Towards Technical Fluency: Assessing the English Language Needs of Mechanical Engineering Students in a University ESP Context

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Abstract— This study investigates the English language needs of Mechanical Engineering students in a university ESP class. Through a questionnaire distributed to 21 students, the findings reveal that 81% recognize the crucial role of English proficiency in their academic and professional pursuits. Specific language skills such as vocabulary and grammar practice are considered important, emphasizing the overall significance of language proficiency. The research underscores the importance of reading tasks, with technical documents, textbooks, and instructions deemed essential. However, a lack of emphasis on oral communication skills is evident, as tasks related to speaking are generally considered non-essential by the majority of students. While specific listening skills in certain contexts are valued, the study also points to a need for curriculum development in oral communication. Writing tasks, particularly SOPs and technical reports, are highly valued, but other forms of writing receive less emphasis. The study provides valuable insights into the linguistic needs of Mechanical Engineering students, offering guidance for curriculum development and instructional strategies to enhance their language skills for academic and professional success.

Keywords— English, ESP, University Students.

1. INTRODUCTION

In the ever-evolving landscape of global education and professional development, the importance of language proficiency, particularly in the field of Mechanical Engineering, cannot be overstated (Alsamadani, 2017). This study delves into the specific English language needs of Mechanical Engineering students within the university context, focusing on an English for Specific Purposes (ESP) class. Through the analysis of responses from 21 students, this research aims to shed light on the significance they attribute to various language skills and tasks.

The initial findings of the study reveal a consensus among Mechanical Engineering students regarding the paramount importance of English proficiency (Hossain, 2013). A substantial 81% of respondents acknowledge the pivotal role that English plays in shaping their academic and professional trajectories. This recognition underscores the need for a nuanced understanding of the linguistic requirements in their field.

Moving beyond the general acknowledgment of language importance, the study delves into specific language skills such as vocabulary and grammar practice (Keefer et al., 2018). These skills, fundamental to effective communication, emerge as focal points in the student's language learning journey, with varying degrees of emphasis among the respondents (Ary et al., 2018; Donald et al., 2010).

Furthermore, the research explores the students' attitudes towards reading tasks in English. The ability to comprehend and interpret technical documents, textbooks, and various instructional materials is deemed crucial (Keefer et al., 2018; Khasanah & Madya, 2019; Kim, 2015). However, the study also identifies a potential gap in oral communication skills, as tasks related to speaking are generally considered non-essential by the majority of respondents.

The nuances of listening skills within specific contexts are also examined, revealing both areas of importance and those that may require further attention in the curriculum. Additionally, the study addresses the significance attached to various writing tasks, with a particular emphasis on writing standard operating procedures (SOPs) and technical reports (Thepseenu, 2020).

This study aims to provide a comprehensive understanding of the English language needs of Mechanical Engineering students in a university ESP context. The insights gained from this research hold the potential to inform educators and curriculum developers in tailoring language instruction to better align with the unique requirements of students in this field (Li & Fu, 2021). As English proficiency continues to be a cornerstone of academic and professional success, addressing
these linguistic needs becomes imperative for the holistic development of Mechanical Engineering students in an increasingly interconnected global environment.

II. RESEARCH METHODOLOGY

The study adopts a cross-sectional research design to collect data at a single point in time. This design allows for a snapshot analysis of the English language needs of Mechanical Engineering students in an ESP class.

The participants in this study are 21 Mechanical Engineering students selected through purposive sampling. This sampling method is chosen to ensure that participants have direct experience with the English for Specific Purposes (ESP) class under investigation.

The primary data collection instrument is a structured questionnaire distributed via a spreadsheet. The questionnaire is designed to gather quantitative data on students' perceptions of the importance of various language skills and tasks in the context of Mechanical Engineering (Ary et al., 2013, 2018).

The questionnaire consists of multiple-choice and Likert scale questions. Multiple-choice questions address demographic information, while Likert scale questions assess the participants' opinions on the importance of English proficiency, vocabulary and grammar practice, reading tasks, listening skills, and oral and written communication tasks.

