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Complementing on-campus engineering research experiences with tailored international research projects in partner universities and internships in industry abroad

Abstract

The paper describes a tailored approach introducing International Engineering Program (IEP) students to research opportunities on campus which are then extended to their year abroad. IEP students are enrolled in a five-year dual degree program through which they pursue two simultaneous degrees: a B.S. in an engineering discipline, and a B.A. in a foreign language. In their 4th year they go abroad first studying for one semester at one of our partner universities in Canada, Chile, China, France, Germany, Italy, Mexico, or Spain, followed by a six-month internship in a company in the foreign country, in the second language.

The paper will discuss

- the context of educating engineering students for global careers
- the sequencing of a model of local to global research and internship engagement
- the academic framework, supervision and credit transfer guidelines for advisors
- examples of successful student engagement in various areas

Keywords

Global engineer, international engineering education, undergraduate international research opportunities, international internships, attribute of a global engineer

Global Engineering Education Context

The need to educate globally competent engineers to meet the demands of the global engineering profession and market and the challenge to come up with related curricular reform has been emphasized by engineering educators[1], engineering societies[2], accreditation agencies[3] and globally operating companies[4] for many years. At the ASEE 2014 annual conference in Indianapolis, a workshop[5] led by Steven Hundley and Lynn Brown summarized the concerted efforts and outcomes of several years of research by the American Society for Engineering Education's Corporate Member Council, reflecting the voice of industry to define "The Attributes of a Global Engineer." The workshop summarized the process and results of this extensive undertaking to define attributes representing the desired competencies needed by engineers in order to effectively live and work in a global context.

The "Global Engineer project" which grew out of an ASEE special interest group linked with the

ASEE Corporate Members Council in 2008 and driven and supported by the Boeing company set out to define the special skills, knowledge, abilities and perspectives an engineer working in the global economy needs. A survey containing questions about the most important "attributes" of a global engineer was then translated into 13 languages and distributed through IFEES to members of engineering societies across the globe. After an analysis of the initial survey results and presenting preliminary results at the 2013 ASEE annual conference, the "attributes" were further refined by workshops and focus groups that met between 2012-15 at ASEE conferences, global colloquia and other engineering conferences throughout the world. Then the 20 attributes the groups agreed on[6] were organized by an ASEE special interest group (SIG) into 5 categories in which the attributes around the global effectiveness of an engineer could be grouped: Technical, Professional, Personal, Interpersonal and Cross-Cultural.

This paper is interested in showing how those desired attributes can actually be nurtured and achieved by an innovative engineering curriculum which integrates the humanities with a mandatory long-term stay abroad[7]. More specifically, it concentrates on showing how the complementarities within a sequence of domestic to global research opportunities (at our German academic partner, the TU Braunschweig) to an internship in a globally operating company in Germany is uniquely set up to foster the kind of attributes within our German IEP undergraduates the ASEE study has deemed crucial for engineers to function effectively in today's global economy.

Background

In the five-year dual degree International Engineering Program (IEP)[8] whose mission is to educate the global engineer, students are pursuing a B.S. in an engineering discipline, and a B.A. in a foreign language and they spend their senior year abroad at one of the IEP's academic partner universities followed by a six-month internship in a company in the target country. Students in the rigorous IEP are not the typical group of engineers; rather they combine a strong interest in engineering, math and the sciences with an equally lively penchant for the humanities. They devote parts of their already packed engineering schedule to completing a full second Bachelor's degree in a foreign language and then perfecting their technical, linguistic and cultural knowledge during a one-year immersion stay studying and working abroad.

To maximize the collaborations built between our partner universities, we have begun to set up with our technical partner university in Germany a 10-12 hour research experiences per week for students in the upper segment of the group going abroad. Those students typically are involved in research groups in their home campus department and then apply for a research project in a complementary institute at the German partner university. If selected by the head of the institute abroad, they will be supervised by a Post Doc or Ph.D. candidate in the institute and will also have monthly skype or email or phone meetings with their advisor at home. As part of the requirements on both sides, they need to present the findings of their work in German in their abroad institute, and also write a 10 page paper in English for their home advisor. If the grade they receive is satisfactory, they can receive 3 professional elective engineering credits for their work.

These pioneering and highly committed students are then also placed in internships in companies that – in the ideal scenario – offer an internship project where the students can apply their former academic research experience.

