

International Students and Communication Skills in Engineering Programs: A Recipe for Success

**Saeed D. Foroudastan, Ph.D., Associate Professor,
Dyani Saxby, Graduate Assistant**

**Engineering Technology and Industrial Studies Department
Middle Tennessee State University**

Abstract

It is of utmost importance that universities seek out creative ways to enhance the communication skills of their international engineering students. Too many engineering students graduate and enter today's global job market without sufficient communication skills that will ultimately give them an edge in their profession. Non-native speakers experience a double-edged sword when it comes to communication skills. Difficulties with the language barrier combined with the fact that some cultures do not encourage speaking out in public exacerbate the problem for many international students. Often, international students will struggle immensely with even the shortest presentations. Learning effective communication skills would help these students have a more pleasant and less stressful experience while studying abroad. Additionally, international students might be more motivated to attend a university that took the extra initiative in teaching communication skills.

This paper examines the importance of teaching communication skills to international students of engineering. Additionally, it investigates various methods of teaching communication skills to international engineering students in higher education. Top priority should be given to see that students are able to live up to the highest standards both academically and professionally. It is time that universities empowered their international students with the additional skills necessary to survive and flourish in today's competitive and demanding global job market.

Introduction

Most college students experience some level of stress throughout their studies. Between balancing their social lives, schoolwork, family, and possibly work responsibilities, it can be difficult to excel in all of these areas. As if there were not enough challenges for college students, international students face several additional pressures. These include adjusting to an entirely new culture and surroundings, as well as building relationships with their new peers¹.

Additional pressures are placed on those international students who do not speak English as their native language. This is one of the major obstacles facing international students. Language barriers can exacerbate struggles with class work including, "...taking notes, answering questions, and writing essays"². They also grapple with oral presentations as, "One specific challenge (for faculty) involves teaching ESL (English as a Second Language) students how to successfully complete coursework which requires oral performance"³. These are some of the common problems that international students face concerning their studies. However, oral and written communication tasks can be an even greater problem for international students majoring in engineering. This is because generally speaking, "Engineering students are for the most part, less skilled than their counterparts in the Arts and Science faculties where much of the research into student writing has been carried out"⁴. This coupled with the fact that some international students will be writing papers and giving presentations in English rather than in their native tongues can certainly make matters worse for international students majoring in engineering.

Research has also shown that some employers tend to discriminate based on whether or not the applicant has a foreign accent⁵. An employer's unfair bias against an international graduate seeking work may be made intensified if he or she also struggles with written and oral communication skills. These factors could prevent qualified international students from obtaining employment in the United States following graduation if they wish to do so. Therefore, a special effort should be made by engineering faculty to help international students succeed in communication skills in addition to their technical studies. Methods of helping engineering educators find ways to integrate these skills into the educational environment that have been tried and tested will be presented below.

Teaching strategies for oral communication skills

Many times, engineering faculty are faced with helping ESL students with their oral and written communication skills having had no prior experience in such matters³. Some universities such as Carnegie Mellon have special programs designed specifically to help students develop their language skills so that they are able to be more proficient in oral and written communication⁶. Nevertheless, for universities that do not have a high ESL enrollment, these types of programs or having separate sections to teach these skills may not be feasible³. A public speaking instructor along with another colleague and an ESL specialist became concerned with this issue and developed a list of assessment and instructional strategies to more effectively serve the needs of ESL students. Shortly afterwards, a case study of two ESL students in a classroom with both native and non-native speakers of English was conducted at the university to evaluate the success of the new strategies³. Although this research took place in a public speaking class, the findings could also be useful for engineering instructors to help engineering students with their presentations.

In order to ease apprehensions, the researchers of this study recommend that students be given ample opportunity to communicate with others in the classroom at the beginning of

the term. One way of doing this is to allow students to introduce themselves and then perform an impromptu speech about an object blindly drawn from a bag³. In the case of engineering educators, they might replicate this exercise by drawing an engineering related topic from a hat. They could be “hot-topics” in engineering so that the exercise would not only serve the purpose of easing anxieties and breaking the ice, but also keeping students in the know concerning the latest topics in engineering.

