Reflections on Fifteen Years of Service-Learning Projects in Thailand

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I. Introduction

Worcester Polytechnic Institute (WPI) provides international experiences for over 50% of its engineering students, more than any other US-based university. As part of its international offerings, WPI has since 1989 been sending mixed teams of engineering, science, and management students to Bangkok to complete 8-week interdisciplinary projects. These projects connect science or technology to social issues and human need, and have been sponsored by Thai nonprofit organizations, government agencies, and universities, as well as by international organizations. The students are accompanied by WPI faculty members who serve as residential project advisors and work closely with the student teams.

Whether in Bangkok or in rural Thai villages, the projects are designed to achieve a broad set of learning outcomes associated with critical thinking and integrative problem solving, written and oral professional communication, teamwork, cross-cultural abilities, and the role of technology in the developing world. About 90 projects had been completed by more than 275 WPI students in Thailand as of early 2005. The faculty directors and local coordinators of the program have developed a network of project sponsor contacts, and have come to understand what types of project opportunities are most likely to lead to the desired learning experience for the students.

This paper will describe the WPI Bangkok Project Center operation and history. Projects in the areas of energy, the environment, sustainable agriculture, capacity building, and community development will be presented as examples. Some of the key elements in developing and maintaining relationships, selecting project topics, and preparing and guiding students through the learning experience will be discussed, in order to illustrate how other universities might provide more international service-learning experiences for engineering students

II. An Overview of WPI and its Student Project Programs

As part of their BS degree requirements, all WPI undergraduates must complete three significant projects, including a third-year interdisciplinary research project called the "Interactive Qualifying Project", or IQP. The IQP is not directly related to the students' major areas of study. Instead, by working on multidisciplinary teams to address problems related to technology, society, and human needs, students come to understand how their careers in technology will impact, and be affected by, societal structures and values. A central learning outcome of this project is an understanding of the social and cultural contexts of technology and science. The

students are presented with an open-ended problem statement, and are expected to develop specific goals, conduct research, gather relevant information, and provide a useful result to the project sponsor. Students complete IQPs in teams of three or four under close direction of WPI faculty advisors, either on or off-campus[1].

The IQP is an academic degree requirement equivalent in credit to three courses (nine credit hours), and is most often done off-campus in collaboration with public, private, or nonprofit agencies or organizations. As part of its Global Perspective Program[2], WPI has created a network of Project Centers in locations around the world, including programs in Europe, Central America, North America, Africa, and the Asia-Pacific region. Typically, about 24 students and two faculty advisors will spend two months in preparation on-campus for these centers, and then will live and work fulltime at the remote site for another two months. The student teams work directly with the local sponsoring agency, and typically have considerable interaction with the local population. Although a service component is not a requirement, these projects typically satisfy the criteria for service learning, in that students generally work closely with community organizations and interact with community members in an academic undertaking that will benefit the local population while allowing the students rich opportunities to learn from the community and to reflect on that learning.

III. Student Projects at the WPI Bangkok Project Center

WPI has been conducting IQPs in Thailand since 1989. These projects have been sponsored by local nonprofit organizations, government agencies, and universities, as well as by international organizations, and the vast majority of them fall into the category of service learning. WPI chose Thailand as its first base of operations in Southeast Asia based on a strong and loyal cadre of local WPI alumni, and it has been through these alumni that most project opportunities have been identified. Two local alumni serve as Local Coordinators and take the lead in identifying potential sponsors and assisting in local arrangements for the WPI students and faculty advisors. Two WPI faculty members serve as Center Directors to develop sustainable relationships with the sponsoring agencies, shape the sponsors' needs into academic projects, and take the lead in recruiting, selecting, and preparing students and faculty advisors for participation in the program.

