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MODELS ON INDUSTRY AND UNIVERSITY GLOBAL COLLABORATION THROUGH CO-OP AND INTERNSHIPS

Introduction

From industry giants to start-ups; from the *U. S. News*' top schools to aspiring institutions of higher education; and from the bastions of engineering education in the U. S. to campuses in all areas of the world, globalization is the mantra being spoken by educators, administrators, and corporate leaders. Author Thomas Friedman brought this to the forefront in his best selling book, *The World is Flat*, and the topic is constantly being discussed in faculty meetings, curriculum revisions, and new degree programs that are proposed on a daily basis in many nations.

But what makes a curriculum truly global in nature? What is required to say with assurance, "If you earn a degree from our institution, you will have the necessary tools to be a player in the global economy?" Many engineering institutions are locating campuses in countries abroad. Study abroad programs are flourishing and working abroad is growing into a more developed field. Although many of these institutions have had successful cooperative education and internship programs in the past, including various international opportunities for students, many believe that work experience needs to be more global in nature and more immersive in practice. In 2005, Continental AG, based in Hanover, Germany, sought to answer these questions. Through cooperation with several respected educational institutions, an exhaustive study was performed in an attempt to structure a program that would produce engineers prepared to work at the highest level in a global environment. Those schools include: Technical University of Darmstadt, ETH (Swiss Federal Institute of Technology) Zurich, Switzerland, the Massachusetts Institute of Technology (MIT), and the Georgia Institute of Technology, both in the U.S.A., the University of São Paulo, Brazil, as well as Jiao Tong University and Tsinghua University, both in China. The entire report may be viewed at: <http://www.global-engineering-excellence.org/>. There is also a link to this specific initiative, the Global Engineering Internship Program (GEIP).

To accomplish this ultimate goal of quality global preparation of engineering students throughout the world, the Global Engineering Internship Program (GEIP) seeks to:

1. Establish a global network of students, universities and companies
2. Define areas of knowledge, skills, and attitudes for a globally competent engineer
3. Offer globally-oriented international internships with mentoring by industry
4. Offer an educational infrastructure before, during, and after the internship by universities
5. Assess the academic infrastructure, internship environment, and student learning outcomes and provide a feedback mechanism for quality enhancement
6. Perform research on how to instill global competence in engineering education.

This paper (and conference program session) will explain this unique model of industry and university collaboration as well as its benefits, which include research, curriculum enhancement, experiential training of potential leaders, and global education.

Requirements for Participation

Universities—In order for an educational institution to participate in the GEIP, certain minimal requirements are expected to be met, not only by the school, but by the students whom they recommend to be employed. Obviously, this is to ensure an expected level of quality that must be maintained. These are set forth as follows:

- Select students on the basis of ability in the following areas:
 - Language skills
 - Academic performance
 - Interpersonal skills
 - Matches students career plans
- The universities select one student per open position. The company then conducts an interview and gives a final “yes” or “no.” All of the “no’s” go up for re-election to all of the university partners to nominate an intern for the position.
- Advise students prior to internship regarding practical organization of internship (travel, health and repatriation insurance, safety information, etc.)
- Offer specific readings and pre-departure assignments with a global context to prepare these students. These courses ideally take place during the academic year before students leave their home institution for the internship
 - International Project Management and Team Competence
 - Intercultural training for a global Working Environment
 - Global issues (For example, international relations, global economics, world trade, etc)
 - Language
- Assist in the organization of an annual student “kick-off” event
- Participate in the development and execution of the monthly events
- Conduct and collect evaluations from students individually and as a group

A set of student requirements for participation has been recommended as follows:

- Outstanding academic performance and exceptional interpersonal skills
- Engineering-related academic background
- Advanced undergraduate and graduate students
- Prior academically related work experience
- Proficiency in English, other language skills an advantage
- Commitment to participating in formal curriculum prior, during and after the internship
- Willingness to participate in virtual learning community prior, during and after the internship
- Submission of final report, including reflective self-assessment on their development as input to Global Engineering Education research

- Willingness to serve as ambassadors for the program and as mentors for future students

Employers—In order for employers to be a part of the GEIP, they must agree to certain minimal requirements. These are set forth in the following:

- Be an organization which develops, produces and supports products and services internationally
- Provide at least 20 engineering internships per year ranging from 12 to 26 weeks
- Provide an international project in which the student will a) go abroad, and b) interact physically or virtually with people from other cultures and countries outside of the host company culture/country
- Encourage an internship environment in which students can gain second language capability
- Appoint a supervisor for the intern who will mentor the student and will be responsible for evaluating the student's performance
- Appoint a student or community relations mentor for the intern
- Offer interns compensation that at minimum covers the cost of living including transportation to work, health insurance, and the cost of travel to/from the host company country
- Provide the project work for the intern at least 3 months before the internship commences
- Provide necessary documents and associated fees for work permits and visas for students
- Contribute to the academic curriculum to prepare students for the international internship
- Appoint an official representative and advocate for the program who must attend at least one event per year, typically the kick-off meeting
- Participate in ongoing research and analysis of the program and its components

Benefits of Participation

As with any worthwhile endeavor, expected benefits play a major role. Otherwise, why would anyone participate in such projects? The lists below for academic institutions, students, and for employers are meant to be substantial, but definitely not exhaustive, itemizations of what might occur.