The importance of being able to pay attention to the needs of ESL students while not singling them out and humiliating them is emphasized. The following are the three instructional strategies found to be beneficial to both the ESL and non-ESL students in the case study. It is crucial to find this delicate balance in a mixed classroom so that all students can reap the benefits of the instruction. The first strategy used was pronunciation, comprehensibility, and listening, all of which the instructor encouraged every student to practice. Students were advised to practice in front of others in addition to watching videos of other student speakers. They were also offered the option of coming to the instructor’s office for individual coaching³.

The second strategy was teaching the students to think rhetorically. The strategies used to achieve this goal was to have students watch videotapes of student presentations while paying specific attention to, “...the organizational patterns, recognizing appeals to the audience, and identifying the speakers’ purpose...”³. In doing so, the students learned how to influence their audience while presenting topics of personal interest to them³. It might be a particularly good idea for international students to have some freedom on choosing a topic of importance to them so that they become excited about what they are presenting. For example, in an engineering class, international students could have the option of presenting material on engineering innovations that have been made in their home countries. This allows students to have a heightened level of confidence when they already have some level of expertise on the topic.

The final instructional strategy used was delivery skills. Students were encouraged to use visual aids and to avoid sounding too memorized in order to promote audience interaction. The instructor noticed that the two ESL students had a particularly difficult time with this. One of them was very reliant upon his notes and as a result had very little eye contact with the class. The other had excellent eye contact, but his presentation seemed too rehearsed. Both students gave correct word choice priority over other important elements such as eye contact or an impromptu style of speech so that they could be understood by the class. It is advised that the additional work required for these students should be taken into consideration³.

The researcher learned several important things from the students in this study that could certainly be of use to engineering educators teaching both ESL international students and native speakers of English in a mixed classroom. First of all, the instructor discovered that for ESL students, actually hearing the words are a key element to learning the language. Thus the students being able to clearly understand the professor, including the terminology used, was an important factor. This is especially true for complex terminology that may be dispersed throughout the class readings. Additionally,

professors should keep in mind that some topics may be difficult for international students to fully comprehend if they involve issues that are specific to the United States or a particular city. Another interesting revelation in this study was that one of the students felt that although he could understand the instructor most of the time, he felt that understanding his fellow classmates was quite challenging as a result of their rapid speaking pace. The student mentioned that it would be acceptable for the professor to say for example, “Bill let’s slow down so everyone could understand” or “Bill let’s slow down so (the student) can understand”³. This particular student felt that saying either of these statements would not cause embarrassment for an ESL student³.

Although it is admitted that the findings of this study cannot be generalized to fit all ESL students, the insight does, “...move us toward a clearer understanding of challenges faced by both ESL students enrolled in “mixed” sections of oral communication courses and their professors or GTAs (Graduate Teaching Assistants)”³. A decision was made that the amount of effort an ESL student puts into the project, such as using additional resources provided by the professor and the university should be considered when grading³. Many of these tips can be useful for engineering professors with international students who struggle with presentations. In the end, these students will reap many benefits from the extra effort and thought put in by the professor. These include not only short-term benefits of good grades, but also the long-term benefits such as improved interviewing, discussion, and presentation skills. For further details please see reference number three.

Addressing language issues for non-writing instructors

Because the focus of most engineering courses is not on writing, it can be difficult for engineering instructors to deal with the special writing needs of international students who are non-native speakers of English. Teaching to large classes can often prevent the professor from marking all of the errors in a student’s paper, particularly if he or she has numerous mistakes. As a solution to this common dilemma, The University of California Writing Institute recommends that instructors make responding to errors that directly interfere with the understanding of the student’s ideas first priority⁷. Items to watch out for that can impair a reader’s ability to comprehend a writer’s ideas include, “...word choice, verb tense and sentence structure issues such as predication errors, derailed sentences (i.e., sentences that begin with one type of syntax and end with another), two-clause sentences that contain both a coordinator (e.g., “but”) and a subordinator (e.g., “although”)”⁷. A student should also be made aware that these kinds of mistakes can also carry consequences such as, “...1) they may distract readers from the message that the writer is trying to convey; 2) readers draw conclusions—even though they may be false—about a writer based on the errors in the written text just as we draw conclusions about people from the way they speak”.