Guidelines for a Research Project for IEP students at TU Braunschweig

Students of the University of Rhode Island (URI) International Engineering Program (IEP) typically stay at TU Braunschweig from October 1st to February 15th of the following year taking language, culture, history and sometimes engineering classes, all in German. They spend the next semester completing a six month industrial internship at a German company.

While staying at TU Braunschweig selected IEP students have the chance to conduct a research project in an Institute of TU Braunschweig. This research project allows the URI students to get a first-hand impression about typical German university life in one of the 65 research institutes which hones their technical skills on the one hand and on the other contributes to the intercultural learning aspect of the IEP. The project may be experimental, theoretical or simulative in nature. Where possible the topic should bridge research activities at TU Braunschweig and at URI. It is conducted during the *Wintersemester*, typically from mid/end October to mid February. The typical workload is 10 to 12 weeks with 1 to 1.5 days/week, i. e. approximately 120 hrs. total workload. Project results should be presented in a written report of approx. 10 pages (in English) plus an oral presentation of approx. 15 to 20 minutes in German. An attestation of the project with workload and grade is issued by the TU Braunschweig Institute head and transmitted to the major Professor at URI. URI IEP students receive credits, typically 3 CP, for a "special problems" course in their field.

The following guidelines were agreed on to support completion of a successful research project at TU Braunschweig (TU-BS) and the transfer of credits to URI.

The people involved in a successful completion of the project are

- The student (with a GPA of 3.3 or higher and enthusiastic about doing research)
- The engineering major professor at URI, who would be accepting the research project as special problem at URI
- The IEP director as facilitator between the two universities who advises the student with respect to choosing a suitable institute and may help contact the institutes
- The head of the institute or designated faculty at TU-BS where the research project is conducted, who selects the student
- A research assistant, typically doctoral candidate, at the respective institute to supervise the daily research work
- The instructor of the Advanced Technical German course of the Language Center at TU-BS where students prepare technical vocabulary and present their research in German.
- The TUBS/URI exchange liaison faculty member who may also assist in finding and contacting a suitable institute explaining the process.

Process to secure a placement and follow-up

Winter Semester at TU Braunschweig

Conduct research project >> Student, research assistant

Skype/email once a month with URI faculty mentor to gauge progress >> URI faculty mentor

First half of February

Finalize Project, report results in German, write report in English and give oral presentation in German to research group >> Student, institute representatives

Before student departure from TU Braunschweig

Attestation of research project as special problem with workload and grade by institute professor >> TU-BS institute faculty

Send copy of project report to Director of IEP, and to International Office so that grade can be transferred to student transcript; send 10- page report to URI faculty mentor so that he can decide if and how many credits to transfer >> Student/ Int. Office
URI faculty advisor

Needless to say that such the research opportunity in the university in Germany alone requires the most careful selection, matching of student interest, capabilities with the assigned tasks, strong mentoring from the home campus advisor and on site mentor, and, of course, an enthusiastic student with the drive and determination to succeed, even in a foreign environment and against potential obstacles.

Student trajectories

Examples of students who participated in institute research on their home campus or did a domestic summer internship, and who then conducted complementary research at TU Braunschweig, followed by a six-month internship in a German company follow below:

1. *Computer Engineering & German dual major: From summer internship at Sensata Technologies (Attleboro, MA) to research at the Institute for Communication Networks at TU Braunschweig (Fall semester) to six-month internship at IAV (Gifhorn, Germany)*

In the summer of 2014 the student interned at Sensata Technologies (a company that develops sensors to ensure the safety in automotive, household, medical and other applications). He worked in the MSG division (microfused silicon strain gauge) on a graphical diagnostic tool for a differential pressure sensor based in Matlab. By the end of the summer he had a better understanding of what car sensors are made of and how each one has a system within itself to protect against errors.

From October 2014 until February 2015 the same student conducted research at the Institut für Datentechnik (Institute for Communication Networks) developing methods for detecting corrupted packets in a multi-nodal communications network and then retransmitting those corrupted packets. This network was being developed for fault tolerant critical applications such as wireless communications technology. The institute does research of this type for use with VW cars e.g. the communications network for the sensors in a car could be an application of this network.

