Integration of English for Specific Purposes: A Comprehensive Study of Language Needs in Computer and Software Engineering Students

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Abstract

Programming along with research and global collaboration depend on English as their main language in computer and software engineering fields. The ongoing advancement of technology demands English proficiency from students because they require international resources and professional connections and industry updates to succeed. Academics and careers of engineering students become shaped by their proficiency in the English language according to this study while it also demonstrates how English proficiency influences both learning efficiency together with problem-solving abilities and career-readiness. The research documents the main obstacles students with limited English proficiency face because they struggle with programming documentation and have restricted access to worldwide educational materials and participate less in international academic collaboration platforms. Students who excel in English can better understand technical subjects and become more efficient programmers while also gaining better opportunities in the international work market. The research demonstrates why engineering education should incorporate English for Specific Purposes (ESP) because it enables students to develop language skills essential for their academic and professional growth. This research strengthens understanding about English's role in engineering education which helps curriculum developers optimize language education instructions. The expansion of career possibilities and the maintenance of competitive advantage in both a global market and technological sector become possible through strong English proficiency development.

Keywords: English for Specific Purposes (ESP), English proficiency, global collaboration, engineering education, academic English.

1. Introduction

Professional development for students of computer and software engineering requires advanced English proficiency because English stands as the primary language of communication across institutional and governmental facilities and academic institutions worldwide. The growing technological transformations require engineering students to develop essential English language abilities because it has become a critical professional requirement. Through globalization English emerged as the dominant language both in science and technology fields. (Irshad, I., & Anwar, B. ,2018). The English language enables future engineers to operate on a worldwide scale according to Ramirez et al. (2018) in engineering fields. Students benefit from the ability to use English to access worldwide academic materials and maintain

professional network connections and learn about current research. Flowerdew (2013) highlights that English for Specific Academic Purposes (ESAP) plays a crucial role in helping students navigate research publications, produce technical documentation, and participate effectively in academic and professional discourse. Learning English proves necessary for scholarly achievement along with career progress since it is extensively used across programming documents and technical literature and industry communication. The English language serves as both an official instructional language and workplace communication standard in professional education due to its routine utilization in higher academic institutions and national offices (Brilianti, D. F., & Rokhim, A. ,2024). According to Harding (2007), English is not only a primary medium for communication in professional and academic engineering contexts, but also an essential tool for career advancement and collaboration in international industries. The rising requirement for English knowledge in every academic field has developed into a fundamental prescription for self-guided education and teamwork development (Uemura, 2017). Tomlinson (2011) highlights that students from the Engineering Faculty need to study authentic materials that target their exposure to genuine sources.

Engineering students encounter difficulties because they demonstrate limited skills in English language. Engineering students who struggle with technical documents along with limited study material access and low participation in international sharing networks face barriers in professional as well academic development. All work focused on English requirements for working adults must incorporate practical uses of classroom material that directly translate outside courses (Kaewpet, 2009). Engineering students need ESP programs which focus on technical vocabulary because these obstacles demonstrate the necessity to teach English directly within engineering education programs. Hyland (2002) emphasizes that ESP instruction must be tailored to the specific linguistic and communicative needs of learners, ensuring that engineering students acquire the precise technical vocabulary and discourse skills required in their professional environments.

Educators need to conduct fundamental analysis of their courses due to English for Specific Purposes (ESP) evolution according to Basturkmen (2006). The evolution of English for Specific Purposes (ESP) has mainly occurred through the adoption of "contextualized notion of language" (Brinton & Master, 1997). Peter Strevens (1977) established three significant characteristics of ESP through which he distinguished this field: a priority system for language usage goals together with learner-driven curricular alignment and methodology selection.

The teaching method of English for Specific Purposes or ESP focuses on delivering English instruction to students who want to learn the language for specialized academic or professional or occupational purposes Pleşca, G. (2016, June). New instructors find the process of designing purpose-built courses challenging for target ESP learners while we believe that appropriate curriculum design leads to their field-related proficiency according to Afia, A. & Mami, N. A. (2020). Several ESP experts (Bojovic 2006; Dudley-Evans & St. John 1998) agree that target learners require specific language capabilities which result from needs analysis-based curriculum development processes. According to Williams (2014) the ESP targets speciality, specification and specialism as its key performance aspects. The current trend in ESP approach integration involves the implementation of content and language integrated learning as described by Sandal, Ö. B., & Özkan, Y. (2022). The instructors used learning need data as a foundation to create connected sequences of teaching and learning skills during the course design process.

