

English Language Needs Analysis for Electrical Engineering Students: A Case Study at Tulungagung University

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ABSTRACT

The need for English language proficiency in engineering is increasing along with industrial globalization, technological developments, and the dominance of English-language scientific literature. This study aims to analyze the English language needs of Electrical Engineering students at Tulungagung University as a basis for developing a contextual, needs-based English for Specific Purposes (ESP) curriculum. The study used a qualitative approach with a case study design. Data were collected through questionnaires, semi-structured interviews, and curriculum document analysis with students, lecturers, and industry stakeholders. The needs analysis refers to the target needs and learning needs framework as proposed by Hutchinson and Waters (1987) and Dudley-Evans and St John (1998). The results show that students require more skills in reading technical texts, understanding equipment manuals, writing lab reports, and oral communication skills for project presentations and technical discussions. In addition, there is a gap between general English material and the demands of academic and professional competencies in engineering. These findings align with global research that emphasizes the importance of a needs-based approach in ESP development (Basturkmen, 2010; Hyland, 2006). Therefore, this study recommends the development of a needs-based syllabus integrated with the context of Electrical Engineering and collaboration with the industrial world to enhance learning relevance. This research contributes to enriching ESP studies in the engineering field in the context of Indonesian higher education.

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1. INTRODUCTION

The development of science and technology presents challenges for cross-cultural and cross-disciplinary communication, particularly in global academic and professional environments. English has become the lingua franca in science and engineering due to the dominance of scientific literature, international standards, reputable journal publications, and technical documents, which are generally written in this language (Jenkins, 2014; House, 2003). This positions English language competence not merely as an additional skill, but as an essential requirement, especially for students in engineering programs, including Electrical Engineering.

English for Specific Purposes (ESP) is a language teaching approach that focuses on the real needs of learners in specific academic and professional contexts (Hutchinson & Waters, 1987). This approach requires a systematic needs analysis to design a curriculum relevant to the scientific and practical context of the subject (Dudley-Evans & St John, 1998). Needs analysis forms the basis for identifying the language skills students must possess to meet academic demands, such as understanding international journals, writing laboratory reports, and delivering technical presentations (Hyland, 2006; Basturkmen, 2010).

Various studies have shown that English language skills related to academic literacy and professional communication contribute significantly to the academic success and employability of engineering graduates (Flowerdew & Peacock, 2001; Coxhead, 2006). Specifically in the field of engineering, students are expected to master not only general English but also technical language, including disciplinary terminology, technical text structure, and oral communication skills in collaborative and global contexts (Paltridge & Starfield, 2013; Swales, 1990). Developing countries such as Indonesia still face challenges in adapting generally general English language learning materials to be more contextual to the specific needs of engineering students (Jordan, 1997; Robinson, 1991).

Research across various academic contexts indicates a gap between what is taught in English classes and the demands of language use in engineering students' studies and professional practice (Belcher, 2006; Braine, 2010). Curricula that are not based on a strong needs analysis tend to produce learning that is less responsive to academic and industrial demands (Nation & Macalister, 2010; Hyland & Hamp-Lyons, 2002). Therefore, developing an ESP curriculum based on academic and professional needs is crucial to improving students' competencies in facing the challenges of globalization of education and the international job market (Long, 2005; Richards, 2001).

In the context of higher education in engineering in Indonesia, including Tulungagung University, empirical research focusing on analyzing the English language needs of Electrical Engineering students is still relatively limited. Most studies adopt a general approach without considering the specific disciplinary context, so that studies that integrate the perspectives of students, lecturers, and industry stakeholders are needed to develop a more accurate and applicable curriculum basis (Hutchinson, Waters, & Basturkmen, 2004; Johns, 2012). This study attempts to fill this gap by identifying the English language needs of Electrical Engineering students at Tulungagung University as a basis for developing relevant ESP teaching materials.

2. LITERATURE REVIEW

2.1. Theoretical Foundations of English for Specific Purposes (ESP)

English for Specific Purposes (ESP) developed in response to the increasingly specific needs of academic and professional communication in the era of globalization. Hutchinson and Waters (1987) emphasized that ESP is not simply teaching technical vocabulary, but rather a needs-based approach oriented toward the learner's language use goals. Thus, ESP's primary focus lies in the relevance of the context, the characteristics of the discipline, and the target language use situations.

Dudley-Evans and St. John (1998) suggest that ESP has both absolute and variable characteristics. Absolute characteristics include meeting the specific needs of learners, using methodologies appropriate to the discipline, and focusing on language relevant to specific professional or academic activities. Meanwhile, variable characteristics relate to flexibility in curriculum design and teaching methods. In the context of higher education engineering, ESP is often positioned within the realm of English for Academic Purposes (EAP) and English for Occupational Purposes (EOP), which emphasize academic literacy and professional communication competencies (Hyland, 2006).

