
Poster Presentation

Aspects of Designing an English for Science and Technology Course in Non-English Speaking Countries

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The need for an English for Science and Technology (EST) course, where EST is a sub-category of English for Specific Purposes (ESP), is to familiarize science and engineering students with the lexicon and different genres of their particular subjects in English. One of the main differences between English for Academic Purposes (EAP) and ESP is that the words and sentences learned and the subject matter discussed in ESP should all relate to a specific field or discipline in which the students are specializing. Thus, the course design includes making use of vocabulary and tasks related to a certain subject. Many aspects need to be considered when designing a suitable EST course for non-English speaking students, specifically, needs analysis, choice of textbooks, subject-matter expertise of the teachers, English proficiency of the students, and evaluation of the students. In this paper, these different concerns are addressed in detail to contribute to a model of a comprehensive and useful EST course that can be beneficial for both students and universities.

For various reasons, English is considered at present the foremost international language. According to the particular context in which English is used, the variant of English changes. Thus, to meet the needs of learners in specific contexts, language instruction also needs to be suitably modified. The need for an English for Science and Technology (EST) course is to familiarize science and engineering students who have been taught their major academic texts in a language other than English with the lexicon and different genres of their subjects in English (Johns & Dudley-Evans, 1991). EST is considered a sub-category of English for Specific Purposes (ESP). Nowadays, almost all teachers consider the EST course necessary. This seems to indicate that all of the teachers differentiate

EST from general English very well and believe that general English alone cannot fulfill their students' future specific needs (Jordan, 1997).

Need for the EST Course

One of the main differences between English for Academic Purposes (EAP) and English for Specific Purposes (ESP) is that the words and sentences learned and the subject matter discussed in ESP should all relate to the particular field or discipline in which its students are specializing (Hyland, 2006). Thus, the course design should include making use of vocabulary and tasks related to that specific subject. However, there is considerable difference between the vocabulary needs of students of different science and technology departments, for example, between those studying computer science and those who are studying mechanical engineering. All teachers seem to agree generally that since their students are and will be working in a scientific environment, whether that is in academia, a research institute or a company, they need to operate in English in a number of different situations. The students will probably be required to present a paper at a conference, exchange views informally at a gathering, read relevant literature on their subject or write papers. Each of these situations demands a different language skill and a different range of communicative abilities. These are considered as the respective genres of EST (Parkinson, 2000).

Stages of EST Course Design

For the EST course, it is required that teachers consider what their students particularly need to be able to communicate their specific subject. From my viewpoint, arising from my almost 10 years of experience as a professional scientist working in a research university, and strong knowledge of academic English, it seems that the efficient use and understanding of technical terms related to their subject needs to be emphasized. After gaining a suitable level of proficiency, the students then can be encouraged to use that learning in different genres, such as writing a research paper or giving a talk. This is an essential process for them to be able to communicate their specific subject in a coherent manner. Reading comprehension of specialized texts is an important objective, as well as

the improvement of the range of specialized vocabulary and grammatical skills. Improving listening comprehension and/or speaking skills are also important as the students certainly need aural-oral skills for their future careers, and they also need such capabilities to continue their studies at higher academic levels (Figure 1).

However, one person's observations should not be the basis of an EST course design. It is undoubtedly necessary to consider the viewpoints of a number of teachers in the different departments of a university involved in the EST course. The following steps are envisaged to be able to contribute to a successful EST course design (Figure 2).

1. Needs Analysis

Answers to the following questions should be addressed by all teachers of the EST course (Gatehouse, 2001):

1. What should the objectives of the EST course be?

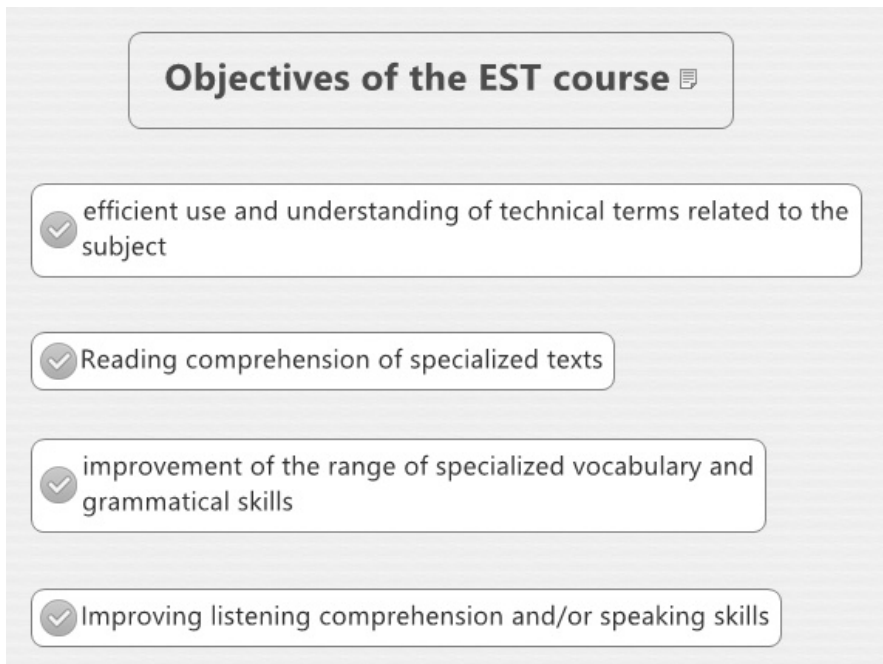


Figure 1. Needs of the students of the EST course.