Many instructors have difficulty deciding whether or not to penalize a student’s grade because of “sentence-level problems” even though he or she might have dynamic ideas. As mentioned before, a student needs to be able to realize to what degree their ideas are being lost due to large numbers of mistakes in “...grammatical choice, sentence structure

and vocabulary”. Students can come to grasp this concept through a combination of both grades as well as written comments. It is added that if a student is going to be graded down because of these types of errors, “...it is essential not to simply penalize the student for errors, but to give her some indication of how her use of the language impacts the clarity of her writing and to work together to address the problem...”⁷. Advice on how to correct the problem must be specific, however, and not simply request that the student improve his or her proofreading.

Another way of helping international students improve their writing skills is for instructors to know when to start correcting grammatical and lexical errors. Until recent years, many educators have waited until students’ final drafts to correct these issues. Believing that these types of errors would gradually diminish over time, they encouraged writers to postpone these types of corrections until the final draft. Some still encourage this practice. However, the latest studies indicate that this is not the best approach for students seeking to improve their writing skills. Continuous feedback on both grammar and content appears to be one of the most solid methods for developing good writing habits. Still, instructors should not get caught up in marking every single error. As mentioned before, priority should be given to those errors that interfere with the reader’s ability to comprehend the writer’s ideas⁷.

Finally, if the instructor feels strongly that an international student is in need of extra assistance despite his or her efforts, the instructor may recommend that the student first see a composition tutor. At that point in time, the composition tutor can make a determination as to whether the student needs more specialized help from an ESL tutor. This process can alleviate any apprehensions the professor may feel about making the student feel “stigmatized” by being referred directly to an ESL tutor. The University of California Writing Institute also reminds instructors that they must continue to work with the tutors and the students by communicating with the tutors about the areas of the students’ work most in need of assistance⁷. For further details please see reference number seven.

These are some ways that instructors can more effectively cope with the specific needs of international students who do not speak English as their first language. Even though some engineering educators may feel that it is relatively unimportant that these students improve their writing skills, errors such as misspellings “...are seen by employers as symptomatic of a less than professional level of education...”⁴. Furthermore, despite the fact that some engineering educators may believe these types of communication errors are irrelevant to the technical capabilities of the student as an engineer, it is “...the employer (that) is in a sense the consumer of the end product of a degree course and his requirements must be taken into consideration”⁴.

Creative ways of teaching communication skills outside the classroom

One professor of engineering technology at Middle Tennessee State University knows first hand how difficult it can be for international students to succeed in tasks involving writing and speaking skills. When Dr. Foroudastan first arrived in the United States to

study engineering, he found that he was perfectly capable of fulfilling the technical aspects of his coursework including math and computer skills. However, when it came to writing papers or speaking in front of a class, he noticed himself struggling. He found this to be especially true when having to lecture to undergraduate classes while working on his Ph.D. Soon he realized the best way to overcome his anxieties in these areas was to practice writing and speaking for a real and identifiable audience.

Eventually he discovered that with each additional publication and with each presentation, his oral and written communication skills improved and he rarely had to struggle. However, it was not long before he was teaching engineering as a full time professor and watching international students who had a native language other than English struggle with their essays and class presentations. Thinking back to his own experience as an international student with limited English skills, he decided that the best way for them to truly master communication skills was to give them a project for which they would have to write a paper and present it to a live audience in a “real world” setting.

After some careful consideration, he determined that a project that enabled international students to utilize their strengths while simultaneously working on their weaknesses would be appropriate. This was decided in order to bolster students’ confidence levels so that they would not feel so apprehensive when it came time to write and present. He decided that the perfect project to accomplish these goals was the moonbuggy. Other projects have been used to accomplish these goals as well including the Solar Bike, SAE Formula One, and the Mini Baja. The moonbuggy is a multidimensional project in which the students are required to design, fabricate, and budget all aspects of the moonbuggy with the ultimate goal of entering it into a national competition. In the final stages, the students are required to write a detailed report of the process and demonstrate their final project to the judges through an oral presentation. This provides a unique opportunity for all engineering students, including international engineering students to work on a multitude of skills that will prepare them for entry into a highly competitive job market.

The integration of these projects into the classroom has proven successful. Take for example his Fundamentals of Engineering class. When it came time for the international students to make their first presentations, before participating in the projects, only forty percent of them were able to deliver their presentations at a satisfactory level. However, after participating in the competitions, all of the students’ grades went up dramatically. Dr. Foroudastan believes that the international students were able to gain support and camaraderie through working in teams with students from their fellow classmates, which raised their level of confidence. His belief was reaffirmed when several students in his upper division Statics and Pollution Control Technology classes began to apply for internships. He had one student tell him, “Before I wasn’t so sure I could handle a position in a company here, but after this experience I really think I can do it.” In fact, several of the international students and non-native English speakers began interviewing for internships. As the level of the students’ confidence went up, the international students were able to communicate with industry more effectively and obtain positions.

