

# **Building Communication Strengths and Skills for Non-native English-Speaking Engineering Students**

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## **Abstract**

Engineering curricula in the US, in general, contain several courses with primary focus on writing and communications to assist engineering students in developing better writing, established branch campuses, these needs become further felt as for a large majority of these students the English is the secondary language and acquiring college degrees in their homeland often prevents them from being exposed to the English-speaking people daily. Although most of the students admitted to the program earn respectable scores in the standards test such as the ACT or SAT, building and strengthening their English communications is often paramount.

This paper describes the process incorporated in the petroleum engineering curriculum at Texas A&M University at Qatar campus to develop and maintain students' competency in English communications

## **Keywords**

Communication Skill, Writing Skill, Non-native English-Speaking, Secondary Language, Student Competency

## **1. Introduction**

The State of Qatar is an independent country, which is about 11,586 sq. km. Qatar is a peninsula in the Middle East that is surrounded by Persian Gulf water with a population of 2.6M reported in 2017 by the World Bank. Natives make only about 10% of the total population, and the rest are expatriates who have taken residence over the past four decades. Qatar has the highest income per capita in the world and has become one of the most developed countries in

the Middle East since 1993. Although the official language of the country is Arabic, the English language is predominately used as a medium of communication by financial and non-governmental agencies. As part of its vision 2030, Qatar has invited six US universities to establish their international campuses in Qatar Foundation's newly designated location, Education City, since 2000. These universities include Texas A&M University, Cornell University, Carnegie Mellon University, Northeastern University, Georgetown University, and Virginia Commonwealth University. Texas A&M University campus in Qatar was established in 2003 and since awarded engineering degrees to over 1,100 in four disciplines including Chemical Engineering, Electrical Engineering, Mechanical Engineering, and Petroleum Engineering. All degree programs offered at the Qatar campus are identical to the main campus in College Station and English is the medium of communication the inside and the outside of campus. Texas A&M University at Qatar (TAMUQ) has widely been recognized in the Middle East for producing engineering graduates with exceptional technical competence and exceptional communication skills.

Although all programs offered in Doha significantly emphasize mastering communication skills, one salient feature of the Petroleum Engineering curriculum at Texas A&M University in Qatar is its one-credit hour technical presentation course, which is required to complete the degree program (Retnanto et al. 2018). For this course (this course is not a replacement for a capstone design course required by the curriculum), all students are required to work individually and deliver industry-based projects of a petroleum engineering problem. In addition to a required comprehensive written report, an end of the semester presentation to sponsors, faculty members, and classmates is needed as well. Students are assisted and coached on presentation skills.

## **2. Organization of the Petroleum Engineering Communication Courses**

Undergraduate students in the Petroleum Engineering Program are required to complete all program, college, and University requirements before they can receive a B.S. degree in Petroleum Engineering from Texas A&M University. The university graduation requirements must have two writing-intensive courses within the major.

Faculty of Petroleum Engineering in College Station has historically been emphasizing communications as skills that can be transformed by proper training and exposing students during their four-year course of undergraduate education.

The main objective of the one-credit hour technical presentation course is to provide skills to conduct an independent study of a petroleum engineering problem and to synthesize results and draw appropriate conclusions from the study. The course provides skills to write technical papers and gives oral presentations in a professional setting. At the end of this course, students will be able to:

1. Gather information, make calculations and analyze data to achieve the specific objectives of an independent study of a petroleum engineering problem
2. Prepare an introduction for a paper/presentation, consisting of the problem statement, review of previous work presented in the literature, need for further study, and study objectives
3. Prepare a methodology section for a paper/presentation, including tasks, data and methods employed, and assumptions made in the study
4. Summarize the results of an independent study in appropriate textual, tabular and graphical forms, consistent with engineering and Society of Petroleum Engineers (SPE) presentation standards
5. Prepare a discussion section for a paper/presentation, including analysis and interpretation of study results
6. Draw appropriate conclusions from an independent study consistent with project objectives and properly supported by data, calculations, and analysis
7. Identify limitations of the work and prepare recommendations for further work, if appropriate, supported by the evidence presented in the results and discussion of the study
8. Identify the significance, potential benefits, and possible applications of the results and conclusions of your independent study
9. Prepare a references section, consistent with the SPE style guide, listing all literature cited in a technical paper
10. Write a title and abstract for a paper/presentation of an independent study consistent with SPE standards
11. Prepare Microsoft PowerPoint slides and poster for an independent study that can be used in an oral presentation to persuade others that the study results, conclusions and recommendations are correct and useful

12. Present the result of an independent study orally to a panel of practicing engineers from the petroleum industry and faculty members in 10 to 15 minutes, using PowerPoint slides

Also, students are required to write a technical paper for the independent study consistent with the Society of Petroleum Engineering standards on a subject related to petroleum technology. All students need to prepare at least 2,600 words that include an introduction for the paper consisting problem statement, review of previous work presented in the literature and study objectives, methodology and technical content for the paper on a subject related to petroleum technology, and discussion, conclusions, title, references, abstract for the paper. During the semester, students receive feedback on their writing progress through in-class workshops, peer review, written and oral comments from the instructor.

