

An Analysis of Students' Mastery of Machinery-Related Vocabulary at SMK TKM Purworejo

Adista*, Junaedi Setiyono, Abdul Ngafif

English Education Program, Univeritas Muhammadiyah Purworejo, Indonesia

*Email Correspondence: disdista307@gmail.com

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Abstract: Vocabulary competence is a key component of vocational education, especially for mechanical engineering students who are expected to comprehend both general English and field-specific terminology. This study investigates students' mastery of machinery-related vocabulary at SMK TKM Purworejo, explores the difficulties they encounter, and examines the strategies they employ in learning technical terms. A descriptive qualitative approach was applied, using purposive sampling to select eleventh-grade mechanical engineering students who had previously studied machinery-related materials in their English classes. Data were gathered through classroom observations, a diagnostic pre-test, and document analysis, and subsequently examined through thematic analysis. The results indicate that the majority of students possess an adequate understanding of fundamental machinery vocabulary, particularly concrete terms associated with tools and equipment. Findings from the diagnostic pre-test show that 95% of the participants were able to correctly recognize common technical terms. Students utilized several learning strategies, such as contextual practice, translating terms into their first language, peer collaboration, organized note-taking, repetition, and digital resources. Nevertheless, some challenges persist, including limited exposure to English beyond the classroom, pronunciation problems, difficulty distinguishing general and technical vocabulary, and the scarcity of ESP-oriented materials. These findings emphasize the need for contextualized ESP instruction and systematic vocabulary reinforcement to better prepare students for professional communication demands.

Keywords: Vocabulary mastery, vocational education, mechanical engineering students, English for Specific Purposes (ESP), technical vocabulary.

Abstrak: Kompetensi kosakata merupakan komponen kunci pendidikan vokasi, khususnya bagi mahasiswa teknik mesin yang diharapkan mampu memahami bahasa Inggris umum dan terminologi khusus bidangnya. Studi ini meneliti penguasaan kosakata terkait mesin oleh siswa di SMK TKM Purworejo, mengeksplorasi kesulitan yang mereka hadapi, dan mengkaji strategi yang mereka gunakan dalam mempelajari istilah-istilah teknis. Pendekatan kualitatif deskriptif diterapkan, menggunakan pengambilan sampel bertujuan untuk memilih mahasiswa teknik mesin kelas sebelas yang sebelumnya telah mempelajari materi terkait mesin di kelas bahasa Inggris mereka. Data dikumpulkan melalui observasi kelas, tes diagnostik awal, dan analisis dokumen, dan kemudian dianalisis melalui analisis tematik. Hasil menunjukkan bahwa mayoritas siswa memiliki pemahaman yang memadai tentang kosakata dasar mesin, khususnya istilah-istilah konkret yang berkaitan dengan alat dan perlengkapan. Temuan dari tes diagnostik awal menunjukkan bahwa 95% peserta mampu mengenali istilah-istilah teknis umum dengan benar. Mahasiswa menggunakan beberapa strategi pembelajaran, seperti latihan kontekstual, menerjemahkan istilah ke dalam bahasa ibu mereka, kolaborasi antar teman sebaya, pencatatan terorganisir, pengulangan, dan sumber daya digital. Meskipun demikian, beberapa tantangan masih tetap ada, termasuk paparan terbatas terhadap bahasa Inggris di luar kelas, masalah pengucapan, kesulitan membedakan kosakata umum dan teknis, serta kelangkaan materi yang berorientasi pada ESP (English for Specific Purposes). Temuan ini menekankan perlunya pengajaran ESP yang kontekstual dan penguatan kosakata yang sistematis untuk mempersiapkan siswa dengan lebih baik menghadapi tuntutan komunikasi profesional.

Kata Kunci: Penguasaan kosakata, pendidikan kejuruan, siswa teknik mesin, Bahasa Inggris untuk Tujuan Khusus (ESP), kosakata teknis.

INTRODUCTION

Vocabulary mastery is essential for vocational school students, as they must understand both general and technical terms needed for future workplace communication. Insufficient vocabulary often hinders comprehension and task performance, especially for mechanical engineering students who are required to learn specialized terminology. In ESP contexts, vocabulary forms the foundation for understanding technical content and supporting practical competence. Therefore, this study examines the problems, needs, and strategies necessary to improve technical vocabulary mastery in vocational education (Havwini et al., 2024).

