entrepreneurial opportunities.

Introduction

In the increasingly global and complex business environment, it is critical that college graduates possess the capability and competency to be effective and efficient in the workplace. How to best prepare graduates becomes more challenging for educators, particularly as it relates to students interested in one day starting their own business ventures. To achieve this, education must extend beyond the classroom to industries through meaningful interaction with businesses facing challenging problems and significant opportunities. This interaction between students and businesses will guide the development of relevant educational programs that emphasize the skills and competencies required in today’s competitive market, in addition to the subject specific knowledge acquisition traditionally fostered by educators (Hynes, Costin, & Birdthistle, 2011).
Skills that can be developed through such interactions may include self-management, teamwork, customer awareness, and communication skills. EGFSN (2007) and Forfas (2009) further emphasized the need for graduates to have skills in innovation and creativity for generating and evaluating problem solving ideas, information processing, critical thinking, and decision making. Resourcefulness for problem solving, operating with uncertainty, and managing customer and external relationships are central skills for graduates to succeed professionally (Hynes, Costin, & Birdthistle, 2011).

To produce graduates of all majors, not just business majors, who are flexible and competent in meeting the dynamic needs of industry and markets, educators need outward focused programming. Practice-based learning is a valuable means of creating the environment for skills attainment while engaging students in real business situations. Beyond the traditional summer internships that typically require students to invest an entire summer to one project of one company, broader experience with more companies and/or projects is valuable and increasingly necessary for students to develop critical skills. These experiences can be stimulated in the educational institution through active collaboration and involvement with industry. In this way, learning comes from engaging in that world where the inquiry of the uncertain situation and the application of thinking and reflection provide the necessary conditions for knowledge and skills attainment (Gherardi, 1999; Brown and Duguid, 2001; Chiva & Alegre, 2005).

Launched in 2009, the Entrepreneurial Consulting Practicum is a proven approach to providing undergraduate students the opportunity to engage in short-term consulting engagements with a large corporate partner in the region to develop their management and entrepreneurial skills. Based on 16 projects completed to date, this practicum places entrepreneurial students with a corporate partner not traditionally defined as entrepreneurial. With five semesters of projects completed to date, student feedback is strong, with a number of students reapplying to join subsequent projects. Corporate mentor feedback is positive, citing that the deliverables are above expectations and valuable to the company. The practicum is managed by Hinman CEOs, a program of the Maryland Technology Enterprise Institute (Mtech) in the A. James Clark School of Engineering. This model is replicable for universities seeking to connect students with large companies to pursue entrepreneurial opportunities.

**Literature Review**

Practice-based learning bridges theory and practice to enhance self-knowledge and expertise in practice (Flanagan, 2000). Formal knowledge is applied to investigation and problem solving of real-world issues experienced within practice. According to Revans (1982) practice-based learning extends beyond problem solving to acquiring new knowledge and developing problem-solving and implementation skills. This can be achieved through engaging students in complex projects within a workplace setting.

It is important to distinguish this practice-based learning as not just “fieldwork” or out of the classroom activities. It extends to a deeper cognitive learning in which learning is experiential, reflective and reflexive (Duch et al., 2001; Tenenbaum et al., 2001; Hytti and O’Gorman, 2004; Brennan, 2005). As discussed by Hynes, Costin, and Birdthistle (2011), experiential learning
positions reflection within a social context, and integrates reflection and action, as a process whereby a group of students support one another in their own and their peer’s reflection and learning (Ramsey, 2005; Higgins, 2008). Active forms of learning encourage thinking and working more creatively to develop innovative problem-solving strategies for uncertain situations they may encounter in the workplace (Hynes, Costin, and Birdthistle, 2011; Tenenbaum et al., 2001; Huggins et al., 2008). This is particularly valuable in the entrepreneurial environment.


With an orientation towards entrepreneurial learning, based on the programs and students served by the Hinman CEOs Program, the contextual learning model as discussed by Rae (2007) is a central approach. In contextual learning, the primary factors are acquired skills and knowledge and business experience. Learning takes place through immersion in the world of work, as indicated by Cooper (1973). According to Wood and Bandura (1989), vicarious experience involves learning from role models through people judging performance, capabilities, and skills. Boyd and Vozikis (1994) emphasize the importance of role models, with a level of contact with role models making a positive impact on entrepreneurial intentions.

**Model**

As an overview, the Entrepreneurial Consulting Practicum places selected teams of students with a corporate partner for eight-week consulting projects. Students apply to be a part of this extracurricular program that is neither a course nor a certificate, but a paid work experience monitored by the director of the Hinman CEOs Program as part of their normal duties.

