Using Analysis of Technical Discourse in the Engineering Curriculum

Margaret Newman-Nowicka, *Lund Institute of Technology*

***Abstract*— English is included in variety of ways in engineering education at Swedish universities and colleges, from course material and speaking and writing assignments, to courses in technical English. In addition, engineering courses are increasingly being offered in English. However, since technical discourse tends to be complex and not always easy to understand or use effectively, it is important that we develop and use teaching methodologies that help students improve the English language skills they will need in their work and studies. In this talk, I suggest an approach for increasing communicative competence in English used in technical settings, both academic and professional. The approach is based on the use of discourse analysis, genre analysis and the English for Science and Technology (EST) teaching methodology. It is illustrated with material developed for postgraduate courses at LTH and undergraduate engineering courses at Malmö Högskolan. It is proposed that this approach can be used in a variety of ways to enhance the use of English in engineering curricula, from helping teachers to give technical courses in English to facilitating the use of English as part of technical courses, and also as a basis for communicative-based courses in technical English.**

English is included in a variety of ways in the curricula of Swedish engineering schools, on both the undergraduate and postgraduate levels. Many undergraduate courses include course material in English and/ or require that students deliver reports in English. Many universities offer (or require) courses in technical English as part of their regular degree programs. For postgraduate studies, the importance of English is even more evident: doctoral students are required to read and write about their research in English-language journals and attend seminars, meetings and conferences where English is

engineering teachers are being asked more and more often to offer courses in English.

The widespread inclusion of English in technical studies enhances the students' ability to access the extensive technical information available in English and provides them with opportunities to practice using technical English before they enter the job market, one where they will often be required to read about, explain and discuss complex technical information in English. Since English is so central in the academic and professional lives of our students, it is important to ensure that it is included in the curriculum in ways that are effective in developing their ability to use English effectively in actual communicative situations.

A language teaching methodology that addresses these issues is English for Specific Purposes (ESP) and its sub-area English for Science and Technology (EST). The ESP/EST approach is based on teaching language skills for actual communicative activities students will encounter. In EST / ESP courses, teachers first work to determine the real-life communicative situations relevant for the students and then design courses and course materials based on an analysis of the language characteristics of the types of communication in those situations (e.g., writing proposals, technical reports / speaking to clients, technical personal / listening to lectures, lab instructions). Since its major objective is to prepare students to communicate in specific types of communicative situations, formal correctness is subsumed under this primary goal. While it is often relatively easy to identify situations in which an engineer or engineering student might use English, it is not always easy to analyze the characteristics of the relevant technical discourse, since it is often complex and highly detailed, with rigorous requirements for accuracy of specialized technical information.

When English is included in engineering studies, it is important to take into consideration the considerable complexity of university-level technical discourse. For students required to read textbooks or research articles in English, this complexity can make it hard to understand why certain ideas or details have been included (or not included). This difficulty is increased if they are also unaware or uncertain about the meaning or emphasis signaled by English formulations.

Speaking and writing about technical information can pose even greater difficulties. Language ability developed for everyday conversation or for discussion of non-technical subjects is often inadequate for clear and effective communication of technical information. Technical English courses that only focus on improving formal correctness may

Manuscript received April 27, 2004. Margaret Newman-Nowicka is a senior lecturer at LTH (mnm@es.lth.se), where she teaches courses for Ph.D. students in writing research articles for publication, reading technical research articles and delivering talks about technical information. Dr. Newman-Nowicka taught previously at the engineering school at Malmö Högskola, where she was in charge of an integrated course consisting of instruction in technical English, technical Swedish and information management. She began teaching English for Science and Technology while at the Extension English Language Program at the University of California, Berkeley.

contribute marginally tp helping students improve their effectiveness in actual communicative tasks.

To develop their understanding of how technical texts function, many ESP/EST teachers have made use of the findings and methods of discourse analysis and genre analysis. Discourse analysis is concerned with the study of the relationships between language and the context in which it is used. It grew out of work in the 1960s and 1970s in different disciplines, including linguistics, sociology, history, anthropology, psychology and semiotics. It is based on studying the language in authentic texts to discover regularities of language use that occur in given situations and for particular purposes. Genre analysis focuses more specifically on the discourse developed by groups, especially professional communities, to carry out their core activities. As regards technical discourse, this approach has provided extensive and highly useful insights into the language of genres such as technical research articles, textbooks and lectures.

