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# Need Analysis of English for Electrical Engineering Students at Vocational High School in the Digital Age

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## Abstract

*This study investigated the English language needs of Electrical Engineering students at a vocational school Indonesia within the context of the digital age. Adopting a mixed-methods design, the research combines questionnaires, interviews, and classroom observations. The research identifies students' linguistic necessities, lacks, and wants using established English for Specific Purposes (ESP) frameworks. Questionnaires were designed to assess students' self-perceived English skills and their preferences regarding skill priority. Then, interviews were conducted with English teachers. Based on the interview and questionnaires, the researcher found quantitative and qualitative data. The research's findings demonstrated the importance of reading and vocabulary competence and their actual competence. Reading is prioritized as essential for interpreting technical manuals, safety documents, and equipment specifications, yet most students report low confidence and ability. Through surveys, interviews, and classroom observations, this research identifies the key linguistic skills required, evaluates the gaps in current curricula, and recommends pedagogical strategies tailored to digital and industry-specific demands. The results highlight a growing need for domain-specific vocabulary, reading comprehension of technical texts, and the ability to communicate in digital environments such as online forums, video tutorials, and remote collaboration platforms. The findings advocate for an ESP (English for Specific Purposes) approach integrated with digital literacy and project-based learning approaches to enhance professional readiness.*

**Keywords:** ESP, Vocational Education, Digital Literacy, Needs Analysis, English For Engineering

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## I INTRODUCTION

English proficiency is a fundamental skill in the twenty-first century, functioning not only as a medium of communication but also as an essential tool for professional advancement. In Indonesia's vocational education system, students are prepared to enter specific occupational fields; therefore, English instruction should be tailored to these disciplines. English for Specific Purposes (ESP) responds to this need by designing courses that meet the linguistic and communicative requirements of distinct professions (Basturkmen, 2010; Hutchinson & Waters, 1987).

English for professional and academic purposes has become an important skill, especially for students in vocational school. English teaching practices in this field must also be specified to prepare the students to enter particular professions in the future (Mahbub, 2018). Vocational education is a part of high school education that prepares the students to have a proper job according to their specific majors (Indonesian law (UU) number 20, year 2003). It means that vocational schools concerned with developing the students' specific skills regarding their majors. So, vocational schools must prepare their students with proper knowledge and skills to compete at a professional level especially in English. The concept is recognized as English for Specific Purpose (ESP). However, English classes at most vocational schools remain general in nature and disconnected from students' future workplace demands.

In ESP, English is no longer viewed solely as just a subject in the curriculum, but rather as a tool for accessing knowledge, participating in international discourse, and advancing in professional settings. Vocational high-school students majoring in Electrical Engineering often interact with technical materials written in English—such as circuit diagrams, operation manuals, and safety protocols. This is particularly true for students in technical fields to studying about instructional material, manuals, technical documents, and safety guidelines are written in English.

ESP is an interesting studies to investigated students' need in English language. Some studies investigated students' language

difficulties in learning English for computer engineering and network such as Arif Mahlub (2023) and Suyadi & Andana (2019) analyzed engineering students' need related to the authentic material. Then, Yusuf, et.al (2022) investigated primary students' need are communication and understanding documents. And also, the results shows that the English skills needed by the Electrical Engineering students were grouped as receptive and productive skills. The receptive skills needed were the ability to grasp the texts' ideas, the ability to listen to others' words, The productive skills are the ability to produce the English words to convey meanings in oral communications.

Then, Wahyudi,W and Jufrizal (2021) investigated ESP needs of first-year electronic industrial engineering students. It emphasizes target situational analysis and students' perception of curriculum design. The main points were greater technical vocabulary, grammatical structures, oral comprehension, and reading understanding. Almost all published work on ESP for vocational school to analysis students' need, learning materials, curriculum and students' carrier. These are not integrated with digitalization communication. Consequently, we are further interested to look analysis of ESP for vocational school deeply which is integrated with the digital age.

In the era of globalization and rapid technological development today, English language skills have become one of the important skills that must be possessed, especially by the younger generation. English is not only used in academic contexts, but also becomes the main communication tool in the professional world, business, information technology, and social media (Al Awlaqi & Ghozali, 2023; Lesiana et al., 2023; Ghwela, 2023). So, the English learning should be integrated with the technology as communication tool effectively today.

