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Chemistry Students' Perceptions Toward English Technical Vocabulary in Their Discipline

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Abstrak

Kosa kata teknis bahasa Inggris merupakan komponen penting dalam pembelajaran kimia, terutama untuk memahami konsep, aktivitas laboratorium, dan referensi ilmiah. Penelitian ini bertujuan untuk mengkaji persepsi mahasiswa kimia terhadap kosa kata teknis bahasa Inggris dalam hal pentingnya, tantangan, strategi belajar, dan kebutuhan instruksional. Pendekatan deskriptif kuantitatif digunakan dengan menggunakan kuesioner skala Likert yang diberikan kepada 57 mahasiswa kimia sarjana di UIN Syarif Hidayatullah Jakarta yang telah menyelesaikan mata kuliah kimia yang melibatkan terminologi bahasa Inggris. Hasil menunjukkan bahwa mahasiswa memiliki persepsi yang tinggi terhadap pentingnya kosakata teknis bahasa Inggris (M = 4.06), terutama dalam mendukung aktivitas akademik seperti membaca buku teks dan memahami artikel ilmiah. Namun, mahasiswa juga mengalami tantangan moderat dalam menguasai istilah teknis (M = 3.82), terutama dalam membedakan istilah dengan makna serupa. Untuk mengatasi kesulitan ini, mahasiswa secara aktif menerapkan berbagai strategi pembelajaran (M = 3.90), terutama melalui pembelajaran kontekstual, membaca rutin, diskusi antar teman, dan penggunaan alat digital. Selain itu, mahasiswa mengungkapkan kebutuhan yang kuat akan dukungan instruksional yang sistematis (M = 3.98), termasuk kolaborasi antara dosen kimia dan dosen bahasa Inggris. Secara keseluruhan, temuan ini menunjukkan bahwa meskipun kosakata teknis bahasa Inggris dianggap esensial, instruksi kosakata yang terarah dan terintegrasi dalam mata kuliah kimia masih diperlukan untuk mengurangi kesulitan belajar dan mendukung pemahaman konseptual mahasiswa.

Kata kunci: kosakata teknis, mahasiswa kimia, persepsi, bahasa Inggris untuk sains

Abstract

English technical vocabulary is an important component in chemistry learning, particularly for understanding concepts, laboratory activities, and scientific references. This study aims to examine chemistry students' perceptions of English technical vocabulary in terms of its importance, challenges, learning strategies, and instructional needs. A descriptive quantitative approach was employed using a Likert-scale questionnaire administered to 57 undergraduate chemistry students at UIN Syarif Hidayatullah Jakarta who had completed chemistry courses involving English terminology. The results indicate that students have a high perception of the importance of English technical vocabulary (M = 4.06), especially in supporting academic activities such as reading textbooks and understanding scientific articles. However, students also experience moderate challenges in mastering technical vocabulary (M = 3.82), particularly in distinguishing terms with similar meanings. To address these difficulties, students actively employ various learning strategies (M = 3.90), mainly through contextual learning, routine reading, peer discussion, and the use of digital tools. In addition, students express a strong need for systematic instructional support (M = 3.98), including collaboration between chemistry and English lecturers. Overall, the findings suggest that although English technical vocabulary is perceived as essential, targeted and integrated vocabulary instruction within chemistry courses is still required to reduce learning difficulties and support students' conceptual understanding.

Keywords: *technical vocabulary, chemistry students, perception, English for scienc*

Introduction

Global Context and Local Challenges explains the importance of English in the global context of chemistry and challenges faced by non-native speakers. While English has become a vital medium in the global context of chemistry, serving as the principal language for research publications and enabling international collaboration, proficiency in this language allows students and researchers to access vast scientific knowledge and participate actively in the global scientific community (Salager-Meyer & Lewin, 2020). Students who are not native speakers of English encounter difficulties with complex scientific terminology, which, combined with academic discourse, may have a negative impact on their learning performance and confidence in studying chemistry (Han & Hyland, 2021). Therefore, while proficiency in English is a necessary condition for interacting effectively with the global chemistry community, addressing the linguistic challenges encountered by non-native speakers is important to guarantee fairness in accessing scientific knowledge and opportunities.