The student is currently working at IAV (Ingenieurgesellschaft Auto und Verkehr), an automotive supplier in northern Germany. He is part of the mechatronics division specifically the team for 6 and 8 cylinder Diesel Audis developing another graphical diagnostic tool based in Matlab. This diagnostic tool helps to figure out what is wrong with a car based on sensor outputs. These errors can then be corrected within the car's ECU. An oversimplified example would be an airflow sensor which is reading very high during a drive because the sensor components are affected by the heat; this "error" can be corrected by reading a temperature sensor and shifting that sensor's output accordingly. The diagnostic tool is based in Matlab, a program the student got to practice using already at his summer internship so he is well versed in the creation of a GUI (graphical user interface) in Matlab.

If one were to analyze the learning curve from summer internship to research in a German institute to internship in a German company one can conclude that on the technical level, he learned at Sensata Technologies how an individual sensor works, how it has built-in methods for detection and correction of errors. At the Institut für Datentechnik he saw how these sensors might communicate with each other adding in fault detection and correction redundancies (so experienced a second layer of fault detection and correction that deals with the transmission of information). Finally, at IAV he experienced how sensor outputs are handled once they arrive at their destination (the car) adding yet another level of fault detection and correction within an integrated automotive system.

In addition, he experienced working in a German research team all the while taking German language, culture and engineering classes for his semester of study at TU Braunschweig which added a cross-cultural and linguistic layer. Due to the nature of his assignment – basically programming in more or less sophisticated ways – this computer engineering student did not get to experience real team work in his companies, more so in the research institute. Being tasked with programming at a company like Sensata (a mostly electrical/mechanical engineering firm) means working quite independently because most of the engineers do not care how the program works (its efficiency or optimization techniques) as long as it does work. At IAV the student also works quite independently but occasionally needs to get feedback from his colleagues, e.g. how his team wants a certain set of information displayed, in a histogram, a best fit line, discrete points, etc. In terms of integration into a German research team, his experience at the Institut für Datentechnik was more balanced, neither over- nor under-managed, structured yet with some freedom for exploration. Since it was technically more challenging it required feedback from team mates and his supervisor, so led to more back and forth. He was given an overarching task that lasted the entire semester, but because the system was very new to him and somewhat obscure he was both told how certain functions should operate but also given the freedom to make some of those decisions himself.

2. *Electrical Engineering & German dual major – from research in TU-BS's Institut für Nachrichtentechnik (Insitute for Communications Technology) to internship at ZF Friedrichshafen (a leading transmission and drive technology company)*

This student conducted his research at the Institute for Communications Technology assisting a PhD candidate to use speech processing to detect the emotion of a speaker's voice. His part of the project was to write a Matlab program which would take a recorded sample of speech, and process it to try and figure out the fundamental frequencies of the speech. He was given a well-documented algorithm to learn and put into code – for the first half of the project he analyzed the algorithm, learned how and why it worked, and programmed it into Matlab code – all this including the coding was done in German. He spent the latter half of his time researching and consulting with the project sponsor, trying to learn ways to improve the program through pre- or post-processing of the signal. In addition, he also attempted to implement some noise reduction into the code. Knowing the fundamental frequencies of speech is considered key to understanding the emotions involved. His program was a trial: the team was observing how a new method of fundamental frequency estimation would impact results. Throughout this time the undergraduate learned a good amount about signal processing, a theme in electrical engineering he had a great interest in and now had the chance to delve further into to see if it would make a potential career field.

At ZF Friedrichshafen AG, the technical part of his six-month project is much different from that at TU-BS. He works in a department that oversees the design and development of electronic control units for use in commercial vehicles. These electronic control units (ECUs) are pivotal in optimizing performance in transmissions systems, active suspension, and many more aspects of automobiles. In short, their job is to tell the mechanical parts of these systems how and when to move. While the technical side of the electrical engineering skills put to use were very different, the student learned a lot about German work culture in Braunschweig that carried over to ZF. Learning to write and comment his code in German and picking up relevant technical vocabulary helped him gain a level of accomplishment and confidence that enables him to hold his ground in this more formal corporate environment when communicating with the members of his team.

3. *Computer Engineering & German dual major: From working in URI's IT department to research in the Institute for Communications Technology to internship at DB Netz*

The Computer Engineering & German dual Bachelor degree senior began working at the URI Engineering Computer Center during his freshman year, maintaining the hardware and software for all the lab computers and servers as well as general upkeep of the computer center. The specific tasks varied greatly, from the more complicated maintenance of URI's Linux-based servers, scripting administrative tools in Perl, and a custom WordPress installation for the engineering webpages to preparing Windows images to deploy to the lab computers. These tasks gave him a strong background in IT knowledge which is useful in any environment where computers are involved. Another aspect of his URI based work was providing technical assistance to faculty and staff in the engineering college through which he gained a great deal of experience interacting with team members and peers to solve various problems.

