

Bucknell's Institute for Leadership in Technology and Management: The Pedagogical Relationship Between Field Trips, Group Projects, and Internships

Gruver, William R.
Bucknell University
gruver@bucknell.edu

Stamos Jr., Stephen C.
Bucknell University
stamos@bucknell.edu

ABSTRACT

This paper describes the rationale for establishing a unique summer Institute for Leadership in Technology and Management at Bucknell University, a private liberal arts university with a strong management program and engineering college. The curriculum and pedagogical objectives of the academic program are discussed. The two-summer program is taught by a team of interdisciplinary faculty. The first summer (between the sophomore and junior year) is an intensive six-week academic program with classes, field trips, group projects, and visits from distinguished executives. The second summer (between the junior and senior year) is a ten-week internship with a private sector firm. This paper will focus on the pedagogy between the core curriculum and how it relates to the field trips, the group projects, and the internships.

INTRODUCTION

As businesses adjust to the demands being placed on the management of technology in today's more complex, faster moving world, their needs for and expectations of employees have also changed. Some business schools have responded with revised curricula that reflect greater emphasis on quality, technology, understanding global competition, ethics, teamwork, and environmental management. Many of the curricular changes that have been made have been implemented at the graduate level, and indeed, new master-level programs have emerged in the areas of engineering management and the management of technology. Unfortunately, a number of business schools have taken a "mix and stir" approach to addressing prospective employers' changing needs, essentially adding or substituting specific courses (e.g., ethics, operations management, international business, etc.) as degree requirements for business school students.

This paper presents information on a relatively new program that was introduced in 1993 at the undergraduate level. The institutional setting for the program is a small, highly selective, private university with strong programs in the liberal arts, business, and engineering. The program, known as the Institute for Leadership in Technology and Management (ILTM), has adopted as its mission the challenge of preparing students for organizational leadership positions in the 21st century, a century that will place added demands on managers to be able to think holistically about problems that are becoming increasingly complex in terms of their technological, global, economic, human, and ethical dimensions.

ILTM is a two-summer program for undergraduates who are majoring in one of the engineering or business disciplines. The first summer, following completion of the student's sophomore year, is spent studying on campus. The second summer, following completion of the student's junior year, consists of an internship with selected organizations. Stipends are paid to students during the first summer out of benefactor funds and all interns in the second summer are paid by the sponsoring organizations. Interdisciplinary project work teams of undergraduates, engineering, business, social science, and

humanities teaching faculty, active and collaborative pedagogies, visiting executives-in-residence, and internships are all key elements that combine to make ILTM a truly unique learning opportunity for students. The sections that follow present in greater detail key features of the program: the Core Curriculum, the Field Trips, the Group Projects, and the Internships.

SUMMER I: THE CURRICULUM

One of the curricular goals of the ILTM program has been to move beyond the traditional "mix and stir" approach of cross pollinating business and engineering majors with course content from their respective disciplines. Rather, ILTM was conceived around the notion that students need to enhance their critical thinking skills and ultimately achieve a level of holistic problem solving by viewing organizational problems not unidimensionally as simply a marketing, engineering design, or finance issue, but as complex problems with multiple dimensions that need to be addressed in an integrative way. Since students are entering their junior year in highly structured majors, they have had relatively little exposure to critical thinking and integrative problem solving techniques in the management of technology. Consequently, significant attention is devoted to these areas by teaching faculty from the humanities and social sciences disciplines during the first summer session.

The first summer consists of three major settings: the classroom, field trips, and a consulting project that is researched by an interdisciplinary team of students. Each project is designed by one of the corporate sponsors that is hosting a field trip that summer and reflects a real world issue that currently faces the organization. Classroom time is devoted to case studies and other Socratic pedagogies. Each week focuses on a different perspective, beginning with macro issues, then specific micro-level skills and tools relating to various functional areas (e.g., financial statement analysis, systems design, etc.), moving next into total quality management (TQM), world class manufacturing systems, and, finally, ethics and environmental considerations.

In addition to the core academic program, the strength of the ILTM experience is based on the unique integration of field trips, group projects, and internships. Each of those individual components will now be explained in greater depth.