Derived benefits for universities:

- Improved quality of the engineering graduate pool
- Ability to set quality benchmarks for global engineering education
- Increased attractiveness of engineering programs
- Establishment of strategic linkages with leading global companies
- Enhanced knowledge transfer between academia and industry
- Gaining of global visibility as a member of a network of leading engineering schools
- Networked with likeminded top universities around the world
- Pathway to adapt engineering curricula to global engineering practice
- Effective method of collecting assessment data for accreditation and other purposes

Benefits for students:

- Participation in a distinguished program that reflects cutting-edge global engineering practice
- Association and interaction with a highly selective group of engineering students from the best technical universities around the world
- Benefiting from established curriculum to develop global engineering competence
- Profiting from global learning community
- Experience in an international work environment with global exposure
- Advantage of close advising and mentoring from university and corporate partner
- Development of foreign language skills and intercultural competence
- Enhanced career preparation
- Network of international professionals
- Membership of a life-long alumni network

Likewise for participating employers, there are benefits such as:

- Access to top technical students from around the world
- Improved quality of the engineering graduate pool
- Low-cost, low-risk means to recruit future leaders
- Access to engineering faculty and universities from around the world
- Ability to set quality benchmarks for global engineering education
- Help shape the future of engineering education through the participation in the international research project of the program
- Access to a like-minded global network
- Gaining of global visibility among students
- Increased global marketing exposure
- Achieved preferred partnership status at universities

Governance Structure

The day to day business of the GEIP will be conducted by a part-time Secretariat, funded by Continental, and housed at one of the member institutions (currently at Georgia Tech in Atlanta, Georgia, USA). The money will be made available to compensate this individual and pay all appropriate expenses.

Each participating university and company internally selects one representative from their organization as the GEIP delegate that will constitute the GEIP Committee. Every delegate has a voting right (only one delegate per institution can vote although additional representatives may attend meetings). Any decision made will require a simple majority vote.

There will be a Chairperson elected by the GEIP delegates. The Chairperson will be selected by a simple majority vote by all the Board Members. The term of the Chairmanship will be two years. In the second year of the Chairperson's term, the Delegates will select a Chair-elect by a simple majority vote. The Chair-elect's role is to work closely with the Chair, in order to become familiar with the operation of the board meetings and preparing to step in as Chair. The Chair and Chair-elect give up their voting

right for their terms as Chair and Chair-elect and choose another representative from their institution to vote for their institution. There will also be a Co-chair elected for a two-year period to work with the Chair. The responsibilities of the Co-Chair are strictly advisory. A Co-Chair will be elected dependent on the Chair in an effort to balance the university and company input and leadership of the consortium. For example, if the Chair is a university representative, then the Co-Chair must be a company representative and vice versa. This will allow for equal input into the GEIP from both universities and companies.

Assessment

In order to conduct a successful and meaningful program, proper feedback mechanisms must be in place. These will be conducted at all levels, and with all parties involved. Current items being evaluated include: the application/hiring process, students' performance on the job (pre and post internship assessment), and the job content/experience. The overall coordination of the assessment process will be managed by the Director of Assessment of one of the member institutions (currently Georgia Tech), with approval from the GEIP committee. This is an evolving process that will improve over time. Regular reports will be disseminated to the committee, and there will be an assessment of the assessment conducted as well.

Summary

As of February 1, 2008, 13 students had been made offers and have plans to begin working this spring or summer in a global internship with Continental. These include students from five of the participating institutions and the positions are spread throughout four different countries. The GEIP is an ambitious endeavor being undertaken by some of the top engineering schools in the world, and with the sponsorship of a corporate leader in this field. (At this writing, plans are to increase the consortium by two educational institutions and two employers in 2008.) The GEIP's goal is to prepare new engineering graduates to work successfully in a global environment. Without collaborations of this nature, involving cooperative education and internship positions, engineering graduates will be lacking in the skills needed to achieve career goals in the global arena. The GEIP is a model venture which can accomplish this goal and deliver the intended benefits not only to the students, schools, and employing organizations, but to society as a whole.