English for Specific Purposes (ESP) in vocational schools plays an important role in preparing students for workplace demands by focusing on career-related language. However, many students struggle with specialized vocabulary because general English instruction often prioritizes everyday language over technical terms. Research shows that targeted ESP strategies such as contextual learning and repeated exposure significantly support long-term retention and understanding of technical vocabulary. Effective combinations of these strategies enhance students' memory, comprehension, and ability to apply vocabulary in professional contexts, ultimately improving their readiness for future academic and workplace situations (Rusmaladewi & Andi, 2025).

Many vocational students still struggle to master machinery-related English vocabulary due to limited exposure and ineffective learning strategies. Previous studies on ESP have discussed vocabulary problems, but research that focuses specifically on machinery terms in mechanical engineering programs remains limited (Avianti & Hakim, 2021). This gap shows the need for a clearer understanding of students' actual vocabulary mastery and the challenges they face. Thus, the purpose of this study is to examine the degree of students' proficiency with machinery vocabulary as well as the variables that affect it.

Machinery-related vocabulary in mechanical engineering includes terms for tools, equipment, machine parts, and operating procedures essential for understanding lessons and ensuring safety in workshop practice. However, many vocational students still lack mastery of these terms, creating challenges in both classroom and practical contexts. Nonetheless, a large number of vocational students continue to struggle with these concepts, which presents difficulties in both academic and real-world settings. The gap between students' actual proficiency and curriculum demands highlights the need for improved translingual strategies (Hajar & Triastuti, 2021).

One major factor contributing to weak machine vocabulary mastery is the limited exposure to domain-specific language in the classroom. Vocational English lessons often lack ESP-based resources, leaving students with insufficient materials to practice technical terminology. This shortage reduces students' confidence and limits their ability to use vocabulary relevant to workplace contexts. Recent empirical studies show that providing contextual and well-designed learning materials significantly improves vocational students' functional vocabulary, making contextual English learning an effective strategy for meeting vocational education needs (Hajar & Triastuti, 2021).

Assessing students' machine vocabulary proficiency is essential for improving instructional practices. Evaluating their current mastery helps identify difficulties and guides the development of targeted interventions. Previous descriptive studies show that many vocational students struggle to recall and use specialized terms, partly due to limited instructional time and less engaging teaching methods. Such an approach is suitable for vocational settings, as it enhances retention while

increasing students' motivation and participation (Simarmata et al., 2025). It is essential for improving instructional practices by assessing students' technical vocabulary proficiency.

In light of these issues, this study aims to evaluate the machinery vocabulary mastery of SMK TKM Purworejo students and identify the challenges they face in learning technical English. By examining their competency and learning obstacles, the study seeks to support more effective ESP instruction aligned with students' professional needs. Vocabulary mastery plays a vital role in helping learners understand concepts and principles across subjects, and lecturers have recommended various strategies to support students' vocabulary development (Havwini et al., 2024).

In the context of vocational high schools, English instruction is expected to function not only as a compulsory subject but also as a means of supporting students' professional competence. Recent policies such as the Independent Curriculum and Ministerial Decree No. 244/M/2024 emphasize that English instruction in vocational high schools must prepare students for the linguistic demands of their respective fields, not just for general communication (Hanapiah et al., 2026). Vocational education emphasizes practical skills and job readiness; therefore, language learning should align with students' specific fields of study. For mechanical engineering students, English becomes particularly important because much of the technical information, machine documentation, and industrial communication uses English terminology. This condition requires students to develop sufficient vocabulary mastery that reflects both general communicative needs and technical specialization.

Vocabulary mastery serves as the foundation for developing other language skills. The success of English learning in ESP contributes to students' understanding of other vocational subjects (Havwini et al., 2024). Students who lack adequate vocabulary knowledge often experience difficulties in understanding written texts, following spoken explanations, and expressing their ideas clearly. In vocational settings, misunderstanding technical terms may lead not only to academic challenges but also to practical errors during workshop activities. Consequently, strengthening machinery-related vocabulary is essential to ensure that students can participate actively and confidently in both classroom discussions and practical training sessions.