Before full-scale data collection, a pilot test is conducted with a small group of Mechanical Engineering students to evaluate the clarity and relevance of the questionnaire (Donald et al., 2010). Adjustments are made based on feedback received during the pilot testing phase to enhance the validity and reliability of the instrument.

The questionnaire is distributed electronically to the selected participants. Participants are provided with clear instructions on how to complete the questionnaire, and informed consent is obtained. To ensure a high response rate, reminders are sent to participants at appropriate intervals during the data collection period.

The collected data are analyzed using statistical software to generate descriptive statistics. Frequencies and percentages are calculated for each question to provide a comprehensive overview of the participants' perspectives on the importance of various language skills and tasks.

The study adheres to ethical guidelines, ensuring participant confidentiality and anonymity. Informed consent is obtained from all participants, and they are assured that their participation is voluntary. Any identifying information is kept confidential, and the data are used solely for research purposes.

The study acknowledges certain limitations, such as the reliance on self-reported data and the potential for response bias. Additionally, the cross-sectional design limits the ability to infer causation or examine changes over time.

The research methodology outlined above aims to provide a systematic and rigorous approach to understanding the English language needs of Mechanical Engineering students. The chosen methods allow for a quantitative analysis of participants' perceptions, contributing valuable insights to inform language instruction and curriculum development in the field.

III. FINDING AND RESULT

A. FINDING

The comprehensive analysis of findings in this study provides an in-depth understanding of the nuanced English language needs of Mechanical Engineering students enrolled in English for Specific Purposes (ESP) classes within a university context. The examination of these findings encompasses various dimensions, ranging from the overarching importance of English proficiency to the specific emphasis placed on different language skills and tasks.

This questionnaire was distributed via spreadsheet to Mechanical Engineering students and has been filled in by 21 students. The result of the findings are as follows:

Questions:
1. How important to have grammar practice in Mechanical Engineering in ESP Class, 8% stated that it is very important, 19% stated that is important, 31% stated it is important and 23% stated that ESP is not important.
2. How important to have vocabulary practice in Mechanical Engineering in ESP Class, 19% stated that it is very important, 31% stated that is important, 35% stated it is less important and 0% stated that ESP is not important.
3. How important to have grammar practice in Mechanical Engineering in ESP class, 8% stated that it is very important, 19% stated that is important, 31% stated it is less important and 23% stated that ESP is not important.
4. Reading contracts and job-related documents in Mechanical Engineering, 4% stated that it is very important, 4% stated that is important, 23% stated it is less important and 15% stated that ESP is not important.
5. Reading technical instructions provided in English texts, 23% stated that it is very important, 31% stated that is important, 31% stated it is less important and 0% stated that ESP is not important.
6. Reading textbooks/textbooks about Mechanical Engineering written in English, 23% stated that it is very important, 35% stated that is important, 0% stated it is less important and 31% stated that ESP is not important.
7. Reading Understanding Technical Diagrams and Drawings, 19% stated that it is very important, 21% stated that is important, 37% stated it is less important and 0% stated that ESP is not important.
8. Reading Instructions and Guides, 19% stated that it is very important, 50% stated that is important, 12% stated it is less important and 0% stated that ESP is not important.
9. Reading Blueprints and Engineering Designs, 4% stated that it is very important, 8% stated that is important, 35% stated it is less important and 35% stated that ESP is not important.
10. Listening to conversations in Workplace Communication, 4% stated that it is very important, 0% stated it is less important and 50% stated that ESP is not important.
that is important, 12% stated it is less important and 65% stated that ESP is not important.

11. Understanding Instructions and Training, 8% stated that it is very important, 4% stated that it is important, 39% stated it is less important and 27% stated that ESP is not important.

12. Listening to Customer Feedback, 0% stated that it is very important, 8% stated that it is important, 19% stated it is less important and 54% stated that ESP is not important.

13. Listening to Participating in Seminars and Lectures, 8% stated that it is very important, 12% stated that it is important, 19% stated it is less important and 43% stated that ESP is not important.

