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Integrating English for Specific Purposes (ESP) in Engineering Education: A Strategic Approach to Enhancing English Proficiency and Professional Communication Skills

Sadia Binte Kausar
National Institute of Textile Engineering & Research (NITER)

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Abstract: *Despite the global emphasis on English proficiency, the majority of engineering students whose first language is not English often encounter significant specific obstacles such as limited vocabulary, pronunciation issues, anxiety, inadequate practice opportunities, linguistic deficiencies, psychological factors, institutional constraints and pedagogical shortcomings. This study endeavors to examine the challenges faced by non-native Engineering students in acquiring English language skills to perform in real-life communication and explore the role of ESP in engineering education, emphasizing its impact on academic success, employability, and professional communication. This study looks at how ESP training customized to engineering contexts improves understanding, technical writing, and the ability to work with others, using well-known theories of language acquisition. ESP (English for Special Purpose) is tailored in a way that fits the demand of engineering students in developing the proficiency of English skills that helps them excel in their specific academic and professional domain. Unlike general English, ESP focuses on context-specific vocabulary, functions, and communication tasks relevant to engineering disciplines. ESP is designed to focus to meet the demands of individuals in their specific professional or academic context employing field-specific vocabulary and targeted skills that enhance the English proficiency in their specific academic and professional settings.*

Keywords: English language proficiency, ESP, Engineering students, language acquisition, specialized vocabulary

INTRODUCTION

The 21st century English has solidified its role as the global *lingua franca* especially in scientific and technical fields such as engineering in this 21st century, the century which has been referred to by many names, such as "the Fourth Industrial Revolution, globalization, the Century of Knowledge, the Century of Information Technology, and the Century of Knowledge-Based Economies". The economy, transportation, technology, communication, and information are all rapidly and unpredictably evolving in this century (Budiyanto et al.

2024). English is the most widely spoken second language, enabling individuals to effectively communicate in international settings. In the job market, strong English-speaking skills can greatly enhance career prospects, making candidates more competitive for positions in multinational companies and global industries.

Strong English communication abilities, especially in speaking, are becoming more and more necessary due to the worldwide character of the engineering profession. For engineering students to succeed academically as well as for professional growth, international collaboration, and employment, fluency in English, especially speaking, is crucial. (Crystal, 2003). Fluency in English is a valuable opportunity to become an engineer in the global society, even though technical knowledge is essential for engineering students. (Kassim & Ali, 2010). Beyond coursework and employment, English offers access to a wealth of online content, such as books, articles, videos, and courses, many of which are not translated into other languages. However, even though engineering students frequently possess superior technical knowledge, their inability to articulate concepts in spoken English might impede their academic performance and employability. Although Engineering students are typically strong in technical knowledge, they may struggle with effectively communicating their ideas in spoken English. This can impede their academic achievements and job prospects.

Many engineering students who do not speak English as their first language often face problems later in their jobs. These challenges faced by engineering students in learning English include lack of confidence, anxiety, inadequate practice opportunities, institutional constraints, ineffective instructional approaches, and pronunciation and accent issues. According to Riemer (2007), engineering curricula often prioritize technical subjects, leaving little room for language development. While conventional English language courses may focus on general grammar and vocabulary, they often lack relevance to the engineering field. In contrast, The English for Technical Communication (ESP) program is designed to meet the language needs of engineering students and help them do well in English at university or at work. For example, ESP may cover technical vocabulary and writing skills that are essential for engineering reports and presentations. ESP is commonly used to refer to the teaching of English for a special purpose (Mackay & Mountford, 1978). ESP addresses field-specific English demands like technical vocabulary, scientific writing, project presentations, and report writing in engineering programs. Their academic performance is improved and their technical communication abilities are strengthened with ESP. In the realm of globalization, mastery of English has become indispensable for engineering students, both for academic achievement and career progression.

Theoretical Framework

The theoretical underpinning of this research is grounded in Needs Analysis Theory (Hutchinson & Waters, 1987). This framework involves identifying the specific linguistic needs of learners based on the contexts in which they will use English. It is a “systematic process to identify gaps between what should be happening and what is actually happening, and to determine the causes of these gaps” (Phillip C. Wright, Gary D. Geroy, 1992). In engineering, this includes technical documentation, presentations, emails, and research reports.

Research questions

The present study aims to understand the following:

1. What common difficulties or challenges do non-native engineering students face while learning English?

2. How does English for Specific Purpose, or ESP, aid engineering students in improving their English language skills?

Objectives of the Study

1. To recognize the role of English in the engineering field.
2. To identify the prevalent problems encountered by Engineering students in the acquisition of English language skills.
3. To examine the body of research on ESP and how well it works to improve engineering students' English proficiency.
4. To explore how ESP aids in enhancing the English competence of the Engineering students in their academic and professional career.

