

**The University of Rhode Island  
International Engineering Program:  
A Model for the Merger of Technology and the Humanities<sup>1</sup>**

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**American Higher Education in Crisis**

Contrary to a long-established and seemingly irrefutable tradition, American parents, educators, private and public sector leaders, and students are beginning to doubt the value of a university education. Charges have been leveled, for example, that students today are spending substantially less time on academics than their predecessors and are making little progress during their undergraduate years in their ability to read, write, speak, or think analytically and critically (see, for example, Arum and Roksa 2011, Vedder and Denhart 2011). Others have argued that college is burdening young people with lifelong debt to the degree that it is stifling their creativity and freedom to innovate. The Thiel Foundation, for example, awards \$100,000 stipends to bright young persons who choose to pursue their own ideas independently rather than attend a college or university. And these doubts are, of course, reinforced by prominent degreeless role models like Steve Jobs, Michael Dell, Mark Zuckerberg, and Bill Gates, who have helped give rise to such phenomena as the UnCollege Movement (<http://www.uncollege.org/manifesto/>) and to reports that universities are not educating students for the needs of the market place. (See: [http://mckinseysociety.com/downloads/reports/Education/Education-to-Employment\\_FINAL.pdf](http://mckinseysociety.com/downloads/reports/Education/Education-to-Employment_FINAL.pdf)). As this recent McKinsey study reports, high percentages of students do not believe that higher education will prepare them for the contemporary workplace, while companies lament that they want to hire, but often cannot find qualified candidates (McKinsey, pp. 11-13).

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Parallel to this skepticism and perhaps in part because of it, both federal and cash-strapped state governments are pulling back from long-standing financial commitments to higher education. The State of Rhode Island, for example, provided 47% less state support per student in 2012 than in 2002 (Providence Journal, *Report: URI in Peril as State Funding Erodes*, October 1, 2012) and now covers less than 10% of the overall funding required to keep the university afloat and competitive. Given that the difference can only be made up by an increase in tuition, the resulting sticker prices for a college education are shocking today, whether at a state-supported university like URI or a private institution, and the end of the increases seems nowhere in sight. The financial sacrifice for a college degree might be deemed acceptable if graduates could be guaranteed a position appropriate to their education, but a high percentage, perhaps even over one-half of recent college graduates, is unemployed or underemployed, (See: <http://www.theatlantic.com/business/archive/2012/04/53-of-recent-college-grads-are-jobless-or-underemployed-how/256237/>) while saddled with enormous debt, the total of which now surpasses one trillion dollars. (*New York Times*, *A Generation Hobbled by the Soaring Cost of College*, May 12, 2012).

### **A Challenge to the Humanities**

Given the high cost of an undergraduate degree and the high unemployment rate of graduates, those who do opt for college today are becoming much more deliberate and pragmatic about their choices of major and have thus become reformers in their own way. Fearing unemployment, students are increasingly shying away from fields that do not promise a job, such as English, history, philosophy, art history, and classics. Even at Yale University, which has always been a bastion for the humanities, undergraduate enrollments in this area have fallen from 19,250 in 2000-2001 to 14,604 in 2010-2011. Course enrollments in English, for example, were down from 3248 to 2595, and in history from 4448 to 2259, as noted by Antonia Woodford on April 18, 2012 in an article for *Yale Daily News*. It is not surprising, therefore, when cash-strapped administrators do not hire replacements for retirees in these fields, or look for creative ways to reinvigorate departments with falling enrollments. Students are looking for programs that will open doors, enable them to pay off their loans, and assure a satisfying career.

Clearly, there is a need to sound an alert in the United States regarding higher education. We need to prepare our students more deliberately, and realistically for the ever-changing workplace of the 21<sup>st</sup> century, and we need to do this without saddling our students with enormous debt. We must consider carefully the skills needed for successful careers in today's global workplace, and promise our students a clear return on their investment. In order to meet this promise, universities must keep pace with the highest standards, which are now set at a global level, and focus more on the STEM disciplines needed to guarantee our nation's ongoing reputation for innovation. Furthermore, we must find ways to support our students financially. We agree with critics that drastic steps will be required to adapt our institutions to today's realities, especially given the limited resources available, and the innate resistance to changing longstanding educational traditions. We strongly disagree, however, with those who would drop everything of a non-professional nature like classics and German and educate solely scientists and engineers. Such a step would be shortsighted. America does indeed need more engineers, but the complexities of life in the 21<sup>st</sup> century demand that all students, including, and perhaps especially, the engineers and those from other STEM disciplines and professional school programs, be broadly and liberally educated. This will mean that the humanities must not only be retained, but also given an expanded, if modified, role.

### **The Role of the Liberal Arts**

In his blog, of June 4, 2012, (<http://presidentdooley.blogspot.com>), President David Dooley of the University of Rhode Island defended a liberal arts education, arguing that "the skills of critical reading and thinking, strong writing, and effective presentation are essential in practically any career" and, as such, are classic outcomes of coursework in the humanities. The ability to learn continuously and to teach oneself, he argues, are also outcomes of the humanities disciplines, though not exclusively. "Creativity, a strong work ethic, self-discipline, and teamwork have always been, and will continue to be, keys to success." Dooley argues that these combined qualities are essential markers of the liberally educated person, and are typically "the

foundation for success after college.” He stresses that many great leaders and professionals have backgrounds in the arts and humanities.