Moreover, the distinction between general English vocabulary and technical terminology presents additional challenges. While general vocabulary is frequently encountered in daily communication, technical vocabulary tends to appear in specific contexts such as manuals, operational procedures, safety guidelines, and equipment descriptions. Without systematic exposure and contextualized practice, students may recognize certain terms passively but struggle to apply them accurately. This gap highlights the importance of integrating English for Specific Purposes (ESP) principles into vocational English instruction. Furthermore, this research highlights that the effectiveness of each strategy depends on its alignment with students' individual needs and learning styles (Rusmaladewi & Andi, 2025).

Another important consideration is the rapid advancement of technology and industrial practices. Mechanical engineering students are expected to adapt to new machinery, digital systems, and global standards. Many reference materials, instructional videos, and technical resources are produced in English. Students with strong vocabulary mastery are better equipped to access such materials independently, expand their knowledge, and remain competitive in the workforce. Teachers need to adopt more communicative methods and engaging media to ensure effective and relevant learning experiences. (Efendi et al., 2025). Conversely, limited vocabulary proficiency may restrict their opportunities for professional growth and lifelong learning.

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In addition, learning strategies play a significant role in vocabulary development. Students employ various approaches to understand and retain new terminology, such as associating words with practical experiences, comparing English terms with their first language equivalents, discussing concepts with peers, and utilizing digital platforms. Exploring these strategies provides valuable insights into how students construct their understanding of technical vocabulary and how teachers can further support their learning process. A well-suited combination of strategies can enrich vocabulary learning experiences in the ESP course, improving memory, comprehension, and the application of vocabulary in professional contexts. Ultimately, these strategies prepare students to succeed in future academic and professional environments (Rusmaladewi & Andi, 2025).

Considering these circumstances, it becomes crucial to conduct a deeper investigation into students' mastery of machinery-related vocabulary, the obstacles they encounter, and the strategies they apply in learning technical terms. A comprehensive understanding of these aspects will contribute to the development of more contextualized instructional materials and more effective teaching practices. Learning methods such as Contextual Teaching and Learning and Task-Based Learning need to be applied to support the learning process. The main difficulties faced are the lack of mastery of speaking and pronunciation, as well as limited vocabulary (Efendi et al., 2025). Ultimately, aligning English instruction with vocational needs is expected to enhance students' language competence and better prepare them to meet professional demands in the mechanical engineering field.

This study aims to answer three main questions:

- (1) How are the students' machinery vocabulary mastery at SMK TKM Purworejo?
- (2) What problems do they encounter when learning machine vocabulary?
- (3) What types of learning strategies do students apply to facilitate their mastery of machinery-related vocabulary in the mechanical engineering program?

METHOD

This study employed a qualitative descriptive research design to explore students' mastery of machinery-related vocabulary at SMK TKM Purworejo. A qualitative descriptive approach is considered appropriate because it enables researchers to gain an in-depth understanding of students' experiences, challenges, and perceptions of technical vocabulary rather than relying solely on numerical measurement. Such a design is frequently applied in educational research to portray classroom realities and provide detailed descriptions of language learning processes (Perreault, 2011).

Purposive sampling was used to select the participants (65 students), namely eleventh-grade students of classes XI C and XI D in the Mechanical Engineering program. This technique was chosen because only students who had studied machinery-related English materials and were familiar with technical terms could provide relevant information. The participants consisted of 65 eleventh-grade students from classes XI C and XI D in the Mechanical Engineering program, with approximately 32–33 students in each class. English is taught as a compulsory subject twice a week, and the selected classes had completed a unit on machinery-related vocabulary prior to data collection. In qualitative inquiry, purposive sampling allows researchers to select information-rich participants who can contribute meaningful insights aligned with the research objectives (Etikan, 2017).

Data were collected through classroom observation, a pre-test, and document analysis. Classroom observation was conducted to examine how vocabulary was introduced, practiced, and used during instructional activities. The pre-test was administered to explore students' prior understanding of machinery vocabulary, while learning materials, worksheets, and students' written assignments were analyzed to identify the range of technical terms encountered in class. The pre-test consisted of 25 multiple-choice and matching items focusing on basic machinery terms related to tools, equipment, and workshop activities. The test was designed to measure students' initial recognition and understanding of technical vocabulary before further classroom instruction. The use of multiple techniques supports data triangulation and enhances credibility and trustworthiness in qualitative research (Nowell et al., 2017).