The principle approach to course creation described by Hutchinson and Waters (1987) has Skill-Centered Approach as its basis: it focuses on learner competence growth to achieve effective information processing abilities. Mitra (2006) advocated ESP education for engineering to enhance both English language skills and communication skills in the cohort's population. Engineers require instruction in English proficiency development through effective and prosperous teaching approaches specifically during their studies which include an English for specific purposes engineering course (Widdowson, 2011).

This study examines the impact of English proficiency on the programming knowledge and conceptual clarity of engineering students. The research demonstrates through language analysis that English plays a vital role for technical communication in Computer and Software Engineering regarding documentation, problem-solving and overall understanding. This research examines the effects of language distinctions on code legibility and documentation precision and conceptual precision through an evaluation of students who work with English versus students who work with Albanian coding language.

Record-keeping through English led to superior syntax formatting along with definitive explanations and more technical phrasing among students. Student success in engineering education depends on the implementation of English for Specific Purposes (ESP) to help students develop technical skills and professional preparedness. Research findings combined with faculty assessments combine to develop helpful insights which service both educational professionals and policy makers in their search for optimal language education methods leading to effective communication skills for engineering students in the global market.

2. Methodology

This study investigates the impact of English proficiency on the academic and professional development of engineering students.

2.1 Participant Selection

University Metropolitan Tirana hosted this study through which 147 undergraduate students from Computer Engineering and Software Engineering departments participated. The research included 75 Software Engineering students and 72 Computer Engineering students. The students were distributed as 48 male and 27 female students in the Software Engineering group, and 44 male and 28 female students in the Computer Engineering group.

Students from the Computer Engineering Group (n = 75) performed programming tasks through documentation and comment-writing in the Albanian language.

Students in the Software Engineering Group (n = 72) performed equivalent programming assignments in English for their documentation requirements as well as comment sections and their explanations. The research design incorporated two separate groups to study how English for Specific Purposes (ESP) influences programming skills and understanding in students.

2.1.1 Research Design

The research design selected for this study was a quasi-experimental format to assess ESP impact within programming education. Research evaluated the impact of language use by studying students who coded in English and Albanian in order to determine the effects of instruction language on efficiency in programming and conceptual understanding. The study used language of instruction and documentation as its independent variable and professors evaluated programming proficiency as the dependent variable.

2.1.2 Study Duration and Procedure

The study period of two weeks was equally applied for each group allowing sufficient time for software development analysis and design implementation as well as documentation.

Students needed to create the same software application based on defined specifications. Students needed to produce comments and documentation and explanation in Albanian language or English based on the assigned group membership.

Students needed to send in their programming code and a structured report explaining their process and support documentation at project completion time.

2.1.3 Evaluation and Assessment

Faculty evaluation served to determine the effectiveness of ESP in programming implementation. The students' work received assessment from three independent professors who utilized these evaluation criteria.

1. *Code Readability & Documentation (1–10 scale):*
   Lexicology: Assesses the use of appropriate programming terminology in comments and documentation.
   The syntax component evaluates grammatical accuracy together with sentence structures of explanations that appear within the program code.
2. *Conceptual Accuracy (1–10 scale):*
   Lexicology: Examines the precision and correctness of technical vocabulary in the written report.
   The syntactical analysis verifies that technical explanations maintain both correct grammatical framework and structural elements.
3. *Linguistic Clarity in Documentation (1–10 scale):*
   The evaluation system assesses the exactness and logical flow of provided explanations throughout programming documentation.
   The measurement system evaluates how well comments and annotations transfer technical information while maintaining correct terminology usage and logical sentences along with proper grammar.

4. *Overall Programming Proficiency (1–10 scale)*

The general assessment evaluates programming effectiveness through code quality assessment combined with problem-solving abilities and conceptual understanding of the task.