While agreeing with Dooley that the “soft skill” outcomes of a liberally educated person are critical for success in a competitive global workplace, we must also face the reality that a high percentage of graduates with majors in the arts and humanities are struggling to find their place in the workforce, and often end up unemployed or taking jobs for which they need no higher education, e.g., as bar tenders or food servers. Many are forced to move back home with mom and dad to make ends meet financially. It is easy to pass this problem off as the unfortunate temporary result of a bad economy, arguing that the situation will soon improve. After all, this would mean there is no cause for alarm and that we can and should maintain the status quo.

Unfortunately, a lot of evidence suggests that the job market for the average college graduate will not improve substantially in the coming years. The economic situation might seem better in any given year, but increasingly any boom times in the United States will depend upon corresponding booms in the Far East, Latin America, the European Union and elsewhere across the globe. As a result of shakiness and long-term challenges in this new interconnected economy, jobs will be tight except possibly for those who have paid attention to the very latest trends and technologies in the global marketplace, and are ready to meet the competition from their peers abroad. Jobs can be found, especially those associated with alternative energy, nanotechnology, biomedical technology, advances in information science, and other fields tied largely to science and engineering. Indeed we hear from employers that many positions are open, but that the great majority of applicants do not qualify.

We in higher education need to pay more attention to the employability of our grads, especially if we want to contribute to regional and national economic development, not to mention keep our lecture halls full, enable parents and future students to pay for that which we provide, and, above all, ensure our students find career opportunities. But this does not mean that we should drop majors such as philosophy, classics or German from our offerings in favor of more courses in topics such as solar power or entrepreneurialism. It does mean, however, that we should be brutally honest with our foreign

language or philosophy majors about what it is that such a major provides and what prospects a major in the humanities might have for a future career. And we need to ask how and in what context the philosophy or any other liberal arts major makes sense, and whether the changing times require a realignment or reorganization of what we teach, how we teach, and to whom.

As former philosophy and literature majors ourselves, we, the authors of this paper, would argue that the study of classically humanistic fields provides an important path toward acquisition of the goals President Dooley has described in his blog. Learning to read carefully and critically, think analytically, define problems, understand and care about values, appreciate different perspectives, communicate in other languages as well as across national and cultural borders, gain an overview of thought in different historical periods, write carefully and clearly are all of utmost importance for our students regardless of long-term disciplinary and career goals. These represent important learning goals which accrue from a good liberal arts education, and less so from a purely technical or professional education. These skills are all important traits of an educated person today.

Humanists might argue that we are speaking of the humanities here almost as a supplement to the STEM and/or professional school disciplines and are thus cheapening or weakening them as disciplines unto themselves. On the contrary, we are arguing that there is a greater need for humanities education than ever before and that it must play a role for all students, not just its disciplinary majors. We in no way wish to disavow the humanities as independent areas of intellectual pursuit, but the realities of a technologically driven global society demand a reconsideration of the roles of the humanities. To be liberally educated today demands significant background in **both** humanistic and technical endeavors.

These considerations are not intended solely for the students in the STEM disciplines, but also carry clear implications for the student majoring in the humanities. Just as we argue that engineering students need to broaden their background with the study of language, culture, and other humanities fields, we also argue that the humanities major, if claiming to be liberally educated today, needs to broaden his/her background with exposure to the sciences and technology. All of the six

hundred language majors at the University of Rhode Island, for example, are now strongly advised to develop a companion expertise with their language skills and cultural understanding, such as engineering, computer science, business, teacher education, journalism, or international policy studies. If students learn to speak other languages, that is good, but if they hope to contribute to society, they must consider how and where they might apply their language skills and what background they will need to do this. Furthermore, if a humanities major wishes to lay claim to being a liberally educated person in today's society, then he/she needs to have a firm understanding of the scientific issues and technologies which are the basis for the bulk of our daily routines, not to mention jobs. Language without application is inadequate, just as technology without language and culture, i.e., the liberal arts, is insufficient.

### **Technology, Science *and* the Liberal Arts**

There is a message in these deliberations for both society as a whole as well as for higher education in particular. While we have always thought of educating philosophers **or** engineers, humanists **or** scientists, today we need to strive for philosophically astute engineers and scientists, and philosophers who understand, appreciate and can contribute to the world of science and technology. It is incumbent upon higher education, therefore, to rethink its structure and system of rewards for faculty in order to bring these traditionally disparate areas of the academy closer together and to provide all of their students the benefits of **both** a humanistic and a professional education. And it is incumbent upon humanists to recognize the practical value of their disciplines in the workplace and to embrace the role that their disciplines can play in partnership with their colleagues from professional and scientific school programs.

One can easily compare our current situation with the climate that gave birth to the Morrill Act, which was signed into law 152 years ago by Abraham Lincoln in 1862. It was this act that created the Land-Grant colleges and universities. As the wording of the bill attests, its authors were concerned about educating young people for the needs of the times, which were largely defined by the industrial revolution. They thus created a new kind of university focused on the agricultural and

mechanic arts, in contrast with the existing, traditional universities that were bastions of the liberal arts. It is critical to note, however, that in stressing professional education, they specifically emphasized that this should not be done at the expense of “other sciences or classical studies.” Their goal was to “promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.” It is, therefore, very much in the spirit of the Morrill Act to suggest that we adapt our universities today to the needs of our technology driven contemporary society with a greater focus on the STEM disciplines, while at the same time recognizing and promoting the need for a strong background in the arts and humanities.