After participating in these national competitions, the international students look forward to going out and demonstrating their skills.

Dr. Foroudastan believes this type of experience is invaluable to international students because not only do they have the opportunity to present on an impersonal level before a panel of judges, but also they are able to practice interpersonal communication on a more intimate level with their peers while working on the project. One study suggests that interpersonal communication may be the most important of all by stating, “These data suggest that engineering practice takes place in an intensely oral culture and while formal presentations are important to practicing engineers, daily work is characterized more by interpersonal and small group experiences”⁸. Finally, the students get to work on their writing skills, particularly on writing for a specific type of audience. According to Christine M. Robinson, Department of English Literature, and Dr. Gerard M. Blair, Department of Electrical Engineering at the University of Edinburgh, communicative writing is an important skill to have when the writer already has an expertise on a particular subject and they are attempting to “...inform or persuade the reader...”⁴.

One more unique benefit provided by this type of project, is that it enables international students to build valuable friendships with their fellow classmates. According to Dr. Foroudastan, socializing in English is another method by which students can improve their language skills. Additionally, these new friends can serve as study partners in the future.

Conclusions

Engineering educators can use the ideas that have been tried and tested by other educators to help strengthen the oral and written communication skills of their own international students. In time, they can improve upon these methods and come up with more innovative ideas of accomplishing these goals. Like engineering educators at Middle Tennessee State University, other educators can integrate projects into the classroom, which incorporate writing and public speaking. Such projects can include competitions where international students are able to work directly with other students and build relationships with them. International students will have a more pleasant experience at the universities that take the initiative to help them attain communication skills. Consequently, more international students will choose to complete their studies at such universities.

Engineering educators can also take the lead of ESL public speaking instructors in replicating their methods. Students can pull “hot topics” in engineering out of a hat and give short impromptu speeches about the topic. This would help international students focus on communicating their thoughts to an audience rather than reading from a paper. It is also especially important that international students be able to present on topics of personal interest to them and incorporate the use of visual aids³. For example, by presenting topics native to their homelands, they might feel more confident and more at ease. When it comes to helping international students with writing skills, engineering educators can focus on prioritizing areas that need help rather than overwhelming the

students with too many items to be corrected at once as is recommended by The University of California Writing Institute ⁷.

Making a concerted effort to improve the communication skills of international engineering students creates a winning situation for universities, students, and industry. Universities make themselves more attractive to international students while simultaneously increasing the level of satisfaction of those already attending. Industries benefit by having skilled engineers who are well versed and have the capability of designing, executing, and selling a product in a global market. Most importantly, qualified engineering students are able to sell themselves to companies without the risk of being overlooked because of poor resume writing and/ or interviewing skills. In an increasingly global market, it is highly important that international engineering students are able to communicate effectively, not only in their native language, but in English as well. International students with these skills will not only reach their short-term goal of graduation, but also their long-term goal of becoming successful engineers.

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Biography

DR. SAEED FOROUDASTAN

Saeed Foroudastan is an Associate Professor in the Engineering Technology and Industrial Studies Department. He received his B.S. in Civil Engineering (1980), his M.S. in Civil Engineering (1982), and his Ph.D. in Mechanical Engineering (1987) from Tennessee Technological University. Professor Foroudastan's employment vitae includes: Instructor of Mechanical Engineering for Tennessee Technological University, Assistant Professor of Mechanical Engineering for Tennessee Technological University, Senior Engineer, Advanced Development Department, Textron Aerostructures, and Middle

Tennessee State University. Professor Foroudastan is involved with several professional organizations and honor societies, and has many publications to his name. He also holds U.S. and European patents.

DYANI SAXBY

Dyani Saxby is a graduate assistant at Middle Tennessee State University majoring in Engineering Technology and Industrial Studies with a concentration in Occupational Health and Safety and a minor in Psychology. She is pursuing a Ph.D. in Human Factors Psychology this Fall with the ultimate goal of working for the CDC/ NIOSH as an Occupational Health Research Psychologist