Note specific learning barriers of the students, such as those concerning technical vocabulary and cognitive load during learning in a second language. When students study scientific subjects in a second language, they usually have difficulty understanding and using technical vocabulary and therefore cannot grasp key concepts and participate in class easily (Zhang & Wang, 2021). Furthermore, the processing of complex scientific information in a non-native language burdens their cognitive load, thus making remembering content and engaging in higher-order thinking tasks more challenging to handle (Rahman & Pandian, 2020). These linguistic and cognitive challenges raise the need for special teaching strategies that could help students understand better and lower their cognitive load when learning science in a second language.

Gaps in Pedagogical Approaches Point to the nonexistence of an overall teaching framework that targets the specific linguistic needs of chemistry students. Many aspects of current teaching approaches in the field of chemistry place a focus on content mastery, which considers scientific correctness, with little or no attention directed at the linguistic challenges faced by non-native English-speaking students in deciphering and expressing meanings related to chemistry (Airey & Linder, 2020). The lack of a pedagogical framework that considers the integration of language development with subject-specific

instruction has contributed to learning gaps where students fail to establish meaningful relationships between specialized chemistry vocabulary and conceptual learning (Mutwarasibo & Ndihokubwayo, 2022). As such, there is a need for the development of a comprehensive pedagogical framework that embeds linguistic support in chemistry teaching to enhance students' conceptual understanding and engagement in science learning.

This research aims to provide a comprehensive analysis of students' perceptions regarding the use of English technical vocabulary in the field of chemistry. It specifically explores how students perceive the importance of technical vocabulary in supporting their academic success and professional future. Furthermore, the study investigates the specific challenges students encounter when attempting to understand and utilize complex, discipline-specific terminology, including the linguistic and cognitive barriers involved. Finally, the research identifies the learning strategies and preferences adopted by students to overcome these difficulties, focusing on their inclination toward visual, contextual, and digital-based learning approaches.

Method

This study employs a descriptive quantitative approach aimed at illustrating how chemistry students perceive English technical vocabulary within their discipline. The design used in this research is a survey, as data collection relies on questionnaires distributed to respondents in order to examine the patterns of perceptions that are measured and systematically recorded. The study was conducted in the Chemistry Education/Chemistry Study Program at the State Islamic University (UIN) Syarif Hidayatullah Jakarta. Data collection took place in the odd semester of the 2025/2026 academic year. Therefore, this study is designed to obtain an accurate and structured overview of chemistry students' perceptions of technical vocabulary.

The population of this research consists of all students in the Chemistry Study Program who have taken courses involving exposure to English technical vocabulary. Such as Basic Chemistry, Organic Chemistry, Analytical Chemistry, and related laboratory courses. This means that the research population includes all chemistry

students who have gained experience learning technical vocabulary in English through core subjects and practical sessions. From this population, a total of 57 undergraduate chemistry students participated as respondents in this study.

The primary instrument used in this study is a Likert-scale questionnaire developed based on five aspects of perception, namely awareness, difficulty, learning strategies, usefulness in academic tasks, and motivation and attitude as the focus of measurement. The questionnaire consists of 35 statements representing each perception aspect and is presented using a 1–5 scale, ranging from Strongly Disagree to Strongly Agree. Prior to data collection, the questionnaire was validated through expert judgment to ensure content validity. Furthermore, a reliability test was conducted using Cronbach's Alpha. The analysis yielded a Cronbach's Alpha coefficient of 0.961, indicating a very high level of internal consistency and reliability for the 35 items**.** This allows the researcher to measure students' perceptions more systematically and in a standardized manner.Data collection was carried out by distributing the questionnaire, provided in Google Forms format, to Chemistry Study Program students at UIN Syarif Hidayatullah Jakarta who met the sampling criteria. Each respondent was given approximately 15–20 minutes without pressure to complete the questionnaire independently. The collected data were then analyzed to illustrate the trends in chemistry students' perceptions of English technical vocabulary related to their field of study.