2.1.4 Data Analysis

Faculty member scores revealed which group of students who programmed in English obtained better results for documentation clarity and problem-solving abilities and overall comprehension compared to students who programmed in Albanian. Mean comparison and standard deviation analysis operated as statistical methods to evaluate performance distinctions.

3. Results

This section details the research conclusions which evaluate the effect of English for Specific Purposes (ESP) on programming effectiveness and understanding among students studying Computer Engineering and Software Engineering at University Metropolitan Tirana. Multiple evaluation criteria produced average scores which came from the assessments performed by three professors.

a. *Code Readability & Documentation:*

Students who wrote code documentation in Albanian achieved 5.8/10 as their average score for code readability and documentation within the Computer Engineering Group. Students exhibited difficulties in using standardized terminology while their code explanations were unclear based on the score results.

Students who documented their software using English accomplished an average grading score of 9.0 out of 10. The documentation produced by this group presented itself as structured along with being concise while maintaining alignment with international programming standards.

The programming clarity of the Software Engineering group improved by 55% in comparison to the Computer Engineering group according to analysis which favors English documentation for software explanation.

b. *Conceptual Accuracy:*

The students in Computer Engineering Group (Albanian) achieved an average score of 6.2/10 for conceptual accuracy. The technical explanations were correct but the group members showed inconsistent use of terminology.

Students from the Software Engineering Group (English) achieved on average 9.5/10 in their performance. The technical material presented in their reports included accurate usage of precise terminology and well-structured explanations.

Technical conceptual accuracy among members of the Software Engineering group improved by 53% due to using English instead of Albanian for their technical articulation.

c. *Linguistic Clarity in Documentation:*

The comments and documentation written in Albanian by the Computer Engineering Group received a combined average score of 5.9 out of 10 from the reviewers. Professional documentation quality was affected by several grammatical mistakes together with structural inconsistencies in the text.

Students in the Software Engineering Group achieved an English linguistic clarity mark of 9.3/10. The students showed improved control of grammar and their documentation structure became more clear.

On average the Software Engineering team achieved a 58% better level of linguistic clarity than Computer Engineering team members.

The evaluation of written explanations in programming documentation through Linguistic Clarity in Documentation rate documents clarity precision and coherence on a 1–10 scale. The assessment establishes how well technical comments and annotations communicate complex ideas by maintaining clear flow and proper use of terminology and correct grammar.

d. *Overall Programming Proficiency:*

Students in the Computer Engineering Group (Albanian) demonstrated a programming mastery of 6.5 out of 10 points which showed they could write functional codes but faced occasional problems in documentation and conceptual explanations.

Students from the Software Engineering team working in English showed average programming understanding and efficiency at 9.7/10.

The Software Engineering team demonstrated overall programming competence that surpassed Computer

Engineering by 49 percent.

4. Summary of Findings

The comparative analysis of the two groups is summarized in Table 1 below:

Table 1. Summary table of results (University, M. T. (2024))

Assessment Parameter	Computer Engineering Group (Albanian)	Software Engineering Group (English)	Improvement (%)
Code Readability & Documentation (1–10)	5.8	9.0	55%
Conceptual Accuracy (1–10)	6.2	9.5	53%
Linguistic Clarity in Documentation (1–10)	5.9	9.3	58%
Overall Programming Proficiency (1–10)	6.5	9.7	49%

These results establish the essential position of English for Specific Purposes (ESP) in improving programming education. This researc demonstrates how English serves as the most advantageous language for code documentation and technical explanations since it delivers improved precision and clarity during programming tasks.

5. Discussion

Computer and software engineering students who learn English for Specific Purposes (ESP) become more ready for their future global employment sectors and work environments. Robinson (1991) explains that ESP teaching concentrates on developing skills for delivering professional language needed across particular domains. The acquisition of technical language and collaborative methods and international membership in professional communities is essential for computer and software engineering students. ESP programs succeed in improving career preparedness when they teach language skills based on the unique requirements of these students.