In this qualitative descriptive study, the pre-test was used as a diagnostic tool to obtain an initial description of students' vocabulary knowledge rather than to measure it statistically. The results were interpreted descriptively to support and enrich the thematic findings derived from classroom observation and document analysis.

The research procedures were conducted systematically: (1) obtaining formal permission from the school and English teachers; (2) conducting preliminary classroom observations; (3) administering the pre-test; (4) documenting classroom interactions; and (5) collecting and reviewing relevant documents. Organizing procedures sequentially contributes to transparency and ensures that the study can be replicated in similar contexts (Haoxing & System, n.d.).

For data analysis, thematic analysis was applied. The process involved familiarizing with the data, coding significant statements, identifying recurring patterns, organizing themes, and drawing interpretative conclusions regarding students' vocabulary mastery. The analysis focused on themes such as vocabulary difficulties, learning strategies, exposure to engineering terms, and classroom practices. All findings were interpreted descriptively without statistical procedures, in line with qualitative research principles (Perreault, 2011). Overall, this methodological approach provides sufficient clarity regarding research design, sampling, data collection, and analysis to support future replication in vocational education settings.

RESULTS AND DISCUSSION

This section analyzes the material by focusing on two key aspects: word choice and its contextual implementation. The following section provides representative data to demonstrate the range and variation observed in the instructional materials. Most of the target vocabulary could be classified as *work-related*. Examples were observed in all classrooms, and included words concerning the practices of relevant occupations, including tools, machines, safety gear. In mechanical engineering class many activities were observed the example involved listing hand tools the students had used as part of their vocational training, etc. In addition to the expected category of work-related vocabulary, our observations included two instances (in mechanical engineering class) of vocabulary that could be classified as relating to the system of vocational education. In summary, the findings indicate that all observed classrooms incorporated specialized vocabulary, predominantly related to occupational contexts. More rarely, the words related to the system of vocational education. In the observed trajectories, vocabulary episodes occurred in contexts of varying complexity.

To explain this complexity, the discussion addresses two contextual categories: the inter-subject context, which highlights the connection between English instruction and vocational

subjects, and the intra-subject context.. Therefore, describing how vocabulary work relates to other tasks or activities within the English subject. in daily learning activities, ordinary vocabulary is more often used to convey material compared to vocabulary that refers to a particular major. However, an observation revealed that students tended to find it easier to comprehend vocabulary related to their major than general vocabulary commonly presented in daily instruction. Because the major they chose made them more careful in understanding what the major teacher conveyed compared to what the subject teacher conveyed. It builds on previous research describing technical vocabulary as an area of particular importance for vocational students' English language development and relies on observation data from eight vocational classrooms.

The study found that vocabulary work has a strong presence within vocational orientation (VO) instruction, across whole-class instruction, group or pair work, and individual work. Most target vocabulary could be classified as words relating to work practices and vocational content knowledge (Skarpaas & Hellekjær, 2021). When researchers conducted research using a pre-test, students were very able to understand the questions given, but there were about 5% of them who still had difficulty understanding vocabulary in mechanical engineering.

In addition to the general description of vocabulary use in classroom contexts, the findings also reveal several important patterns regarding students' vocabulary mastery. Vocabulary is a fundamental component of language proficiency and plays a crucial role in students' ability to comprehend texts and communicate effectively. Effective vocabulary instruction requires the use of appropriate teaching strategies to support students in acquiring, retaining, and applying new words (Susanto & Nanda, 2025).

First, students showed stronger comprehension of concrete and frequently used machinery terms compared to abstract or procedural vocabulary. Words referring to physical tools and machines such as hand tools, measuring instruments, and production equipment were more easily recognized and recalled. This indicates that direct exposure during workshop practice significantly supports vocabulary retention.

Second, students' understanding was influenced by the relevance of vocabulary to their major. Many students expressed that they found it easier to understand machinery-related terms compared to general English vocabulary because the technical terms were directly connected to their daily vocational activities. Their interest in mechanical engineering increased their focus and attention when learning related terminology. This finding suggests that contextual relevance enhances engagement and comprehension.