Projects are focused on entrepreneurial topics, to include market assessments, competitive analyses, industry forecasts, and related entrepreneurial topics. Each project team of three to four students are assigned a corporate mentor. Students are expected to work no less than eight hours per week, hold at least one weekly team meeting to discuss progress, and send minutes of these weekly meetings to their corporate mentor and the Hinman CEOs Program. At the end of the term, each team presents their final report and submits a detailed written report on their assigned project to the corporate partner and the University. Each student is supported with a $1,000 assistantship funded by the corporate partner and payable upon successful project completion and positive peer evaluation feedback.

To elaborate on the rationale, implementation, and management of this model, key topics discussed herein are practicum objectives and learning outcomes, student profiles and team formations, client selection, project selection, project schedule, and course requirements.
Practicum objectives and learning outcomes

The primary aim of the practicum is provide students of this entrepreneurship program with a hands-on experience to collaboratively work with real, significant business and technology problems. Target skills to develop in this experience are self-management, teamwork, customer awareness, and communication skills (EGFSN, 2007; Forfas 2009); as well as resourcefulness for problem solving, operating with uncertainty, and managing customer relationships (Hynes, Costin, & Birdthistle, 2011). The team nature of the project also presents the opportunities for students to develop their skills in team project management skills, negotiation, conflict management, and listening.

An operational objective of the practicum is to meet the aforementioned learning objectives while minimizing the resource requirements of faculty and staff of the university, as funding is not provided to significantly support the management of the effort. Other universities operating student consulting program have commented that “Faculty spend approximately 20 hours with each team each semester (e.g., in weekly meetings that last one to two hours), plus extensive time with technical and writing assistance, not including project procurement and client time.” This time commitment of faculty is not possible given the resources available on campus. This practicum needs to be largely owned by the students, and the procedures for the ongoing operations of the projects need to require minimal levels of effort from faculty and staff. While faculty and staff orient themselves with the client, problem, and solution approach, students own the projects and are responsible for its successful completion. The lack of successful completion, as judged by the sponsoring company and faculty, results in students not being paid in full for the project and/or spending additional time beyond the original schedule to complete projects.

Student profiles and team formations

The practicum is structured like a consultancy. The student teams act as the analysts. The faculty and staff are the senior partners who act as advisors. The client is the sponsoring company; with one to two mentors from the company assigned to each project. Student teams own the problem, the project, and the deliverables for the client.

Student teams are sourced exclusively from the University of Maryland’s Hinman CEOs Program. Hinman CEOs is the nation’s first living-learning entrepreneurship program, placing approximately 90 entrepreneurially-minded junior and senior students from all disciplines into a unique community in which students live together, learn about entrepreneurship, and launch new ventures. In the 2011 class, the major distribution is 48 percent engineering, 38 percent business, and 14% arts, humanities, and sciences. The Program’s incubator environment and resources, on-site business coaching services, academic courses, and seed funding provide a rich environment for developing the entrepreneurial mindset and functional skillsets in entrepreneurship. The mission of the Hinman CEOs Program is to foster an entrepreneurial spirit, create a sense of community and cooperation, and develop ethical leaders.

The faculty and staff advisors interact with the client to secure funding for the projects, scope projects, communicate the project opportunities to students, staff projects, confirm deliverables, and make payment to the students upon project completion. Beyond these roles, faculty and staff
involvement is limited to quality control and assuring a successful project outcome, while allowing as much independence as the student teams can manage. In cases where teams struggle with client communications, analytical approaches, or other problem areas, the faculty and staff work to nudge the team in the right direction as opposed to solving problems for the students.

On the client side, there is a high-ranking project sponsor to commit funding for the projects, maintain a high level of visibility, and navigate organizational barriers as needed. Each project team includes one to two mentors from the company who write the statement of work for the project and serve as the primary point of contact throughout the project on data requirements, scheduling meetings, and project coordination. Clients are asked to be demanding of the student teams in the mold of hired consultants, but still collaborate with them as they would with a new employee.

For the formation of student teams, candidate projects are defined in a one- to two-page scope of work by the client. All candidate projects are collected in a single email and distributed to Hinman CEOS students near the start of the semester. Within approximately one week, students may apply for multiple projects, but will be selected for no more than one.

To apply, students send an email to the Hinman CEOS staff stating what project(s), in order of preference, that they are interested in joining. Included is a statement of interest of no more than 100 words that specifically addresses their interest and capabilities for that project. These, and a resume, are used for decisions on project staffing.