Literature Review

English for Specific Purposes (ESP) has gained prominence in tertiary education due to the increasing demands of globalization and the need for discipline-specific communication skills. A lot of studies have been done on how ESP courses can practically enhance the English skills of Engineers that the General English courses cannot. Basturkmen (2003) emphasizes the importance of English for Specific Purposes (ESP) courses tailored to the needs of engineering students. According to Basturkmen (2010), ESP courses are particularly beneficial for engineering students as they focus on relevant technical vocabulary, professional genres, and the communicative practices specific to engineering. Hutchinson & Waters (1987) have developed frameworks to differentiate ESP from General English and advocate for learner-centered instruction. Hyland (2006) emphasizes genre-based approaches to teaching ESP, which are particularly useful in technical disciplines where formats and styles are highly standardized. Some experts such as Joesba and Ardeo (2005) argue that engineering students ought to be taught these specific English skills which will become valuable assets not only in their academic settings but also in their future careers as professionals (in Hyo Kim, 2013).

Value of English in an Engineer's academic and professional career

Cross-cultural communication abilities are essential for 21st-century engineers because in a global corporate environment where English is the language of global business, engineers with these skills are more employable (Cal, A. et al., 2023)

Professional engineers are increasingly involved in operations, where they must be adept in both soft and technical abilities (Kaushal, 2016). Flowerdew (2001) states that, English has become the principal medium of scholarly communication in science and engineering, making it essential for students to read, understand, and engage with current research. Strong English-speaking abilities can greatly enhance career chances in the labor market, increasing a candidate's competitiveness for jobs in international corporations and globally operating industries. According to research, during recruiting interviews, companies mostly evaluate potential employees based on how well they communicate in English. (Afroze et al., 2019).

English is the principal language of communication for many international organizations, engineering firms, and multinational corporations. Graddol (2006) emphasized that English is no longer just a foreign language but a core skill for employment, particularly in technical and scientific domains. Engineering graduates who are fluent

in English have more mobility, as they can work across borders, apply for international graduate programs, and participate in global engineering projects.

Fig 1: Four Skills in English

Hyland (2006) observed that English not only facilitates communication but also supports the development of analytical and critical thinking skills, which are vital for problem-solving and innovation in engineering contexts.

Engineers must write technical reports, present project findings, collaborate in teams, and communicate with clients or stakeholders. Proficiency in English enhances a student's ability to participate in these activities.

Moreover, English is also the primary language of higher education and scientific research. English proficiency ensures that engineers can stay abreast of the latest technological advancements, as a significant portion of scientific literature and technical documentation is published in English (Riemer, 2007). The vast majority of scientific journals, engineering textbooks, and instructional manuals are published in English, especially those associated with major international databases such as IEEE Xplore, Elsevier, and Springer. For students aiming to pursue higher education abroad (like MS, MTech, or PhD), English speaking is crucial for interviews, group discussions, and academic interactions. Many global exams and certifications (like GRE, TOEFL, IELTS, PMP) require strong English communication**.**

English proficiency also enables students to participate in international engineering conferences, publish academic papers, and earn professional certifications. Proficiency in English enables engineers to communicate effectively with peers worldwide, access and contribute to the latest research, and participate in international projects and conferences (Kachru, 1992). Most international conferences use English as the official language, and major engineering certifications such as PMP (Project Management Professional), Six Sigma, and ISO training programs are often conducted in English. Engineers frequently have to explain complex technical concepts to non-technical stakeholders, such as managers or clients, and fluent spoken English is necessary for doing so. It's also useful for team collaboration, meetings, and presentations**.**

What is ESP?

English is an international language that is divided into English for General Purposes (General English or GE) and English for Specific Purposes (ESP) (Rahman et al., 2023). General English focuses on developing overall English language proficiency. ESP is more specialized and practical, providing learners with the specific language skills they need for their specific field. ESP is commonly used to refer to the "teaching of English for a special purpose" (Mackay & Mountford, 1978). Basturkmen (2006) defined ESP as a language that is learnt "not for its own sake or for the sake of gaining a general education, but to smooth the path to entry or greater linguistic efficiency in academic, professional or workplace environments." (Basturkmen, 2006)

Sarre and Whyte (2017) defined it as "the branch of English language studies which concerns the language, discourse, and culture of English-language professional communities and specialized groups, as well as the learning and teaching of this object from a didactic perspective." (p. 150)

