Developing a Global Technical/Business/Communication Experience for Students

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Abstract

During the summer of 1999 a group of Knowledge Engineering students Universiteit Maastricht of Maastricht, Netherlands, spent a summer session studying at Baylor University. Baylor was targeted as the host international institution because of its hospitality and glaring contrasts, including climate, transportation system, and social and religious conservatism. Accommodations were made to enhance the learning experience for the students and included modifications in teaching style, work week, and topical coverage. Within a couple of years, students from Maastricht's transnational university partner, the Limburg Universitair Centrum, Belgium, began to participate. With the benefits of international and global exposure and study recognized, sincere efforts were undertaken to improve the program and to make a counter experience available for Baylor engineering and computer science students. However, some of the very same cultural/social differences this program was designed to expose students, hindered the negotiation and implementation process. Included among these were differences in institutional finance, budgeting, and accounting systems, student demands and expectations, pedagogy, and communications. In 2001, for the first time, a group of Baylor engineering and computer science students studied in Maastricht during the summer. As the relationship between the staffs of Baylor and Maastricht matured, improvements were envisioned for enhancing the global, business, and communication components of the program. In 2004 an international business plan component was implemented, and in 2005 the curriculum for students from both continents were merged to provide contextually similar experiences, and business students also participated. With those innovations came new challenges, including managing the expectations for and value of the contributions of technical and non-technical team members. Recognizing the worth of global-business-communication experiences for engineering and computer science students, a trial version on-campus companion of this program is being designed.

Introduction

The recognition of the need for individuals contributing in a 21st society to be globally conscientious and knowledgeable is virtually universal.[1] Student exposure to globally timely and sensitive issues effects their capacity to appreciate, utilize and participate in international initiatives.[2, 3] To help encourage this attribute among tomorrow's workforce most secondary

schools and universities offer or require some form of global education. Traditionally, this has often taken the form of required foreign languages or course work in Western Civilization or World History. More recently, region-specific cultural courses and study abroad programs have sought to contribute greater specificity to these efforts. Yet with such efforts, only a small minority of U.S. undergraduate students study abroad each year, and the percentage is even lower among engineering and computer science students The need for college graduates in technical fields to possess global astuteness is particularly advantageous as it is technical innovations that have brought about most global interfaces and many of these interfaces surround a technology product or project.[5] The recognition of the disparity among technical graduates gaining international exposure/experience has led to the development of new and innovative programs.[6,7,8] In addition to introducing relevant academic content, technical global programs must also promote conditions that attract student interest and work to avoid circumstances that detract from a student's willingness/desire to participate.[9] It is also desirable to provide students with the opportunity to not only learn/experience other cultures, but to also learn with their global counterparts and work on multi-disciplinary teams.[10,11]

Background

During the summer of 1999, students, faculty, and staff from the Knowledge Engineering (KE) program at the Universiteit Maastricht, Maastricht, Netherlands, initiated a summer abroad program at Baylor University in Waco, Texas. This relationship was initiated by the KE Dean in response to the program's emphasis of educating students to work with a multi-national environment. Baylor Center for International Education (CIE) coordinates more than twenty study abroad programs, and one of those is in conjunction with Center for European Studies (CES) at the Universiteit Maastricht (UM). Baylor was chosen for this partnership because of the existing broad university relationship, and the stark contrast between the universities'/communities' environments. Besides those differences that exist between most European and American higher education institutions, UM and BU also experience contrasts that include weather, physical layout, faith commitment, teaching style and student expectations.

Program Description and Analysis

Each summer between 2000 and 2005, between twenty and forty students participated in this program each year. During the third year and beyond, students from Maastricht's transnational partner, Limburg Universitair Centrum (LUC), Limburg, Belgium, also participated. The academic subjects they studied at Baylor were altered after the first year to better meet the needs of the students. Originally, a segment with prominent computer science topics was included. That component transitioned into numerical methods topics to better compliment the varied competencies of students from two universities. Business law was also taught to help add an American element. A hands-on entrepreneurial training program to hone the skills to create, manage, and grow a successful business, was offered each year under the coordination of Ms. Abrahams, using FastTrac, a program of the Kauffman Foundation of Kansas City.

The performance of this program improved each year. Initially, some of the more technical topics were presented in a form and expectation unfamiliar to European students and a hybrid style was adopted. When student projects became more involved and complicated, a computer lab was assigned exclusively for Maastricht/Limburg students during their visit.