FIELD TRIPS

The field trip component of the first summer is an important one and one that has been extremely successful. These trips last one full day and are specifically designed to reinforce and strengthen the concepts being taught in the classroom. The goal is for our students to see goods being made and/or services being created and delivered. Our students are exposed to each of the major aspects of a firm's activities, i.e. management practices, strategic planning, engineering and technology, finance, accounting, marketing, human resources, and environmental programs – all in the context of globalization and strategic planning.

Field trips are selected to represent a broad range of size and types of organizations, providing a rich blend of different technology environments, and have ranged in size from Procter and Gamble's largest plant in the world and Corning's research facility to a small privately-held coal company which specializes in reclamation of anthracite from abandoned deep shaft mines. (Other field trips have been to such firms as: Johnson & Johnson, Pennsylvania Power & Light Co., Ford, Carpenter Technology, Carlisle Tire and Rubber, JP Morgan, Penn State Geisinger Health System, and Armstrong Industries.)

Special attention is given by the host organizations to ILTM's mission and learning objectives. In addition to "tailored" plant tours of the production and manufacturing ends of the business, the field trips have included presentations to students by CEOs and other top management officials on themes such as technology, leadership, teamwork, and the engineering/management interface.

For the ILTM program, each field trip must be adaptable to the unique characteristics of the program. The planning and execution of a typical field trip will go through the following stages: (1) make contact with firm executive(s) (often times, a Bucknell graduate); (2) communicate effectively the professional goals and needs of the field trip. Standardized plant tours do not meet our goals; (3) request some advance reading about the firm, i.e. The Annual Report, (4) Develop a well-defined schedule for the day, including speakers from different functional areas of the firm and executive management; (5) every trip will involve a tour of the physical plant/office (manufacturing facility or service facility); (6) there is

always an introduction in the form of a brief (30 minute) presentation which is followed by the tour; (7) lunch is usually a "working" lunch when other representatives from the firm join the student/faculty group (of about 24). These representatives are often more junior executives who offer their perspectives from a level closer to that of a peer of the students. (8) the day ends with a final "Question and Answer" period with senior representatives from the firm. In this final session, the theme of, "Managing Change in a Global Context" is center stage.

To amplify the general characteristics listed above, the details of one of the 1999 field trips follows: At JP Morgan, a managing director introduced the firm. He was followed by presentations by executive management from finance, technology, and information systems. At lunch, the firm introduced six additional employees, who were mostly recent graduates or interns (some of whom were Bucknell alumni), to sit at each table with the students. In the afternoon, the managing director taught a case for the class and then ended the day with a question and answer period.

What, then, are the criteria for an appropriate ILTM field trip? (1) There must be a serious commitment on the part of the firm to be involved; (2) The visit must be tailored to meet the goals of the ILTM program; (3) The firm's contact person (host) must be prepared to develop the program in consultation with a faculty member; (4) The host must prepare the other participating members of the firm; (5) The host needs to put together a diverse (functional areas) group of staff to address the needs of the program, i.e., the interface between technology and management; (6) The "question and answer" period and the "closing" session must be wide open: critical, honest, and with as much transparency as is deemed appropriate (respecting the need for confidentiality).

PROJECTS

ILTM projects constitute the glue that binds together all of the parts of the six-week first summer. On the first day of the Institute the faculty assigns each student to a project team made up of five students with at least two members each being management and engineering majors. The very nature of the teams that result from this forced mixing (two Management and three Engineering, or vice versa) does much to advance one of the primary purposes of the program—integration of the majors in order to foster respect for each other's skills.

The subject of the projects also advances a primary goal of the ILTM in that each project is designed to involve the students in the technological decision making process of operating businesses. Subjects that are solely technical (lab analysis) or purely business (market research) are rejected. Ideal subjects of study require holistic and critical thinking (another Institute goal) beyond business and engineering and into areas such as the environment and international business.

Projects are conducted as executive consultancies. In order to improve the chances of successful results the following criteria have been established:

- The issue being explored must be a real problem currently facing the host organization. Retrospective cases are not welcome. Similarly, "pie in the sky" wishful thinking exercises are not acceptable.
- The question asked of the students must be one that can reasonably be addressed by someone between their sophomore and junior years with only six weeks available to study, analyze and report. Further complicating the identification of a proper question for study is the nature of our university (a comprehensive university with a liberal arts focus). More specifically, because of general education requirements, our students are not nearly as far into their majors at the end of their sophomore years as second year students would be who are enrolled in purely professional programs.
- The subject must be such that it will require both business and engineering skills. In this way, each member of the team will have both an expertise to contribute and a need for the expertise of a teammate.