He continued to improve and utilize the skills he learned working at URI when he began his research at the Institute for Communication Technology (Institut für Datentechnik) at Technische Universität Braunschweig, where the research platform was based in a Linux environment. He

worked in cooperation with German faculty and PhD candidates already involved in the project. Like all German IEPers he first took an intensive German Summer School course preceding the academic semester at TUBS and was then enrolled in courses to advance his proficiency in the German language (Advanced Technical German); civilization and history (Landeskunde) and Intercultural Partnership Course (IPP) which he took simultaneously while engaged in his research project.

After the Wintersemester (Fall term) in Braunschweig, the student moved to Frankfurt to begin his internship in the network division, DB Netz, of Deutsche Bahn (German Rail), one of the largest logistics providers in the world. His current project involves working in a multifaceted group, consisting of a managerial team and a technical team, designing a web application for internal company use. Given the team-based aspect of the project and the technical, programming side of the work, he is able to now apply the technical and team skills he learned and continuously improved through his work at the computer center (URI) and his research at TU-BS in a real corporate environment focusing on the needs of various departments within this large company. Through his experiences both in the US and in Germany, he has become a more competent individual in both his engineering field, German proficiency, cultural and cross-cultural knowledge and his professional abilities and interactions.

4. *Chemical Engineering & German dual major: From research in URI's Nanotechnology Lab to research at TU Braunschweig's Institute for Medicinal Pharmacy to internship at BASF in Ludwigshafen, Germany*

This Chemical Engineering & German senior was involved in Chemical research in three different labs—stretching across both the spectrum of scientific fields and different locations. His undergraduate engineering research journey took him from a project sponsored by NSF led by Geoffrey Bothun in URI's Bionanotechnology Laboratory trying to enhance oil spill treatment methods, to characterizing drug delivery systems under Professor Heike Bunje's guidance at the Institute for Pharmaceutical Technology at TU Braunschweig to attempting to increase the lifetime of a battery cell at BASF's Ludwigshafen headquarters.

At first glance these research topics seem to be vastly different, how could oil spills, pharmaceuticals and batteries possibly have anything in common? However, specific lab techniques indeed crossed over, just with different applications. The student used Dynamic Light Scattering in both university research labs to measure particle sizes in the nano range. He worked with dispersions, mixing two chemically dissimilar substances together by using the means of surfactants (in Dr. Bothun lab he tried to mix oil and water using "food grade surfactants", with Dr. Bunjes he assisted in emulsifying "water unsoluble" drugs into water using lipid nanoparticles). The project at BASF in the Process Research and Chemical Engineering department which has the student assemble and analyze lithium ion battery cells uses a very different technique - Impedance Spectroscopy – goal is to find out what can be done to make a longer lasting battery. But even here one could find a commonality or even complementarity:

In the case of the oil spills the student was trying to emulsify oil into water, two liquids that repel each other due to fundamental differences found at the molecular level—differences caused by charge. For the drug delivery systems the same idea was at work, trying to dissolve nonpolar ("evenly charged") drug into a polar ("unevenly charged") solvent. And of course, in his batteries research and experimentations he is trying to store this charge with as large of a capacity

for as long a time as possible. With each experience he gained skills that he was able to apply to the next level, whether it was the use of a technical method or device, efficiently managing his time, communicating effectively with team members through daily interactions (first in English, then in German) on to presentations of his research results in German to his German institute team to a scientific paper summarizing the results in English for his URI faculty mentor to interacting in German with a team of researchers in a corporate setting at the largest chemical company in the world and managing his time under constraints like deadlines and stakeholder needs.

Research in China – connecting the home campus with abroad

Through our Chinese & Ocean Engineering IEP program a student's international research project became part of a larger agenda between the home campus and the campus abroad. This was the case for an Ocean Engineering & Chinese major who studied at Zhejiang University simultaneously pursuing research in the university's newly established Ocean College. This College received significant help from the University of Rhode Island department of Ocean Engineering to establish their curriculum and has been sending their faculty to our campus to learn from us while also receiving Ocean Engineering faculty to teach and help build the curriculum from scratch. In this scenario, the undergraduate researcher who had been trained at home in certain geo-technical methods and had taken the courses the host university wanted to "import," was even able to play a role in the process of curriculum transfer. The additional benefit for the student in this scenario was that the research experience in China made it easier for her to find an internship at Offshore Pipelines & Risers, Inc. in Hangzhou which is a start-up out of our academic partner university in China, Zhejiang University.