Other important aspects for hosting students included living accommodations, recreational activities, and weekend excursions. The UM and LUC staff and faculty contributed valuable suggestions to improve the transition for students. Apartments adjacent to campus and within easy walking distance offered access to campus academic and student life facilities. Apartment furnishings, such as cooking utensils and bed linens, were purchased and stored locally for annual use. Student identification cards for use in the popular McLane Student Life Center were issued although the students weren't officially enrolled at Baylor. A large van was rented for impromptu visits to Wal-Mart. A variety of weekend trips to recreational sites included visits to rodeos, Texas Rangers games, Six Flags, and Sea World. Cultural and historical destinations included the Texas State Capital, the Alamo and Moody Gardens. NASA, Dell, Accenture, and Raytheon all provided tours and experiences associated with American high-tech corporations.

The number of student participants changed each year (TABLE I) and often was not estimated until well into the spring semester, creating difficulty in some aspects of planning.

TABLE I: Number of Participating Maastricht/Limburg Students

Year	Number of Students
2000	20
2001	21
2002	35
2003	41
2004	22
2005	22

A comparison of student evaluations for the 2001 and 2005 programs provides evidence for program improvement and student satisfaction. Between twenty and twenty-five students participated each of these two years, and 100% of both groups indicated they would advise other students "to do this trip." The composite degree of student evaluation of academic and social aspects of the program increased in each area surveyed as shown in TABLE II.

TABLE II: Student Evaluation of Program- Percent Positive

Category↓ Year→	2001	2005
Educational Content	81	89
Academic Instruction	71	79
Excursions/Activities	66	80

Besides hosting international UM and LUC students, it was also the desire of Baylor's School of Engineering and Computer Science (ECS) to have ECS students study abroad. It was not feasible to develop a pure exchange program between KE and ECS because of differences in finances, curriculum, student supervision, accreditation, etc. Yet in developing an abroad program, one of the important considerations is to have a strong host partner, and ECS and KE were now well acquainted. In 2001, under the leadership of Prof. Fry, Baylor ECS initiated its first international academic experience for students by offering the *Baylor in Maastricht* (BIM) program.[6] This experience occurred for the five weeks immediately prior to the UM/LUC group traveling to Baylor and involved credit for two courses. Fifteen ECS students participated in the inaugural BIM program. In the evaluation of this program, 100% of the students expressed they would recommend the program to other Baylor students. But student demand for this program wasn't great enough to sustain it each year, and so the second offering of BIM occurred in 2003, with nine students enrolled. Figure 1 shows Baylor ECS students in a computer laboratory assigned to the program at UM.

Figure 1: Baylor ECS students in UM computer laboratory.

Although the objectives of the BIM and Baylor hosted programs contained many of the same objectives, there was no coordination between the academic offerings. When the Maastricht delegation visited Baylor during Summer 2003, plans and strategies were devised to implement and move toward a more common experience for the students from all the participating universities, assuring that business, communication, and global issues were prominent in the experience, and how this might be accomplished. Dean Kasper Boon was the primary instigator of this initiative. The resulting plan involved assigning participating student teams to develop a web-based technology product/service. Included in this development is the requirement to prepare a written business plan, including marketing and financial analysis, and that the project be deployable within the international community. The final design is presented by the team to the faculty and outside entrepreneurs. For the case of Baylor students, teams are composed of students with different majors, including business/entrepreneurship students. Further, students from the hosting institution participate with their international counterparts.

Several potential benefits were identified to this approach. Because the specific web-based product or service being developed is not prescribed, student teams could propose a technology that matched individual team members' academic strengths and interests; ECS students partner with business students and with international students; ECS students gain exposure and know how to relevant marketing, finance, economics, and other business principles and practices; ECS students sharpen their written, oral, and interpersonal communications skills; and ECS students gain international and global experience. The addition of business/entrepreneurship students also helps attract a larger critical mass of student participants.

The Maastricht/Limburg students, assisted by Mr. Michael Aars, practiced this approach during Summer 2004. A Baylor faculty team consisting of a computer science professor (Sr. Lecturer Cindy Fry) and business professor (Dr. Les Palich, Associate Professor and Associate Director of Entrepreneurship Studies at Baylor) implemented the program in Maastricht during Summer 2005. The program was titled *Baylor International Technology Entrepreneurship* (BITE). Twenty-five Baylor students participated in the five week experience. TABLE III includes a listing of the projects completed by the Baylor teams, and also by the UM/LUC teams (while at Baylor). An example of the introductory slide from one of the presentations is shown in Figure 2.