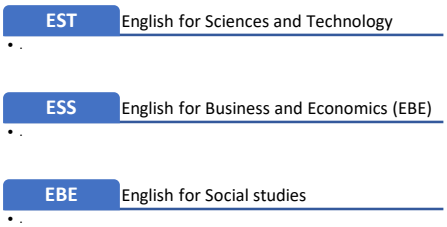

Fig 2: Three categories of Esp

According to Fig-2, the ESP was first divided into three categories- English for Sciences and Technology (EST), English for Business and Economics (EBE) and English for Social studies (ESS). Each of these three categories is branched into English for Academic Purposes (EAP) and English for Occupational Purposes (EOP). (Omnia Ibrahim Mohamed & Nowar Nizar Alani, 2022).

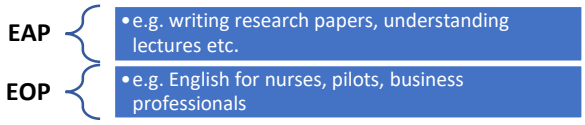

Fig 3: Two types of ESP

Key Aspects of ESP:

- **Needs-based:** ESP courses are designed around the specific language needs of the learners in a particular field.
- **Content-focused:** ESP focuses on the language and content used in a specific field, rather than general English.
- **Targeted skills:** ESP instruction emphasizes the language skills (reading, writing, listening, speaking) most relevant to a learner's field.
- **Authentic materials:** Uses real-life documents, audio, video, and case studies. Examples: business emails, lab reports, patient charts, engineering blueprints.
- **Learner-Centered:** Learners often have prior knowledge in their field. Instruction builds on what they know to improve professional communication.
- **Goal-Oriented:** ESP focuses on helping learners achieve specific communicative tasks, like: Writing reports, participating in meetings, Understanding technical manuals.

Emergence of ESP:

According to Hutchinson and Waters (1987), three main reasons contributed to the emergence of ESP: the demands of a brave new world, a revolution in linguistics, and a focus on the learner's needs. This development called for English instruction that was relevant and practical rather than general and literary (Hutchinson & Waters, 1987).

As Strevens (1988) observed, "ESP was a direct response to the new world order, where English was required not for cultural or literary pursuits, but for immediate and practical purposes." advances in linguistics, particularly the shift from traditional grammar-based approaches to those emphasizing functional and communicative competence, influenced ESP's development. Scholars like Halliday (1978) promoted the idea that language varies depending on its use and that linguistic features are determined by context, register, and field—principles central to ESP.

Third, the shift in educational philosophy towards learner-centeredness emphasized analyzing learners' needs and tailoring instruction accordingly. This led to the concept of "needs analysis," a foundational aspect of ESP (Dudley-Evans & St John, 1998). It focused on determining the linguistic and communicative requirements of learners in specific professional or academic domains.

The origin of ESP is rooted in the socio-economic, linguistic, and educational transformations of the mid-20th century. Responding to the growing need for practical and contextual language instruction, ESP has developed into a dynamic field that continues to adapt to the evolving demands of learners. Its foundation in needs analysis, contextualized language use, and communicative purpose ensures its continued relevance in education and professional training around the world.

Difficulties in learning English encountered by the Engineering Students

According to Riemer (2007), engineering curricula often prioritize technical subjects, leaving insufficient room for language development. Engineering students, who are often more focused on technical subjects, may feel especially intimidated by language-based tasks. He adds that, engineering curricula often prioritize technical subjects, leaving little room for language development. Engineering students often come from backgrounds where English is not the principal language of instruction. As a result, they may struggle with understanding complex texts, interpreting technical vocabulary, or expressing ideas clearly in English (Flowerdew, 2001). Many reasons play behind these challenges or struggles they face in acquiring English language skills.

One of challenges is the lack of institutional structured support for English learning within engineering programs. In many non-English-speaking countries, language instruction is often limited to the early semesters of a degree program, with little emphasis in later, more specialized courses. Braine (2002) highlights that non-native English-speaking students often receive minimal assistance in developing academic literacy, particularly in technical writing and communication. This institutional gap leaves students unprepared to meet the language demands of their upper-level coursework or professional environments.

Besides, some psychological factors also play a significant role in the challenges engineering students face. For example, Fear of making mistakes, lack of confidence in speaking, and anxiety about academic performance in English can discourage students from participating fully in class discussions or presentations. Krashen's (1982)

Affective Filter Hypothesis suggests that emotional barriers such as fear or embarrassment can significantly inhibit language acquisition.