At the end of the six-week executive consultancy, each team submits a 20-page (minimum) written report to the faculty and the host. Concurrently, the team delivers a 60-minute oral presentation of its findings to the faculty, a representative of the host organization, and the other project teams. Vigorous questioning is typical. In many ways, the questioning resembles a dissertation defense or an appearance before an active corporate board.

Other than certain logistical and mechanical support (e.g., speaker phones, conference rooms, computers, and transportation), the essential requirement to support the students is two dedicated and understanding mentors—one from the Institute faculty and the other from the host organization. These mentors must converse with each other several times during the six weeks of study and then once upon completion to design the question and to evaluate the students and their results.

The faculty mentor serves as a guard rail, rather than as a director of the project. A good faculty mentor does not inject personal views, but instead monitors the team's progress and serves as a safety observer who only intervenes when a disaster is approaching.

The company mentor is a host to introduce the team to the organization. If others within the organization need to be included in the study, the mentor makes the necessary introductions. In addition, the mentor provides some initial guidance on information sources.

Below are three brief examples of successful projects that were completed in the summers of 1998 and 1999:

- *Penn State Geisinger Health System* is the largest rural health care system in America. Its largest hospital is a 700-bed tertiary care center located in the central part of Pennsylvania. Many of the specialized services it provides would require a patient to travel approximately 200 miles to Philadelphia or Pittsburgh, if the Geisinger Medical Center were not available. Within this context the team was asked to explore the feasibility of introduction of a new level of service (urgent) between emergency and routine care. Financial, legal, human resource, and ethical issues were considered in addition to the obvious medical issues.
- *JP Morgan* is a major international bank that wanted to redo its internet web site. Benchmarking U.S. and foreign sites, the feasibility of certain applications to JP Morgan's internal systems and economic projections were critical to this study.
- *General Electric Transportation Systems* is a leader in the production of diesel locomotives. GE wanted to know if improving the cold weather performance of its diesels was possible on a profitable basis. Mechanical, market, and chemical analyses all needed to be completed.

The advantages to the Institute and its students of these projects are apparent: real application of critical and holistic thinking, interdisciplinary team experience, and working under time pressure for high standards. But what are the benefits to the host organization? Realistically speaking, what can college undergraduates really contribute in just six weeks? That is a very fair question and, more often than not, our team reports do more to push the ball forward than to score victories. Most often an internal team or professional consulting organization will have to do further study before a final decision is made.

Nevertheless, the host organization has started the process in all cases (and in some have found complete answers) and, more importantly, has obtained major recruiting advantages. The direct recruitment of team members is an obvious possibility, but in seven years, our experience has been that it is less meaningful than the indirect recruiting advantage. The goodwill earned by the host organization with an influential group of students (the Institute's project team) spreads through word of mouth advertising not only to the other students in the Institute, but far beyond the Institute to all parts of the university.

INTERNSHIPS

The internship component of the Institute occurs between a student's junior and senior years. Before a student is placed in an internship, the previous summer's six-week program must be successfully completed. All of the internships last a minimum of ten weeks and are paid positions (at rates appropriate for geography and industry).

Each internship is specifically tailored to place the student at the confluence of business and technical decision making. It is hoped that the student will be pushed to new levels in one or more of several ways: by placing management majors in technical positions (or vice versa); by placing the students in environments in which the definition of excellence is much higher than they encounter in the classroom, or by positioning students such that the consequences of their actions have significant and meaningful consequences far beyond the evaluation rendered of their own performance.

Each internship is evaluated by both the intern and the host organization. The host's evaluation is in the form of a one-page questionnaire that is completed at the end of the internship. The intern's evaluation is one part of a detailed (10-page minimum) report that the student must present in writing and, if asked, orally to the faculty upon their return to campus in the fall. In addition to the evaluation, this

report includes a description of the internship, its fit with the purposes of the Institute, and lessons learned by the student. Furthermore, a daily journal of the intern's experiences must be included as an attachment.

The internships generally fall into one of these categories:

1) *Project Oriented*. This is the least preferred model, but one which has been employed very successfully with certain students whose skills are superior in analysis and written communication, but who may be lacking in oral skills and self confidence in team situations.