Once staffing decisions are made by the Hinman CEOS staff, an email to the company mentor shares student team names and information. Students are instructed to develop a work plan with the company mentor to define the milestones and timeline for the project deliverables.

**Client selection**

With students sourced from a premier entrepreneurship education program, an intuitive fit for client selection would be startup companies. While the Hinman CEOS Program does work to offer internship opportunities with startup companies to students, the client participating in the Entrepreneurial Consulting Practicum is a FORTUNE 500 company.

The benefits of working with a large company include a long-term commitment to working with the Hinman CEOS Program, significant funding to support the practicum ($25,000 annually), willingness by the company to spend time working with the University and its students to manage the practicum and the projects, and a breadth of challenges and opportunities from which to source interesting projects for 20 students per year. As startup companies are typically resource constrained in time and in money, and hesitant to make long-term commitments for projects requiring a semester to complete, established companies are a better fit for this type of experience. Working with a single company also fits the efficient resource requirements objective of faculty and staff time; in that all projects are sourced from one company and that same company provides projects over multiple semesters.
The client company for the Hinman CEOs Program is a FORTUNE 500 scientific, engineering, and technology applications company based in the Washington-Baltimore region. Its expertise includes energy, environment, healthcare, national security, and cybersecurity. Customers include the U.S. Department of Defense and other U.S. Government civil agencies and selected commercial markets.

While this company is the sole client since the launch of the Entrepreneurial Consulting Practicum in 2009, the balance in the supply of projects and the demand by students has not necessitated seeking additional company participation. With 90 junior and senior students in the Hinman CEOs Program, this practicum typically appeals to the 45 juniors. With 20 funding consulting positions available annually, this accommodates approximately half of the junior class. Based on the 16 projects completed since 2009, all students interested in working within the practicum have been accommodated, and there has been no significant gap in supply and demand. In rare cases where there were additional students interested, or one or more vacancies in the student teams, project team sizes were slightly adjusted and funding was pushed or pulled across semesters to balance the budget.

Project selection and schedule

Projects are proposed by the client and chosen by Hinman CEOs faculty and staff based on a number of criteria, including entrepreneurial orientation, rigor, appropriateness of project scope, and importance to the client. Based on the work of the sponsoring company, the projects address engineering and science challenges, typically in the government sector.

While the client is a large firm itself, and as a consulting firm serves large corporate and government clients, the most important criteria is the entrepreneurial orientation of the project. By entrepreneurial orientation, projects aligning with the entrepreneurial interests of the Hinman CEOs Program and its students should address business opportunities and challenges related to entering new markets, developing new technologies, and strategic decision making in dynamic industries.

For rigor and appropriateness of project scope, the timeline for the projects are set at eight weeks for teams of three to four students. This timeline accommodates up to two weeks at the start of the semester to staff projects before the projects launch. With projects starting the third week of the term, students can comfortably complete the projects by the twelfth week, thereby submitting final practicum deliverables before immersing themselves in final projects due at the end of their academic courses.

The expected time commitment per students is eight hours per week for eight weeks. Eight hours is based on an estimate of the time that students can invest in a practicum without significantly deterring from their academic and extracurricular activities. The 64 hour commitment over the term also aligns with the $1,000 payment made to students, as the average hourly rate of approximately $15 is a competitive rate for part-time student work.

Students are expected to hold at least one weekly team meeting to discuss progress and track performance, and send minutes of these weekly meetings to their company mentor and the
Hinman CEOs staff. The majority of the time spent on each project is expected to be on campus, working individually and collectively with the student team during nights, weekends, or at times convenient for them. This is a not a weekday, on-site at the company type of experience.

From a client perspective, the projects should be of real value to the client, and with potential for tangible and actionable outcomes. The projects are not research or a class project, but a consulting engagement, and clients should view projects accordingly. It is expected that important projects lead to more client attentiveness and greater student satisfaction. It is important that clients be fully committed, interested, and engaged. This leads to faster response times and energetic feedback for the student teams.

For the 16 projects over five semesters since 2009, the types of projects typically include market assessments, industry assessment, technology readiness analysis, competitive analysis, and business process reengineering projects. The technologies involved include nanotechnology, battery technology, drug delivery systems, alternative lighting systems, and chemical, biological, radiological, nuclear, and high explosive (CBRNE) detection systems.