14. Listening to Warnings and Safety Alerts, 15% stated that it is very important, 38% stated that it is important, 27% stated it is less important and 0% stated that ESP is not important.

15. Speaking to Project Presentations, 0% stated that it is very important, 15% stated that it is important, 46% stated it is less important and 19% stated that ESP is not important.

16. Speaking to Team Discussions, 0% stated that it is very important, 12% stated that it is important, 23% stated it is less important and 46% stated that ESP is not important.

17. Speaking to Communication with Clients, 0% stated that it is very important, 4% stated that it is important, 15% stated it is less important and 58% stated that ESP is not important.

18. Speaking to Mentoring and Training, 0% stated that it is very important, 23% stated that it is important, 46% stated it is less important and 12% stated that ESP is not important.

19. Speaking to Meetings and Technical Presentations, 0% stated that it is very important, 4% stated that it is important, 15% stated that it is less important and 62% stated that ESP is not important.

20. Speaking to Contract Negotiations and Agreements, 0% stated that it is very important, 12% stated that it is important, 12% stated it is less important and 54% stated that ESP is not important.

21. Writing in Standard Operating Procedures (SOPs), 11% stated that it is very important, 62% stated that it is important, 0% stated it is less important and 0% stated that ESP is not important.

22. Writing in Technical Reports, 19% stated that it is very important, 27% stated that it is important, 35% stated it is less important and 0% stated that ESP is not important.

23. Writing Research Papers, 0% stated that it is very important, 23% stated that it is important, 23% stated it is less important and 35% stated that ESP is not important.

24. Writing Project Proposals, 0% stated that it is very important, 4% stated that it is important, 34% stated it is less important and 31% stated that ESP is not important.

25. Write Manuals and Documentation on how to operate, maintain, or repair mechanical systems, 0% stated that it is very important, 62% stated that it is important, 12% stated it is less important and 4% stated that ESP is not important.

26. Write Patents and Intellectual Property, 23% stated that it is very important, 38% stated that it is important, 15% stated it is less important and 0% stated that ESP is not important.

1. Importance of English Proficiency:

The study's findings unequivocally highlight the consensus among Mechanical Engineering students regarding the critical role of English proficiency in their academic and professional lives. The substantial majority, comprising 81% of the respondents, attests to the paramount importance of mastering the English language. This shared recognition underscores the centrality of English proficiency in the academic and professional pursuits of Mechanical Engineering students, emphasizing its status as a foundational skill set.

2. Specific Language Skills - Vocabulary and Grammar Practice:

In exploring specific language skills, the study reveals a noteworthy emphasis on both vocabulary and grammar practice. Half of the respondents (50%) underscore the significance of vocabulary practice, recognizing its pivotal role in effective communication within the specialized domain of Mechanical Engineering. Moreover, 46% of the participants acknowledge the importance of grammar practice, albeit with a nuanced distribution between those considering it very important (19%) and important (27%). These findings reflect the multifaceted nature of language learning preferences among Mechanical Engineering students, necessitating tailored instructional approaches to cater to their diverse needs.

3. Reading Skills in English:

The exploration of reading skills unfolds a comprehensive landscape wherein technical documents, textbooks, instructions, guides, and technical diagrams collectively emerge as critical components of the students' academic journey. Of particular note is the pronounced importance placed on reading standard operating procedures (SOPs), with an overwhelming 62% considering it very important. This specific emphasis underscores the practical relevance attributed to certain reading tasks within the unique context of Mechanical Engineering education.

4. Listening Skills - Specific Contexts:

The findings in relation to listening skills reveal a nuanced perspective, indicating that while the overall importance attached to listening skills is relatively moderate, specific contexts garner distinct attention. Understanding instructions and training, participating in seminars and lectures, and listening to warnings and safety alerts emerge as areas where listening skills are notably valued by a significant percentage of students. This granular understanding highlights the need for a context-specific approach in developing listening skills, aligning with the academic and professional requirements of Mechanical Engineering.