One example of a sponsor with which WPI has had an ongoing relationship is the Duang Prateep Foundation (DPF), a community development and education organization located in Klong Toey, Bangkok's largest slum settlement. Projects with the DPF have centered on the foundation's mission to build the threatened community's capacity for self-determination through educational and economic empowerment. Recent projects have included the development and implementation of a computer learning center for kindergarteners; the community-based design of an affordable playground; identification of economic opportunities for physically disabled slum dwellers; development of a pictorial database of DPF project work for fundraising and archival purposes; and design of an irrigation system for a center for abused children that DPF operates in western Thailand. Although the projects vary considerably from year to year, they all relate to the foundation's mission and they all involve WPI students working directly with DPF personnel and Klong Toey residents on a regular basis.

A series of related projects has been completed in partnership with Chulalongkorn University's College of Public Health, working with a number of communities in central Thailand that have suffered from the effects of air pollution due to a nearby government-controlled lignite coal-burning power plant. These projects have involved working to help relocate displaced communities; helping to evaluate the success of information technology centers for community development; and design of community resources to better inform citizens about public health issues. In these projects, the students work not only with the College of Public Health, but with the energy utility responsible for the power plant—and so they need to exhibit an understanding of the complex relationship between the citizens, the researchers, and the government as they do their work.

Three recent projects, all sponsored by different not-for-profit organizations, have served to provide electric power to remote hill tribe communities for the specific purposes of education and cultural preservation. The hill tribe villages are located near Thailand's borders with Myanmar and Laos, and the villagers do not associate themselves with any particular nation. Most hill tribe members do not speak Thai, and many do not have a written language, imposing specific challenges regarding participation in the local economy, and broader issues of self-determination. These challenging projects require students to understand enough about the residents' needs and traditions to develop solutions that will be both technologically sustainable and culturally appropriate. Two solar photovoltaic systems and one micro-hydroelectric system have been implemented in these villages during the past three years.

Sustainability has also been a theme in a number of projects dealing with agricultural practice. A team of students worked with the International Board for Soil Research Management to evaluate the extent to which modern agricultural practices had been adopted and effective in the region of Loei. A key finding was that agricultural practice is intimately connected with family structure; for example, certain tasks are typically done by women carrying infants. This and other matters of culture, tradition, and local economy were considered to recommend strategies to extend the meager harvests in this area. A related project in 2003 involved the design of an irrigation system for several villages in eastern Thailand, near the Cambodian border. In this case, the students work was driven to a large extent by political factors, since the cooperation between individual farmers and the municipality was influenced considerably by local issues; matters of tradition regarding crops were also of importance. The students were able to recommend a compromise that suited all parties, and work has begun on the irrigation system.

An example from a more urban setting is provided by a recent project at the National Museum in Bangkok, a central attraction in the heart of the city. The students designed a database system in which to record all the museum's artifacts. Before the students began their work, the only records of these works existed on paper where they were obviously very destructible and impossible to access remotely. The database had to accommodate images and text in both English and Thai, and had to be expandable so as to eventually accommodate the holdings in all of Thailand's many National Museums; furthermore, it had to be easily used and modified by a variety of museum personnel. The students designed the database, partially populated it for

testing, and then trained representatives from over 20 museums in its use.   In this project, as in many others, the students learned how to adapt their skills to meet the needs of people with a different cultural background and outlook. That process reflects a major goal of the project program, which is to help students understand that scientific and technological developments cannot be simply transplanted wholesale from a western culture to non-western cultures.

WPI students have worked for sponsors as prestigious as the Thai Royal Family and UNESCO, and as humble as individual aid workers trying to promote education in a particular remote village. Regardless of their setting, the projects that are best suited to powerful learning experiences share common characteristics. They address a problem that is of genuine concern to the sponsor; they are apt to yield to some achievable results in the relatively brief timeframe of the project; they involve both technical and nontechnical aspects; they enjoy the participation of sponsor liaisons who are willing and able to interact with the students on a regular basis; and they involve interaction between the students and Thai people. The Bangkok Project Center's Local Coordinators, in consultation with faculty Center Directors, employ their local network of contacts to identify potential project sponsors and topics. Projects for governmental agencies, NGOs, and non-profit agencies are usually better suited to the educational goals of the IQP than are projects for corporations or other for-profit entities. Many successful projects have been completed through a partnership with Chulalongkorn University, but that success has been generally dependent on working with particular communities that will benefit from the projects; academic research alone is unlikely to achieve the learning goals of the IQP.