There are some researches studies about students' need in vocational school in English learning with technology such as Puspitaloka, N., & Ambarwati, E. (2023). They analyzed ESP needs of software engineering students in vocational schools. Highlights the importance of integrating ESP into core instruction. In their research explained English for Specific Purpose

Needs Analysis at a Vocational High School. Analyzes ESP needs of software engineering students in vocational schools. Highlights importance of integrating ESP into core instruction. Then, Marculescu, C. (2025) discusses project-based learning (PBL), a dynamic, essentially student-centered approach to teaching which motivates students to explore real-world problems and to learn by discovery (rather than through the textbook-centered learning or through information given directly by the teacher). he investigated undergraduate economic students in Bucharest where it offering students' opportunity to work in collaborative teams and use the digital technology now available. Then, vonog and friens(2021) combine reading strategies both traditional strategies and digital age strategies in reading in Russian university. Then, in indonesia Nurhayati also investigate trends, challenges, and pedagogical implications of technology-enhanced ESP instruction in higher education between 2019 and 2025

Srisudarso, M., & Nugraha, S. A. (2023). Improving Students' English Language Skills with an ESP Approach in the Center of Excellence Vocational School Curriculum. BIS-HSS 2023, Atlantis Press. Their studies showing that ESP-based teaching improves students performance significantly more than standard English curriculum. Besides, Srisudarso, M., & Nugraha, S. A. (2023). Improving Students' English Language Skills with an ESP Approach in the Center of Excellence Vocational School Curriculum. They used experimental study showing that ESP-based teaching improves student performance significantly more than standard English curriculum. It also needs more investigation how the students' need in rural area, which is integrated with digitalization.

## II RESEARCH METHODS

This study adopts a descriptive qualitative research design, supported by quantitative techniques for triangulation. A mixed-methods approach was chosen to gain both depth and breadth of understanding. According to Creswell (2014), mixed-methods research is appropriate when researchers seek to explore a phenomenon both qualitatively (in-

In the context of Electrical Engineering, integrating technology into English for Specific Purposes (ESP) instruction is crucial to preparing learners for global industry demands. Electrical engineers frequently work with technical documentation, international standards, and digital tools that require precise and field-specific English proficiency. By incorporating simulations, online circuit design platforms, virtual labs, and technical corpora into ESP lessons, educators can create realistic and highly relevant language-learning environments. This not only improves technical vocabulary acquisition but also strengthens learners' ability to communicate clearly in collaborative engineering projects and professional reporting. As Basturkmen (2010) highlights, ESP programs must align with the professional practices of the target field—and for electrical engineering, that means leveraging technology both as a medium and a subject of instruction.

The findings of this research aim to guide the creation of a more responsive, skill-focused English for Specific Purposes (ESP) curriculum and identifies the gap between the current teaching practices and the demands of the digital industry. Implementing ESP should be an intention for English students' skills. This approach will enhance students' functional literacy and improve their employability in the global job market. Ultimately, this research supports the national vision of preparing skilled human resources who are not only technically proficient but also capable of communicating effectively in an international language and integrated to technology development.

Unlike previous studies, this research specifically integrates ESP need analysis with digital-age communication demands in rural vocational contexts.

depth descriptions, interviews, observations) and quantitatively (numerical patterns, survey data). "Qualitative research explores the meaning individuals or groups ascribe to a social or human problem, while quantitative research tests objective theories through numeric data" – Creswell, 2014

In the context of ESP (English for Specific Purposes), qualitative research is especially effective because it allows educators to explore learners' perceptions, motivations, and specific needs in real-world settings (Richards, 2001; Basturkmen, 2010). This research presents English for Special Purposes (ESP) in vocational school. This analysis describes students' need and design ESP course. Following Hutchinson and Waters (1987), students' English needs were classified into necessities, lacks, and wants.

**Table1. Students' English need**

Category	Description	Example in this Study
<b>Necessities</b>	Skills required for the target situation	Ability to read and interpret technical manuals, safety documents.
<b>Lacks</b>	Gaps between current ability and target proficiency	Limited vocabulary and difficulty understanding complex instructions.
<b>Wants</b>	Learners' preferences and priorities	Desire to master reading and technical vocabulary through digital media.