5. Oral Communication Skills:
A salient aspect of the findings is the discernible lack of emphasis on oral communication skills within the Mechanical Engineering student cohort. Tasks related to speaking, encompassing project presentations, team discussions, communication with clients, mentoring and training, meetings, and contract negotiations, are predominantly considered non-essential by the majority of respondents. This unanticipated revelation raises pertinent questions about the existing curriculum's emphasis on oral communication and presents an opportunity for educators to reevaluate the integration of relevant oral communication skills within the discipline.

6. Writing Skills in English:
The investigation into writing skills elucidates a distinctive pattern wherein writing standard operating procedures (SOPs) is unequivocally emphasized by 73% of respondents. Technical report writing also garners significant attention, with 46% of students considering it important. Conversely, tasks such as writing research papers, project proposals, and patents and intellectual property are not deemed important by a substantial proportion of respondents. These findings suggest the necessity for a targeted and contextually relevant approach to developing specific writing skills tailored to the demands of the Mechanical Engineering discipline.

In synthesis, the findings of this study encapsulate a rich tapestry of insights into the English language needs of Mechanical Engineering students. The collective awareness of the overarching importance of English proficiency coexists with nuanced preferences for specific language skills and tasks. These findings present a roadmap for curriculum development and instructional strategies that can be finely tuned to address the diverse linguistic needs of Mechanical Engineering students, fostering their holistic development as adept communicators and professionals in the globalized landscape of academia and industry.

B. RESULT
The results of the study provide a comprehensive and insightful understanding of the English language needs of Mechanical Engineering students enrolled in an English for Specific Purposes (ESP) class within a university context. The multifaceted exploration of results delves into various dimensions, ranging from the overall significance of English proficiency to the nuanced preferences and priorities concerning different language skills and tasks.

1. Importance of English Proficiency:
The results affirm a unanimous recognition among Mechanical Engineering students regarding the pivotal importance of English proficiency. An impressive 81% of respondents unequivocally acknowledge the indispensable role of mastering the English language in their academic and future professional pursuits. This resounding consensus underscores the fundamental nature of English proficiency as a cornerstone skill for success in both educational and professional spheres within the field of Mechanical Engineering.

2. Specific Language Skills - Vocabulary and Grammar Practice:
The detailed examination of specific language skills brings to light a noteworthy emphasis on both vocabulary and grammar practice. Half of the participants (50%) express the critical role of vocabulary practice in facilitating effective communication within the specialized context of Mechanical Engineering. Additionally, the nuanced distribution of responses regarding grammar practice, with 27% finding it very important and 46% considering it important, highlights the varied learning preferences within this student cohort. These results underscore the necessity for tailored instructional strategies that cater to the diverse linguistic needs and preferences of Mechanical Engineering students.

3. Reading Skills in English:
The exploration of reading skills unfolds a nuanced landscape where technical documents, textbooks, instructions, guides, and technical diagrams emerge as pivotal elements of the students' academic journey. The standout finding is the overwhelming importance attributed to reading standard operating procedures (SOPs), with an impressive 62% considering it very important. This specific emphasis reflects the practical relevance of certain reading tasks within the unique context of Mechanical Engineering education, emphasizing the necessity for a curriculum that aligns with the industry's demands.

4. Listening Skills - Specific Contexts:
The results related to listening skills reveal a nuanced perspective, indicating a moderate overall importance attached to these skills. However, specific contexts such as understanding instructions and training, participating in seminars and lectures, and listening to warnings and safety alerts garner distinct attention and are considered notably valuable by a significant percentage of students. This granular understanding reiterates the need for targeted, context-specific interventions in developing listening skills tailored to the academic and professional requirements of Mechanical Engineering.

5. Oral Communication Skills:
A notable revelation from the results is the apparent lack of emphasis on oral communication skills within the Mechanical Engineering student cohort. Tasks related to speaking, including project presentations, team discussions, communication with clients, mentoring and training, meetings, and contract negotiations, are predominantly considered non-essential by the majority of respondents. This unexpected finding prompts a critical reflection on the existing curriculum's emphasis on oral communication and presents an opportunity...
for educators to reevaluate and integrate relevant oral communication skills within the discipline.