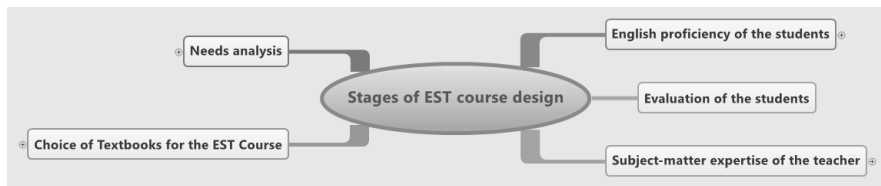


Figure 2. Stages of an EST course.

2. Which objectives should be supported by the materials offered to students in the EST course?
3. How will EST teachers evaluate the texts and/or materials offered in the EST course?
4. Who should teach the EST course, prepare course materials and finally grade the students?
5. Are all the students capable of taking the EST course and benefiting from it?

2. Choice of Textbooks for the EST Course

There are three major problems in using a standard textbook in non-English speaking countries (Jordan, 1997): unpreparedness of the majority of students for their EST course, the current EST textbooks' high level of difficulty, and lack of suitable textbooks. However, there are some series for different levels of English proficiency produced by renowned publishers, such as Cambridge University Press and Gateway. These are considered to be some of the best textbooks produced for the science and engineering fields. An examination of these textbooks shows that the concentration is on subject-related vocabulary and how to properly use that in different contexts. These textbooks have been written with great consideration as a result of collaboration between subject-matter and language specialists, and are used in different universities all over the world. Almost certainly, they have been proved to be able to produce competence in scientific English. I strongly recommend systematically using such a textbook as a helping guide when preparing course materials.

3. Subject-matter Expertise

How much subject-matter expertise the ESP practitioner must possess has been a controversy since the early days of ESP. Troike (1994) has said that it is far easier, and more efficient, to train subject-matter specialists in the basics of English as a Second Language (ESL) than to try to train ESL teachers in the technical content of the ESP subject. Also, trying to teach ESP without knowing the subject matter is akin to short changing the students (Troike, 1994). Similar to this idea, Schleppegrell and Royster (1990) conducted an international survey on the quality of business English training at different institutional environments. They interviewed business managers from various companies. The results indicated that the most successful English teachers and administrators were familiar with the business environment in their city. Thus, they could take into account how firms in their city do business, what types of business they are in, and what types of skills they expect their personnel to develop.

In the EST course, students should focus on learning subject-related English expressions, and thus this program needs instructors with professional knowledge and understanding for workplace English. It is thus easier for subject matter specialists with a good command of English to be trained for proper instruction of the EST course. However, in a non-English speaking country, such instructors may be difficult to obtain. Also, the EST course is foremost a language course, and language specialists undoubtedly possess more institutional knowledge of the methodologies involved in the efficient teaching of a language. Therefore, since EST is specialized teaching, it requires subject-matter professionals, as well as English language academics, to provide the whole range of supporting activities. These include proper curriculum design, proper choice of teaching materials, the actual teaching conducted in a classroom and the evaluation process.

The overall field of science or engineering certainly has a whole special range of vocabulary that people who are engaged in the Humanities do not ever encounter. It is this technical vocabulary that should be the basis of the EST course. An English teacher will possibly possess limited knowledge of technical terms, because of not having a background in science. The curriculum and course

material should be thus such that the can still successfully understand the basic concepts of the subject after studying the course material, and can then teach the course to non-English speaking science majors.

4. English Proficiency

A great problem for the students of the EST course in a non-English speaking country is that often they have shortcomings in basic English skills. Naturally, they thus may not have self-confidence or competence when asked to undertake tasks such as presentations or writing papers. An English proficiency exam may thus be required in order to take the EST course. Those who succeed in this examination take the regular EST courses and those who fail are required to take a one-year preparation course. This preparatory course will enable students to develop their language abilities up to a level which can be inferred as being ready for technical English instruction. Alternatively, the university could accept some reasonable result in a language proficiency exam such as TOEIC or IELTS.

EST is mainly a course by which students should be able to learn and communicate in English, not a class for understanding their science subjects. Therefore, the continuous usage of English by the teacher for all tasks and instructions during class can provide the students with the opportunity to learn different expressions which they can then use in their own speaking. Students unaccustomed to this can sometimes find the initial classes to be difficult, but they all seem to be able to rise to the challenge.

5. Evaluation of the Students

Although EAP is an integral part in all universities nowadays all over the world, including the universities situated in English-speaking countries, ESP is primarily necessary for students who have completed their tertiary education in a non-English language (Cheng, Myles, & Curtis, 2004). Therefore, the process of evaluation that is common for EAP courses in the United States, for example, should not be adopted for judging the level of a non-English speaker's English proficiency.

There should be a standardized method for evaluating the students' performance in the EST course. Instruction without proper evaluation is

ineffective and may mislead the students and their future workplaces about their level of English proficiency.

For linguists and others with not much familiarity with scientific research texts, moves analysis is an extremely interesting pedagogical approach. However, for students, researchers and teachers of scientific subjects, these are not much of a revelation, as almost all research papers are produced with the same pattern. Too much emphasis on the IMRaD (introduction, methods, results, and discussion) pattern prevents the teachers from concentrating on increasing their students' vocabulary and grammar skills, which have been shown to be the primary attributes in enhancing fluency (Geva & Zadeh, 2009). Therefore, more focus on vocabulary and grammar should be reflected in the grading and assessment of the students.

According to the solutions to these discussed subjects, a proper EST curriculum can be devised. A more detailed needs analysis based on more than these first few preliminary matters should be carried out.

Conclusions

The principal aspects to be considered when designing an EST course in a non-English speaking country have been discussed in this paper. These legitimate concerns should be considered in more detail to provide a comprehensive and useful course that is beneficial for both the students and the university.

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