Engineers must possess English proficiency for success in real-life projects as well as work at international workplaces. The International Journal of Multimedia and Ubiquitous Engineering (2013) reported engineers across the globe depend on English for their working tasks that involve preparing technical reports alongside collaborating with colleagues and initiating network contacts at their profession. English functions as the standard communication language across GitHub and Stack Overflow along with other collaborative development tools since all documentation and project tracking occurs in this language. Lack of proper English language skills prevents computer and software engineers from effectively joining open-source projects and international team collaboration while also blocking their access to contemporary research and documentation.

The nature of international collaboration requires computer and software engineers to deliver complex technical concepts effectively to diverse multinational teams. Exceptional programs in English for specific purposes targeted at this group of students provide an academic-industry communication bridge to boost their professional advancement opportunities. Kaur and Muthusamy (2018) highlight that integrating English communication training into engineering curricula provides students with practical language skills needed for effective collaboration and networking in the global workforce.

ESP courses play a fundamental role according to Mudraya (2006) since they train engineering students for their future professional work. The importance of using proper English language skills becomes crucial for GitHub participants because engineers perform both coding inspections and technical discussions within this collaborative platform. Being able to speak and understand English provides students with the capability to express their ideas effectively and understand directions and make significant contributions within international teamwork. The essential mission of ESP programs is to develop essential communication abilities that student engineers require when participating in global collaborative environments. Saito (2019) emphasizes the importance of conducting thorough needs analyses when designing ESP courses for engineering students, ensuring that the language instruction aligns with the specific demands of the engineering profession.

The engineering field mainly uses English as its dominant language for both international organizations and their

professional publications. Alharthi (2021) discusses how ESP courses tailored for engineering students in Saudi Arabia have been crucial in enhancing their communication skills, preparing them for the demands of international professional environments. The lack of proficiency in English makes native speakers encounter professional challenges at work because of language barriers. Engineering students need continuous specialized training of English because their academic success depends on it.

Mastering English presents additional difficulties to non-native speakers because engineering concepts possess complex characteristics. Non-native speakers need 4-10 years of training according to Orr and Aizuwakamatsu (2002) to achieve average proficiency levels in English language skills. Computer and software engineers operating in a fast-evolving industry encounter substantial difficulties due to their need to maintain their skills by continually accessing English-language technical documentation research papers and online tutorials. Global professional environments require students to receive a complete and enduring approach to ESP education so they can prepare appropriately.

The analysis conducted by ESP experts for agricultural engineering students revealed that engineers must learn English efficiently to succeed in their work environment (ESP Needs Analysis of Agricultural Engineering Students). Computer engineering students together with software engineering students need the same language proficiency because their professional duties require international standards of international team collaboration as well as international conference presentations and academic journal publication requirements.

6. Conclusions

The research demonstrates how knowledge of English shapes programming education together with professional development abilities for students in Computer Engineering and Software Engineering fields. The results reveal that program documentation clarity together with improved problem-solving capabilities and enhanced programming concept understanding belong to students who wrote their programming explanations in the English language over students using Albanian language. The research proves that engineering programs should implement English for Specific Purposes (ESP) to enhance student success along with professional progress.

This study describes the problems faced by non-English proficient students who face barriers when understanding technical documents as well as find limited international educational resources and experience limited participation in academic and professional global networks. English language proficiency enables students to understand technical subjects better while making them more efficient programmers which leads to expanded career possibilities in international markets.

The investigation reveals critical relationships between English proficiency levels and programming outcome success which teachers along with curriculum developers should use to enhance their educational strategies. Engineering education that incorporates English for Specific Purposes trains students with fundamental language skills which makes them successful in international markets. The professional and academic success of engineering students depends significantly on their English proficiency because of modern technology expansion and growing global industrial team requirements.

References

Afia, A., & Mami, N. A. (2020). An ESP course design for postgraduate students of engineering at Badji Mokhtar Annaba University. International Journal of English Language Teaching, 8(1), 1–10.

Alharthi, M. (2021). English for Specific Purposes in the context of Saudi engineering students: An exploratory study. Journal of English for Specific Purposes, 15(2), 105-121.

Basturkmen, H. (2006). Ideas and options in English for specific purposes. Lawrence Erlbaum Associates.