Course requirements

With all students sourced from the Hinman CEOs Program, they meet certain academic requirements and career objectives, and enroll in entrepreneurship courses assistive to completing the Entrepreneurial Consulting Practicum successfully. The 12-credit curriculum completed by all Hinman CEOs includes four 3-credit courses, with students enrolling in one course per semester for each of their four semesters in the Program. The course sequence is:

- **“ENES 461: Advanced Entrepreneurial Opportunity Analysis in Technology Ventures.”** This course explores the factors that influence entrepreneurial opportunity analysis in technology-based ventures. Using a cognitive theoretical framework, the course examines the integration of motivation, emotions and information processing modes to make complex entrepreneurial decisions in fast pace technology venture environments.
- **“ENES 462: Marketing High-Technology Products and Innovations.”** Marketing of high-technology products occurs in turbulent environments, and requires rapid decision making with incomplete information. The course will provide a balance between conceptual discussions (based on readings of concepts and practices) and applied/hands-on analysis (cases, guest speakers, and a semester project).
- **“ENES 463: Strategies for Managing Innovation.”** This course emphasizes how the technology entrepreneur can use strategic management of innovation and technology to enhance firm performance. It helps students to understand the process of technological change; the ways that firms come up with innovations; the strategies that firms use to benefit from innovation; and the process of formulating technology strategy.
- **“ENES 464: International Entrepreneurship & Innovation.”** This course focuses on the need for every entrepreneur and innovator to understand the global market in today’s hypercompetitive world, and to appreciate how to compete effectively in domestic markets by managing international competitors, suppliers, and influencers.
Students working in the practicum have therefore completed one or more of the above course, or are co-enrolled in a course during the practicum. As the practicum is managed independently of coursework, with students earning financial payment for the practicum, there is no graded component for the practicum nor interweaving of practicum deliverables with the courses. The practicum and the course are separate and distinct from a project, grading, and financial perspective.

Results & Discussion

The benefits of the Entrepreneurial Consulting Practicum extend to students, the client company, and the University of Maryland. Students gain valuable project management and collaboration experience, in addition to subject matter expertise in the specific project. The company benefits from the work product itself, plus the relationships formed with students and enhanced branding of the company on campus. The university benefits from student learning with practitioners, and by providing a meaningful linkage between campus and the community. These student and client company benefits are further defined below.

Benefits to students

When students work on real projects involving entrepreneurship in this practicum, they see the opportunities and challenges in action. They develop and test ideas, participate in brainstorming sessions, craft work plans, plan project schedules, and propose solutions to practitioners from the client company. Consequently, students begin to see how work really operates in an entrepreneurial setting. Students also develop the ability to work collaboratively in a non-classroom setting. Beyond the grade in a course, in this case there are real consequences if project work is poorly done or not completed on time. Students may lose their jobs and not be paid, just as in the real world. They may also feel the dissatisfaction of the client dismissing their work and their teammates’ dismay as well. Students also develop a significant experience to discuss in interviews and in resumes, and establish employment opportunities with the client company.

Benefits to client companies

The company client benefits from the practicum in several ways. There is a cost savings benefit of hiring students with a $1,000 per student stipend versus hiring interns or full-time hires. The work product delivered from the students is consistently cited by the company as being helpful and actionable in their organization. The client benefits by helping prepare students whom they may want to hire in the future; with the practicum also serving as an extended interview period of sorts. The company also cites the branding benefits of the relationship in that it helps them with recruiting not only students in the practicum, but their friends and classmates that hear of the practicum and the sponsor company.

Conclusions
Mtech’s Entrepreneurial Consulting Practicum enables professionals to shape the education of future graduates, students to gain practical entrepreneurial experience with companies that are large enough to fund their efforts and provide active mentorship.

Consulting projects with company clients are not a perfect learning environment. Clients are not always responsive to students and faculty. Every student team does not achieve synergy. Timelines are missed on occasion. It is, however, these flaws that create a learning environment representative of what entrepreneurs face in practice.

Based on 16 projects completed since 2009, the Entrepreneurial Consulting Practicum has evidenced that when working towards a common goal with real deliverables for a real client, students become committed to producing quality results. As a team, they find a way to succeed when obstacles arise. While Mtech faculty and staff oversee approximately 10 students per semester working collectively on 3 to 4 projects, faculty and staff time is intentionally capped at one to two hours per week so that the students lean to own the project.

The results of these efforts are that Mtech has developed a proven model that places entrepreneurial students with a large corporate partner not traditionally defined as entrepreneurial. Student feedback is strong, with a number of students reapplying to join subsequent projects. Corporate mentor feedback is positive, citing that the deliverables are above expectations and valuable to the company. This model is replicable for universities seeking to connect students with large companies to pursue entrepreneurial opportunities that are funded by companies and efficiently manageable by faculty and staff.

Bibliography