Incorporating ESP into Engineering Study

The general English language programs often fail to align with the specific linguistic needs of engineering students. Traditional language teaching methods often emphasize general English such as grammar, rather than focusing on technical vocabulary, report writing, or oral presentations relevant to engineering contexts. On the other hand, English for Specific Purposes (ESP), particularly in technical fields, helps learners develop communication skills tailored to their academic and professional needs (Braine, 2002). According to Dudley-Evans and St John (1998), English for Specific Purposes (ESP) is essential for helping students function effectively in their fields. These types of courses are considered to provide students with the necessary tools to address their essential needs to develop specific skills for specialized contexts in the target language (Hossain, 2013).

Traditional English courses often lack relevance to the engineering context, focusing on general grammar and vocabulary rather than technical communication. ESP, however, is designed to meet learners' specific academic and occupational language needs (Dudley-Evans & St John, 1998). ESP courses help engineering students acquire field-specific vocabulary, interpret technical documents, and write structured reports. By aligning language instruction with discipline-specific tasks, ESP improves both comprehension and performance in engineering coursework. ESP utilizes materials from the learner's field, such as academic papers, professional reports, or industry-specific texts, to provide relevant and practical language. The emphasis on technical vocabulary is a key component of ESP for engineering. Engineering students must be familiar with the real-life vocabulary used in their specific field and jargons used in their area to read technical papers and interact successfully with colleagues. ESP courses provide training in scientific writing, helping students to create clear technical reports, research articles, and professional documents.

Engineering professionals are expected to write research papers, deliver presentations, and collaborate in multidisciplinary teams—tasks that require strong communication skills. ESP courses emphasize the development of these abilities through practical activities such as report writing, oral presentations, and reading technical manuals (Basturkmen, 2006). This tailored approach helps students overcome communication barriers and become more confident in using English in professional settings. Hampel and Hauck (2006) argue that ESP courses contribute to improved job performance and career advancement, as students are better equipped to handle the linguistic demands of their field. According to Hutchinson and Waters (1987), relevance to learners' goals enhances motivation and leads to more effective learning outcomes.
By focusing on the practical language skills required in academic and workplace environments, ESP helps engineering students succeed in both areas (V Murali et al. 2024). It prepares them for academic tasks such as writing theses and understanding journal articles, as well as for career-related tasks like job interviews, technical documentation, and international collaboration (Anthony, 2018). ESP improves students' general academic and professional preparedness in addition to addressing language barriers. Proficiency in a field-specific language enhances comprehension, participation, and academic success. Furthermore, Employers favor applicants who can successfully communicate in their professional setting, therefore proficiency in the language used in engineering can improve employment chances and career growth.

Key Skills Developed through ESP in Engineering:

- Reading and understanding technical manuals and journal articles are learned. ESP instruction significantly enhances comprehension of engineering texts (Hyland, 2006).
- Learners become efficient in writing reports, proposals, and research documentation in discipline-specific language. Students develop better professional communication skills, such as report writing and collaborative presentation (Basturkmen, 2010).
- They acquire the skill of participating in presentations using technical English.
- Students communicate effectively in cross-cultural, globalized engineering environments. Engineering graduates who receive ESP training are more prepared for international work environments where English is the lingua franca (Swales, 1990).

Suggestions

The present study recommends the following:

- Conduct ongoing needs analysis to ensure course relevance.
- Use and integrate authentic texts from engineering contexts (e.g., academic journals, patent documents).
- Encourage project-based learning and interdisciplinary collaboration in ESP classrooms.
- Regularly review and update ESP materials in line with industry demands.
- Involve technologies such as online platforms and multimedia resources
- Train faculty to integrate and develop English learning into their engineering curricula.

Practical Implications

- Engineering departments should integrate ESP courses that reflect the authentic language use in engineering fields.
- ESP instructors should work closely with engineering faculty to develop specialized curriculum using real-world materials.
- Institutions should invest in teacher training in ESP pedagogy

CONCLUSION

As the engineering profession becomes more integrated and international, the ability to use English effectively is no longer optional—it is indispensable. Therefore, engineering education must continue to integrate English language learning to prepare students for the demands of the global industry in this 21st century. ESP courses offer a practical and effective solution to the English language challenges faced by engineering students. By tailoring content to specific academic and professional needs, ESP improves technical vocabulary, enhances communication skills, boosts learner confidence, and prepares students for success bot in their studies and careers. Institutions should consider integrating ESP into engineering curricula to better support students in today's globalized educational and professional environments. By actively incorporating

language learning into engineering education, institutions can bridge the gap between technical expertise and communication skills.

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