IV. Operations and Logistics

The students and faculty advisors who travel for two months to Thailand (and to the other WPI residential Project Centers) are supported by a network both on the WPI campus and in Bangkok. On campus, faculty Center Directors maintain continuity of the program, and bear the ultimate responsibility for soliciting projects, selecting students, overseeing local arrangements at the site, and monitoring the academic integrity of the program. Center Directors are supported on campus administratively and academically by the Interdisciplinary and Global Studies Division (IGSD), which bears responsibility for health, safety, and risk management, and provides the infrastructure for selecting and preparing students and faculty advisors for the programs.

In addition to attending to logistical and operational matters, the IGSD also administers the academic preparation for the program. Faculty with expertise in the social sciences take the lead in coordinating a 4.5 credit-hour preparation course that integrates rudiments of Thai language and Thai culture with academic preparation for the projects. The Thai language and culture component is provided by an adjunct faculty member hired for that purpose. Also participating in the collaboration are the faculty project advisors who will accompany the students to Bangkok. In any given year, about 10% of the WPI faculty is involved in off-campus advising; about 30% of faculty is involved at some stage in their career. Faculty advisors are chosen from all departments across campus to work on these interdisciplinary projects; this year, the advisors in Bangkok were a geographer and a physicist. During the previous year, a chemist and a literature scholar were the on-site advisors, and the year before that, a materials scientist and the

author, an electrical engineer, were in Bangkok with the students. The interdisciplinary collaboration of the faculty team, in addition to bringing a variety of perspectives to bear on the project, serves to model the teamwork that will be expected of the students.

During the preparation, the students are formed into teams of three or four and begin working in earnest on the projects, developing goals and objectives, formulating background research, and proposing methodologies. They develop a formal written project proposal in consultation with their sponsoring agencies and under the guidance of their faculty advisors. Once on site, the students begin working fulltime to put their classroom learning to practice. Each team typically divides its day between the offices of the sponsoring agency and whatever location suits the fieldwork demanded by the project. Projects often follow a pattern of data collection, data analysis, and development of recommendations and solutions, but the analysis is often highly qualitative and the evidence is rarely straightforward and ambiguous. Students often interview or survey Thai residents and then must analyze the results in conjunction with their findings from the literature, their knowledge of local constraints, and especially their developing understanding of Thai culture. Often this involves complex tradeoffs between economic, environmental, and social imperatives to determine a feasible and sustainable solution to the problem at hand. Frequently, the students come to realize that problems related to poverty do not yield themselves to simple or neat solutions, but rather require a multiplicity of related efforts over time.

Faculty advisors participate in workshops and other development work before leaving campus to prepare them for the challenges of off-campus project advising, which extend well beyond the academic to include matters of housing, safety and risk management, travel arrangements, health care, and disciplinary matters (in 2002, WPI won a Hesburgh Award for the faculty development efforts to prepare advisors for off-campus work). Once on site, the faculty advisors create a learning community consisting, typically, of six or seven student teams and the two advisors, augmented by the local coordinators and project sponsors. Students and faculty are housed on or near the Chulalongkorn University campus, centrally located in Bangkok.

The faculty advisors meet regularly with the students and with the liaisons from the sponsoring agencies and organizations. Often, these liaisons will have advised WPI student teams in past years, but sometimes the advisors must strive to strike a balance between the interests of the sponsor, which are often focused on products and results, and the educational objectives of the project, which involve matters of process and broad, general learning outcomes. The advisors spend a substantial amount of time responding to student writing, focusing in particular on matters of argument, evidence, structure, and persuasion. During the course of the project, the students develop a formal written report that is often in excess of 100 pages for a four-student team. Faculty advisors also critique regularly scheduled interim student oral presentations, providing the students with the feedback they need to develop an effective final presentation for the sponsor.