This description is followed by a discussion of the need analysis based on students' need on their study filed which gathering information by teacher and former students by using the questionnaires, interview and observation of English course for electric engineering students in vocational school. So, the study used triangulation by combining three main methods. There are Questionnaires. Interview and observation. Questionnaires are designed to assess students' self-perceived English skills and their preferences regarding skill priority (reading, writing, listening, speaking).it is Structured using Likert Scales (1–4) and multiple-choice formats. Based on Hutchinson & Waters (1987) and Dudley-Evans

& St. John (1998) frameworks: measuring necessities, lacks, and wants. Then, interviews were conducted with English teachers (to understand instructional practices, challenges). Interviews followed a flexible guide based on ESP target situation analysis (TSA) principles. And also, this research used classroom observation checklist to collect data which is focused on student-centered practices, ESP integration, and skills emphasis. Observation in natural settings allows researchers to examine actual practices rather than just perceptions.” – Marshall & Rossman, 2011. Three main instruments were employed:

**Table 2. Instruments of research**

Instrument	Purpose	Description
<b>Questionnaire</b>	Identify perceived needs and competence	20 items using a 4-point Likert scale evaluating reading, writing, listening, speaking, vocabulary, grammar, and digital English use.
<b>Interview</b>	Explore teachers' perspectives	Semi-structured; focused on teaching materials, difficulties, and ESP relevance.
<b>Observation</b>	Examine classroom practice	Checklist of ESP features (authentic materials, skill focus, use of digital tools).

The participant of this research is English teacher and 45 first-semester students (Grade X). They are electrical engineering students and English teacher who teach English for electrical engineering students. The student participants were selected using purposive sampling, which is ideal in needs analysis studies where participants are chosen based on their relevance to the research focus (Ary et al., 2010).

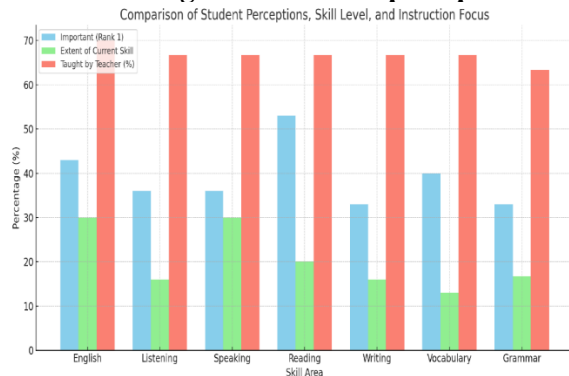
### III RESULTS AND DISCUSSION

Based on the data collected through questionnaires, interviews, and observations, several key findings emerge regarding the

English language needs of Electrical Engineering students in the vocational school at Tanjung Raya, Agam. In the begining describing of

students' need based on students' answer on questionnaires that have given. Questionnaire results show clear distinctions between perceived importance and actual competence This analysis based on questionnaires of need assessment as diagram below:

**Diagram 1. students perception**

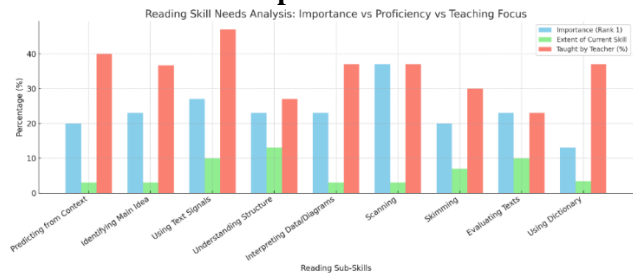


Reading is rated as the most important skill (53%), but students feel only moderately competent in it (20%)—highlighting a significant gap between need and ability. Vocabulary also ranks high in importance (40%), but only 13% of students feel confident in their vocabulary knowledge—again pointing to a critical deficiency. Listening and Grammar have moderate importance scores, but the teacher's instructional focus remains consistently high (above 63%) for all skills. English in General is perceived as important (43%), and 70% of students affirm that teachers focus on it—but the extent of their current skill is still low (30%)

Based on the questioner that shown that the reading skill is important one than other. Deals with the english teacher siad that English for electric engineering students are related to english that they found in theirfield. The english in electricity is diffrent with english for other course because in the electricity has diffrent (Interview, Mei 6<sup>th</sup> 2024). Based on four skills in english, the students' need and more important skill in four skills is reading. According to Yuneldi (electric teacher in vocational school tanjung raya Agam) said that the more important one is reading. In reading skill, they know the new vocabullary about electricity.

Then, let we see the students competence in reading skill. At the begining the table above shown that students' answer their need in reading skill. The amount of student answer based on questionnaires as diagram below:

**Diagram 2. Students' need in reading competence**



From the reading skill it seem that student need in reading competence still low and most of students' want more learning of reading skill. It also has been said by English teacher in vocational school in Tanjung Raya that students skill still low (interview, Mei 6<sup>th</sup> 2025). The teacher want the students focused on reading and rich vocabulary about electricity. It will help them in their carrier.

From the tables above, it seems that the English course in vocational school should be constructed based on students' needs for their career. The teacher should teach English related to their field of study. As Yunaldi said (English teacher) that students develop their skills by using authentic material related to their vocational school. Today, since the curriculum has changed, they can't teach specifically about the English field in electricity, and the time for teaching English is short.

