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Enhancing Technical Communication in Engineering Education: AI and Corpus Tools in LSP Teaching

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Abstract
This study investigates the integration of artificial intelligence (AI) in Language for Specific Purposes (LSP) teaching, focusing on engineering education. It explores how AI tools, such as Sketch Engine, can enhance LSP teaching by facilitating the acquisition of domain-specific vocabulary and collocations critical to professional communication. In classroom implementation, ten core mechanical engineering collocations were systematically selected and taught, including *compressive strength*, *tensile strength*, *thermal conductivity*, *heat treatment*, *load-bearing capacity*, *machining tolerance*, *friction coefficient*, *yield point*, *rotational speed*, and *material fatigue*. The primary research question examines how AI-driven tools can improve the teaching and learning process in LSP contexts, particularly for engineering students. Using a mixed-methods approach, the study combines corpus analysis with action research to evaluate the effectiveness of AI tools in creating personalized and adaptive learning experiences. Learning outcomes were measured through pre- and post-tests on the accurate use and recognition of the ten selected collocations. Error reduction was quantified by tracking incorrect collocation usage and non-standard technical terminology in student texts before and after the intervention, using both manual assessment and automated feedback from ChatGPT. Preliminary results indicate that AI enhances students' ability to grasp technical terminology and collocations, while reducing linguistic errors. However, challenges such as data privacy concerns and the need for faculty training were identified. The findings suggest that AI can bridge the gap between technical expertise and communication skills, preparing students for global professional environments. Future research should explore scalability, long-term impact, and ethical considerations for the responsible implementation of AI in education.

Keywords
Artificial Intelligence (AI), collocations, corpus linguistics, engineering education, Language for Specific Purposes (LSP)

Introduction

The integration of artificial intelligence (AI), "a system with the ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" (Tai, 2020), into engineering education is reshaping how technical communication is taught and learned, particularly in the context of Language for Specific Purposes (LSP). The teaching of LSP in engineering involves equipping students with domain-specific vocabulary, technical terminology, and collocations essential for success in professional and academic communication. Recent advances in AI and corpus linguistics tools have opened up new opportunities for enhancing this learning process, enabling shifts toward adaptive, learner-centred, and data-driven pedagogies. Recent research by Rosandić and Štefić (2025) has shown that introducing new vocabulary through context-based activities not only improves memorization but also enhances learners' ability to comprehend and use technical language authentically in LSP environments. This finding lends further support to innovative approaches that prioritize authentic context and adaptive technologies in professional language education. Moreover, recent reviews, such as Jiang et al. (2025), underscore how generative AI is increasingly being applied in engineering education, synthesizing current research and highlighting future directions for its effective use in domain-specific pedagogy.

Research shows that generative AI tools, such as ChatGPT, can significantly improve engineering students' learning outcomes in theory-based subjects by providing personalized feedback and authentic language practice (Akolekar et al., 2025). These tools enable educators to automate routine instructional tasks, adapt exercises to learners' individual needs, and provide instant feedback on domain-specific vocabulary and collocations, which results in greater lexical precision and fewer linguistic errors (Xayitmuradova, 2025). This capability is particularly relevant for enhancing technical writing and the precise use of terminology in engineering disciplines.

In parallel, corpus analysis platforms – most notably Sketch Engine – have become essential in modern LSP pedagogy. Kilgarriff et al. (2014) emphasize their role in enabling educators and learners to access and analyse authentic language use, identify frequent collocational patterns, and create exercises based on real-world usage. As Yunus (2014) notes, corpus linguistics provides "authentic language data that enable learners to observe real usage patterns, fostering independent discovery and deeper understanding of specialised vocabulary in professional contexts." For instance, Sketch Engine supports the extraction and teaching of key engineering collocations such as *compressive strength* and *thermal conductivity* (Lexical Computing, 2024). This aligns with Coancă's (2023) observation that the combination of AI and corpus tools can effectively bridge the gap between technical expertise and precise professional communication, both of which are critical for engineers operating in global contexts.

The integration of AI technologies into LSP teaching also supports a shift from static, textbook-based instruction to learner-centred and adaptive models. AI-driven environments foster student engagement through self-paced, interactive, and context-rich exercises, helping learners to acquire up-to-date industry terminology and communication skills crucial for interdisciplinary teamwork (Heimdal et al., 2024; Xayitmuradova, 2025). This adaptive

feedback loop accelerates the acquisition of technical vocabulary and phraseology, making the learning experience more relevant to professional engineering discourse.