Following that one-credit hour technical presentation course, senior students are required to participate in the annual petroleum engineering student paper contest, in which SPE-style presentations are judged by industry representatives (Retnanto and Parsaei 2017). The student paper contest has a long tradition at College Station, and we have incorporated the activity in our program largely unchanged, although only for senior students. Students are required to make a 15-minute presentation on a subject of their choice, commonly one involving an independent project or an undergraduate research project, although students may choose to speak on any petroleum engineering topic. Students are responsible for proposing the topic, conducting independent research, and preparing the presentation. Students improve presentation skills and write an accompanying technical report in the form of a Society of Petroleum Engineers paper. Students are encouraged in their junior year to begin an independent study of a petroleum engineering topic that they could later present in the student paper contest.

The contest is a daylong event that now occurs at the beginning of the spring semester. Usually, two or more presentation sessions run concurrently, with each session judged by panels of three to five industry participants. Typically, 15-20 technical industry professionals take part during the day. The contest day begins with an orientation meeting of faculty session leaders and technical judges. Judges rank student achievement on 1-to-4 scale with 4 indicating proficient or skillful ability and 1 indicating lack of ability according to the rubric. Judges may also write comments concerning individual presentations, which are read and saved by the program. Judges rank the first and second place winners for each session.

Winners from senior student paper contest submitted their abstract in the Society of Petroleum Engineers regional student paper contest, a very significant event held annually in one of the GCC capitals. Winners of that regional contest, in turn, present at the SPE international student paper contest, which takes place during the SPE Annual Technical Conference and Exhibition (ATCE), the major event on upstream oil and gas, usually attended by more than 8,000 people.

Strong financial support has been provided by industry to TAMUQ Petroleum Engineering for prize money and contest expenses, indicating their recognition of the value of the activity. Texas A&M at Qatar has been successful in the contest having had students 1<sup>st</sup> place in 2014 and 2015 SPE Middle East Regional student paper contest undergraduate division and competed at the 2014 and 2015 SPE International Student Paper Contest during the SPE ATCE in Amsterdam and Houston, respectively. Texas A&M at Qatar students rank the 2<sup>nd</sup> place in 2016, 2017 and 2018 at the regional contest undergraduate division.

### **3. Observations Made and Recommendations Received from the Course Audience**

Student outcome in communication (ability to communicate effectively with a range of audiences) is assessed for both writing and communication skills. The student is assessed on their ability to express their ideas logically and systematically, and clear statements of the significance of topic, problem, and solution (as applicable), and conclusions were included. In student presentation skills, the assessment covers the ability to communicate effectively orally. That includes that speaker engaged audience, referred to graphic aids, had appropriate eye contact and speaking voice and speed, and was at ease; the presentation was within and not excessively under-allocated time. Also, visual aides were informative, supportive of presentation, well designed, had appropriate content, attractive, not excessively wordy, and in an appropriate number for the presentation. The student is required to highly competent use of the library, online,

and other technical resources to research information were displayed in the presentation as judged from technical completeness.

The assessment of student outcomes in communication shows that students have met the assessment target. The judges provided the recommendation on several areas such as technical content, body language, and the quality of slides.

#### **4. Conclusions**

The industry expects that the engineering graduates equipped with communication skills including writing and oral presentation. In international campuses, these challenging requirements will further be magnified due to the variety of languages practiced in that community. Continuous encouragement both technical and professional competence and repetitive demand for writing and acquiring public speaking skills have proven to be instrumental in developing well-rounded engineering graduates to perform well and meet the global expectations of multinational industries

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#### **Biographies**

**Albertus Retnanto** is a Professor of Petroleum Engineering at Texas A&M University at Qatar and has been in the Petroleum Engineering program since 2009. He received his Ph.D. degree in Petroleum Engineering (1998) from Texas A&M University. He teaches undergraduate courses in well testing, petroleum production systems, production engineering, petroleum technical presentation, natural gas engineering, and integrated asset development and makes significant curriculum enhancements to several courses. He held a Principal position with Schlumberger and has more than 18 years of experience worldwide in both technical and management positions in the area of well testing, field development, and production enhancement.

**Hamid R. Parsaei** is a Professor of Industrial and Systems Engineering at Texas A&M University in College Station. Dr. Parsaei served as Associate Dean for Academic Affairs at Texas A&M University at Qatar and Professor and Chair of the Department of Industrial Engineering at the University of Houston. He is a registered professional engineer in the State of Texas and has served as an ABET program evaluator (PEV) and a member of the Engineering Accreditation Commission (EAC)

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