AC 2007-607: INTEGRATING TEACHING ABROAD INTO AN INTERNATIONAL STUDENT EXCHANGE PROGRAM

Joerg Mossbrucker, Milwaukee School of Engineering
Dr. Mossbrucker is an Associate Professor of Electrical Engineering and Computer Science at the Milwaukee School of Engineering (MSOE). He did graduate studies at Michigan State University and received the Ph.D. degree from the University of Kaiserslautern, Germany. He has extensive industrial experience and teaches courses in analog and digital circuits, microprocessors, and computer programming.

Stephen Williams, Milwaukee School of Engineering
Dr. Stephen Williams is Associate Professor of Electrical Engineering and Computer Science at the Milwaukee School of Engineering (MSOE). He received the Ph.D. degree from the University of Missouri in 1990 and has 20 years of experience across the corporate, government, and university sectors. He is a registered Professional Engineer in Wisconsin. He teaches courses in control systems, electronic design, and electromechanics.

Edward Chandler, Milwaukee School of Engineering
Dr. Chandler is Program Director of Electrical Engineering Technology and Professor of Electrical Engineering and Computer Science at the Milwaukee School of Engineering (MSOE). He also currently performs systems engineering consulting for DISA (U.S. DoD) and for L-3 Communications. He received the Ph.D. degree (EE) from Purdue University in 1985 and is a registered PE in Wisconsin. He teaches courses in circuits and communications.

Owe Petersen, Milwaukee School of Engineering
Dr. Petersen is Department Chair and Professor of Electrical Engineering and Computer Science at the Milwaukee School of Engineering (MSOE). He is a former Member of Technical Staff at AT&T Bell Laboratories and received his Ph.D. degrees from the University of Pennsylvania in 1971. He is a Senior Member of the IEEE and an ABET EAC program evaluator in Electrical Engineering.

Holger Dahms, Lübeck University of Applied Sciences
Dr. Dahms is Professor of Electrical Engineering at the Lübeck University of Applied Sciences since 1991. He received the Dipl.-Ing (U) degree from the Technical University of Darmstadt and the Ph.D. degree from the University of Dortmund. He has held research positions with AEG-Telefunken (control structures of switching systems) and Nixdorf (teletraffic problems in modern PABX systems and communications).

Jens Thiedke, Lübeck University of Applied Sciences
Herr Thiedke is a Laboratory Engineer at the Lübeck University of Applied Sciences, Lübeck, Germany, since 1994. He graduated from the Lübeck University of Applied Sciences in 1994 with the degree of Dipl.-Ing. (FH). He provides the laboratory support for the international student exchange program and is the central point of contact for the MSOE EE students at the Lübeck university.
Integrating Teaching Abroad into an International Student Exchange Program

Jörg Mossbrucker, Stephen Williams, Edward Chandler, Owe Petersen
Department of Electrical Engineering and Computer Science
Milwaukee School of Engineering, USA

Holger Dahms, Jens Thiedke
Lübeck University of Applied Sciences
Lübeck, Germany

Abstract

The electrical engineering program at the Milwaukee School of Engineering (MSOE) has integrated a bilateral faculty teaching component into its international student exchange program. Considerable flexibility was needed to adjust to faculty availability and the major differences in academic calendars between the two institutions. Specifically, MSOE is a private institution on a quarter system and its partner university is the Lübeck University of Applied Sciences in Lübeck, Germany which utilizes the semester system and is a state university. Among the problems that needed to be overcome is that the semester versus quarter systems simply didn’t align and neither institution has the resources to allow faculty absences for an entire academic year.

At the Lübeck University of Applied Sciences the MSOE faculty generally teach a short intensive 2 week course at the end of the spring semester. An appropriate number of credits and associated grade are given and entered on both university transcripts. The Lübeck university faculty visit MSOE in the fall quarter to participate in the project defense of their own students who perform their Diplom Arbeit (senior thesis project) at a company generally in the Milwaukee region. During the visit the Lübeck faculty also provide a series of special topic lectures in various courses depending on the expertise of the faculty member.