Research at URI, at PUCV and at BASF in Chile

We have begun to also set up research experiences at our new partner university in Chile, the Pontificia Universidad Católica de Valparaiso (PUCV) in Valparaiso, Chile, followed by internships in a Chilean company. One such example is the experience of a Chemical Engineering & Spanish IEP senior who worked as a research assistant for Dr. Gonzalo Ruiz Filippi, Associate Professor of the Biochemical Engineering School, and Deputy Dean of the College of Engineering at the Pontifical Catholic Univeristy of Valparaíso, in his Environmental and Biotechnology Laboratory. The student worked in Dr. Vinka Oyendel–Craver's Sustainable and Environmental Technologies Laboratory at URI in Spring 2014 in the area of "green synthesis of nanoparticles," focusing on the fabrication of silver nanoparticles in a sustainable and environmentally friendly manner during the spring semester of 2014. At PUCV he continued his URI research using the fabrication process developed at URI, to create silver nanoparticles and eventually copper nanoparticles, in Dr. Ruiz' lab in Chile. The question the group tackled was "where do the nanoparticles go after they are used, and what happens to them when they pass through our current water treatment systems?" There are many products currently on the market that use nanoparticles, e.g. sunblock and antimicrobial socks. Therefore, the idea was to find out where the nanoparticles went after a person who had used the sunblock took a shower, or after a person washed their socks that contained nanoparticles. Would they pass through the filters due to their extremely small size? And if so, how would they affect the water treatment process? Would they improve it with their antimicrobial properties, or pass through all stages of treatment untouched and eventually contaminate our drinking water? There was also the possibility that due to their unstable structure, (it is very difficult to separate the particles and then keep them separated at nano-size) they would clump back together, unionize, and form larger

particles that would get trapped in the filters.

During the Spring semester 2015, the student is interning at BASF in Valparaíso in their Residuals Division focusing on liquid industrial residuals, also known as waste water. He has been assigned three independent projects: The first two projects, The Optimization of the Wastewater Treatment Plant and the Traceability of the Wastewater Treatment Plant, are to be completed at the same time. The idea of the first project is to study the water treatment process in detail and identify bottle necks, or areas where the process is slowed down, and innovate solutions to optimize the system and improve the overall treatment time. The goal of the second project is to develop a method to estimate the quality of the waste water at the end of treatment by taking a quick approximation early in the process. The idea is to encounter a relationship between the clarity of the water early in the process with the final overall quality of the water and use this method to avoid treating water that will not have a final overall quality the meets legal standards, ideally saving time and money on treatment the will not result in a desirable final product. The third project, to be completed after the first two, involves designing a sand filter as a primary treatment system to help optimize the overall water treatment process. He can put his experience as a member of URI's chapter of Engineers for a Sustainable World to work in designing a sand filter for waste water treatment. The student's work with waste water at BASF relates nicely to his research in the Environmental and Biotechnology Laboratory at PUCV in terms of waste water treatment. However, it differs in the fact that at BASF the group is not using nanoparticles in their treatment process.

Conclusion

On the meta-level, going back to the "attributes of a global engineer" we postulate that the local to global research/internship sequence described in the examples above enabled the students to go way beyond learning new technical skills in a lab environment. They had to possess at least some of the following attributes (from the list of 20 mentioned in the ASEE study cited above) to successfully complete all three projects:

On the technical level, they had to demonstrates knowledge of project planning, management and the impact the project has on various stakeholder groups (team members, sponsors, clients, end-users)

On the professional level, they had to embrace "a commitment to quality principles/standards and continuous improvement" and to apply "personal and professional judgement in effectively making decisions and managing risks."

On the personal level they had to have individual characteristics needed for global flexibility including the "ability to think both critically and creatively," the "ability to think both individually and cooperatively"; they had to maintain "a positive self-image and positive self- confidence," "show initiative" and "demonstrate willingness to learn."

On the interpersonal level they needed skills and perspectives to work on interdependent global teams such as "functioning effectively on a team (understanding team goals, contributing effectively to the team, supporting team decisions, and respecting team members.)"

On the cross-cultural level they had to demonstrate society and cultural understanding to embrace diverse view-points including "an understanding of the ethical dimensions and business norms" and had to apply "norms effectively (in a specific industry, context, and country.)"