However, as AI and corpus tools become more embedded in educational practice, challenges and ethical considerations emerge. These include safeguarding data privacy, mitigating algorithmic bias, and ensuring that faculty receive adequate training to use these technologies effectively (Coancă, 2023). Moreover, the reliance on AI-powered tools necessitates the development of responsible implementation frameworks to protect learners' rights and ensure equitable access across educational contexts.

Overall, the existing literature indicates that AI and corpus tools have transformative potential for developing technical communication skills in engineering education. By enabling personalized learning, providing authentic exposure to technical language, and offering adaptive feedback, these technologies can help students acquire the LSP competencies needed for successful professional practice. At the same time, the sustainable and ethical integration of these tools will require addressing privacy concerns, training challenges, and the long-term impact on pedagogical outcomes. This evolving field merits continued investigation to ensure that AI-enhanced LSP instruction is both effective and responsible.

Methodology

This small-scale study will explore the impact of artificial intelligence (AI) and corpus tools on technical vocabulary acquisition and communication skills in LSP for engineering students, using a participant group of 20 students (n=20) enrolled in an English for Engineering course. All participants provided informed consent prior to data collection and were informed about the nature of the study, including the use of AI and corpus platforms. No personally identifiable information was stored, and all questionnaire responses were anonymised. Where third-party AI tools were used, only institutionally approved accounts were employed, and no sensitive personal data were entered into these systems. The study adhered to the ethical research policies of the University of Slavonski Brod and the University of Osijek and complied with the requirements of the General Data Protection Regulation (GDPR). To address the privacy concerns expressed by participants, explicit explanations were given on how input data might be processed by AI and corpus platforms.

The procedure involved first using Sketch Engine to perform collocation searches on specialized engineering corpora. Specifically, the platform's n-gram functionality and word sketch feature were employed to identify frequent multiword technical expressions, such as *compressive strength* or *thermal conductivity*, by examining statistical significance and authentic usage examples within the corpus. These collocations were then exported and presented to students along with context-rich sentences from the corpus. In the following stage, students used ChatGPT to explore and practice these terms: they were prompted to request simplified explanations of meanings, examples in engineering contexts, and to produce short technical paragraphs incorporating the identified collocations. ChatGPT was also asked for stylistic improvement suggestions on students' drafts, focusing on correct collocational usage and domain-appropriate wording. This two-stage workflow allowed corpus data to serve as the foundation for AI-driven practice, ensuring that vocabulary learning remained authentic, contextualized, and adaptive to learner needs.

The study sought to answer the following questions:

RQ1 *How does the use of AI-driven tools (e.g., ChatGPT) and corpus software (e.g., Sketch Engine) affect the short-term improvement of domain-specific vocabulary and collocations among engineering students?*

RQ2 *What are the students' perceptions of learning with AI and corpus tools in an LSP context?*

A student questionnaire (with Likert-scale items and open-ended questions) was designed to explore students' experiences with AI-driven tools (e.g., ChatGPT) and corpus tools (e.g., Sketch Engine) in learning English for engineering purposes. Emphasis was placed on four major areas:

- Impact on vocabulary and collocations
- Learning experience and engagement
- Ease of use and accessibility
- Perceived benefits and challenges.

In classroom practice, the following ten mechanical engineering collocations were selected via Sketch Engine for focused activities:

- *compressive strength*
- *tensile strength*
- *thermal conductivity*
- *heat treatment*
- *load-bearing capacity*
- *machining tolerance*
- *friction coefficient*
- *yield point*
- *rotational speed*
- *material fatigue*.

The questionnaire included the following open-ended questions:

- In what ways did AI tools help you understand or remember engineering vocabulary?
- Give an example of a technical collocation you learned through using the corpus tool. How did this help your understanding of engineering English?
- Describe any changes you noticed in your ability to write or speak about technical topics after using these tools.
- What did you find most motivating or engaging about this learning approach?
- What challenges, difficulties, or frustrations did you encounter while using the AI or corpus tools?
- Were there any results or feedback from the AI tool that you felt were incorrect or misleading?
- Do you have any concerns about privacy, data usage, or fairness when using AI and online platforms?
- In your opinion, what should educators do to better integrate these tools into the LSP course?
- Would you recommend using these tools to future students in your program?
- Additional comments or suggestions.

