RETAINING ENGINEERING STUDENTS THROUGH A J-TERM GERMAN IMMERSION STUDY TOUR

Faculty Paper
Recruitment, Retention, and Outreach Programs

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Introduction:

The International Engineering Program (IEP) organizes a 10-14 day German Study Tour during January break. It offers International Engineering and International Business students a full-immersion program to further expand and extend their study of German language and culture. At the same time, it is a great incentive for students enrolled in URI’s 5 year dual degree German IEP program, working towards a B.S. in an engineering discipline, and a B.A. in German. Students in this program spend their 4th year studying and interning abroad. The IEP has a demanding curriculum, and the annual study tour is one of its most effective tools to retain these students who go the extra mile. It serves several purposes: firstly, it introduces students to Germany as an attractive site for science, technology and culture. Highlights of the study tour are visits to German companies as a means of preparing students for their internships in the 4th year. At companies such as Bayer, BMW, Conti, Hilti, Lufthansa Technik, Siemens, or ZF students can use power tools, and admire transmission systems or classical car collections. Secondly, students tour science and art museums, and historical sites to get immersed into the culture. Thirdly, they use their budding language skills to talk to their German counterparts while visiting institute labs at our partner university. Lastly, students use their teamwork, language and problem solving skills to contribute to a case study sponsored by a company. They work in teams with young trainees from the German Rail company (Deutsche Bahn) on solving a real world problem, e.g. designing new cars for the next generation of InterCityExpress train taking into consideration the technical specifications, customer demands and budget restrictions, or finding the best logistics solution for transportation of goods from Germany to Italy via rail, truck, or ship.

The German Study Tour is an effective and attractive tool for retaining students in the IEP, reaching out to our industrial partners, and recruiting freshmen into the program. This innovative study module also closely ties in with the regular curricular offerings in the German department and with URI’s strong focus on globalizing the curriculum, e.g. the Academic Plan’s focus area on “Global Citizenry” [1]. The Study Tour is usually organized by the director of the IEP who can take advantage of the program’s extensive company network for scheduling corporate visits and tours. Outside funding comes from the German Academic Exchange Service where faculty can apply for a group study visit [2] which supports up to 15 students and one faculty for up to 12 days with a maximum of 9,600 Euros. Additional support comes from the Van Meeteren Foundation [3]. We are keeping the costs low overall since we are staying in youth hostels and use public transportation whenever possible. Thus student charges are kept at a minimum which
allows us to offer the study tour every year. Between 20-30 students usually participate, most international engineering, but also business or pharmacy majors – students need to be currently enrolled in a German class to apply for the trip. The two accompanying faculty are either German professors or German speaking engineering faculty.

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Retention of engineering students is of national and international concern since a globalizing world needs ever more culturally savvy and technically adept graduates to fulfill the work force demands of companies operating globally. The literature on retention of engineering students widely agrees that the freshmen year is of critical importance [4a,b]; that only about 40-50% [5,6] graduate with an engineering degree. Many students who excelled in high school in the STEM disciplines do not have a good understanding of what engineering is all about when they begin their engineering studies, nor do they know much about a career in engineering. Similarly, within the realm of language studies, enrollment in language courses is always high in the first year, and then usually begins to dwindle in the intermediate sequence with the highest attrition rate in the upper level courses. Students often begin with a foreign language due to a one year language requirement (like at URI), but then they do not continue beyond the first year. At the same time, the internationalizing of the curriculum is of increasing concern. The world needs multi-lingual graduates to fulfill the communication demands of an increasingly flat world, those who can tackle the challenges of global teams in businesses operating all over the world. To make language learning more meaning- and purposeful, ACTFL, the American Council on the Teaching of Foreign Languages, recommends contextualization of language learning and came up with the five ‘C’ standards (Communication, Connections, Communities, Culture, Context) [7]. Teachers should be aware of those standards and use them in their daily teaching strategies, through community involvement, or through immersion programs abroad. The hope is that the learner becomes more engaged in learning the language when his/her language learning ties in with actual communities and contexts.