Is it a fantasy that higher education might reconfigure its offerings and redefine what it means to be a liberally educated person, or is it a necessity? Is it possible for engineering faculty (and others from scientific and professional fields) and philosophy professors (with others from the arts and humanities) to collaborate and provide their students with a more rounded education and thereby not only greater employability in today’s complex global workplace, but also an increased sense of responsibility? Can higher education be so flexible? Can more be packed into an already full curriculum without adding time and expense to an already overpriced commodity? If so, how might this be achieved? What changes would be required in the structure and nature of American higher education? What forces would have to converge to make this possible?

Needless to say, a change of this magnitude would, in an ideal world, call for an act of Congress comparable to the Morrill Act of 1862, resulting in a new kind of higher education institution for our age of globalization. In 2014, such a bill would not sponsor the land to create new campuses, but would rather sponsor and support a new vision of education designed to graduate technically and scientifically savvy young people with the breadth and depth of knowledge and skills required for careers in a complex global society. But, given the fact that we do not live in that ideal world at this time, it is perhaps more realistic that we in higher education look for ideas and inspirations and for individual initiatives which will point us in the right direction.

### **Language and Engineering: A Template for Reform**

Berka and Grandin, the authors of these pages, are respectively the current executive director and the recently retired founder, executive director, and developer of a now twenty-seven year old program at the University of Rhode Island which has proven it possible for students to efficiently achieve the goals of a technical **and** a liberal arts education in a financially responsible manner highly appropriate to today's workplace. The International Engineering Program (IEP), which was developed in close partnership with business and industry, is a cost-effective, career-oriented program combining the study of language and culture with engineering, and including a full-year of study and work abroad. It is a five-year undergraduate curriculum, leading simultaneously to both the BA with a major in a language and the BS in one of the engineering disciplines. IEP grads are highly qualified engineers, who have stronger writing, speaking, analytical, and problem-solving skills, in combination with the command of a second language and the cross-cultural communication skills acquired through a year of in-depth study and work abroad. With over 400 graduates, and with a highly competitive employment rate, the program demonstrates the fact that the humanities and the sciences do work together productively, i.e., that universities are indeed adapting to the contemporary needs of society. Our research documents the long-term value of such an education in today's workplace, where IEP graduates have been able to excel and achieve beyond their initial expectations, and make meaningful contributions to society (Grandin 2011).

The IEP is built, of course, on the reality that engineering is a global field today and that engineers commonly work in teams crossing many cultural and linguistic borders. Even when not travelling, it is typical for engineers to be working on projects with others in widely dispersed locations, where successful communication depends upon knowledge of and sensitivity to other cultures and languages. Engineers need to be many things today: technically savvy, analytically sharp, culturally astute, and cross-culturally informed. Moreover, they must be good problem solvers, good communicators, and lifelong learners who are able to take calculated risks. The IEP experience is designed to support the acquisition of all of these skills with a curriculum that combines the best of both a technical and humanistic education.

The University of Rhode Island International Engineering Program (IEP) began as a partnership between two faculty, Dean Hermann Viets of the College of Engineering, and Professor of German, John Grandin, who also served as associate dean of the College of Arts and Sciences. Both shared a common interest in Germany and the belief that all students, engineers included, would greatly benefit from becoming bilingual and by including a significant experience abroad as part of their undergraduate education.

Grandin and Viets were well aware that they were entering a partnership fraught with barriers and hurdles. Aside from some outspoken engineers who saw no need for language study and a core group of language faculty who saw no reason to teach languages to engineers, there were manifold challenges from many bureaucratic corners of the academy. Would it be feasible or even wise to complete two undergraduate degrees in five years? Could six-month professional internships really be arranged in companies abroad? Who would teach the proposed special, content-based German classes for engineers? How would one convince and recruit students to study both German and engineering? Would students see value in spending an additional year of study before entering the workforce? Who would find answers to these questions and complete these tasks? Despite the many questions, Viets and Grandin believed that all the challenges could be met and they agreed to pool their efforts and sell their idea, each to their respective faculty groups, arguing strongly that such a partnership would be mutually beneficial, i.e., that it would bring more and stronger students to both the engineering and language classrooms.

Indeed the partnership between Grandin and Viets, which grew to a partnership between engineering and languages, or viewed more broadly, a partnership between technology, science and the humanities, and subsequently a partnership between the university and the corporate sector, has been a great success, truly beneficial to all parties. The IEP today enrolls approximately 345 students, and has expanded from the initial German and engineering model to include programs with French, Spanish, Mandarin Chinese, and Italian. It has benefitted languages, for example, by vastly increasing the number of German majors at the University of Rhode Island from a shrinking handful to over 180, and by sustaining the second largest enrollment of German

majors in the country.<sup>2</sup> Prior to the founding of the IEP, there had been genuine concern for the viability of the shrinking German major, which no doubt would have gone the way of so many such programs in the country. Benefits for the engineers included not only an increase in applicants to all engineering fields at URI, but also a substantial increase in the quality of the students. By marketing the IEP as a challenging program for gifted students who wanted more than what the pure engineering major could provide, the IEP became a magnet for such students. Gifted and motivated students seeking to enhance and build on their technical skills, were attracted to URI and the IEP, often turning down admission offers from far more prestigious schools.

