

## **Engaging Industry in a Chemical Engineering Program at a Hispanic-serving Institution**

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### **Abstract**

Contact between industry and a university engineering department is beneficial to both parties, when viewed from the perspective that the university product, that is BS engineering graduates, are the new intellectual capital for the industrial entity. This presentation will review the different types of industry / university engagement that our department has utilized and will assess those activities which are of most direct benefit and those which are of less benefit.

### **Introduction**

Engineering degree programs typically engage industry in their local or regional area through an advisory board, as required for ABET accreditation. Industry engagement may also occur as part of industry hiring of graduates, and through industry-funded student scholarships. Our chemical engineering program has expanded our engagement with industry beyond these typical interactions. This expanded level of interaction has multiple benefits, both for our department in its mission, as well as for our graduates that are soon to be employed by local industry.

The authors of a study from a Technology Institute in Sweden found minimal research on student perceptions and motivations arising from industry interactions, while enrolled in engineering programs [1]. The obstacles to industry engagement encountered by engineering faculty were identified as primarily relationship associated in an Australian study [2]. A pilot program to evolve industrial advisory boards into industrial partnership boards, in which industry plays a greater role in curriculum definition, has been implemented by a small group of engineering programs in the United States [3]. The current effort relating to industry engagement at the Wayne H. King Department of Chemical and Natural Gas Engineering at Texas A&M University-Kingsville is presented here for the purposes of soliciting feedback from others in our region.

### **Methodology**

First, for the benefit of the students, our faculty instructors engage with area industry by organizing class field trips to chemical engineering industrial facilities and also bringing industry speakers to the students. Our department strives to provide separate field trips to area industry sites for each year in the students' academic career, and plans these visits for different classes that cover all levels

of engineering courses in our curriculum. These visits are planned by individual course instructors for the students in their specific class. This approach allows the instructor to tailor the content and objectives of each visit so that it is most relevant to the course instructional material. To date, our department has integrated industry visits for all academic years except the junior level classes, although this is an important academic level to include, since students are subject to at least six discipline-specific courses at this level. An industry site visit for a freshman level course serves to familiarize the students with the industries and processes where chemical engineers are most frequently employed. An industry visit for a sophomore level course gives the students a first opportunity to see and understand unit operations, as they learn about them in a mass and energy balances course. Industry exposure at the sophomore level also serves to motivate students to consider a summer internship with a local industry after their sophomore or junior years. An industry visit for a senior level course provides exposure to the concepts and approaches to process development from unit operations and process integration related to capstone engineering design courses.

Faculty in our department also strive to bring industry personnel, including alumni of our program, together with current students as part of specific chemical engineering courses. Opportunities for industry persons to talk with our students occur during a summer bridge program for underclassmen students, and in job search discussions conducted by local student chapters of national engineering professional societies. In this same vein, industry personnel also provide information sessions about their companies at the university campus, typically coincident with the university-organized career fair, which is held one time each semester. Several local refining or petrochemical industry employers prefer to hire our chemical engineering graduates over students that come from schools farther away from our region. This occurs because employers have found that the latter hires are much more likely to leave in a short period of time. When recent alumni from our department visit for events such as those described above, our current students are likely to recognize them from previous interactions when they were on campus. This recognition can have a very strong impact on the current student's ability to see persons like themselves now having successfully advanced to a professional environment.

Secondly, principally for the benefit of the department, industry personnel serve on our industrial advisory boards and they also volunteer as judges for our senior design conference held at the end of senior capstone courses in May each year. The industry personnel on the industrial advisory boards provide excellent feedback on their expectations of recent graduates that they may hire. The board members also provide suggestions for minor modifications to the chemical engineering curriculum, so that our program graduates may be better prepared for their start into an industrial position. The involvement of industry personnel in judging for the design conference is itself an excellent venue for industry to student interactions. The judges' interactions with students provides the latter with insight on what employers think of student work, besides providing the judges with a preview of the skills of specific students.

Third, there are interactions with industry that are mutually beneficial to both our department and to industry. These include a Port Industries Consortium group led by a department faculty member, which provides regular technical short courses for the benefit of industry operators and engineers. Additionally, faculty from our department have periodically visited industry sites to assist in public

outreach and donation or sponsorship events at their locations. These activities are typically not a direct benefit for the university students, however they serve to build connections between industry and our faculty, and thus lead to future engagements that do benefit the students. The building of relationships amongst faculty and industry has been cited as a critical element in these endeavors by other researchers [2].

## Results and Conclusions

Our recent efforts to increase our departmental engagement with industry benefits our students, principally in affording them a better idea of who their potential future employers are, and in what their future career may look like. In the last couple of graduating classes, there appears to be an increase in the number of departmental graduates that have a full-time position at the time of graduation with the BS degree, although some of this observed effect may also be due to recovery from COVID era conditions. The longer-term benefits of increased exposures to the plant environment and industry contacts are not necessarily immediately obvious, due to the very recent nature of our departmental efforts. However, the benefit of this exposure at different academic levels will be more evident as current lower level student cohorts rise through the four years of their academic career. Additionally, the author solicits feedback on industry engagement activities undertaken by other engineering programs.

**Keywords:** industry engagement, student motivation, engineering career.

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