The International Engineering Program (IEP) at the University of Rhode Island [8] is an example of how such contextualized and content-based learning can be achieved by way of an integrated curriculum. It offers an award winning five year dual degree program, through which students receive two simultaneous degrees, a B.S. in an engineering discipline, and a B.A. in German, French, Spanish, or Chinese. The 4th year is completely spent abroad, first for a semester of studies at a partner university, followed by an internship in a company in the target country. About 25% of all engineering students participate in the IEP. Over the last 7 years, an average of 38% of all women engineering students were enrolled in the IEP versus only 16% of women engineering students enrolled in the College of Engineering (COE). Over the same period of time, an average of 22% minority students were enrolled in the IEP versus only 13% enrolled in the College of Engineering. Needless to say, this rigorous program places the highest demands on students and yet has a very high retention rate. In fact, it attracts the best and brightest, those who are willing to go the extra mile. 55% of IEP students receive a centennial scholarship which goes to the upper echelon of the incoming class. Thus their chances of achieving a high GPA in their first year, which in turn is a crucial indicator of successfully completing the engineering curriculum [4], are very high.
At the same time, these students fill the foreign language pipeline, because their language learning has a purpose strongly correlated with their other interest: science, engineering and technology. In fact, the model of integrated learning which the IEP provides, has a tremendous impact on enrollment figures at URI: While many American universities are discontinuing German language courses, the program at URI is thriving, thanks in part to the partnerships with the university’s engineering and business programs. About 135 students major in German at URI, most of whom major in another academic discipline. In certain years, up to 90% of the German majors were engineering students! It is easy to see, that URI is retaining engineering students in engineering AND languages because they are studying with the purpose of the great promise to go abroad in their 4th year, use the language in the target country, and do their internship at a dream company like BMW, Bosch, or Bayer.

However, it is not always easy to stay on this challenging course at all times. That is why the attractive yet highly demanding curriculum needs to have supplementary offerings which allow students to learn in the “off-season”, add incentives, and lead to student-student bonding and faculty approachability:

- Special courses across the disciplines like German for Engineers.
- Excellent advising structure (IEP students have an engineering advisor and also an advisor from the Foreign Languages Department who serves as IEP Director. The IEP directors often know the student already as a prospective student, then accompany him/her on the 5-year journey including placement in a company for the internship part.
- Immersion courses (a 3-6 week German summer school; an 8 week Chinese summer school with 4 weeks spent in China); a Chinese winter immersion at URI; the German Study Tour (10-14 days spent in Germany).
- A special Living & Learning Community where IEP students live together, solve problem sets and get free tutoring in the languages from foreign exchange students which also serves as headquarters for IEP housing coordinator, IEP director, and coordinator.
Those inbuilt incentives like the faculty-led German Study Tour keep students enthusiastic about giving it all, make them study harder than their engineering peers in the regular curriculum, and generate a feeling of belonging to a special group. It raises their self-confidence and self-efficacy to stay on top of a demanding curriculum. During the study-tour, students can readily approach the two faculty leaders and explore the two contexts they are majoring in together, German history and culture and German engineering culture. According to Vogt [5] faculty distance or aloofness lowers self-efficacy, academic confidence and GPA, while academic integration and faculty approachability has a positive effect on effort, confidence, and critical thinking. It also encourages help-seeking and peer-learning. Students on the study tour can bond with faculty mentors and with their peers, decide to take up-coming classes together, enroll in summer immersion, and finally go abroad together. Looking back at several years of study tours, we observed that ALL of the IEP students who participated are either still in the program or have successfully graduated. Many of them also chose to enroll in the German summer school, and thus got a head-start in proficiency before going abroad for the year. Freshmen, who went on a tour, often go back again a second time. Students not only report satisfaction with the technical and cultural program, but they also notice that their ears tune into the German sound very quickly, and they get excited about understanding first words, and to be able to speak short sentences like ordering food in a restaurant, buying train tickets etc. “Speaking German with native speakers really helped my language skills,” said Peter Edwards, a junior who is studying German and business. “It was a good way to learn and absorb the language. I’m hoping to work internationally, and studying German is a great stepping stone in that direction.” [9]. Studies about learning outcomes through abroad immersion programs indicate that there is a strong correlation between language proficiency gains and long-term immersion programming [10]; but as a first step towards the longer-term stay abroad, the short-term trip is also of great value. It keeps students excited about learning the language because they witness and experience it in the context where it is actually spoken, and get motivated by initial small successes in handling everyday situations.