Third, observation results show that vocabulary instruction often occurred incidentally during classroom interaction rather than through structured vocabulary-building activities. Teachers introduced technical terms while explaining materials, but limited time was allocated specifically for vocabulary reinforcement. As a result, students' receptive knowledge (recognizing meaning) appeared stronger than their productive ability (using vocabulary accurately in speaking or writing). Furthermore, the pre-test results indicate that approximately 95% of students were able to answer basic machinery vocabulary questions correctly, while around 5% still experienced difficulties. These difficulties were mainly related to unfamiliar terminology, pronunciation issues, and understanding vocabulary within longer technical sentences. This suggests that while general mastery is satisfactory, deeper comprehension and advanced vocabulary application still require improvement.

This percentage refers to 65 eleventh-grade students who participated in a preliminary diagnostic test consisting of 25 items focusing on basic machine-related vocabulary. The instrument

measured students' recognition and understanding of commonly used technical terms encountered during classroom instruction.

Another important finding is the role of learning strategies. Students who actively used strategies such as note-taking, peer discussion, translation comparison, and digital tools demonstrated better vocabulary retention. This shows that independent and collaborative learning strategies contribute positively to technical vocabulary development. Overall, the findings confirm that machinery vocabulary learning is most effective when it is contextualized within vocational practice. The results suggest that incorporating contextualized vocabulary instruction and repeated practice into vocational English curricula can better equip students with the language needed for specific workplace communication tasks (Susanto & Nanda, 2025). However, structured reinforcement, pronunciation training, and expanded ESP-based materials are still needed to ensure balanced development of both receptive and productive vocabulary skills.

DISCUSSION

The results of this study indicate that the use of vocabulary in mechanical engineering is more effective in training their learning abilities in the world of mechanical engineering. The majority of students are able to understand, work on, and answer questions, thus improving significantly. These findings directly answer the first research question concerning students' achievement in mastering machinery-related vocabulary. The purpose of this study is to hone their English skills in the mechanical engineering department. The findings of this study also illustrate the challenges students face when learning vocabulary, between daily vocabulary and vocational vocabulary. Most teachers are concerned about the teaching of vocabulary. However, it is much more effective to focus on the ways in which vocabulary can be learned.

The study reveals that the teacher played many roles from planning the materials, managing the class, monitoring and evaluating the students' progress (Suryadi et al., 2022). Teachers need to know what learning strategies can help students improve their English learning skills. These findings also revealed that students offer solutions when learning vocabulary. They said that choosing a major they enjoy can make it easier for them to understand the world of work, such as workshop practice, familiarity with machine tools, work safety, workplace regulations, etc.

The Strategy Used by Students of SMK TKM in Mastering the Machine Vocabulary

The findings indicate that students of SMK TKM Purworejo apply several learning strategies, both consciously and unconsciously, in mastering machinery-related vocabulary. Based on these findings, it is recommended that educators design multimodal materials that are visually supportive, cognitively balanced, and comfortable for prolonged reading so learning outcomes can be maximized (Amalia Salsabila et al., 2025). These strategies can be categorized into cognitive, social, and contextual strategies that support their understanding of technical terms in mechanical engineering.

These findings respond to the research question regarding the strategies applied by students in mastering machinery vocabulary.

First, many students rely on contextual learning strategies. Instead of memorizing vocabulary lists in isolation, they tend to associate English machinery terms with real objects and tools they encounter in workshop practice. Specifically, the research examines the barriers faced by students in their pursuit of proficient acquisition of vocabulary (Muryani & Yunus, 2024). For example, when learning words such as lathe, drilling machine, wrench, or milling cutter, students connect the

English terms directly with the physical equipment used during practical sessions. This strategy strengthens retention because vocabulary is not treated as abstract language but as functional terminology linked to daily vocational activities. It is crucial for educators and developers to prioritize the inclusion of interactive elements in their vocabulary (Muryani & Yunus, 2024). Context-based exposure helps students remember meaning more effectively than traditional translation-based instruction.