TABLE III: 2005 Student Projects

Baylor Projects	Maastricht/Limburg Projects
Aura- an interface for home devices shared across a wireless network	Junk.net- a network that allows users to exchange, vs. sell, unwanted items
Club Xchange- a web resource for university clubs and organizations	MediClock- a systems that dispenses medication and reminds the patient
The Proper Pour- an automated cup sensing system for faucets	Not-a Casino- an online gaming community including chat rooms and statistics
College Tool- a web service to assist students to manage their budget, grades, and job search	E.S.S. Solutions- an integrated wireless entertainment and point of sale system
Jamma- a media center based service providing immediate access to product information	i-CAM- software and services to facilitate video surveillance over the internet
	BreedBay.net- an on-line breeding exchange market for dogs

The student presentation of their projects to business leaders and venture capitalists was impressive. Each student team member was responsible for a portion of the presentation and each team explained the technological, business, and international aspects of their projects. Invited business leaders helped evaluate the projects and presentations and participated in the question-answer session. Though there were occasional presentation glitches and oversights, it was evident that the students and teams learned a great deal and had achieved the objectives of communicating about their achievements and participation in a multidisciplinary, international, and technological project.

Figure 2: Introductory slide from a team presentation.

Observations and Future Plans

The BITE project was deemed a success and a number of valuable lessons were learned. The purposes of conducting a study abroad program to promote personal growth, to encourage new perspectives in world affairs, to provide career enhancement, to interact with colleagues of a different nationality within their cultural context, to give an enriching opportunity to experience different countries and different cultures, and to provide coursework that applied toward their technical degree, was accomplished.[6] Further, other attractive program elements such as being offered within an English speaking setting and at a level of the junior year or higher were achieved.[9] Students gained valuable exposure and experience with other desirable features including practicing communication skills, working on multidisciplinary teams, conducting marketing, financial, and economic analyses, and considering international factors in project design. Among the areas that need further development include improving the appreciation for the value team members from other disciplines bring to the project. For example, there were times when it was evident that team dynamics degraded because individual team members didn't fully comprehend the importance of the contribution and synergy required of combining the technical and business aspects of the project. This predicament was particularly magnified by the level of effort, timeliness, and expectations to which students from different majors were accustomed. Introducing special team building activities into the program may help alleviate this weakness.

One of the reasons the project was able to mature to such a level of development was because of the continuing close working relationship between Baylor ECS (and business/entrepreneurship) and Maastricht KE. Unfortunately, administrative personnel changes at UM may have weakened their commitment to this project. This understanding and the desire to offer a higher level of international-business-communication experience to all Baylor ECS students is leading toward the consideration of new companion approach. During the Spring 2006 semester, up to ten ECS students will enroll in the course ENT 4340: Technology Entrepreneurship, taught by Dr. Greg Leman. During the Fall 2005 semester, an experimental course will be offered that teaches business, economic, and communication topics, with international applications, to ECS students. This course, combined with ENT 4340 is being investigated as a replacement (and improvement) over existing course sequences that include engineering economics-technical/professional writing for engineering majors and technical/professional writing-technically speaking for computer science majors. If permanently implemented, this new course sequence will not replace the BITE summer program, but rather will offer other Baylor ECS students on-campus coursework that emphasizes many of the BITE concepts.

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BENJAMIN S. KELLEY Dr. Kelley has served of Dean of Baylor University's School of Engineering and Computer Science since 1999. His academic interests lie in bioengineering applications relating to cardiovascular and orthopedic systems. His educational priorities are aimed at optimizing the learning and success of students and promoting faculty achievements.

KASPER L. BOON- Dr. Boon recently retired after serving for a number of years as the Dean of the Knowledge Engineering program at the Universiteit Maastricht, in Maastricht, Netherlands. Among the focuses of this program was to assure a strong international capability, technical competence, and business framework. Dr. Boon's areas of expertise include biomedical and cardiovascular flow sensors.

CYNTHIA C. FRY- Ms. Fry is Senior Lecturer of Computer Science at Baylor University. She has received teaching awards representing her strong inside and outside of the classroom interactions. During 2006-07, Ms. Fry, her husband, and two children will reside in Baylor's Engineering and Computer Science Living-Learning Center. Ms. Fry previously served on the technical staff at the NASA Marshall Space Flight Center in Huntsville, AL.

MARY D. ABRAHAMS- Ms. Abrahams has been instrumental in both the Baylor in Maastricht and Baylor International Technology Entrepreneurship programs as an instructor and facilitator. She is the assistant director of Baylor's John F. Baugh Center for Entrepreneurship and coordinates the FastTrac Entrepreneurial training program, which is provided through BU as a program of the Kauffman Foundation of Kansas City. Ms. Abrahams teamed with her husband to offer the FastTrac modules.