The benefits of the faculty exchange are many. Not just does the experience foster a stronger bond to the partner abroad, but the presence of the faculty serves to assure the students that the home institution is paying attention to their welfare and academic progress. The most essential thing we have come to believe is that while good academics are essential to a program, it is the relationships between the people involved in the program that determines a truly successful international program. The faculty exchange aspect has become a lynchpin of our exchange program.

Introduction

Many universities provide student exchange opportunities to study abroad\textsuperscript{1-8}. The program offerings are organized in a wide range of formats:

- The university serves as a gathering point and provides an umbrella program for students from many institutions
• Universities establish a presence in a foreign country and export their own faculty to teach courses
• Short student excursions to foreign lands during breaks or summers
• Extensive long semester or multiple semester terms abroad.

The exchange programs may include formal consideration of how the study abroad experience at a foreign university advances the student’s progress towards a degree.

The descriptions of the exchange programs generally focus on the student, curriculum and associated logistics. We will also provide some of those details. However, what we strongly believe is that while for our program the logistic details, something very much connected with the study abroad experience being an academic year-long experience, were central to launching the program, the maintenance and ultimate health and success of the program hinged on building relationships, relationships, relationships, the exchange program’s equivalent to the well known adage of the real estate market.

**Exchange Program Description and Institutions**

The Milwaukee School of Engineering (MSOE) and the Lübeck University of Applied Sciences, Lübeck, Germany jointly developed and implemented a unique international student exchange program in the discipline of Electrical Engineering (EE). The uniqueness of the program lies in the fact that it is fully integrated into the EE curriculum of both institutions and constitutes a specific degree path at both institutions. Graduation is not delayed for students who participate and successfully complete the prescribed academic requirements. The MSOE EE program is fully ABET accredited.

The Milwaukee School of Engineering (MSOE) is a private university in Milwaukee, Wisconsin, with a primary focus on engineering, business, and medically related programs. The Lübeck University of Applied Sciences is a government supported University of Applied Sciences in Germany with a primary focus on applied engineering, business, and the natural sciences. Both institutions are teaching institutions with similar missions.

During the first two academic years, the students at MSOE and from Lübeck pursue the normal course of study at their home institution. This would constitute the “Grundstudium” (Foundation Studies) for Lübeck students. After completion of the first two years, students participating in the exchange program enter a virtually common curriculum during their junior year that is taught in Lübeck. For all participants in the international study program the junior year constitutes a joint MSOE/Lübeck academic year with the academic content determined, reviewed, and assessed jointly by both institutions.

Both groups of students complete their senior year at MSOE, although not in a common set of courses. Since the junior year in Lübeck does not equate to the identical set of courses as normally taken at MSOE, the MSOE students complete their remaining MSOE academic requirements, consisting of a mix of junior and senior year courses. The Lübeck students take a set of prescribed courses at MSOE that complete their Lübeck academic requirements. The Lübeck students also complete their Diplom Arbeit requirement (Diploma Design Project –
required for the Lübeck students) while at MSOE. This is a major design experience and is normally performed in an industrial setting.

All participating students are awarded the BSEE degree from MSOE and the Diplom Ingenieur (FH) from the Lübeck University of Applied Sciences upon the successful completion of all academic requirements.

**Achieving a Healthy Exchange Program**

The logistics of an exchange program are obviously vital to have a vibrant program attractive for student participation. Hence, for MSOE and the Lübeck University of Applied Sciences resolving details regarding length of stay abroad, tuition issue, capstone project, and numerous other points was central to the successful implementation of the exchange program. The major structural differences such as having a private university on a quarter system versus a foreign state university on a semester system “pushed” the exchange program towards a year-long experience, as opposed to a shorter stay. That, however, is not only more difficult to implement but more difficult to maintain. At this point in time the MSOE-Lübeck University of Applied Sciences student exchange program is entering its 12th year for the Electrical Engineering (EE) program, with an expanding relationship that has resulted in the development of additional programs in Mechanical Engineering and International Business.