Second, students frequently use translation and bilingual comparison strategies. They compare English machinery terms with their Indonesian equivalents to ensure comprehension. Although translation alone cannot guarantee deep understanding, students reported that it serves as an initial bridge to grasp unfamiliar terminology. On previous research describing technical vocabulary as an area of particular importance for vocational students (Skarpaas & Hellekjær, 2021). After understanding the basic meaning, they attempt to apply the word in short sentences or practical explanations related to machine operation. This gradual process allows them to move from passive recognition to active usage.

Another strategy observed is peer collaboration. During classroom activities and workshop discussions, students often ask classmates for clarification when they encounter unfamiliar vocabulary. Effective vocabulary instruction requires the use of appropriate teaching strategies to support students in acquiring, retaining, and applying new words (Susanto & Nanda, 2025). Group work enables them to share prior knowledge and reinforce understanding collectively. In vocational contexts, collaborative learning is particularly beneficial because students are accustomed to teamwork during mechanical practice. Through discussion, they negotiate meaning and correct each other's pronunciation and usage of technical terms.

In addition, some students apply note-taking and repetition strategies. They write down new vocabulary in notebooks, sometimes creating personal glossaries of machine-related terms. Repeated exposure through reviewing these notes before practical sessions enhances memory retention. Repetition becomes more meaningful when students encounter the same vocabulary during English lessons and vocational practice.

Digital resources also play a role in vocabulary mastery. Several students mentioned using online dictionaries, translation applications, and video platforms to search for explanations of machine tools in English. Visual demonstrations from videos help them connect terminology with mechanical processes. This multimodal learning approach—combining text, sound, and visual demonstration—supports different learning styles and increases comprehension.

Overall, students' strategies demonstrate that vocabulary mastery is more successful when learning is integrated with vocational content. It signifies that the pupils responded well to the teachers' teaching and learning strategies (Yulia Dwi Sulistyaningtyas, 2021). Rather than relying solely on memorization, students benefit from contextual exposure, collaborative interaction, and repeated practical application. These strategies align with ESP principles, which emphasize meaningful language use within specific professional domains.

The Students' Achievement in Mastering the Machine Vocabulary

Based on classroom observation and pre-test results, the majority of students demonstrated satisfactory achievement in mastering basic machinery vocabulary. Most participants were able to recognize and identify commonly used machine tools, safety equipment, and operational terms. Their familiarity with workshop practice contributed positively to their vocabulary comprehension.

The pre-test findings revealed that approximately 95% of students were capable of understanding and answering questions related to essential mechanical engineering terms. They showed confidence in identifying tools such as hand tools, measuring instruments, and production machines. the strategy helped the student to brainstorm and generate the idea or knowledge (Darussalam, 2022). This achievement suggests that vocational exposure significantly supports vocabulary acquisition. When technical terms are repeatedly encountered during practice sessions, students develop stronger semantic connections.

However, achievement levels varied depending on the complexity of vocabulary. Based on the Indonesian education system, English is one of the subjects that must be taught in every institution and teaching English in Indonesia is not easy, it will be more difficult than other subjects because there are many students who lack experience with English so it will be difficult for students to understand (Annisa et al., 2025). Students performed better on concrete nouns (e.g., names of tools and machines) than on abstract or procedural terminology (e.g., maintenance procedures, safety regulations, or operational instructions). Concrete vocabulary is easier to visualize and associate with direct experience, whereas procedural language requires deeper linguistic comprehension.

Pronunciation and spelling accuracy also showed moderate variation. While students generally understood the meaning of terms, some experienced difficulty pronouncing multi-syllabic words correctly. Teachers must find ways to make students excited and motivated to learn English, and found that repetition drills can improve English and increase concentration (Annisa et al., 2025). This indicates that receptive vocabulary knowledge (understanding meaning) is stronger than productive vocabulary ability (using words accurately in speech or writing).

Another important finding is that students' motivation influenced achievement. Those who expressed strong interest in mechanical engineering tended to demonstrate better vocabulary retention. Vocabulary knowledge achievement is crucial for effective language (Ayana et al., 2024). Their engagement in workshop practice increased their exposure to relevant terminology, which reinforced classroom learning. In contrast, students with lower intrinsic motivation required additional support to maintain focus on vocabulary development.

