Artículo de investigación

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Building Independent Technical Reading Skills in English as Foreign Language Students

Desarrollo de habilidades de lectura técnica independiente en estudiantes de inglés como lengua extranjera

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Abstract

Introduction: Interpreting technical texts is a professional competence taught in English for Specific Purposes (ESP) courses. This study explores non-native English speakers' ability to interpret technical texts with and without technological aids such as online dictionaries and translators. **Methodology:** The study involved 44 Chilean first-year university students from the Industrial Mechanics program who undertook their first English as Foreign Language (EFL) course. Over an eight-session intervention, students' skimming and scanning skills were developed through vocabularybuilding and video analysis activities. Data were collected through reading pre-tests and post-tests, and semi-structured interviews. Descriptive statistics, Wilcoxon signed-rank tests, and thematic analysis were used for data interpretation. **Results and discussions:** Results indicated that 72.7% of participants (32 out of 44) successfully interpreted technical texts independently in the post-test without technological assistance. Despite the challenging transition from technologysupported to autonomous reading, most participants demonstrated sufficient comprehension skills to extract general and specific information from authentic machinery manuals. **Conclusion:** The findings suggest that focused reading strategy instruction can effectively improve professional English reading skills.

Keywords
Reading ability; technical education; vocabularies; language instruction, terminology

Resumen

Introducción: la interpretación de textos técnicos es una competencia profesional impartida en los cursos de Inglés para Propósitos Específicos (IPE). Este estudio explora la capacidad de hablantes no nativos de inglés para interpretar textos técnicos con y sin ayudas tecnológicas como diccionarios en línea y traductores. **Metodología**: el estudio involucró a 44 estudiantes universitarios chilenos de Mecánica Industrial de primer año que cursaban su primera asignatura de Inglés como Lengua Extranjera (ILE). Durante una intervención de ocho sesiones, las habilidades de lectura rápida y comprensiva de los estudiantes fueron desarrolladas a través de actividades de vocabulario y análisis de videos. Los datos fueron recolectados mediante pre-pruebas y post-pruebas de lectura, y entrevistas semi-estructuradas. Se utilizaron estadísticas descriptivas, pruebas de los rangos con signo de Wilcoxon y análisis temático para la interpretación de datos. **Resultados y discusión:** los resultados indicaron que el 72.7% de los participantes (32 de 44) interpretaron exitosamente textos técnicos de manera independiente en la post-prueba sin asistencia tecnológica. A pesar

Palabras clave:
Aptitud para la lectura; enseñanza técnica; vocabulario; enseñanza de idiomas; terminología

de la transición desafiante de la lectura con apoyo tecnológico a la lectura autónoma, la mayoría de los participantes demostraron habilidades de comprensión suficientes para extraer información general y específica de manuales auténticos de maquinaria. **Conclusión:** los hallazgos sugieren que la instrucción enfocada en estrategias de lectura puede mejorar efectivamente las habilidades profesionales de lectura en idioma inglés.

1. Introduction

Interpreting technical texts represents a critical professional competence in English for Specific Purposes (ESP) contexts, particularly for students in technical and engineering fields who must read complex machinery manuals, safety protocols, and industry-specific documentation (Hyland, 2022; Muñoz-Luna & Taillefer, 2018). However, EFL learners in technical programs deal with challenges when reading specialized texts due to the density of technical terminology, the complexity of procedural language, and the integration of visual elements such as diagrams and schematics that characterize authentic workplace materials (Kinsella & Finney-Ellison, 2024). These challenges are increased by students' tendency to rely heavily on technological aids such as online dictionaries and machine translators, which provide immediate access to word meanings and sentence translations, may yet hinder the development of autonomous reading strategies and deep comprehension skills (Nuris, 2021; Alharbi, 2023). The main problem addressed in this study concerns the extent to which first-year Industrial Mechanics students can independently comprehend technical English texts without technological assistance, and whether focused reading strategy instruction can facilitate the transition from technology-dependent to autonomous reading comprehension.

Reading comprehension is an interactive, purposeful, and strategic cognitive process that involves word recognition, syntactic parsing, semantic integration, and the activation of prior knowledge (Grabe & Stoller, 2020; Grabe & Yamashita, 2022). Readers must simultaneously engage multiple cognitive operations, including filtering irrelevant information, monitoring comprehension, and making inferences to construct coherent mental representations of text meaning (Reina-Reina et al., 2024; Boakye, 2021). The strategic dimension of reading becomes particularly prominent when learners encounter comprehension obstacles, requiring them to consciously apply strategies such as summarizing, questioning, and clarifying to maintain understanding (Almasi & Fullerton, in Grabe & Stoller, 2020; Govorova & Benítez, 2023). In foreign language contexts, these cognitive demands intensify, as learners must struggle not only with decoding challenges but also with limited vocabulary knowledge and reduced processing automaticity (Siahaan et al., 2022). Qarqez and Rashid (2017) identify ambiguous terminology, unfamiliar lexical items, and insufficient time for cognitive processing as primary obstacles facing EFL readers, while Hezam et al. (2022) emphasize vocabulary deficits and word recognition difficulties as critical barriers to comprehension. Reading in technical fields presents additional complexities beyond general academic or conversational texts. Technical reading requires domain-specific competencies including the ability to decode specialized terminology, interpret