The exchange of faculty and teaching experience provided a central opportunity to build relationships at the faculty/institutional level. Considerable flexibility was needed to adjust to faculty availability and the major differences in academic calendars between the two institutions. The semester versus quarter systems simply didn’t align and neither institution has the resources to allow faculty absences for an entire academic year.

**MSOE Faculty:** The MSOE faculty generally teaches a short intensive 2 week course at the Lübeck University of Applied Sciences at the end of the MSOE spring quarter. At that point in time the academic year in Lübeck is still in session, lasting well into June. The course outcome is officially registered on the students’ transcript and academic credit is awarded, commensurate with the number of hours taught. Homework is given and final exams are administered. Topics cover a wide range of subject material, depending on the faculty’s normal courses and their potential appeal, such as American History, Dynamic Systems, Analog Electronics, and Quality. Student participation in the courses offered in Lübeck by MSOE faculty is voluntary.

**Lübeck University of Applied Sciences Faculty:** The faculty from Lübeck teaches in a very different format. They come to MSOE in the middle of the fall quarter and come for dual purposes. After completion of all academic courses of the senior year at MSOE, the Lübeck students are required to successfully complete a major engineering design project (Diplom Arbeit – senior thesis project), normally in an industrial setting. The EE program at MSOE assumed the responsibility of finding suitable projects in regional industry. At the conclusion of the project the students are required to write a major report and defend their topic results. The grade for the project is determined by the visiting Lübeck faculty, whose presence is required by German academic procedures, and the MSOE project advisor. While at MSOE
the Lübeck faculty give lectures open to all MSOE faculty and students and guest lectures in courses currently running that match the expertise of the Lübeck faculty.

Among the specific vital reasons for some sort of faculty exchange experience are:

- ABET accreditation – the MSOE EE program is ABET accredited and that requires all degree paths to meet the same EC2000 criteria, program educational objectives, and program outcomes. Strong faculty interaction is required for successful accreditation. Lübeck has proven to be a willing and understanding partner in the ABET assessment process. Key to the partnership is the close relationship that has developed over the years from when the exchange program was initially started.

Likewise, the Lübeck University of Applied Sciences must also undergo periodic assessment processes that require cooperation by MSOE. Courses at MSOE must fulfill requirements set by the state ministry of education for Schleswig-Holstein in accordance with the BMBF (Bundesministerium für Bildung und Forschung, Federal Ministry for Education and Research). The educational framework for the Lübeck degree is set by the KMK (Kultusministerkonferenz der Länder, Standing Conference of the Ministry of Culture of the States) and the HRK (Hochschulrektorenkonferenz, Standing Conference of University Presidents and Rectors), with considerable input from the VDE/VDI (Verein Deutscher Ingenieure, Association of German Engineers /Verein Deutscher Elektroingenieure, Associates of German Electrical Engineers) for engineering disciplines.

- Recruiting of students to the exchange program – There is nothing like first-hand contact with prospective student to enlarge the pool of participants. Lübeck students in the earlier academic years have a chance to speak to MSOE faculty at a number of events such as “Tag der offenen Tür” (type of Open House for all regional universities) and information sessions to 2nd semester sophomores. Students who take the course offering of the MSOE faculty get an opportunity to listen to lectures given in the American dialect and pace common at MSOE. It is often forgotten what the worries are on the part of students. Students have often commented about their worry that their English skills might be inadequate to keep up in an USA academic system. The continuous homework, quizzes, exams, and project assignments common in the USA, not deployed in Germany universities, require an immediate ramp-up. Hence, the Lübeck students are quite keen on interacting with MSOE faculty in order to gauge the difficulties they might face.

- Addressing student problems – As the exchange program has grown in the number of student participants from MSOE, we have found it is important to assure the MSOE students retain contact with “home” and not get a feeling of being forgotten. That has resulted in MSOE faculty and staff paying occasional visits to Lübeck during the academic year. MSOE students participating in this program generally have never traveled abroad before and sometimes forget that some forms of behavior have greater consequences in other nations with different rules and values.