### **A New Kind of Teaching**

The success of the IEP, which has received many awards and been emulated by several other institutions, has not come, however, without considerable work and reassessment of what it means to be a humanist in American higher education today. Establishing the International Engineering Program meant, for example, a major shift in professional duties for founder John Grandin. Prior to that time, he had been a traditional professor of German, teaching three courses of German language and literature per semester and pursuing a research and publication program in German literature. But after launching the IEP together with Hermann Viets, his career took a very different direction. He first became a grant writer and fund-raiser, then a program developer, student recruiter and advisor, and teacher of specialized German language courses for students of engineering. The next steps involved the creation of an advisory board from the public and private sectors, and outreach to companies, both in the U.S. and Germany, to foster interest in the program and its students and to create six-month internship opportunities in Germany. Soon there was the addition of a program in French, to be followed by Spanish, Chinese, and Italian. Then came the IEP housing program, the dining program, and the acquisition and renovation of two buildings, with all of the issues associated with their management and maintenance. As the program

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<sup>2</sup> For an account of enrolled German majors in U.S. institutions, see *Personalia, Monatshefte* 104, no. 4 (winter 2012).

expanded, the duties and responsibilities grew even more. Soon there would be the addition of an assistant director, the development of short-term study tours for younger students, the creation of a regular newsletter, outreach to alumni, complex recruiting programs, and meetings with alumni, not to mention the founding of a yearly professional conference, the Annual Colloquium on International Engineering Education and a professional Online Journal for Global Engineering Education (<http://web.uri.edu/iep/colloquium/> and <http://digitalcommons.uri.edu/ojgee/> respectively).

Though Grandin did less and less traditional classroom teaching as the program matured, he came to see himself as a new kind of teacher with increasing hours of contact with his students. An open-door policy now brings in a steady stream of students. Though preparing students for study abroad and professional internships is technically not a classroom experience, it is an important part of the educational goals of the IEP, requiring many meetings, face-to-face and in groups. Moreover, helping students design their foreign language resumé or draft their letters of application for internships are equally important educational steps. Yet another important component of this new form of teaching involves sitting down with students at the lunch table to learn how they are doing and what problems they may be having.

This new demand with more emphasis on advising and career coaching was accompanied by a shift in the research and publication side of Grandin's professorial obligations. It meant moving from research on the works of Franz Kafka, to becoming a writer, presenter, and disseminator based on his experiences as an international educator and academic entrepreneur. Over the years, Grandin has become an authority on the internationalization of engineering education, the placement of students in international internships, fund-raising and grant writing, and the teaching of content based language courses, all of which are reflected in his lengthy list of publications.<sup>3</sup>

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<sup>3</sup> Several new appointments in the German, French, Spanish and Chinese sections hired to help administer the various IEP programs have also shifted their research focus more toward applied language studies, and international engineering education.

### **A New Kind of Learning**

The IEP curriculum is far more comprehensive than that of the traditional major, whether in engineering or the humanities. Though it has its share of typical classroom learning, the overall program is part of a well-planned all-encompassing living, learning, and working experience focusing on the development of technical understanding and skills, as well as in-depth language and culture study and learning. What happens in the classroom is supported outside the classroom through regular interaction with peers and faculty, study tours abroad, professional internships at home, study and work abroad, journal writing in the target language, and capstone learning experiences in the final year. In short, the IEP provides a supportive framework enabling motivated and gifted young people to prepare broadly and extensively for lives and careers in today's complex global society.

Both the language and the technical learning experiences are integrated into every semester of the five-year program. The language learning is further highlighted by the design of content-based language courses, allowing the students to enhance their language skills in courses infused with technical materials (Rarick 2010, von Reinhart 2001). IEP language learning also focuses on cultural issues and cross-cultural communication, helping to prepare students for their year abroad as exchange students and professional interns. In the final year, after students have strengthened their language abilities with a year of in-country use, students are better prepared, both intellectually and motivationally, to deal with sophisticated texts selected from the history of the culture and literature of their chosen language. By graduation they have advanced-level proficiency in the language, backed by direct experience with engineering as it is taught at a technical university and as it is practiced in the country of their choice.

The IEP is a demanding program in terms of its language and its requirements for time spent abroad. Students in the program may participate in optional, short-term study tours abroad without considerable background in the language. However, no student is sent abroad for study and professional internships without having completed at least six full semesters of language study or the equivalent, and at least six semesters of the engineering curriculum. With this stringent requirement, the IEP sets itself apart from most study abroad programs,

whether in engineering or any field. The trend today in American higher education is to send more students abroad, but predominantly for short-term stays such as in the summer or between semesters, and for programs conducted solely in English (Institute for International Education 2014). IEP students complete a full semester at a partner university, where they study engineering and language/culture, and complete research projects in university institutes, with all work done in the language. The work is pre-approved, enabling students to complete a full semester of credit, which is transferred to URI.

The internship follows the semester of study and is carried out in collaboration with cooperating companies in the country of the target language and culture. Internships are professional, full-time, paid, and conducted under the supervision of an engineering mentor. The internships are also arranged to coordinate with students' majors, i.e., mechanical engineers often work with automotive-related companies, electrical engineers with companies such as Siemens, chemical engineers with companies such as Bayer, and so forth. While on location during the six-month period, the students are required to submit written reports in the foreign language every second week, discussing their work and offering observations on the culture, both in a day-to-day sense, but also as it impacts engineering practice in that location.

The IEP year abroad is financially very cost effective, especially when compared with most study abroad programs arranged by American universities. The IEP semester of study is based upon a one-to-one exchange relationship with the IEP partner schools. Participants in the exchange meet all financial obligations at the home institution and then exchange places, one-for-one. By special arrangement, IEP students pay in-state tuition for the one semester of study, whether they are in-state students or not, and they are not required to pay any tuition during the internship semester. Students thus pay URI tuition for one semester of study for the entire year. Living expenses come out of their own pockets, but room and board tend to be highly subsidized at foreign universities and thus far less expensive than in Rhode Island.

