English for Science and Technology

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One of the core areas of my professional expertise during my career as a professor was the research and teaching of English for university students, postdocs, and working professionals in science, engineering, and technology. My interest in this area began during my undergraduate years in architecture and got a tremendous professional boost while completing my master's in English, master's in Teaching English as a Foreign Language (TEFL), and doctorate in Composition, where I focused primarily on written discourse in computer science and engineering.

In this PDF, I provide a few small excerpts from a multiple-page article that I was commissioned to write for *The Encyclopedia of Applied Linguistics*, which summarizes some useful information for those who are interested in this specialization.

T. Orr, "English for science and technology," in *The Encyclopedia of Applied Linguistics,* C.A. Chapelle, Ed., Oxford, UK: Wiley-Blackwell, 2012.

English for Science and Technology

Thomas Orr, PhD

English for Science and Technology (EST), sometimes called English for Science and Engineering (ESE), has two definitions. In one, EST refers to the spoken and written English that is needed for work or study in science and engineering. In the other, EST refers to English language education that supports science and engineering.

EST as Language

In the first definition, where EST labels a specific domain of English, EST refers to all of the spoken and written English used in science labs and engineering classes; conferences, meetings, and trade shows; and at factories, corporate offices, and construction sites for academic or professional purposes related to technical or scientific aims. Some of this English is very general in nature, such as small talk before the start of a project meeting. Other forms are highly technical, such as lab reports, design specifications, and patent applications. What makes this domain of language "EST" is not so much the characteristics of the English but, more importantly, the nature of its purpose for work or studies in scientific and engineering fields, which influences the form and content of the English. Success in learning this English is not measured by one's ability to produce English discourse that reads or sounds like EST, but rather genuine mastery is determined by one's ability to obtain successful results from using it in scientific and technical contexts. Identifying, understanding, and profiling this English, so that it can be taught, is one of the most important goals of EST research.

EST as Education

In the second definition, where EST designates a specific educational focus, EST refers to both the research of the language used for studies or employment in science and engineering as well as the development and delivery of training in this language to improve academic or workplace performance. At the introductory levels, EST education is typically designed for nonnative speakers (NNS) of English, since the instructional content may simply consist of material that the average educated native speaker (NS) already knows. But at more advanced levels, EST training may also address the learning needs of NS, since technical discourse and documentation is typically unknown by both groups of learners. In applied linguistics, EST is normally considered a specialization within the field of English for Specific Purposes (ESP), but it also draws heavily upon the expertise of other fields to achieve good results.

History of EST as Education

English language training for study or employment in fields of science or engineering has probably been around as long as there has been technical or scientific work carried out in English in which people from other language communities have wanted to participate. Unfortunately, few records remain from the language's earliest years of existence to tell us how this English was specifically used, taught, or learned for early technical and scientific activities, but there are some things we do know….(**see full article**)

EST Research

EST research is normally conducted to meet the information needs of two different audiences: EST educators and EST learners. Research carried out for EST educators is similar to the research in other specializations within English for Specific Purposes; it seeks to identify specific tasks that a specific group of learners need to perform in academic or workplace contexts, and then assesses what kind of instruction will best fill the gap between the learners' present skills and the skills that are required to complete those tasks successfully. Principally, this research involves identifying and describing the spoken scripts and written genres in English that facilitate these tasks, but at deeper levels, the research also investigates how this English can be used more effectively in context to obtain the most satisfactory results. Additionally, the research must also uncover the most appropriate mental perspectives, amounts of content knowledge, attitudes, body language, emotions, tones of voice and other relevant features that can enable this English to accomplish its goals. Some of the necessary information for this research…(**see full article**)

EST Training

EST training comes in many different forms and sizes since it is specifically tailored to fit the unique situation of each learner. At the smallest end, EST training may consist of a workshop or seminar at an engineering conference to help engineers give better conference presentations, one-to-one writing assistance to help scientists improve their English on returned journal article manuscripts, English instruction embedded in a university software course to help students write better software documentation, or a special training course to help NNS graduate student teaching assistants prepare to teach NS undergraduates in introductory science or engineering courses. At the opposite end, EST training may consist of entire courses or curriculums within science and engineering departments to meet the discipline specific English training needs of all the students, or it may consist of in-house programs within major companies that are responsible for providing EST training and document production for all aspects of corporate communication. EST training can be highly personal (e.g., face-to-face) or highly technical (e.g., online independent study). What is most important, however, is its suitability for the specific instructional content, learning objectives, and learning context. Sophistication in technologies, classroom facilities, or instructional resources mean very little in EST if the learners cannot successfully carry out the target tasks in English at the end of their training for which the EST instruction was designed to train them.

EST Teachers

EST teaching is a highly challenging profession that requires significant time, commitment, and expertise. It also requires a wider range of knowledge beyond English linguistics and language education. Those who obtain the most impressive results from their teaching tend to have the following characteristics.

- a good understanding of languages
- a strong understanding of English linguistics
- a strong understanding of human nature and communication
- a strong understanding of teaching, learning, and assessment
- a good understanding of science, engineering, and related fields such as math and business
- a strong understanding of English use in science, engineering, and related fields
- a strong understanding of EST education and research
- a very strong interest in helping people – the most essential requirement for successful EST

Teachers who excel in EST also tend to be committed to EST as their life work and continually seek to develop themselves professionally.

EST in the Future

EST…(see full article). Presently, the demand for EST teachers exceeds the supply of available candidates, and thus the field remains rich in employment opportunities for this very important work.

I also recommend reading the following chapter, which is also posted at www.thomasorrconsulting.com. It contains a full chapter, with complete corrections of the original mistakes that the publisher accidently edited into the original book.

T. Orr, "English language education for science and engineering students," in *English for Professional and Academic Purposes*, M. F. Ruiz-Garrido, J. C. Palmer-Silveira, and I. Fortanet-Gomez, Eds. Amsterdam: Rodopi, 2010, pp. 213-231.

Abstract: This chapter provides an introduction to English for Science and Engineering (ESE), not only for those who may be interested in developing an ESE program, but also for those who may be interested in pursuing ESE as a career. It contains explanations of ESE work, descriptions of successful practice, attributes of an ideal practitioner, and a detailed profile of one representative program.