Result and Discussion

These forms are used for the collection of general data about respondents' characteristics, such as age, gender, education level, and other backgrounds related to the research. This collection is considered paramount because the researcher will be aware of whether their sample composition is a representative reflection of the greater population in which the study is being conducted. In addition, describing participant demographic variables is of importance for "identifying relations between these variables and" the procedures or outcomes being analyzed. Therefore, this demographic data collection becomes the foundation for validation of the sample, understanding its context, and analyzing how research findings may differ across different groups.

The initial collection of demographic data is essential to ensure that the sample composition provides a representative reflection of the overall chemistry student population. This data serves as a foundation for understanding the research context and analyzing how findings might differ across various academic backgrounds. This aligns with the necessity of mapping student learning profiles to understand their perceptions of workload and academic demands in chemistry (Partanen et al., 2024).

Table 1.*Table of Questionnaire Data Analysis Results*

No.	Questionnaire Theme	Item	Mean	Percentage	N	Description
1	Perception of the importance of technical vocabulary	10	4.06	71.93%	57	Vocabulary is Perceived as Essential
2	Challenges in understanding and using technical vocabulary	10	3.82	57.89%	57	Challenges Tend to Be Experienced
3	Strategies & preferences for learning technical vocabulary	10	3.90	63.16%	57	Strategies are Actively Utilized
4	Support & learning needs	5	3.98	66.67%	57	Support and Training are Highly Needed

The findings of this study are based on responses from 57 undergraduate chemistry students of UIN Syarif Hidayatullah Jakarta who had experienced learning chemistry with substantial exposure to English technical vocabulary. Overall, the results indicate a strong awareness of the importance of English technical vocabulary, accompanied by moderate challenges and active learning strategies adopted by students.

The perception of the importance of technical vocabulary emerged as the most dominant aspect, with a mean score of M = 4.06 (71.93%). This result indicates that students widely perceive English technical vocabulary as essential for understanding chemistry content, particularly for reading textbooks, interpreting laboratory manuals, and engaging with scientific articles. This strong acknowledgment reflects students'

recognition that chemistry learning is closely intertwined with English as the dominant language of science.

In terms of challenges in understanding and using technical vocabulary, the results show a mean score of M = 3.82 (57.89%), suggesting that difficulties are commonly experienced, although not perceived as overwhelming. The most prominent difficulty reported by students relates to distinguishing terms with similar meanings, such as compound and mixture, rather than merely guessing word meanings from context. This indicates that the challenge lies primarily in mastering discipline-specific semantic nuances rather than general English comprehension.

Regarding learning strategies and preferences, students reported actively employing various approaches to overcome vocabulary difficulties, as reflected in a mean score of M = 3.90 (63.16%). Contextual learning strategies, particularly routine reading of textbooks and scientific materials, were preferred over isolated tools such as specialized chemistry dictionaries. Additionally, peer discussion and digital tools were identified as commonly used strategies to support vocabulary learning.

Finally, the aspect of support and learning needs recorded a relatively high mean score of M = 3.98 (66.67%), indicating that students strongly feel the need for more systematic instructional support. Many respondents emphasized the importance of collaboration between chemistry lecturers and English lecturers in teaching technical vocabulary, suggesting that current instructional practices may not sufficiently address students' linguistic needs.

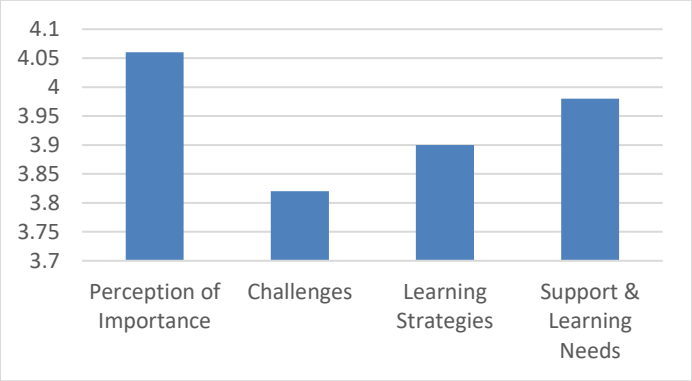

Figure 1. *Comparison of mean scores across perception aspects of English technical vocabulary among chemistry students (N = 57).*

The perception of the importance of English technical vocabulary shows the highest mean score (M = 4.06), indicating strong agreement among students regarding its essential role in chemistry learning. This is followed by support and learning needs (M = 3.98) and learning strategies (M = 3.90), suggesting that students actively engage in various strategies while also expressing the need for additional instructional support. The challenges dimension records the lowest mean score (M = 3.82), indicating that although students experience difficulties in understanding and using technical vocabulary, these challenges are perceived at a moderate level.