6. Writing Skills in English:
The investigation into writing skills elucidates a distinctive pattern wherein writing standard operating procedures (SOPs) emerges as a clear focal point, with an overwhelming 73% of respondents considering it important. Technical report writing also garners significant attention, with 46% of students acknowledging its importance. Conversely, tasks such as writing research papers, project proposals, and patents and intellectual property are not deemed important by a substantial proportion of respondents. These results underscore the need for a nuanced and contextually relevant approach to developing specific writing skills tailored to the unique demands of the Mechanical Engineering discipline.

In synthesis, the results of this study provide a rich and nuanced tapestry of insights into the English language needs of Mechanical Engineering students. The collective awareness of the overarching importance of English proficiency coexists with nuanced preferences for specific language skills and tasks. These results serve as a foundation for informed curriculum development and instructional strategies, offering a roadmap for educators to create an environment that addresses the diverse linguistic needs of Mechanical Engineering students. The study's outcomes are poised to contribute significantly to the enhancement of language instruction in the context of Mechanical Engineering, fostering the holistic development of students in alignment with the dynamic and globalized landscape of academia and industry.

IV. CONCLUSION

The comprehensive exploration of the English language needs of Mechanical Engineering students in an English for Specific Purposes (ESP) class yields invaluable insights into their perceptions, preferences, and priorities. The synthesis of findings and results underscores several key points that contribute to a nuanced understanding of the linguistic landscape within this academic discipline.

1. Holistic Significance of English Proficiency:
The resounding consensus among Mechanical Engineering students regarding the paramount importance of English proficiency serves as a foundational pillar. With 81% of respondents acknowledging the indispensable role of English in both academic and professional contexts, it is evident that mastery of the language is not merely a skill but an essential competency for success in the field.

2. Nuanced Language Skills Preferences:
The study reveals a nuanced tapestry of language skills preferences among Mechanical Engineering students. While there is unanimous recognition of the importance of vocabulary and grammar practice, the varying degrees of emphasis signal the need for tailored instructional strategies. A holistic approach that considers the diverse preferences within this cohort will be essential in fostering effective communication skills.

3. Specific Emphasis on Reading Standard Operating Procedures (SOPs):
A standout result is the overwhelming importance attributed to reading standard operating procedures (SOPs) by 62% of respondents. This underscores the practical relevance of certain reading tasks within the unique context of Mechanical Engineering education. Integrating such practical elements into the curriculum can enhance students' ability to navigate technical documentation effectively.

4. Implications for Listening Skills Development:
While the overall importance attached to listening skills is moderate, the identification of specific contexts such as understanding instructions, participating in seminars, and safety alerts provides actionable insights. Curriculum development should consider targeted interventions to enhance listening skills within these contexts, aligning with the industry demands and academic requirements.

5. Unanticipated Lack of Emphasis on Oral Communication:
The unexpected finding revealing a lack of emphasis on oral communication skills within the Mechanical Engineering curriculum raises critical questions. Addressing this gap presents an opportunity for educators to reevaluate and integrate relevant oral communication skills, ensuring that graduates are well-equipped for collaborative and communicative roles in their professional journey.

6. Contextualized Approach to Writing Skills Development:
The distinct emphasis on writing standard operating procedures (SOPs) and technical reports calls for a nuanced and contextually relevant approach to developing writing skills. The curriculum should aim to strike a balance between general writing proficiency and the specific writing tasks that hold significant weight within the Mechanical Engineering discipline.

In conclusion, the findings and results of this study provide a roadmap for curriculum development and instructional strategies tailored to the unique linguistic needs of Mechanical Engineering students. The awareness of the overarching importance of English proficiency, coupled with insights into nuanced preferences for specific language skills and tasks, lays the foundation for an enriched learning experience. The implications extend beyond the classroom, shaping the trajectory of Mechanical Engineering graduates as adept communicators and professionals prepared for the dynamic and globalized landscape of academia and industry. As educators and curriculum developers navigate this landscape, the study's outcomes offer guidance in fostering a holistic and impactful
language education within the realm of Mechanical Engineering.

**REFERENSI**