A genre-based approach also enriches ESP studies, particularly in understanding the structure of academic and professional discourse. Swales (1990), through his theory of genre analysis, emphasized the importance of understanding rhetorical patterns and text structures within specific academic communities. In Electrical Engineering, for example, students are expected to understand the structure of lab reports, research articles using the IMRAD pattern, and technical documentation based on international standards. Therefore, English language learning needs to integrate an understanding of genres and disciplinary communication practices.

2.2. Needs Analysis in Curriculum Development

Needs analysis is a key foundation in ESP curriculum development. Hutchinson and Waters (1987) differentiated needs into target needs (necessities, lacks, wants) and learning needs. This concept helps educators identify gaps between students' actual abilities and future language demands.

Long (2005) emphasized that needs analysis must be conducted systematically through various data sources, including students, lecturers, academic documents, and industry stakeholders. Dudley-Evans and St.

John (1998) also emphasized the importance of target situation analysis and present situation analysis to obtain a comprehensive picture of learner needs. Nation and Macalister (2010) stated that the results of needs analysis form the basis for setting learning objectives, selecting materials, teaching strategies, and evaluating systems.

In the engineering context, Basturkmen (2010) emphasized that needs analysis not only identifies general language skills, but also specific competencies such as reading technical texts, understanding equipment manuals, writing data-driven reports, and conducting technical project presentations. Therefore, a comprehensive needs analysis is a prerequisite for developing a relevant English curriculum for Electrical Engineering students.

2.3. The Need for English in the Field of Electrical Engineering

The engineering field has distinctive communication characteristics, such as the use of technical terminology, procedural text, and the integration of visual elements (diagrams, graphs, tables). Paltridge and Starfield (2013) emphasized that academic literacy in engineering disciplines requires an understanding of data-based texts and scientific argumentation. Furthermore, professional communication in engineering often involves international collaboration, making oral communication skills in English crucial (Jenkins, 2014).

Hyland and Hamp-Lyons (2002) stated that engineering students require academic competencies that include reading international journals, writing research reports, and understanding disciplinary rhetorical conventions. Coxhead (2006) also emphasized the importance of mastering academic and technical vocabulary to support understanding of scientific literature. In practice, many engineering students struggle to understand English-language technical texts due to limited vocabulary and limited understanding of academic discourse structures.

Previous research has shown a gap between general English language learning and the specific needs of engineering students (Belcher, 2006; Robinson, 1991). Curricula that are not based on needs analysis tend to be less relevant to academic and workplace demands (Richards, 2001). Therefore, a learning approach is needed that explicitly integrates the disciplinary context of Electrical Engineering.

3. RESEARCH METHODS

This research uses a qualitative approach with a case study design. This approach was chosen because the research aims to deeply understand the English language needs of Electrical Engineering students in the context of a specific institution, namely Tulungagung University. Case studies allow researchers to explore phenomena contextually and holistically in a real-life setting (Yin, 2018). In addition, a qualitative approach provides flexibility in exploring respondents' perceptions, experiences, and actual needs through direct interaction (Creswell & Creswell, 2018). This design aligns with Long's (2005) recommendation, which emphasizes that needs analysis in ESP requires a contextual approach capable of capturing the complexity of the target situation and learning situation.

4. RESULTS AND DISCUSSION

4.1. Results of the English Language Needs Analysis of Electrical Engineering Students

Based on the results of questionnaires, interviews, and document analysis, the English language needs of Electrical Engineering students at Tulungagung University were classified into four main skills: reading, writing, speaking, and listening. The analysis was conducted using the target needs and learning needs framework (Hutchinson & Waters, 1987) and the target situation analysis approach (Dudley-Evans & St. John, 1998).

Table 1. Priority English Language Needs of Electrical Engineering Students

Skill	Specific Needs Form	Priority Level	Context of Use
Reading	Reading international journals, understanding component datasheets, IEEE standards, technical manuals	Very high	Academic and Professional
Writing	Writing lab reports, research abstracts, project documentation	High	Academic
Speaking	Project presentations, technical discussions, team communication	High	Academic and Industrial
Listening	Understanding online lectures, technical tutorials, international webinars	Medium–High	Academic

The results indicate that reading skills are the highest priority. Students expressed difficulty understanding technical terminology and the structure of English scientific texts. This finding is consistent with research by Coxhead (2006), which emphasized the importance of mastering academic and technical vocabulary in understanding disciplinary texts. Furthermore, Hyland (2006) stated that academic literacy is the primary foundation for students' success in accessing global scientific knowledge. Writing skills are a high priority, particularly in the preparation of lab reports and research summaries.

Scientific rhetorical structures and academic genre conventions are a major challenge for students. This aligns with Swales' (1990) theory of genre analysis, which asserts that academic texts possess distinctive rhetorical patterns that must be explicitly understood during learning. In speaking, students require project presentation skills and technical discussions. Interviews with industry representatives indicate that Electrical Engineering graduates are expected to communicate effectively in multinational teams.