### **Expanded Learning Outcomes**

In a recently published study of fifteen IEP graduates in the workplace, Grandin (2011) sought to define more clearly what skills or qualities IEP

students specifically gain from the linguistic and international components of this unique five-year program, and how these come into play in their professional careers. What skills are gained from the IEP curriculum and from the time spent abroad? What skills or qualities are acquired over and above those of a traditional engineering program? And what difference have the outcomes of the IEP education made for them in their lives and careers since graduation? Grandin interviewed the fifteen former students in depth, asking them to look back at their undergraduate years and to evaluate what they achieved as a result of the IEP and how this may have helped them in their professional and personal lives since that time.

Historically the IEP has always promoted itself as a special program with a strong international dimension. It promises a first rate engineering education, and language skills strong enough to participate in an accredited semester-long study abroad program at a partner university, as well as a six-month professional internship. The IEP has always argued that study and work abroad in the language give access to a culture and professional practice in a manner otherwise not available. Students develop strong language skills, strong cross-cultural communication skills, appreciation for different points of view and different attitudes influencing things like design, safety, environmental protection, and quality. IEP students also become mobile, flexible, and tolerant of difference.

Grandin was able to legitimize these claims through the case studies of these fifteen alumni, but he was also able to discover other commonalities among this group that the program had not typically identified. Each member of this group stressed, for example, that he or she had developed far more advanced problem solving skills during the time spent abroad. They pointed out that they were sent to another culture well outside of their comfort zone, where all matters, both large and small, were dealt with in another language, and where they were expected to take far greater responsibility for themselves. Adapting to a different university system, a dormitory philosophy, banking system, diet, sense of humor, interpersonal reaction patterns, and so forth, required attentiveness and a sharp learning curve, all to be dealt with in a milieu which provides far less hand-holding and spoon-feeding than the American university system. Learning to use their language skills

and to build on the background that had been provided through three years of study was a huge challenge in and of itself. But beyond that, they all reported that each day brought new issues, problems, and challenges, linguistic, cultural and otherwise, but that this process in turn resulted in major personal growth during the year abroad, enabling them to return home and enter their careers with a far greater maturity than most of their peers who did not have such an experience during their undergraduate years.

The members of this group also reported that their success in learning to communicate in another language and in another culture, along with their new problem solving skills led to a greater sense of self-confidence, and a new sense of what they might be able to achieve in life. Learning at age 21 that one can live abroad, communicate in another language, and, for example, successfully take a seminar in Finite Element Analysis in German and apply that knowledge in the workplace, builds confidence and helps one to understand that goals once thought to be mere dreams are now achievable.

While studying and working abroad for one year provided a boost in self-confidence, the fifteen alumni also reported that the experience enhanced their ability to take calculated risks. In looking back, the alums could view the IEP curriculum itself as a risk that has paid off handsomely. They committed to learning a new language, spending a year abroad, taking engineering courses in a foreign language, going to work for a company with unknown supervisors and unclear assignments in advance, and yet they met all these challenges and succeeded. As a result, they were each able to reassess the future and the goals they might set for themselves. Matthew Zimmerman, for example, had the courage to turn down job offers in his senior year, with the belief that he could start his own company – which he did. Sharon Ruggieri turned down an offer from a major automobile manufacturer with the hope that she would be accepted to MIT's Sloan School of Management – which she was. Rather than go directly into a full-time job in the U.S. after graduation, Daniel Fischer chose to do a second internship with Siemens in Germany, with the hope that he might be able to land a regular position with them at their German headquarters for MRI technology – which he did. Sareh Rajee decided to apply for early admission to Brown Medical School – where she recently

completed her MD while simultaneously earning a Masters in Public Health from Harvard. In their own words:

The IEP experience, especially my year abroad, helped me build confidence in my interpersonal communication skills, in my independence, and in myself as an individual. The IEP showed me what I am capable of, and I am now a stronger, happier, and more independent person because of it. (*Sareh Rajaei, 2006, Biomedical Engineering and German*)

The IEP put me in situations that I would not have experienced in the U.S. In that sense, you grow and learn how big your comfort zone is and what you can do when you find yourself in situations on the border of or outside of this zone. (*Daniel Fischer, 2002, Electrical Engineering and German*)

I'm a much different person as a result of the IEP. The world is a lot smaller and my ambitions are a lot larger. Challenges don't look as daunting, and as a result, I'm more willing to provide my opinion or step forward to work on a project. (*Johnathan DiMuro, 2003, Chemical Engineering and German*)

A comprehensive longitudinal assessment of IEP alums' perception of the technical, linguistic and cross-cultural gains they made during their five year IEP program and the impact it had on their careers confirm the findings of the case studies of the smaller segment of alums cited above. Walter von Reinhardt, a faculty member who teaches German for Engineers at URI undertook the assessment of IEP alums over a ten year period (2001-2010), and Erin Papa, Assistant Director of the Chinese Flagship Program and Sigrid Berka cross-checked the results with outcomes of a survey on company needs in Rhode Island. They found an excellent match between the IEP alums' skill-sets and the hard and soft skills as well as linguistic and cultural proficiency needed in Rhode Island companies with global operations and a diverse work force (Berka, Papa, and von Reinhardt 2013).

