

Developing Communication Effectiveness in a Freshman Electrical Engineering Technology Curriculum

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Abstract

The ability to communicate effectively is expected of all college graduates. The ability to present technical concepts and write good reports distinguishes an outstanding technologist from an average one. Feedback from our industrial board indicated that writing should form an integral part of an electrical engineering technologist's education. The goal of graduating electrical engineering technologists with effective communication skills is found in the ABET 2000 TAC criteria.

Traditionally, electrical engineering technology programs have required that courses in technical writing and oral presentations be administered through their English departments. While these courses can provide useful instruction, they inevitably suffer from certain drawbacks. First, these courses teach students only one standardized approach to writing and speaking, overlooking the significant differences that exist in the way that engineers in various industrial domains communicate technical information. And second, the courses seldom provide the students with adequate, "real world" exercises.

To help give our freshman students a better understanding of technical writing and to give the electrical engineering technology program immediate relevance, ECET 196 "Introduction to ECET and Projects" has been designed to incorporate the teaching of these communication skills. This paper focuses specifically on my efforts to incorporate these features into this course and into our undergraduate laboratory courses.

Introduction

The ability to communicate effectively is expected of all college graduates. The ability to communicate technical concepts well, distinguishes an outstanding technologist from an average one. Students seeking to become engineering technicians or technologists often lack the basic communication skills. It has been written many times, that employers regard good communication skills as a necessary element of technical positions. These employers know that a paraprofessional on the engineering team must be able to communicate ideas to others. This is why electrical engineering technology instructors must require good report writing in their

technical courses. The feedback from our industrial board concurred with the findings of many scholars that writing should form an integral part of an electrical engineering technologist's education. In a survey of 200 people, with 55% identifying themselves as being in technical positions, Failey and Miller found that the average respondent reported that over 29% of their total work time was spent writing reports.¹

To promote this concept, ABET 2000 TAC Criteria I.C.5.a "Communications" was updated with an emphasis on this.

I.C.5.a "Communications --- Good oral and written communications are considered by ABET to be a necessary achievement of a college graduate. Technically trained individuals should not be considered educated regardless of the depth of their technical ability if they cannot communicate both orally and in writing, their technical findings, thoughts, and philosophy to others around them. Since it is by practice that the real importance of a specific aspect of educational endeavor is demonstrated to the student, a good technical educator will insist that reports be neat, grammatically correct, and lucid. It must be evident to the visiting team that graduates are proficient in the use of the English language and have developed the ability to communicate ideas and understand those of others. Course work in English composition, including both written and oral presentation, literature and especially technical writing, is appropriate for meeting the quantitative requirement. Moreover, the visiting team will be looking for evidence that both oral and written communications have been taken into account in the review and evaluation of student technical work."

By way of this paragraph, the Accreditation Board for Engineering and Technology (ABET) feels that written and oral communication is important and critical to the success of engineering/engineering technology graduates in their careers and has therefore developed this updated set of accreditation criteria for engineering and engineering technology programs in the United States. Accreditation seeking programs (institutions) must therefore demonstrate that their graduates have a good ability to communicate effectively.

Written Communications

The integration of written communication skills into engineering technology courses reinforces the importance of communication skills in the various technical careers. Examples of such forms of written communication are technical journals, technical magazines, engineering case studies and technical reference books.

The understanding and use of these materials has been covered in the ABET 2000 TAC Criteria I.K.5 titled "Equipment catalogs"

I.K.5 "Equipment catalogs, professional magazines, journals, and manuals of industrial processes and practices should be readily accessible and used by

technology students in addition to the usual library resources. Students should be familiar with the literature of their technology and encouraged to use it as a principle means of staying abreast of the state of art in their technological field.”

Why Equipment Catalogs

Along with introducing the freshman engineering student to the different facets of electrical engineering/electrical engineering technology, these electronic catalogs, professional magazines, journals, and other manuals of industrial practices are probably the first examples of technical writing the freshman has ever come in contact with. Therefore if he/she is to develop good engineering writing skills, they need to have good examples to refer to. These materials can be used as good examples upon which the student can hone his/her future writing skills .

What is Good Writing

A technical report is considered to be well written if it demonstrates the following qualities: it must be easy to read, that is, the flow of ideas must be smooth and apparent to the reader and the conclusions must be consistent with the goals of the experiment.

“Good spelling, as well as good writing, takes discipline, dedication, and attention to details. The conscientious student consults the dictionary or uses the self-contained word processor’s “spell-check” whenever the spelling or the usage of a word is in doubt. Most managers will not seriously consider a report that has excellent content if he/she sees misspelled or misused words in the report, especially if the words are technical in nature”.²

Therefore, I stress the use of a dictionary or thesaurus and/or the use of the word processors built in “speller/grammar checker”.

Traditionally engineering/engineering technology programs have attempted to satisfy the requirements of these technical writing and oral presentation courses through their English departments. At the Columbus site of the Purdue University Statewide School of Technology program, we use the services of the Indiana University/Purdue University at Columbus’ English courses W131 “Elementary Composition I”, W132 “Elementary Composition II”, and R110 “Fundamentals of Speech Communication” to fulfill the program requirements. While these courses can provide useful instruction, they inevitably suffer from certain drawbacks. That is, these courses teach students the basic standardized approach to writing and speaking. However, this does not take into account the significant differences that exist in writing technical reports, the mainstay of the function of an electrical engineering technologist. To help freshman students to appreciate the relevance of technical writing, ECET 196 “Introduction to ECET and Projects” has been designed to incorporate these communication skills.

A Practical Solution

It has been said many times that beginning electrical engineering technology students have a real aversion to writing technical reports on subjects about which they are not well versed. From my experience, I have seen some students who at first did not write well, but then were able to write clearly and smoothly when they covered subjects that they knew and/or in an area where they felt comfortable.

An effective instructional model for teaching technical communication to electrical engineering technology students, which we have found very useful, is the use of having written communication assignments that mimic the workplace settings. This is where the use of professional magazines and periodicals comes into use.

In ECET 196 “Introduction to ECET and Projects”, students pick a technical topic that he/she will feel comfortable writing about, look up an article from one of the many technical periodicals or magazines that are available in our classroom and laboratory book rack and write a technical synopsis or report about it; as if it were a laboratory experiment or field test that they had just completed.

A sample of technical periodicals that we have available is

- Electronic Design
- Electronic Products
- Test and Measurement World
- EDN
- TV Technology
- RF Design

Conclusions

After writing three technical reports during the semester, a majority of the students began to develop a knack for summarizing the articles and the technical material that they have chosen. Most key in on the positive aspects of the subjects, although we have had one student summarize his “team’s report” by offering his negative criticism of the idea expressed in the article. Based on his personal experience as a part time sales person in an electronics store, he gave all the reasons why the airline security counter system explained in the article would be a bad idea.³ You might say he was playing the “Devil’s Advocate”. Every good project team has one, or should have one, to inject a series of “checks and balances” into the project as it progresses. Usually this is done during the weekly, or monthly, project review.

By having the students read and write about their technical articles, they

- 1) Build up enthusiasm for Engineering Technology as a career
- 2) Possibly introduce the student to a whole new world of electronics
- 3) Show the importance of good written communication

It is hoped that students, when they finish this course, will have an appreciation of technical writing that will help to assure that they are effective, productive technologists who will be assets to their companies and to the profession.

Bibliography

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3. "Airport Check-in Minus the Counter" Popular Science, August 2001

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