Using the insight and methods developed by discourse and genre analysis, I have developed an approach for teaching EST courses in which I instruct students in analyzing basic aspects of technical discourse. The approach is intended to help students recognize characteristic uses of technical language in general and then to identify such typical uses in their own fields of study. The goal is that such insights will help them in better understanding and producing technical texts and, by learning to look for characteristic language, encourage them to become more independent language learners.

In my talk, I illustrate the approach with materials I developed for teaching spoken technical communication. In these materials, students are first taught to analyze global aspects of communicative situations: audience, purpose and organization. They look at actual technical texts and are shown how the information is selected and formulated differently according to the needs and background of the intended audience and according to the purpose in communicating. They then learn about organizational/rhetorical modes commonly used for speaking about technical information in English: top-down (general-to-specific) organization; problem-solution, advantage-disadvantage, cause-effect and comparison-contrast formats, physical-function and process descriptions, definitions of technical terms and past-present-future formats. Authentic technical texts are used to illustrate how these common organizational modes function to carry the message to the intended audience for the author's purpose. The global framework of audience, purpose and organization is then used as a context for clarifying local language use: the use of words, expressions and grammatical structures.

Students next locate and analyze technical texts in their own fields and discuss their use of words, expressions and grammatical structure as they relate to global communicative issues. Here, their knowledge of content helps them in understanding how the discourse functions. Finally, applying the knowledge of the discourse thus gained, students give talks about technical information in their fields and receive feedback about how clearly they have communicated their information and ideas.

This approach provides a flexible means of including English in the technical curriculum. Analyzing typical discourse can provide a basis for developing courses in technical English with a clear communicative emphasis. Such classes can help students or teachers who wish to deliver talks or give classes in English or to improve their ability to read or write technical texts. The approach can also be used to create a language component within technical courses. For example, technical courses can include lectures and exercises on particularly important language aspects of English texts students will be reading or creating. Another possible use is in adjunct classes: parallel language classes specifically designed to assist students in carrying out communicative tasks in English required for a technical course.

I have used this approach in technical English and adjunct classes to teach speaking skills to undergraduates at Malmö Högskola and speaking, reading and writing skills to doctoral students at LTH, Lund University and the Swedish University of Agriculture. (Materials developed for the speaking courses are found in my book, *Technically Speaking*.) Based on this experience, I feel that this approach is very useful in teaching engineering students. It responds to their strong interest in understanding how to use English for actual communicative tasks that they will meet in their academic and professional careers.

FURTHER READINGS IN ESP/EST, DISCOURSE AND GENRE ANALYSIS

Journals:
English for Specific Purposes, Permagon Press

International Journal of Science Education, Wiley Periodicals, Inc

TESOL Quarterly

Books:
Academic Writing for Graduate Students, A course for non-native speakers of English, Swales, John M & Feak Christine B. 1994, University of Michigan Press

Disciplinary Discourses, Social Interaction in Academic Writing, Applied Linguistic and Language Study, Ken Hyland, 2000, Longman

Discourse Analysis, Brown and Yule, 1983, Cambridge University Press

Discourse Analysis for Language Teachers, Cambridge Language Teaching Library, Michael McCarthy, 2000, Cambridge University Press

English in Today's Research World, Swales, John M & Feak, Christine B., 2000, University of Michigan Press

Genre Analysis, English in academic and research settings, Swales, John M., 1990, Cambridge University Press

Genre in the Classroom, Multiple Perspectives, ed. Ann M Johns, 2002, LEA Publishers

Genre Knowledge in Disciplinary Communication, Cognition/Culture/Power, Berkenkotter, Huckin, 1995, Lawrence Erlbaum

Shaping Written Knowledge, Bazerman, Charles, 1989, University of Wisconsin Press

Technically Speaking, Developing Speaking Skills for Technical Communication in English, Margaret Newman-Nowicka, 2003, Studentlitteratur