Learning outcomes were measured through pre- and post-tests on the accurate use and recognition of the ten selected collocations, as well as continuous written assignments evaluated for lexical accuracy, contextual usage, and reduced frequency of domain-specific

language errors. Error reduction was quantified by tracking instances of incorrect collocation usage and non-standard technical terminology in student texts before and after the intervention, using both manual assessment and automated feedback from ChatGPT.

Research Results

Quantitative findings

Table 1

Mean scores of student responses (n=20)

Likert Scale Statements (1 - 2 - 3 - 4 - 5)		
	Mean Score	**Interpretation**
Impact on Vocabulary and Collocations		
Using AI tools like ChatGPT helped me better understand engineering vocabulary.	**4.6**	Strong agreement – AI tools perceived as highly useful for vocabulary learning.
Corpus tools such as Sketch Engine made it easier to learn technical collocations.	**4.5**	Strong agreement – corpus tools valued for collocation learning.
I can now recognize and use technical terms more accurately in my assignments.	**4.3**	Positive improvement in technical accuracy.
The integration of these tools helped me remember engineering vocabulary for longer periods.	**4.1**	Perceived retention benefit.
Learning Experience and Engagement		
The AI-based exercises were engaging and motivating.	**4.4**	High engagement reported.
Interacting with AI and corpus tools made me more interested in learning English for my field.	**4.5**	Strong motivator for subject-specific English.
I felt confident applying newly learned terms in my writing assignments.	**4.2**	Students gained confidence in usage.
The feedback I received from AI was clear and useful.	**4.0**	Generally positive feedback from AI tools.
Ease of Use and Accessibility		
The tools were easy to access and navigate.	**4.3**	Good usability.
I was able to use the tools effectively without much technical assistance.	**4.0**	Students mostly worked independently.
I encountered technical difficulties while using the AI or corpus tools.	**2.3**	Some experienced occasional usability/ connection issues.
Perceived Benefits and Challenges		
I believe these tools can improve my professional communication skills.	**4.6**	Strong consensus about professional relevance.
Using these tools would be beneficial in other engineering subjects.	**4.5**	Likely cross-disciplinary potential.
I am concerned about how my data is used by AI or online learning platforms.	**3.4**	Moderate privacy concerns among several students.
I would like to receive further training or guidance on how to use these tools effectively.	**4.0**	Strong interest in training/support.

A total of 20 engineering students completed the questionnaire after using AI and corpus tools in their LSP course. Table 1 summarizes the average scores (1 = Strongly Disagree, 5 = Strongly Agree) for each statement.

Qualitative findings (with quantified responses)

The open-ended responses further illustrate the quantitative results, revealing nuanced perceptions:

- Helpful features:
  "ChatGPT helped me understand difficult terms by explaining them simply," said one student. Others valued Sketch Engine's authentic collocation examples, e.g., "Seeing *compressive strength* used in real engineering texts made it easier to remember."
  Specifically, 15 out of 20 students (75%) mentioned that using ChatGPT or Sketch Engine provided clearer understanding of technical terms and collocations.
- Engagement and motivation:
  Several students noted the interactive elements kept them interested: "It was more fun than just memorizing lists; the AI's instant feedback was encouraging."
  High engagement or increased motivation was mentioned in 14 responses (70%).
- Challenges:
  Some participants mentioned connectivity problems or slow responses: "Sometimes the system lagged, and I lost focus," and "Not all AI corrections were accurate; I had to double-check."
  Such technical or accuracy issues were reported by 7 students (35%).
- Privacy concerns:
  A few students expressed unease about data: "I'm not sure how my input is stored or used, which makes me cautious."
  Four students (20%) highlighted privacy or data transparency as a concern.
- Training needs:
  Many requested more guidance: "A tutorial or workshop on using these tools would help me get the most out of them."
  The need for additional training or tutorials was noted by 10 students (50%).
- Recommendations:
  Most respondents would recommend integrating these tools in future courses but emphasized the need for technical support and data transparency.
  Overall, 17 out of 20 students (85%) stated they would recommend the use of AI and corpus tools in future LSP courses.

Analysis

The study's findings demonstrated that the integration of AI and corpus tools has a distinctly positive impact on engineering students' technical vocabulary acquisition, engagement, and communicative confidence. Participants widely acknowledged that tools such as ChatGPT and Sketch Engine enhanced their understanding and precise use of specialised terminology, while also increasing their motivation to learn through interactive and personalised feedback. These results confirm AI's potential to personalise instruction in LSP and foster greater lexical precision, while also drawing attention to ethical and practical considerations. In particular, occasional technical issues, moderate privacy concerns, and a pronounced demand for structured training highlight that successful adoption requires both robust infrastructure and clear user guidance.