Table 2. *Summary of Dominant Responses for Each Perception Aspect*

No	Perception Aspect	Questionnaire Item (Statement)	Mean	Description
1	Importance of Technical Vocabulary	I believe that understanding English technical vocabulary is important in studying chemistry.	4.21	Most Dominant
		I believe chemistry lecturers should explain the meaning of technical terms in English.	3.88	Least Dominant

2	Challenges in Understanding	I find it difficult to understand long or complex chemistry terms (e.g., polymerization).	4.02	Most Dominant
		I find it difficult to distinguish terms with similar meanings, such as compound and mixture.	3.74	Least Dominant
3	Learning Strategies	I feel that routine reading practice helps expand my technical vocabulary.	4.02	Most Dominant
		I use a specialized chemistry dictionary to understand English terms.	3.79	Least Dominant
4	Support & Learning Needs	I believe mastery of technical terms will improve through routine scientific writing and reading practices.	4.09	Most Dominant

	I feel that chemistry and English lecturers need to collaborate in teaching technical terms.	3.86	Least Dominant

As summarized in Table 2, the data highlights the most and least dominant responses across the four perception aspects. Regarding the importance of technical vocabulary, students strongly believed that understanding English terminology is fundamentally essential in studying chemistry (M = 4.21). In terms of challenges, comprehending long or complex chemistry terms, such as polymerization, was reported as the most prominent difficulty (M = 4.02). To overcome such barriers, students heavily relied on contextual learning, particularly through routine reading practices, which emerged as the most dominant strategy (M = 4.02). Finally, concerning support and learning needs, respondents highly agreed that their mastery of technical terms would improve significantly through routine scientific reading and writing practices (M = 4.09).

The findings of this study indicate that chemistry students hold a highly positive perception of the importance of mastering English technical vocabulary, as reflected by the highest mean score in the perception dimension (M = 4.06). This finding is consistent with previous studies reporting that science students in *English as a Foreign Language* (EFL) contexts perceive technical vocabulary as a core component of disciplinary understanding rather than merely an additional language skill (Gui et al., 2022; Valipouri et al., 2021). This consistency reinforces the argument that English functions as a *lingua franca* in chemistry and plays a direct role in shaping students' conceptual understanding and scientific literacy.

Despite the high perception of its importance, students in this study still experienced moderate challenges in understanding and using technical terminology (M = 3.82). This finding aligns with prior research emphasizing that the primary difficulties faced by science students are not related to general grammatical competence but to the

understanding of discipline-specific terms that often differ from their everyday meanings (Shafi, 2020; Rees, 2020). In this study, the most frequently reported difficulty involved comprehending long or complex chemistry terms, such as polymerization. Additionally, students also struggled with distinguishing terms with similar meanings, such as compound and mixture, a cognitive barrier that has been identified as a major source of misconceptions in chemistry learning (Naibert, 2022).

The findings further reveal a similar pattern in the affective dimension of learning, where students demonstrate high motivation to master technical vocabulary due to its relevance to future career opportunities and global scientific communication (Wathi et al., 2023). However, this motivation is often constrained by psychological factors, including low self-confidence and fear of making mistakes in bilingual learning environments, suggesting that barriers to mastering technical vocabulary are not solely linguistic but also psychological in nature.