Reading emerged as the most essential for students. This preference is rooted in the nature of electrical engineering itself, which relies heavily on the comprehension of technical documents, such as manuals, circuit diagrams, datasheets, and standard operating procedures. Students reported frequent encounters with written materials in English, especially when operating machinery, installing equipment, or studying for certifications. Despite recognizing its importance, many students struggled to understand these materials due to complex sentence structures, passive voice, and unfamiliar technical vocabulary. Teachers also noted that the materials used in the classroom rarely reflect the real-world pace or content of digital media,

The role of digital literacy in shaping language use emerged as a particularly important theme in this study. With the increasing integration of digital tools in education and the workplace, students are required not only to read and write in English but to do so within a digital

context. For example, students frequently search for solutions on technical forums such as Stack Overflow or Reddit, watch tutorial videos, or participate in virtual learning environments. During internships, many were asked to write short reports, send email updates, or communicate using messaging apps like WhatsApp and Slack. These activities demand a practical and applied use of English, yet they are rarely addressed in traditional English curricula.

Despite these needs, the study found that the current English curriculum at most vocational schools remains outdated and disconnected from the realities of modern engineering practice. Teaching materials continue to focus on general English topics such as daily routines and personal hobbies, which do not reflect the professional contexts students are entering. Authentic materials, such as technical manuals, online video content, and real-world documentation, are seldom used. Additionally, the integration of digital tools into language instruction is minimal, even though digital competence is increasingly tied to English proficiency in technical domains.

Another critical issue identified in this study is the lack of teacher preparedness for teaching English for Specific Purposes (ESP). Most English teachers interviewed admitted that they had limited knowledge of electrical engineering concepts and terminology, making it difficult for them to confidently deliver ESP content. Without sufficient training or access to up-to-date resources, teachers are unable to design lessons that are relevant and engaging for engineering students. This situation further contributes to a mismatch between the students' needs and the instruction they receive.

Interviews with teachers reinforced these quantitative results. Teachers reported that most students struggle to interpret technical materials written in English, particularly manuals, safety procedures, and component specifications. Observations further revealed that classroom activities are dominated by general English drills rather than tasks related to electrical contexts. Teachers also expressed difficulty integrating ESP into the curriculum due to limited instructional time and lack of resources. Moreover, digital tools are rarely used beyond basic PowerPoint slides, even though students

often seek information from online sources such as YouTube tutorials and technical forums.

Next, it can be discussed of the research finding. The present study provides a distinct and contextually grounded contribution to the field of English for Specific Purposes (ESP), especially as it relates to vocational education in Indonesia. While numerous studies have explored ESP implementation across technical schools, this research stands apart in several critical aspects—most notably its localized focus, triangulated methodology, and fine-grained skill analysis.

Unlike previous research that tends to generalize vocational learners under broad categories, this study is sharply focused on a specific group: electrical engineering students in a rural vocational school in Tanjung Raya, Agam. This regional and field-specific orientation allows the research to uncover linguistic needs that are unique to students navigating technical texts, safety manuals, procedural documents, and real-world instructions in electricity-related tasks. In line with Arif Mahlub (2023), his research investigated English teaching to uncover possible areas of students' language difficulties in learning English for computer engineering and network. But, this research found the students' language difficulties especially English for electrical engineering students whom learning about the procedural of using the electricity. The students need English language related to electricity, electricity safety, how way to use electricity.

To strengthen reading comprehension for technical material, Learners must develop the ability to understand and interpret complex technical texts such as manuals, schematics, and research papers. This involves not only recognizing key ideas but also analyzing information critically and applying it to real-world electrical engineering contexts. Enhanced reading comprehension ensures that learners can follow safety procedures, understand technical documentation, and stay current with technological advancements.

Furthermore, the research design itself demonstrates a stronger analytical rigor. By combining questionnaires, interviews, and classroom observations, the study integrates both student perceptions and observable classroom realities. This triangulation ensures that the findings are not only based on self-reporting but

are grounded in actual teaching practices and learner behavior. This is a methodological strength not always evident in earlier ESP studies.

The findings reveal a consistent and compelling narrative: students in Electrical Engineering prioritize reading and vocabulary as the most essential language skills for their field, yet they report low confidence and competence in those very skills. Reading, in particular, is vital for understanding technical documents, wiring diagrams, safety instructions, and user manuals—all of which are frequently written in English. However, less than 25% of students felt proficient in sub-skills like scanning, skimming, or interpreting graphical data. The dominance of reading and vocabulary as priority skills aligns with prior ESP research (Basturkmen, 2010; Rahmat & Jannah, 2020). Electrical Engineering students depend heavily on written English to comprehend technical documentation and international standards. Yet, many vocational English curricula remain generalized, focusing on conversational English instead of discipline-specific tasks (Mahbub, 2018).