### **Partnering with the Private Sector**

As explained above, the IEP is built upon a series of partnerships, beginning in 1987 with the initial shared vision of Dean of Engineering Hermann Viets and German Professor John Grandin. The resulting partnership between engineering and languages faculty has grown significantly and thrived over the years, with the two fields working closely together in many ways. Going far beyond the superficial or symbolic level, the staff and faculty involved in the program today feel an equal allegiance to the two colleges involved, and vice versa, to the extent that the IEP Director has voting rights in the College of Engineering chairs meetings as well as in the Department of Modern & Classical Languages & Literatures' department meetings. The College of Engineering and the College of Arts and Sciences are equally proud of the program, have joined in helping to support its costs, and both have made a major commitment to seek extramural funding for its long-term infrastructure.

Faculty from each area have discovered the many benefits of their IEP partnership. The program has helped to recruit a larger and stronger student body; it has made it possible to launch joint research projects with faculty from partner institutions abroad; and it has made the faculty more competitive for research funds from agencies such as the National Science Foundation. The partnership has resulted in joint faculty publications, and joint presentations at both technical and language based professional meetings. In the final analysis, the IEP has brought considerable recognition to both engineering and language programs at URI from peers at other institutions and leaders in higher education, and many awards have come to the program from both the engineering and the language professional communities.<sup>4</sup>

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<sup>4</sup> The IEP and its directors have received awards from ABET (Educational Innovation Award), IIE (the Heiskell Award for Innovation in Study Abroad), ADFL and MLA (2012 Award for Distinguished Service in the Profession), NASULGC (Michael F. Malone Award), the German government (Federal Cross of Honor), the German Academic Exchange Service (DAAD Alumni Award for International Exchange), AATG (Outstanding German Educator), NAFSA (Senator Paul Simon Spotlight Award for Campus Internationalization)

If the IEP relies on a willing interdisciplinary partnership within the institution, its relationship with the private sector is equally important and equally vibrant. Since its beginning, the IEP has relied on globally-involved companies who see the value of the program and participate by providing paid internships to qualifying students. Initial contacts with companies in Germany were made by Hermann Viets and John Grandin, with the promise that we would send students with good conversational ability in the language and at least third-year standing in the engineering curriculum. The companies, in turn, agreed to provide a meaningful, supervised, professional internship experience with a housing arrangement and a subsistence stipend. From the beginning it was clear that the companies valued the idea of American engineers with global communication skills and most hoped, in the long run, to be able to hire IEP graduates. Indeed, many of our partner companies have recruited and hired our graduates, with some companies employing as many as 8-10 former students at locations in both the U.S. and abroad.

The IEP leadership has found business and industry very open to the idea of a partnership with the IEP and more than willing, if not eager, to play a role in shaping such an educational curriculum. Our corporate partners thus helped us found an external advisory board for the program, whose members would help guide its direction and eventually also support it financially. The IEP Advisory Board is made up of members of both the public and private sectors, including the German Consul General in Boston and corporate leaders from several global companies, including U.S. companies with subsidiaries abroad and European companies with strong representation in the U.S. The Board is chaired by a private citizen, Heidi Kirk Duffy, who has a strong commitment to the IEP and has been one of its strongest financial supporters. It meets as a group annually, most often at the URI campus, but every third year or so at a location abroad, at one of our partner universities or at the headquarters of one of our global partner companies. To date the group has met in San Sebastian, Spain, in Paris, and in Munich, Berlin, Friedrichshafen, and Braunschweig, Germany.

Our corporate partners all provide internships for our students, with approximately 60 placements per year in Germany, France, Spain, Mexico, and China. Given the fact that participating companies are global in their structure and commitments, it is often possible to work

with the same companies in multiple countries. Our German partner, ZF Friedrichshafen AG, for example, has provided internships for IEP students in Germany, France, Spain, Mexico, Brazil, China, and the U.S. Ideally, students are placed with a partnering company for a summer position following the second and/or third years of the curriculum, and then placed with the same company when completing the six-month position abroad. Such was the case with Sheida Danesh, a German and Mechanical Engineering major who interned for two summers locally with Hexagon Metrology in Quonset, R.I., followed by research in the Institute for Metrology at TU Braunschweig during her semester of study abroad, and then a six-month internship at Hexagon Metrology in Wetzlar. This practice provides a consistent educational plan for the student, while providing the company the opportunity to review the student's work and capabilities in two different locations. The student also, in such situations, collaborates with the same company when completing the required senior design project, and thus becomes a strong candidate for any open positions at the company.

Most of the IEP cooperating companies have become willing partners, partly out of their personal eagerness to be involved in educational innovation at the university level, but also due to the direct benefit they can accrue by hiring IEP graduates. Our partner companies are very aware of the need for engineers with international experience and global communication skills, and are thus eager to be in the front line when the best students are ready to enter the workplace. Now that the program can boast an alumni body of over 400, the partner companies can assess the extent to which their participation has been worthwhile. Although many of the grads have gone to work for other firms, a sizeable number has indeed joined the cooperating companies. Thus, there are IEP graduates working for Siemens in Germany and the U.S.; for BMW, likewise in Germany and the U.S.; for ZF Friedrichshafen AG in Germany, the U.S., and Japan; for Continental AG in Germany; for MTU Aero Engines in Germany and the U.S.; for Sensata Technologies in the U. S. and China; for Hexagon Metrology in the U.S.; for ExxonMobil in Texas, and Nigeria; for the Deutsche Bahn in Germany, and so forth.