In general, the findings suggest that students' vocabulary mastery is at a functional level. It suggests that to improve reading ability, teachers should develop students' vocabulary mastery and cognitive learning style. Cognitive learning style and vocabulary mastery cannot be separated (Ikhsanudin et al., 2025). They are capable of recognizing and applying essential machine-related terminology in familiar contexts. Nevertheless, further instructional support is necessary to expand their mastery toward more advanced technical vocabulary and communicative competence in professional settings.

The Problem Students Encountered in Learning the Machine Vocabulary

Despite relatively positive achievement, several challenges were identified in students' learning processes. One major problem is limited exposure to English outside the classroom. The analysis shows that the teachers use VO to facilitate adaptive L2 English teaching by drawing on student interests, promoting subject relevance and scaffolding learning (Skarpaas & Hellekjær, 2021). Since most workshop instruction is delivered in Indonesian, students rarely encounter English terminology consistently in practical sessions. As a result, vocabulary retention depends heavily on English class frequency.

These challenges provide a direct response to the research question related to the problems students encounter in learning machinery vocabulary.

Another challenge involves differences between general English vocabulary and technical vocabulary. Although many studies have explored the relationship between vocabulary mastery and reading comprehension, research in vocational school contexts is limited, where students face unique challenges in learning English (Kandisa et al., 2025). Students sometimes feel confused when switching between everyday language and specialized mechanical terms. General English lessons may emphasize conversational expressions, while vocational vocabulary requires precise and technical usage. This gap can create cognitive overload, particularly for learners with limited foundational English skills.

Pronunciation difficulties also emerged as a common obstacle. Many machinery terms originate from technical or foreign linguistic roots, making them unfamiliar in sound structure. Students often hesitate to pronounce words aloud due to fear of making mistakes. These findings highlight the essential role of vocabulary development in supporting reading skills and suggest that integrating systematic vocabulary instruction into English lessons can improve students' overall language proficiency in vocational school settings (Kandisa et al., 2025). This hesitation reduces opportunities for oral practice and affects their confidence.

In addition, some students struggle with understanding vocabulary in complex sentence structures, especially in written instructions or manuals. While they may recognize individual words, interpreting full technical instructions requires grammar comprehension and contextual reasoning. Thus, it is important that English teachers are aware that students with different proficiency levels use different vocabulary learning strategies (Qiao et al., 2024). This indicates that vocabulary mastery cannot be separated from overall language proficiency. Time constraints within the curriculum further limit in-depth vocabulary practice. English classes in vocational schools are often allocated limited hours, reducing opportunities for repetition and reinforcement. Without sufficient practice, vocabulary retention may decline over time. English for Specific Purpose (ESP) instruction in vocational schools necessitates the use of English materials that are tailored to the students' particular requirements. However, the English materials currently available for vocational institutions lack an adequate needs analysis (Abidah, et al., 2025). Lastly, learning resources are sometimes not fully aligned with vocational needs. When textbooks focus more on general topics than mechanical engineering contexts, students perceive the material as less relevant. Relevance strongly affects motivation and engagement in ESP learning environments.

The Solution to Overcome Students Problem in Learning the Machine Vocabulary

To address these challenges, several pedagogical solutions can be proposed. First, integrating English instruction with workshop practice can significantly enhance vocabulary exposure. The study affirms the importance of contextual learning strategies in language acquisition at vocational schools (Zulkarnain et al., 2025). Teachers may collaborate with vocational instructors to incorporate English terms into practical demonstrations. For example, labelling machines and tools in English within the workshop environment can create continuous exposure.

Second, adopting context-based and project-based learning approaches can strengthen vocabulary retention. Ideally the vocabulary that should be mastered is related to their major study (Zidni et al., 2023). Students can be assigned tasks such as creating bilingual glossaries, presenting machine operation procedures in English, or designing instructional posters for workshop safety. These activities encourage active language production rather than passive memorization.