In the summer of 1997, such a student (who was majoring in Chemical Engineering) was assigned as an intern to work with the Quality Assurance Director of the Geisinger Health System (now Penn State Geisinger Health System), the major not-for-profit participant in our Institute. The student had no medical training or experience and the only exposure to total quality management occurred the previous summer in the Institute. The collaborative work resulted in a paper published in an international medical journal in which she was recognized as one of the two co-authors (along with the Director).

2) *Shadow to an Executive*. This is the more frequently used model. In this model, the intern is "partnered" with a mid-level executive. The intern spends every minute (within reason) of the working day with the executive, learning as an apprentice would.

In the summer of 1998, a management major was paired with a salesperson for Johnson and Johnson Professional Services, the leading manufacturer of surgically implanted prosthetic devices (e.g., artificial knees). By the end of the internship and after accompanying the salesperson everywhere (including operating rooms) for several weeks, the student (much like an apprentice) enabled the sales executive's time to be leveraged since the intern was able to perform the more basic technical analyses and answer many customer questions. This allowed the salesperson to devote more time to more complex analyses and questions.

3) *Executive Assistant*. In this type of an internship a student serves in a paraprofessional role for a senior executive (one whose responsibility includes strategic issues). The intern is expected to complete those tasks for the senior executive that require administrative skills, but would not be an efficient use of time for a junior executive. Those tasks range from analytical projects to taking notes in meetings so that the senior executive can concentrate on running the meeting.

In the summer of 1999, an intern was placed in an executive assistant role at Chase Manhattan—a leading international bank. The executive was responsible for support services in emerging markets. The intern's work started out as a "gopher" (go for this; go for that), but in a short time had progressed to an important, urgently needed, rationalization of the cost accounting system.

Regardless of the role that is filled, each intern is evaluated on their critical and holistic thinking, ability to work with others, leadership aptitude, timeliness, and accuracy.

To be a successful internship, a host organization must be willing to tailor a position for the student. Mass production, classroom-oriented, show-and-tell type of "internship programs" do not suit our needs; neither do "make work"-type of jobs filled with meaningless tasks. Some otherwise excellent internships are also rejected because they are all one-sided. Such positions are either entirely technical (laboratory work) or exclusively business (audits).

Except in extreme circumstances (e.g., family illness), the students are given no geographical preferences. A successful host organization, therefore, must also be willing to provide basic human resource support services for housing and transportation advice. The most obvious example of this need is a student with no international experience other than our classroom discussions of the first summer who found himself working the next summer in Holland with Akzo Nobel. This situation obviously required some support from the host organization, but for many of our students, an assignment to New York City or the West Coast can seem equally foreign.

The benefits to our students of these immersion experiences have been life altering. A recent graduate, before his ILTM on campus summer and internship, had no vocational desire in life other than professional sports. After the internship experience, this student-athlete was transformed into someone seriously interested in the information services business and is now a valued employee of IBM, where the same student had interned.

Such pre-recruiting, however, is not the main benefit to host organizations. The real benefits are two-fold: 1) interns generally have had very positive economic value added (EVA) evaluations from their hosts; 2) the select group of twenty seniors who have had an ILTM internship the previous summer have extraordinary credibility as word of mouth advertisers to their classmates. There are several examples of

companies hiring excellent (non-ILTM) students who learned of their organization from a peer who had been an ILTM intern. The compelling quantitative measure of the value of interns to host organizations is that for the 120 placements over the past six years, each employer has requested another ILTM intern for the next summer.

CONCLUSION

The ILTM program can be thought of as a three-legged stool. The seat represents the core academic program in the first summer. One leg is the Field Trip component. Another leg is the Group Project. And, the last leg is the Internship. Together this experience represents an "education" outside the conventional educational program. The pedagogical dynamics and framework of the ILTM program with the Core Academic Program supported by field trips, group projects, and internships make its focus on real-world firms and collaborative learning truly distinctive. It is our hope that our experiences and insights will prove to be useful for faculty and practitioners who are interested in technology-management issues and more creative ways to engage students in the learning process by developing quality field trip experiences, group projects, and internships.

*(Note: We would like to acknowledge the contribution of Professor Timothy W. Sweeney, Department of Management, Bucknell University. He has provided valuable leadership, intellectual insight, and contributed to a previous article about the ILTM program.)