Partner companies see it in their direct interest to work with the IEP and also to support the IEP financially over and above the promise

of internship positions and stipends. As noted above, several of our companies supported the development of the IEP House and the Texas Instruments House. In addition, many of our partners have provided scholarship support for our students, in the form of direct grants or endowed scholarship funds. More recently, our partners, along with many alumni and other friends of the IEP, have contributed to an endowed directorship fund, which has been established in the name of emeritus director John Grandin, with the goal to achieve financial independence of the directorship position in the future.

### **What are the Barriers to such Reform?**

If we have successfully presented the International Engineering Program as a model to provide today's students with the extensive knowledge and skill sets required for the contemporary workplace, then we need to ask what stands in the path of its adoption on a broad scale. As acknowledged above, the marriage of engineering with languages is unique and few have tried to imitate the IEP, despite its obvious advantages and despite its many admirers. Why is this the case?

The problems begin first with long-standing traditions in academia, reinforced by an overwhelming tendency to preserve the status quo. As mentioned above, language faculty view themselves as traditional humanists, with their disciplines based in the study and teaching of national literatures. Furthermore, many language faculty fear the notion that their language courses might be placed in the "service" of other disciplines. On the engineering side, there are many who argue the prevalence of English on the global scene and see no value in devoting time to learning languages other than English. Additional time, they argue, should be devoted to supplemental technical courses. These barriers can only be overcome if, as was the case at URI, the doubters begin to see the mutual value of working together with faculty across the disciplines, leading to the understanding that both parties can benefit through collaboration. As a result of the IEP, both the URI language and engineering classes were soon full of very talented students, many of whom would not have come had it not been for this program.

Secondly, humanists are reluctant to recognize and market any pragmatic value of their studies for the future careers of their students.

Though all students can benefit from exposure to our disciplines through the acquisition of very definable skills, the first priority has been and remains the training of small numbers of students to pursue graduate studies with a narrow and esoteric focus. The workplace calls for scientists and engineers who are good problem solvers, good communicators, good team leaders, who are culturally aware and informed, who can communicate in other languages and across cultures, and who can see the value of their work in a larger context. As the IEP has shown, these are all qualities that emerge from a rigorous liberal and international education. The IEP has given a whole new dimension to the engineering student at URI, and, in the process, enabled the German program to blossom, rather than wither on the vine. Language and culture study at URI have not only been preserved through the creation of the IEP, but have become far more central to the entire university curriculum.

Another major hurdle for the development of such innovative curricula is found in the nature of the faculty tenure and promotion system, which, by design, directly discourages faculty from committing time and effort to programs like the IEP. Language faculty are promoted as a result of good teaching, but typically not without publication records in their esoteric literature specializations. Engineers, of course, will not be tenured or promoted without a strong research record and success at attracting substantial outside funding. Faculty who involve themselves extensively in designing new curricula or promoting the partnerships required for an IEP place themselves and their careers in jeopardy. There is simply no motivation for faculty to become involved in such projects other than personal commitment to its value. Unfortunately, this is not sufficient to support widespread change.

It is also true that significant innovation in any organization requires visionaries with the sustained passion and commitment necessary to bring the desired change to fruition, and the relative freedom to do so. An example is the case of Hermann Viets and John Grandin who rapidly became consumed by the idea of the IEP, and who both were in a position to act. Viets was dean of his college and thus unconstrained; Grandin had already been promoted to full professor and thus had the freedom to set his literary projects aside. Had they not met, had they not shared a common interest, had they not had the

freedom to act, and had they not been successful opinion shapers, the IEP would not have come about. Change of this nature requires zealous champions, reliable partners, and leaders with credibility and the freedom to move forward.

Funding is another very real hurdle. Visiting companies in the U.S. and Germany to develop internships required funding. Grandin further needed release time to commit to the project and to enable him, for example, to develop and offer separate introductory German courses for students of engineering. Funds to create promotional materials were also needed. Since there was no internal fund or seed money to get the program started, Grandin turned to the U.S. Department of Education and secured a FIPSE (Fund for the Improvement of Post Secondary Education) grant which supported all of the immediate needs, such as hiring young language faculty with an additional background in a STEM or business field to implement content based instruction, and also lent prestige to the effort. Realistically, failure to find extramural support would have made the project unrealizable.

The lack of institutional commitment and support can also be a hurdle in the path of change. When the IEP was first in place, URI administrators in international education, with the exception of Hermann Viets, demonstrated very little interest, thus leaving the full effort of the program in the hands of just a few faculty. Once the program had a longer track record of success and had begun to attract attention and financial support from the private sector, however, the president took a greater interest in the project. Were we to start the program today, it would very likely find immediate administrative support, since the current president has designated global education as a major priority.

### **Overcoming the Challenges**

We feel strongly that the kind of change suggested here must begin with recognition of the extent of the crisis in higher education today. Nothing will happen if the engineering faculty, for example, are blind to the challenges of the contemporary workplace or are unaware of the high disciplinary standards and competition set by colleagues across the globe, especially in Europe and Asia. Nothing will happen if faculty members are comfortable in their departmental silos, convinced that

their classes will always be filled for their traditional lectures. And nothing will happen if language faculty are allowed to teach to the very few students who enroll in their esoteric upper-level classes, which have no direct relationship to the world of employment. Faculty in all disciplines must open their eyes to the problems facing higher education today and must reassess the roles that they and their disciplines can or could play in preparing young people for meaningful careers.