Furthermore they definitely had time throughout their five years of learning the German language and taking German culture and history classes as well as conducting their research and internships in a German environment, to develop "an international/ global perspective"; after their year abroad they will furthermore "possess fluency in at least two languages." The fact that they used their academic training in a particular field in various "concentrations' or applications in which a set of different fields came into play, also equipped them with the flexibility of mind to "embrace an inter-disciplinary/multi-disciplinary perspective."

References

[1] Downey, G. L., Lucena, J. C., Moskal, B. M., Parkhurst, R., Bigley, T., Hays, C., & Nichols-Belo, A. (2006). The globally competent engineer: Working effectively with people who define problems differently. *Journal of Engineering Education*, *95*(2), 107-122; Allert, Beate I., Atkinson, Dianne L., Groll, Eckhard A., Hirleman, E. Dan, „Making the Case for Global Engineering: Building Foreign Language Collaborations for Designing, Implementing and Assessing Programs in *Online Journal for Global Engineering Education* (OJGEE)Vol. 2 (2007) Iss. 2, article 1; Grandin, John M., Hirleman, E. Dan, "Educating Engineers as Global Citizens: A Call for Action: Report of the National Summit Meeting on the Globalization of Engineering Education, in *Online Journal for Global Engineering Education* (OJGEE) vol. 4 (2009) issue 1; Parkinson, A. The rationale for developing global competence. *Online Journal for Global Engineering Education*, vol. 4 (2009) issue 2.

[2] National Academy of Engineering. (2004). *The engineer of 2020: Visions of engineering in the new century*. Washington, DC: The National Academies Press, 2004.

[3] Michael K.J. Milligan, "The future of international engineering education and accreditation's role in improving quality and promoting innovation." Keynote at the 13th Annual Colloquium on International Engineering Education: Moving Forward, Nov. 4-7, 2010 Newport, R.I.; Shuman, L. J., Besterfield-Sacre, M., & McGourty, J. (2005). The ABET "professional skills"—Can they be taught? Can they be assessed?. *Journal of Engineering Education*, *94*(1), 41-55; Prados, J. W., Peterson, G. D., & Lattuca, L. R. (2005). Quality assurance of engineering education through accreditation: The impact of Engineering Criteria 2000 and its global influence. *Journal of Engineering Education*, *94*(1), 165-184.

[4] McMasters, J. H. (2004). Influencing engineering education: One (aerospace) industry perspective. *International Journal of Engineering Education*, *20*(3), 353-371; Bybee, R. W., & Fuchs, B. (2006). Preparing the 21st century workforce: A new reform in science and technology education. *Journal of Research in Science Teaching*, *43*(4), 349-352; Arlett, C., Lamb, F., Dales, R., Willis, L., & Hurdle, E. (2010). Meeting the needs of industry: The drivers for change in engineering education. *Engineering Education*, *5*(2), 18-25; Genheimer, D. R., Stephen, R., Shehab, D., & Randa, L. (2009). A survey of industry advisory board operation and effectiveness in engineering education. *Journal of Engineering Education*, *98*(2), 169-180.

[5] Hundley, Stephen, Brown, Lynn, "The Attributes of a Global Engineer: Implications and Opportunities for Corporate members," workshop W221, ASEE Annual Conference in Indianapolis, IN June 18, 2014 available at http://www.asee.org/public/conferences/32/registration/view_session?session_id=3964.

[6] See the list of the 20 attributes in Hundley, Stephen, Brown, Lynn, Fox, Patricia, Didion, Catherine "The Attributes of a Global Engineer: Purpose, Perspectives and Progress" in Proceedings of the ASEE Annual Conference, June 23-26, 2013, Atlanta, GA available at http://www.asee.org/flash/FlexPaperViewer.swf?PrintEnabled=true&ZoomTime=0.25&SwfFile=%2Ffile_server%2Fpapers%2Fattachment%2Ffile%2F0003%2F3165%2F6198.pdf.swf&FitWidthOnLoad=true&ProgressiveLoading=true&ZoomInterval=0.1&Scale=1&FullScreenAsMaxWindow=true&ZoomTransition=easeOut&FitPageOnLoad=false

[7] Grandin, John M., Berka, Sigrid, "Reforming American Higher Education: The University of Rhode Island International Engineering Program" in ADFL Bulletin 2014 Vol. 43, No. 1 (2014), pp. 23–44.

[8] For more information on the International Engineering Program see its main website at www.uri.edu/iep.

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