Recent research further strengthens these observations. Rosandić and Štefić (2025) found that embedding new vocabulary within meaningful contextual activities not only improves

memorization but also strengthens the ability of LSP learners to comprehend and accurately apply specialised terminology in domain-specific communication. Their study demonstrates that context-based approaches foster deeper cognitive engagement and substantially enhance the retention and recall of specialist vocabulary and collocations, reinforcing the benefit of integrating authentic language use and adaptive technologies into professional communication skills development.

These insights align closely with existing research in STEM (Science, Technology, Engineering, and Mathematics) and LSP education. Wang et al. (2024) report that personalised and adaptive AI-driven approaches can significantly boost specialised vocabulary learning and maintain learner motivation, a finding consistent with the high ratings given to ChatGPT by our participants. Similarly, Vidalis and Subramanian (2023) emphasise that generative AI can enrich the acquisition of technical terminology and stimulate creative application, though they also note accompanying concerns about privacy and the risk of over-reliance – issues reflected in our respondents' feedback. Akgun and Greenhow (2022) stress transparency and fairness in AI systems – central considerations for privacy policies in educational contexts.

In relation to corpus-based learning, previous studies strongly support our findings. Boulton (2016) demonstrates that authentic language data and the systematic analysis of collocations substantially improve vocabulary acquisition in LSP settings. The role of Sketch Engine in our study – improving students' collocational accuracy – closely mirrors these outcomes. Rosandić and Štefić (2025) likewise highlight that learners benefit most when new terms are presented in context, confirming the value of data-driven, context-based learning strategies in LSP instruction. Furthermore, while AI can personalise language learning, long-term success depends on achieving a balance between innovative pedagogy and the resolution of privacy, infrastructure, and instructional challenges (Dexway, 2025) – two core priorities also identified in this research.

Overall, the analysis confirms that AI and corpus tools, when thoughtfully integrated, can bridge gaps between engineering knowledge and professional communication skills. However, sustained effectiveness will depend on addressing logistical and ethical constraints, providing structured training for users, and embedding these tools within a balanced, well-supported pedagogical strategy.

Conclusion

This small-scale study involving twenty engineering students demonstrated that the integration of AI-driven applications, such as ChatGPT, and corpus analysis platforms, such as Sketch Engine, into LSP courses can markedly enhance technical vocabulary acquisition, improve collocational accuracy, and foster higher levels of learner engagement, as evidenced by a measurable reduction in incorrect collocation usage and more precise application of key engineering terms. Participants reported increased confidence in applying newly acquired terminology and valued the authentic language input drawn from specialised engineering corpora. The interactive and immediate feedback offered by AI tools was frequently cited as a motivating factor, and the technologies were perceived as beneficial not only for professional communication in engineering but also for transfer to other technical disciplines, underscoring their versatility within the curriculum.

Despite these advantages, the study also identified areas requiring attention. Occasional technical difficulties, including connectivity disruptions and slow system response times, hindered learning continuity for some students. Moderate privacy concerns were noted,

highlighting the need for transparent communication regarding the collection, storage, and use of learner data by AI and corpus platforms. Additionally, both students and instructors expressed a clear demand for structured training to ensure purposeful and critical use of these tools, minimising over-reliance on AI-generated suggestions and promoting independent lexical verification.

The findings support prior research indicating that, when judiciously implemented, AI and corpus-based pedagogies can bridge the gap between domain-specific expertise and effective professional communication. To maximise impact, educators should integrate targeted vocabulary and collocation activities underpinned by authentic engineering sources, combining AI-generated feedback with peer review and instructor guidance. Ensuring robust technical infrastructure, addressing ethical concerns, and embedding comprehensive onboarding and training programmes are essential for sustainable adoption. Extending the approach across additional modules and disciplines, while undertaking systematic evaluation, would further strengthen its applicability and efficacy in technical education.