Incentive for change can come from institutional leadership. Faculty need to be encouraged by their presidents, provosts, and deans to think about the university and its curriculum in a time of major change such as this. Institutional leadership is always “looking for stellar programs in which to invest” (Roche 2011). A flagship program such as the IEP with its impressive success of garnering external support as well as several national awards both from the languages as well as from the engineering side provides such an investment opportunity. In addition, it gives the President, Provost and the collaborating deans a narrative, a story to tell which is unique and makes the university and its leadership stand out. Faculty should be encouraged to explore what students need to know in today’s society, to rethink their places in the educational curriculum, and to reach out to untraditional partners. A president, for example, could offer challenge grants and seed money to explore opportunities with potential partners, to research potential funding sources, and to experiment.

As mentioned above, incentive for change could also come from the federal government in the form of a Morrill Act for the 21<sup>st</sup> century. Just as President Lincoln reacted to the education needs for the age of industrialization, the current administration and Congress might seek to redefine the undergraduate curriculum for the age of globalization.<sup>5</sup> There might, for example, be a certification process resulting in special funding for universities that could be certified as Morrill 2014

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<sup>5</sup> President Obama’s 100,000 Strong Initiatives to China, and the newly launched 100,000 Strong Initiative in the Americas is a step in the right direction, but needs to be complemented by a more comprehensive reform of higher education curricula. Programs like the IEP with a strong pipeline of students and an international infrastructure of academic and industrial partners are uniquely suited to win such grant competitions, as recently demonstrated by the Spanish IEP’s successful grant competition for exchanges with Chile, see <http://web.uri.edu/iep/files/100000-Strong-Launch-1.17.14-APPROVED-FOR-RELEASE.pdf>

universities. Land Grant was a concept for its time, just as Sea Grant became a concept for its time in 1966, Space Grant in 1988, and Sun Grant in 2003. Morrill 2014 institutions would redefine liberal education by creative curricula through which students would acquire the benefits of both a technical/professional and a liberal arts education. They would possess the skills to thrive in an era of rapid change, defined by modern technology and globalization.

With or without federal support, higher education leaders should and can take specific action to drastically change the rewards system for faculty, making it possible to commit themselves to programmatic ventures such as the IEP without endangering their university careers. One might, for example, allow faculty to pursue different tracks, with some focused more on teaching than research, with others more on research, and others on entrepreneurial program building. Given these options, one might even build flexibility into the system so that a research faculty member could, for example, devote five years to the teaching track or the administrative track. Such five-year blocks could be defined by contract, with very clear duties and expectations. All of these professional strands would be acceptable as steps toward tenure and promotion, assuming that certain predefined standards are met.

Administrators should also provide more than lip service for interdisciplinary teaching and programming. It could be made much easier for faculty to have joint appointments, and for programs such as the IEP to be at home in both a College of Engineering and a College of Arts and Sciences. Deans should be prepared to co-fund projects that are in the interest of both colleges. They should be prepared to jointly mentor and evaluate faculty participating in cross-disciplinary programs.

The administration should also be prepared to help faculty overcome university bureaucracies which are, by design, equipped only to deal with the status quo. Faculty can easily be discouraged by institutions that do not embrace attempts to do things differently or that have little room for experimentation in the curriculum. The IEP survived by persisting in the face of resistance when proposing, for example, two degrees (BA/BS) in five years, or attempting to streamline the general education program for IEP students, or creating dual degree masters programs with partner schools abroad, or even accepting financial support from the People's Republic of China. It is an

unfortunate reality that institutions often say “no” in the face of common sense proposals, when they should be saying: “Now this makes sense. How can we make this happen?” Would it not be possible to appoint an innovation board, i.e., a group of faculty and administrators who are pledged to help their school’s academic entrepreneurs?

To encourage cross-disciplinary teaching, administrators should require all faculty to participate in general education curricula. It would be important, for example, for engineering faculty to offer engineering courses for non-science majors, or engineering courses for an engineering minor or an engineering Bachelor of Arts degree. Science faculty should do the same, as should pharmacy and medical school faculty, and law and business faculty as well.<sup>6</sup> No humanities or social science student should be allowed to graduate without sufficient background in science and technology to comprehend and appreciate those things that drive our economy and impact our daily lives. Likewise, no engineering student should be allowed to graduate without exposure to engineering as practiced abroad and without demonstrating the acquisition of strong communication skills, problem-solving skills and a commitment to lifelong learning.

Administrators and faculty should be continually networking with the leaders from the private sector who will be hiring their graduates, as has been shown in the example of the URI International Engineering Program. The urgency of this matter stands at the heart of the McKinsey report cited above, reminding higher education of the huge gap between the needs of business and industry and the related perceptions of educators. The report found that 84% of higher education providers believed they were preparing students well for the workplace, while less than half of the business leaders agreed (66-68). Higher education curricula can and should be developed, therefore, in consultation with leaders from business and industry, who should be expected to take an active and engaged interest in the formation of their future employees. Employers and educators should be in continual

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<sup>6</sup> At the University of Rhode Island, the Provost’s interdisciplinary cluster hire initiative in which three faculty from different educational backgrounds each were hired jointly to collaborate within “clusters” such as sustainable energy, water resources, and the ageing society, is a laudable undertaking in that sense.

conversation about the skills needed for success in the workplace, both “hard and soft,” and the appropriate means for providing students with such skills. As has been shown in the example of the IEP, employers should also understand that it is in their best interests to help finance the education of their future employees. Students of our programs should be able to find appropriate internships, special projects, and advising opportunities, through which they can learn, be supported, and also receive valuable feedback. If such a network is active, we should never hear that our education system is not producing graduates with the skills needed for the workplace and for the 21<sup>st</sup> Century. And we should no longer hear that 50% of our graduates are unemployed or underemployed.

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