Jenkins (2014) emphasized that English as a lingua franca demands adaptive communication competencies in a global context. Listening skills are also essential, especially for understanding technical tutorials, online lectures, and technology-based learning videos. Flowerdew and Peacock (2001) stated that exposure to spoken academic discourse helps students improve their conceptual understanding and disciplinary terminology.

4.2. Gap Analysis

An analysis of curriculum documents shows that English courses are still oriented toward General English and have not fully integrated the context of Electrical Engineering. There is a gap between students' actual needs and the material being taught. Nation and Macalister (2010) assert that a language curriculum that is not based on needs analysis risks producing less relevant learning.

These findings support Basturkmen's (2010) view that ESP development must be based on identifying real-life communication practices within specific disciplines. Therefore, the English curriculum in the Electrical Engineering Study Program needs to be oriented toward a genre-based approach, authentic technical texts, and professional communication simulations.

4.3. Academic Implications and Curriculum Development

Based on the research results, there are several strategic implications:

- a. Development of a Contextual ESP Syllabus
Learning materials need to be based on authentic texts such as engineering journals, device manuals, and project reports (Paltridge & Starfield, 2013).
- b. Genre-Based and Task-Based Learning
The integration of genre analysis (Swales, 1990) and task-based learning can increase academic relevance.
- c. Collaboration with Industry
Industry stakeholder involvement is crucial in designing professional communication scenarios (Long, 2005).
- d. Integration of Digital Literacy
Given the widespread availability of engineering learning resources online, learning needs to integrate the ability to understand multimodal discourse.

Theoretically, this study strengthens the argument that needs analysis is the primary foundation for effective ESP development. Practically, the results provide an empirical basis for revising the English curriculum in Electrical Engineering.

5. Conclusion and Recommendations

5.1 Conclusion

This study aims to analyze the English language needs of Electrical Engineering students at the University of Tulungagung using a case study approach based on needs analysis. Based on the research findings, it can be concluded that students' English language needs are predominantly focused on reading technical texts and international journals, followed by writing academic reports and technical project presentations. Speaking and listening skills also have a high level of urgency in the context of professional communication and access to global learning resources.

These findings confirm that English language learning in the Electrical Engineering environment is not solely oriented towards General English but needs to be directed towards a contextual and discipline-based English for Specific Purposes (ESP) approach. In line with Hutchinson and Waters (1987), target student needs include the ability to understand scientific literature, technical documentation, and academic and professional communication. Furthermore, a genre-based approach (Swales, 1990; Hyland, 2006) has proven relevant in supporting mastery of the rhetorical structure of engineering academic texts.

This study also identified a gap between the applicable English language curriculum and the actual

needs of students and industry demands. This strengthens the argument that needs analysis is an essential foundation in developing an effective language curriculum (Long, 2005; Nation & Macalister, 2010). Thus, this study provides a theoretical contribution in enriching ESP studies in the context of higher engineering education in Indonesia as well as an empirical contribution in the form of a comprehensive and multi-perspective mapping of language needs.

5.2 Recommendation

Based on the research conclusions, several strategic recommendations can be proposed:

- a) Developing a Disciplinary ESP-Based Curriculum
The Electrical Engineering Study Program needs to develop an ESP-based English syllabus that integrates authentic texts, technical terminology, and professional communication practices. This aligns with the principles of contextual ESP course development (Basturkmen, 2010).
- b) Integrating Genre-Based and Task-Based Approaches
Learning can be designed using genre-based and task-based learning approaches to improve students' skills in writing technical reports and delivering academic presentations (Hyland, 2006).
- c) Collaboration with Industry
Industry involvement in the development of teaching materials and the evaluation of professional communication competencies can increase the relevance of learning to the needs of the global workplace (Paltridge & Starfield, 2013).
- d) Strengthening Academic and Digital Literacy
Given the dominance of digital-based scientific sources, students need to be equipped with critical reading strategies, an understanding of academic vocabulary, and skills in understanding multimodal discourse (Coxhead, 2006).

By implementing these recommendations, it is hoped that English learning in the Electrical Engineering Study Program can be more adaptive, relevant, and responsive to academic and professional demands in the global era.

5.3 Gap Research

Various international studies have examined the importance of needs analysis in ESP development (Basturkmen, 2010; Long, 2005). These studies confirm that a needs-based approach can increase the relevance and effectiveness of language learning. However, most research has been conducted in developed countries or specifically in fields of study other than electrical engineering.

In the Indonesian context, ESP research in engineering is still relatively limited and generally focuses on student perceptions without comprehensively involving industry stakeholders. Furthermore, there are few studies examining the English language needs of electrical engineering students at regional universities as contextual case studies. This finding demonstrates that the institutional context and student characteristics significantly influence their language needs. Based on this synthesis, two main research gaps exist:

- a) Limited empirical studies specifically examining the English language needs of electrical engineering students in the local Indonesian context.
- b) The lack of a multi-perspective approach that integrates students, lecturers, and industry stakeholders in needs analysis.

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