Bojovic, M. (2006). Teaching foreign languages for specific purposes: Teacher development. In Proceedings of the 31st Annual Association of Teacher Education Conference. https://doi.org/10.13140/2.1.4011.4566

Brilianti, D. F., & Rokhim, A. (2024). Academic journal perspective on education, language, and literature. Perspective Education Language and Literature, 11(1), 70-78. https://doi.org/10.33603/wc0gnm38

Brinton, D. M., & Master, P. (1997). New ways in content-based instruction. Teachers of English to Speakers of Other Languages (TESOL).

Dudley-Evans, T., & St. John, M. J. (1998). Developments in English for specific purposes: A multi-disciplinary approach. Cambridge University Press.

El Ouardi, M. (2021). ESP needs analysis of agricultural engineering students. International Arab Journal of English for Specific Purposes, 4(1), 45–60.

Flowerdew, J. (2013). English for Specific Academic Purposes (ESAP) writing: Making the case. Journal of English for Academic Purposes, 12(1), 65–73.

Harding, K. (2007). English for Specific Purposes. Oxford University Press.

Hutchinson, T., & Waters, A. (1987). English for specific purposes. Cambridge University Press.

Hyland, K. (2002). Specificity revisited: How far should we go now? English for Specific Purposes, 21(4), 385–395.

Irshad, I., & Anwar, B. (2018). Designing English for specific purposes course for computer science students. Journal of Education and Educational Development, 5(1), 156–171.

Kaewpet, C. (2009). Communication needs of Thai civil engineering students. English for Specific Purposes, 28, 266–278.

Kaur, A., & Muthusamy, S. (2018). The role of English in the engineering curriculum: Insights from Malaysian students. Asian Journal of Language and Communication, 3(2), 70-80.

Kim, H. (2013). English for engineers: Issues and challenges. International Journal of Multimedia and Ubiquitous Engineering, 8(6), 279-288. http://dx.doi.org/10.14257/ijmue.2013.8.6.28

Mitra, B. K. (2006). Effective technical communication: A guide for scientists and engineers. Oxford University Press.

Mudraya, O. (2006). Engineering English: A lexical frequency instructional model. English for Specific Purposes, 25(2), 235-256. https://doi.org/10.1016/j.esp.2005.05.002

Orr, T., & Aizuwakamatsu, T. (2002). Constructing a corpus of fundamental engineering English for nonnative speakers. In Professional Communication Conference, IPCC 2002 Proceedings, Reflections on Communication (pp. 403-409). IEEE.

Pleșca, G. (2016, June). The essence of English for specific purposes. In Perspectivele și problemele integrării în spațiul european al cercetării și educației (Vol. II).

Ramirez, A. V., Isabel, B. A., & Alfonso, L. V. (2018). Challenges of the English teacher in the engineering faculty. English Language Teaching, 11(2), 149-155.

Robinson, P. C. (1991). ESP today: A practitioner's guide. Prentice-Hall.

Saito, Y. (2019). ESP course design for engineering students: A needs analysis approach. Journal of Engineering Education Research, 28(1), 11-23.

Sandal, Ö. B., & Özkan, Y. (2022). The evaluation of English for Specific Purposes (ESP) program at an engineering faculty. Istraživanja u Pedagogiji, 12(1), 253–268. https://doi.org/10.5937/IstrPed2201253S

Strevens, P. (1977). Special-purposed language learning: A perspective. Language Teaching, 10, 145-163.

Tomlinson, B. (2011). Introduction. Principles and procedures of materials development. In B. Tomlinson (Ed.), Materials development in language teaching (2nd ed.). Cambridge University Press.

Uemura, T. (2017). CLIL and its possible application to engineering education to enhance undergraduates' academic and subject-specific English literacy. International Journal of Engineering Innovation and Management, 7(2), 13-21.

University Metropolitan Tirana; "Evaluation Report on Experiments" unpublished,Tirana,Albania,2024.

Widdowson, H. G. (1978). Teaching language as communication. Oxford University Press.

Williams, C. (2014). The future of ESP studies: Building on success, exploring new paths, avoiding pitfalls. ASp. la revue du GERAS, 66, 137-150.