In addition to the final presentation, the final results of the project—whatever system, recommendations, or artifact is developed to address the problem at hand—are also documented and conveyed to the sponsor in the formal written project report, which serves as evidence of the

students' work toward the IQP requirement and is archived in WPI's Gordon Library. However, the reports are sometimes of more interest to the WPI faculty as evidence of students' learning and accomplishments than they are to our community partners, so they are frequently augmented by student-designed guides, manuals, or other documents designed specifically for the sponsor to use in implementing the students' work after the project ends.

V. Lessons Learned: Some Keys to Powerful Learning Experiences

One of the primary lessons learned—one that will come as no surprise to international educators—is the importance of student academic and cultural preparation before arrival in Thailand. The WPI students complete a 4.5 credit hour preparation course that is team-taught by a language instructor, the faculty members who will advise the on-site projects, and a faculty member who focuses on the social science methodologies common to the projects and the cultural context in which they must be employed. At the end of the preparation, the students have developed a detailed proposal for their work in Thailand, have learned at least some rudiments of the Thai language, and have considered how Thai culture will affect the appropriateness of the solutions they bring to bear. For both the students' sake and the sake of those affected by the projects, it is imperative that students develop an understanding of their work and its context before traveling to Thailand.

Another key element for success is having an authentic problem of importance to the sponsor, rather than an area of investigation that is primarily of academic interest. Tackling real problems brings students into contact with local professionals and Thai stakeholder groups, and requires the students to consider practical aspects of developing sustainable solutions that balance competing concerns. Interaction with sponsor liaisons provides both expert guidance and an intensive cultural experience for the students.

A third element for success has been selecting projects the results of which would help some community either directly or indirectly. Work with governmental agencies, NGOs, and non-profits tends to present students with complex and compelling problems in which matters of economics, environment, and quality of life must be balanced. In addition, such projects typically bring the students into contact with the community that stands to benefit from the project. As is usually the case in service learning, the students learn at least as much from the community and organizations as is learned from the results of the project.

A fourth element that has contributed positively to student learning is having trained WPI faculty project advisors accompanying the students and working closely with them on site. Faculty work in teams to guide the students through their academic and cultural experiences and serve as coaches, mentors, and promoters of personal and professional growth. Working intensively with students on compelling, important in a new and challenging setting can be the highlight of a teaching career, providing rich opportunities for personal and professional growth. WPI faculty specializing in engineering, physical sciences, literature, history, foreign policy, mathematics, and management have served as residential advisors to these projects. The resulting faculty teams bring helpful perspectives to students who are tackling complex, interdisciplinary

problems involving technology, social issues, and human needs. Moreover, the resulting internationalization of the faculty and the development of their capacities and interests in interdisciplinary fields have strengthened the university considerably.

Perhaps the most critical element for the success of this and WPI's other Project Centers is that these projects are WPI degree requirements. All WPI students must complete an IQP, whether abroad or in Worcester. The students are not engaged in study abroad just for an optional cultural experience, but are traveling to engage fully in real work, the academic component of which is taken very seriously by students and faculty advisors alike. Students are working full-time on the projects, 50 or more hours per week each. As a result, the students often accomplish more than the sponsor, or the students themselves, thought possible.

WPI's success in Bangkok has led to the creation of two other Project Centers in developing nations: one in San José, Costa Rica, and another in Windhoek, Namibia. Furthermore, the large number of students and faculty advisors who have had powerful and positive experiences in Bangkok has created greater student demand for such opportunities. WPI's international programs, which began in Western Europe as do so many other study abroad programs, now send between 10 and 15% of WPI's engineering students to complete projects in developing nations.

Technologists have a crucial role to play in developing sustainable solutions to problems of energy, resource management, poverty, hunger, and public health around the world. Accordingly, more and more universities are realizing the importance of helping engineering students better understand the "other half" of the global population that lives on less than two US dollars per day. WPI's Bangkok Project Center is one example of how to provide engineering students with powerful learning experiences that bring students into contact with development issues and help them better understand the potential and risks of technology in a global and societal context. By helping students learn to use technology in wise and appropriate ways to advance quality of life and alleviate human suffering around the globe, educational institutions can promote more responsible, effective leadership for the 21st century.

References

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