As expected, students communicate quite well to each other regarding any problems that exist in the exchange program. Likewise, the positive nature of the personal and
professional growth experienced is quickly spread around. Establishing first-hand contact and relationships is invaluable in increasing the likelihood of such positive happenings.

- **Success is local** – The “local faculty and staff” at the institution abroad take on the responsibility of acclimating and guiding the students. Someone local, who understands the arriving students, we believe, is the most vital link in the success of our exchange program. That understanding is greatly enhanced by faculty interaction. General knowledge is certainly important, but knowledge of individual students is often equally important. This allows determination of what the real problems are and how severe they are.

It was especially important for the Lübeck faculty to have an understanding of the procedures and normal activities of MSOE since those students usually are in a foreign land for the first time and often have the feeling that they have been “forgotten.” Mentoring of the students during the 1st semester is a key to their ultimate academic success.

On the other hand, the Lübeck students generally have already had extensive international experiences before coming to MSOE. Their comfort level at being abroad is much higher and a significant number of FHL students stay in the USA for several years, working for an American company, before returning home.

- **Teaching style and academic course structure** – While teaching and the academic structure are quite similar in many respects, there are significant differences that, if ignored, can be quite fatal. The German system has a central focus on the final exam for passing the course. For MSOE students, accustomed to assignments that force almost daily activity in a course, the sudden lack of pressure is felt at the end of the 1st semester. Only great vigilance by the Lübeck faculty keeps this problem in check.

Exchanging first-hand experiences to achieve an understanding of how the “other” place operates is important in having the faculty understand and interpret the student academic performance they observe. As a result many instructors invest more than the usual time in order to assure academic success.

The requirement on the Lübeck students to do their Diplom Arbeit in the USA is both a major opportunity and a significant risk. The opportunity is to do the work in another major industrial country and the risk is that the impact of a bad grade is a major career blow. Hence, it is critical for the MSOE faculty to have a keen understanding of the academic requirements of the project.

- **Support issues** – With time, issues arose that demonstrated that students cannot be forgotten and need some support just like the students back home. Two examples – one relatively simple and another requiring a longer period of time to resolve:
Because MSOE students seldom have the German language skills to read anything other than books in English a small library of books was established in Lübeck on topics that might normally be covered in the course work. The library continues to be enlarged as new topics are identified by the students.

MSOE requires all students to have a laptop and the computer accompanies the students abroad. Part of the support for MSOE students back home is the guaranteed servicing of the computer, hardware and software. Arranging for reasonable “local” support while in Lübeck was ultimately from vendors service facilities in Hamburg, Germany. Such arrangements are often fragile and in the in-between time it was a motivated Lübeck faculty that served to check student discontent.

Logistics too are affected – One of the major issues that had to be resolved for accreditation was the transfer of grades from the Lübeck courses to MSOE and for entry into the MSOE transcript. The German and MSOE grading system do not at all align. Further, there is the problem of what grades to award for a given performance. Extensive discussions and interaction, and some trial and error, resulted in a grade conversion format that has proven to work quite well, the awarding of comparable grades for comparable results. Sounds simple. It wasn’t.

Communication (an important problem) – In discussions among peers at the same institution, it is common to be misunderstood. But clarification is reasonably reached if the parties involved wish it. Communication across borders and oceans face the same problem, except cultural issues, differences in values and behavioral norms, complicate the situation. There are times we have started the conversation between Germans and Americans by saying “I need to speak German to you.” This does not mean speaking in the German language but rather with a bluntness the American ear is unaccustomed too. This demonstrates the strong need for people to get to know each other so that phone calls and emails are taken in the proper context.

Conclusions

The successful implementation and long term health of an international student exchange program strongly hinges on not just the normal details of logistics, but also on the relationship built between the faculty and staff of institutions. The exchange of faculty teaching fosters a stronger bond to the partner abroad. Significantly, the faculty interaction also serves to assure the students that the home institution is paying attention to their welfare and academic progress. Our experience suggests that, especially for longer stays abroad, academic success is related to the relationships between the people involved in the program. The faculty exchange has become a linchpin of our exchange program.
Bibliography