Third, pronunciation practice should be incorporated systematically. Vocabulary mastery is one of the important keys that bridge the subject comprehension. Understanding new concepts,

ideas, and principles requires knowledge and competence in using words in various settings. The success of English learning in ESP will then contribute to the success of understanding other subjects in the field. Therefore, this research aims to investigate the problems, needs, and feasible strategies in improving vocabulary mastery in vocational higher education settings (Havwini et al., 2024). Teachers can model correct pronunciation and provide guided repetition exercises. Utilizing audio-visual materials and interactive speaking activities can reduce students' anxiety and increase confidence in using technical terms orally. Another effective solution is the development of ESP-specific teaching materials tailored to mechanical engineering contexts. Materials should include authentic texts such as machine manuals, safety guidelines, and technical diagrams adapted to students' proficiency levels. Authentic resources enhance relevance and prepare students for real workplace communication. Encouraging independent learning through digital tools can also support vocabulary development. Teachers may recommend reliable online dictionaries, vocabulary apps, or educational videos related to mechanical engineering. The results present the current state of students' vocabulary level. Moreover, a number of strategies were also recommended by the teachers in terms of students' English vocabulary learning dan development. Future research directions are also presented (Havwini et al., 2024). When guided properly, technology can extend learning beyond classroom limitations.

Finally, motivational support plays an essential role. Teachers should emphasize the practical benefits of mastering technical English, particularly for future employment opportunities. Highlighting real-world applications can strengthen students' intrinsic motivation and engagement. To conclude, overcoming vocabulary learning challenges requires collaborative effort between teachers, students, and curriculum planners. training in vocabulary learning strategies had a significant impact on students' vocabulary knowledge achievement (Ayana et al., 2024). By implementing contextual, interactive, and vocationally relevant strategies, students' mastery of machinery vocabulary can be significantly improved, ultimately enhancing their readiness for professional communication in mechanical engineering fields.

The proposed solutions are formulated based on the identified problems, thereby answering the research question concerning possible strategies to overcome students' difficulties.

CONCLUSION

In summary, this study demonstrates that students of SMK TKM Purworejo generally possess an adequate level of mastery of basic machinery-related vocabulary. Most students are able to recognize and understand commonly used mechanical engineering terms, particularly concrete vocabulary associated with tools, equipment, and workshop activities. Their familiarity with practical vocational training significantly contributes to their comprehension and retention of technical terminology. The pre-test results further indicate that the majority of students have achieved satisfactory understanding, although a small percentage still encounter difficulties. These findings suggest that direct engagement with technical practices in the workshop supports vocabulary acquisition in a meaningful and sustainable way. The findings also reveal that students' vocabulary development is strongly influenced by contextual relevance, learning strategies, and exposure. Students tend to learn technical terms more effectively when the vocabulary is directly connected to their major and daily workshop practice. Strategies such as contextual learning, peer discussion, translation comparison, note-taking, repetition, and the use of digital resources play an important role in strengthening their vocabulary retention. These strategies allow students to process

new terms actively rather than memorize them passively. However, several challenges remain, including limited exposure to English outside the classroom, pronunciation problems, confusion between general and technical vocabulary, and insufficient ESP-based instructional materials. Such obstacles indicate that vocabulary mastery is not only a matter of recognition but also of consistent practice and guided reinforcement. Therefore, improving machinery vocabulary mastery requires more structured and contextualized English instruction that is closely integrated with vocational practice. The development of relevant ESP materials, consistent pronunciation training, and the integration of digital learning tools are essential to enhance both receptive and productive vocabulary skills. Collaboration between English teachers and vocational subject teachers may further strengthen the relevance of instruction. By implementing these improvements, vocational students can be better prepared to use technical English effectively in academic settings and future professional environments, particularly in workplaces that demand clear and accurate technical communication.

Despite these contributions, this study has several limitations. The research was conducted in one vocational school and involved students from a single study program, which may limit the generalizability of the findings to other vocational contexts. In addition, the study relied primarily on classroom observation, a pre-test used descriptively, and document analysis without long-term measurement of vocabulary development. Therefore, future research is recommended to involve broader participant groups and explore longitudinal approaches to examine vocabulary growth over time.

In practical terms, ESP teachers are encouraged to integrate technical vocabulary systematically into both classroom instruction and workshop activities. Teachers may design vocabulary-focused tasks such as bilingual glossaries, short oral presentations on machine operation, pronunciation drills for technical terms, and project-based assignments related to students' vocational practice. Furthermore, collaboration between English teachers and vocational subject teachers is strongly recommended to ensure that English instruction remains relevant, contextualized, and aligned with students' professional needs.

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