Often, the study tour reminds students in a powerful way why they joined the German IEP in the first place: some are attracted by the brand “made in Germany.” There is a reason why the German IEP is the largest IEP program: not only is it IEP’s oldest program; students who have to opt for one of the available languages, also often start with German from scratch rather than continuing what they have had in high school, because they connect German with engineering excellence. They join the GIEP because one day they want to work for BMW, and the prospect of getting placed in the company as an intern is extremely motivating. Four years are a long time, though, until the goal is reached, and so the study tour serves as a powerful reminder of the long-term goal and helps keep up students’ enthusiasm for the brand. When our students get a special tour through the BMW Classic Collection, a private ride on a German high speed train (DB) [11] or on a test track for tires (CONTI), use one of the powerful diamond coated HILTI drills made for the construction industry, watch how a plane is being overhauled in a Lufthansa hangar, or how steering and driving is simulated at ZF (a specialist in drive train and transmission technology), they understand why they are putting such an effort into their studies; they reconnect with the original purpose of joining the IEP, and feel excited about soon being able to do an internship in the company they visited. “The study tour gave me a rare behind-the-scenes view of German engineering companies,” said Matt Hooks, a junior computer engineering major.
who will spend the next school year studying and interning in Germany [9]. The relaxed and exciting environment created by faculty adds to affecting student motivation, performance, and persistence.

The highlight of each tour is a case study workshop with young employees or trainees of the German Rail company which always combines cultural and cross-cultural exploration with technical problem solving. This year’s workshop topic was “The Ideal Mobility Comfort.” IEP students were mixed in with trainees from DB in several inter-disciplinary teams. They had to put together a whole train with several cars, and decide on how to design the interior: where to place the private and group compartments, dining cars, toilets, bike racks, and family compartments, and where to place first class and coach cars, complete with or without internet access, on-train entertainment, areas for communication, and networking etc. It is a great exercise in learning to use one’s team working and analytical skills as well as business know-how. Students had the opportunity to learn about how a different culture approaches problems in a different way, and use their budding language skills in the process. This culturally diverse group situation provides the ideal context for effective learning: access to a new community, allows communication which is driven by a real world scenario or context, and connection with their German peers, first by trying to find a solution and win a price together, then afterwards by celebrating their achievements. For our technically savvy students, this hands-on experiential learning opportunity is right up their alley; it also allows them to delve deeper into cultural understanding. In evaluating the case study teams, IEP faculty and DB management on the jury observed the following differences between IEP students and DB young employees in their way of problem solving:

Generally, the German participants were more direct in their comments compared with their polite US counterparts. They tended to plan longer ahead and then strived for fast execution while their US counterparts usually approached the problem by experimenting with various solutions and correcting them along the way if faced with an obstacle. Looking at the difference between university and corporate culture we observed: IEP students were much younger than their German program counterparts and showed well trained analytic skills and impressive presentation techniques. They were group-oriented, openly sharing their problem solving approaches with others and showed a noticeable “Can-Do-Attitude”. Their less restricted approach and readiness to jump immediately into problem-solving led them to very creative solutions. On the other hand, DB’s young employees were much more calculative in forming conclusions based on the variables of the situation and environment. They usually focused more on content and background information with less emphasis on analysis techniques. Though they did not come up with radically new approaches, it was remarkable how DB employees moved beyond analysis and progressed to the implementation of their ideas. They often elaborated practical solutions that easily fit into a given corporate culture and thought hard about how to convince stakeholders.

The role of intercultural awareness, understanding and competence in language learning has received increasing attention in foreign language acquisition theory [5,6,7] and the study tour is a case in point that whenever possible, immersion modules should be integrated into the language teaching curriculum. Data from a recent survey on teaching culture in the German language classroom show that teachers did not feel adequately prepared. The low ratings for adequacy of
preparation allotted to pedagogical approaches for teaching cultural awareness, understanding or competence or (56.7%) or how to use the standards for teaching culture (43.5%) demonstrate that it is difficult to convey in a classroom [5]. Immersion modules like an eye-opening study tour, especially when prefaced by a pre-departure orientation on which cultural products, practices and perspectives to watch out for, provide first-hand access to the cultural environment and thus raise the students’ level of awareness. In the case of our study tour, students could also gain one credit by writing a reflective paper on either differences in US-German culture or any engineering or technical feature they were impressed by. Putting the study tour in an academic frame ranging from linguistic preparation geared towards engineering students in the German language classroom “German for engineers”, to pre-departure cultural orientation, immersion in Germany, post-immersion reflection, and integration of study tour material in the classroom thus makes the most effective pedagogical use of this immersion innovative module. At the same time, the study tour and related effective mentoring by faculty leaders engages and empowers the student learner, increases self-efficacy and persistence [15] and provides a strong incentive to counter the high drop-out rate in STEM fields [16] and stay in a challenging engineering program.

References

[8] The International Engineering Program of the University of Rhode Island: http://www.uri.edu-iep/