This gap between perceived importance and actual skill level is further exacerbated by the teacher's inability to deliver field-specific English content, due to limited instructional time, the use of general English textbooks, and a national curriculum that does not support ESP specialization. Interviews with teachers confirmed this constraint, as they expressed frustration over the lack of materials and training to align their instruction with the students' technical needs. Thus, a significant misalignment exists between student needs, curriculum content, and teacher resources. So, English education remains disconnected from their career paths.

This research also reflects on the broader implications of such a mismatch. On one hand, it illustrates the readiness and motivation of vocational students to learn English when they perceive its relevance to their careers. On the other hand, it highlights systemic challenges that obstruct the delivery of effective ESP instruction in rural contexts. The findings serve as both a diagnosis of current deficiencies and a call to action for educational policymakers.

Besides, the rise of digital technologies has profoundly transformed the way English is taught and learned, making the learning process

more accessible, interactive, and personalized. For students in vocational and technical fields—such as electrical engineering—digital platforms offer an especially powerful medium to acquire English that is both practical and relevant to their future careers. One of the primary advantages of digital platforms is the abundance of real-world, authentic English materials. Unlike printed textbooks, which can quickly become outdated or overly generic, digital platforms provide students with current and industry-relevant content. Digital platforms also provide spaces for real-time interaction and collaboration, enabling students to practice English in more social, communicative contexts. So, the teacher should utilize digital platforms (e.g., Padlet, Google Classroom, Canva, ChatGPT) to enhance collaborative learning.

In reflecting on this study, several critical insights emerge. First, vocational English instruction cannot be separated from occupational contexts. General English classes that focus on topics like shopping, travel, or entertainment are insufficient for students who need to read wiring schematics or write technical reports. English for vocational students must be integrated with field-specific vocabulary and communicative practices. Second, this research underscores the importance of authentic materials—students must interact with real manuals, blueprints, and technical documentation, not just ESL textbooks designed for academic learners. Third, the success of ESP hinges on teacher empowerment. Teachers must be equipped with professional development opportunities and materials that allow them to bridge language instruction with technical content.

In conclusion, this research contributes significantly to the field by revealing the urgent need for localized, targeted, and authentic ESP instruction for vocational students in Indonesia. It is both a scholarly contribution and a practical guide for curriculum reform, one that calls for systemic alignment between student needs, instructional design, and teacher capacity. Without such reforms, vocational students—especially those in rural areas—will continue to be left behind in the global workforce where English proficiency is no longer optional, but essential.

## IV CONCLUSION

The finding of this study can be understood as this research has revealed a significant gap between the current English language instruction provided to Electrical Engineering students in a vocational school in Tanjung Raya, Agam, and the actual language competencies these students require for their academic and professional futures. This study has contributed to a deeper understanding of the linguistic needs of vocational students in rural Indonesia. It emphasizes the importance of contextualized language education that prepares students for the practical use of English in their field. While the findings are significant, this study is limited by its scope—focusing on one vocational school and one field of study. Further research should be conducted across various technical departments and regions to validate and expand these findings. this study affirms that English language instruction for vocational students must move beyond generic approaches and instead focus on real-world, discipline-specific needs. A well-designed ESP course will not only enhance students' academic success but also significantly increase their employability and confidence in using English in professional contexts.

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The findings clearly show that vocational students in electrical engineering require English instruction tailored to their technical and digital needs. A shift toward ESP-based curricula is necessary to improve relevance and motivation. Integrating digital platforms, real-world materials, and project-based learning can bridge the gap between the classroom and the workplace.

Recommendations:

1. Revise curricula to include technical English aligned with digital learning tools
2. Develop multimedia-based learning modules using authentic materials
3. Train teachers in ESP methodology and digital tools
4. Encourage partnerships with industry to keep materials current
5. Implement project-based tasks using English in real-world scenarios

Besides, learning English through digital platforms offers a dynamic, flexible, and relevant alternative to traditional methods, especially for vocational students navigating the complexities of technical education in a digital world. By combining multimedia content, interactive tasks, real-time feedback, and authentic materials, these platforms make English learning more engaging and immediately applicable to students' academic and professional lives. For educational institutions and instructors, the integration of digital platforms into the English curriculum is no longer optional but essential in preparing students for the demands of the modern workforce.

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