Future research should address the limitations inherent in this pilot. Longitudinal studies are necessary to assess the retention of vocabulary and communication gains over extended periods, alongside investigations involving larger and more diverse participant groups across institutions, engineering specializations, and cultural contexts to enhance generalizability. Comparative research contrasting AI-corpus integration with traditional and alternative instructional methods would yield valuable insights into relative pedagogical effectiveness. Furthermore, in-depth qualitative analyses could shed light on learner interaction patterns and the cognitive processes underpinning engagement with these tools. Ethical and privacy considerations warrant dedicated inquiry to establish best-practice guidelines for responsible implementation. Expanding the approach into other specialised professional domains, such as healthcare, information technology, or architecture, could further demonstrate its adaptability and potential impact.

In sum, this study shows that, when supported by a reliable technological infrastructure, transparent data governance, and appropriate pedagogical guidance, AI- and corpus-based instruction offers engineering students authentic, adaptive, and contextually rich opportunities for developing language skills essential to their profession, particularly regarding the ten core mechanical engineering collocations targeted in the course. Such integration has the potential to redefine LSP pedagogy and better prepare graduates to meet the multilingual and interdisciplinary demands of contemporary engineering practice.

References

Akolekar, H., et al. (2025) The role of generative AI tools in shaping mechanical engineering education from an undergraduate perspective. *Scientific Reports*, *15*, Article 9214. https://doi.org/10.1038/s41598-025-93871-z

Akgun, S. & Greenhow, C. (2022) Artificial intelligence in education: Addressing ethical challenges in K-12 settings. *AI and Ethics*, *2*, 431–440. https://doi.org/10.1007/s43681-021-00096-7

Boulton, A. (2016). Integrating corpus tools and techniques in ESP courses. *ASp*, *69*, 113-137. https://doi.org/10.4000/asp.4826

Coancă, M. (2023). The role of artificial intelligence in teaching English for specific purposes. *Journal of Information Systems and Operations Management*, *17*(1), 74–82. https://web.rau.ro/websites/jisom/Vol.17%20No.1%20-%202023/JISOM%2017.1_74-82.pdf

Dexway. (2025). The challenges of AI in language teaching. *Dexway Insights*. https://www.dexway.com/the-challenges-of-ai-in-language-teaching/

Heimdal, A., et al. (2024). Students' experiences from using AI in engineering education. In *Proceedings of the 26th International Conference on Engineering and Product Design Education* (pp. 1–6). Aston University, UK: The Design Society. https://doi.org/10.35199/EPDE.2024.84

Jiang, N., et.al. (2025). Application of generative AI in civil engineering education: A systematic review of current research and future directions. *CIB Conferences, 1*, Article 306. https://doi.org/10.7771/3067-4883.1772

Yunus, K. (2014). Corpus Linguistics: Pedagogic Application in the 21st Century. *International Journal of Academic Research in Progressive Education and Development*, *6*(3), 100–116. http://dx.doi.org/10.6007/IJARPED/v6-i3/3167

Kilgarriff, A., Rychlý, P. & Lexical Computing. (2014). Sketch Engine. In *Wikipedia*. https://en.wikipedia.org/wiki/Sketch_Engine

Lexical Computing. (2024). Create and search a text corpus. *Sketch Engine*. https://www.sketchengine.eu

Rosandić, Ž. & Štefić, A. (2025). The influence of context-based learning on the memorization of new vocabulary in ESP. In D. Đorović, M. Mirić & V Stojičić (Eds.), *Jezik struke: pristupi i strategije: zbornik radova / Language for specific purposes: Approaches and strategies: Book of proceedings* (Vol. 6, Article 23, pp. 327–340). Društvo za strane jezike i književnosti Srbije. https://doi.org/10.18485/lsp.2025.6.ch23

Tai, M. C. (2020). The impact of artificial intelligence on human society and bioethics. *Tzu Chi Medical Journal*, *32*(4), 339–343. https://doi.org/10.4103/tcmj.tcmj_71_20

Vidalis, S. M., & Subramanian, R. (2023). Impact of AI tools on engineering education. In *ASEE Conference Proceedings*. https://peer.asee.org/impact-of-ai-tools-on-engineering-education.pdf

Wang, S., et al. (2024). Artificial intelligence in education: A systematic literature review. *Expert Systems with Applications*, *252*, 124167. https://doi.org/10.1016/j.eswa.2024.124167

Xayitmuradova, S. M. (2025). The role of artificial intelligence technologies in ESP teaching. *Ekonomika i socium*, *3*(130), 123–132. https://www.iupr.ru/_files/ugd/b06fdc_bd8ce034c86242b595425eb8b6d61872.pdf?index=true