Regarding learning strategies, respondents in this study showed a strong preference for contextual approaches, such as routine reading of textbooks and scientific articles (M = 4.02), over the use of specialized chemistry dictionaries (M = 3.79). This finding supports previous research indicating that context- and visual-based technical vocabulary instruction is more effective than memorization-oriented or isolated lexical reference approaches (Burhan, 2025; Burhan & Yuhelman, 2025). Furthermore, the reported use of peer discussion and digital tools is consistent with studies highlighting the role of digital technology in enhancing student engagement and comprehension of technical vocabulary (Megasari, 2025; Yani, 2025).

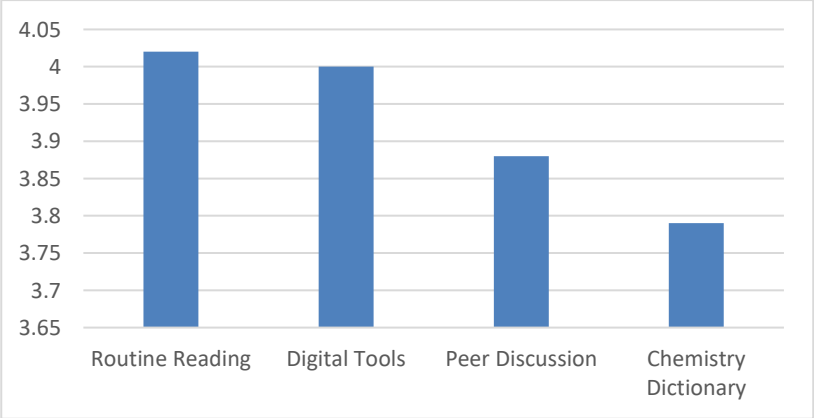

Figure 2 .*Comparison of Students' Learning Strategies for Technical Vocabulary*

In terms of learning support needs, students expressed a strong demand for more systematic instructional support (M = 3.98), particularly through collaboration between chemistry lecturers and English lecturers. This finding aligns with the *Content and Language Integrated Learning* (CLIL) approach, which has been reported as effective in supporting students' conceptual and linguistic understanding of technical vocabulary (Valipouri et al., 2021). The main distinction between this study and previous research lies in the institutional context, where interdisciplinary collaboration remains limited, leading students to emphasize the need for collaborative solutions rather than merely highlighting the lack of vocabulary training.

Overall, these findings not only confirm previous research but also extend the understanding of technical vocabulary learning in EFL contexts, underscoring that successful mastery of technical vocabulary in chemistry education depends not only on individual learning strategies but also on collaborative and integrated instructional design capable of reducing cognitive load and enhancing students' confidence in using English as the language of science.

Conclusion

This study concludes that chemistry students demonstrate a high awareness of the importance of English technical vocabulary in their academic learning. With the highest mean score recorded for perceived importance (M = 4.06), students recognize that technical vocabulary plays a crucial role in supporting key academic activities, such as reading chemistry textbooks and understanding scientific literature. This finding confirms that English technical vocabulary is viewed as an essential component of chemistry education. Despite this positive perception, students still encounter moderate challenges in mastering technical vocabulary (M = 3.82), particularly in distinguishing between terms with similar meanings. These difficulties indicate that vocabulary-related problems in chemistry learning are not merely linguistic, but also conceptual in nature. To overcome these challenges, students actively apply various learning strategies (M = 3.90), with a strong preference for contextual learning approaches, including routine reading and peer discussion. Furthermore, students express a strong need for systematic instructional support (M = 3.98), especially through collaboration between chemistry and

English lecturers. Therefore, this study emphasizes the importance of integrating targeted English technical vocabulary instruction into chemistry courses. Such integration is expected to reduce learning difficulties, support conceptual understanding, and enhance the overall effectiveness of chemistry learning in English-as-a-foreign-language contexts.

The findings suggest that chemistry education should integrate technical vocabulary instruction more systematically. Rather than relying solely on independent student efforts, institutions should consider implementing Content and Language Integrated Learning (CLIL) frameworks. Practical implications include the need for collaborative workshops between chemistry and English lecturers to design bilingual teaching materials. Furthermore, incorporating digital tools and routine scientific reading within the chemistry curriculum is essential to bridge the gap between students' high motivation and their linguistic challenges, ultimately fostering a more confident and globally competitive scientific community.

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