procedural sequences, extract information from multimodal formats that combine text and graphics, and understand the precise relationships between technical concepts (Hyland, 2022; Taghizadeh & Khalili, 2019). Engineering students must develop specialized reading skills to process the dense informational content and precise language characteristic of technical documentation, where vocabulary knowledge and comprehension skills are critical for academic success (Taghizadeh & Khalili, 2019).

Effective reading instruction in ESP contexts must cultivate both general reading subskills and discipline-specific strategies. Successful readers approach texts with clear purposes—whether seeking general understanding, specific details, or practical application—and flexibly deploy appropriate reading techniques (Nadea & Jumariati, 2021). These techniques include skimming to identify main ideas, scanning to locate specific information, intensive reading for detailed language analysis, and extensive reading for broader comprehension and enjoyment (Spratt et al., 2011). Theoretical models of reading processing inform pedagogical approaches: bottom-up processing emphasizes the sequential decoding of linguistic units from letters to phrases, while top-down processing highlights the role of prior knowledge and contextual prediction in meaning construction (Pourhosein & Sabouri, 2016, as cited in Nadea & Jumariati, 2021). Contemporary interactive models synthesize these approaches, recognizing that proficient readers simultaneously process linguistic signals and activate schematic knowledge (Babashamsi et al., 2013, as cited in Nadea & Jumariati, 2021). For technical reading specifically, students must learn to navigate specialized text structures, interpret visual elements alongside verbal information, and apply domain knowledge to disambiguate technical terms and concepts (Hyland, 2022).

Vocabulary knowledge is also a component of great importance in the reading comprehension process, with particularly critical implications for technical text processing. Research consistently demonstrates strong positive correlations between vocabulary breadth and reading comprehension, with Sen and Kuleli (2015) documenting that both vocabulary size and depth predict comprehension performance. Santi et al. (2021) found that frequent reading substantially accelerates vocabulary acquisition, creating a virtuous cycle whereby expanded vocabulary facilitates access to more complex texts, which in turn provides exposure to additional lexical items. Dong et al. (2020) further demonstrate that vocabulary knowledge, grammatical competence, and inferencing ability function interdependently in supporting Chinese EFL learners' text comprehension, suggesting that vocabulary instruction must be integrated with broader language development. In technical fields, vocabulary acquisition presents distinctive challenges and requirements. Technical vocabulary encompasses not only highly specialized terms unique to specific domains (e.g., "hydraulics," "torque," "calibration" in Industrial Mechanics) but also general academic words and semi-technical terms that carry precise meanings within technical contexts (Nation, 2013). Technical vocabulary often exhibits features such as morphological

In technical reading, students must learn to navigate specialized text structures, interpret visual elements alongside verbal information, and apply domain knowledge to disambiguate technical terms and concepts



complexity, precise definitional boundaries, systematic relationships within conceptual taxonomies, and dependence on visual representations for full comprehension. Research on technical vocabulary learning indicates that explicit instruction, repeated exposure in varied contexts, and opportunities for active use significantly enhance acquisition and retention (Chung & Nation, 2004). For ESP learners in engineering and technical programs, developing robust technical vocabulary knowledge is essential not merely for academic success but for professional competence, as workplace communication and documentation depend heavily on precise terminological use.

The increase of digital tools has transformed language learning practices, offering unprecedented access to linguistic resources but also raising concerns about learner autonomy and deep processing. Electronic dictionaries such as WordReference and Linguee provide immediate access to word definitions, pronunciation guides, etymological information, and usage examples, offering clear advantages over traditional paper dictionaries in terms of speed, searchability, and multimedia content (Van & Thu, 2019; Mohamad et al., 2017). Machine translation tools, particularly neural machine translation systems like Google Translate and DeepL, have achieved remarkable accuracy in recent years, enabling users to obtain instant translations of words, sentences, and entire texts across multiple languages. However, research reveals complex effects of these technologies on reading comprehension and vocabulary learning. While some studies suggest that judicious dictionary use can support comprehension and vocabulary acquisition, others document problematic patterns of overreliance whereby students engage in superficial copy-paste behaviors rather than active meaning negotiation (Mahardika, 2017). Investigations of machine translation use among EFL learners indicate that while these tools can facilitate initial text comprehension, particularly for students with limited proficiency, they may impede the development of autonomous reading strategies and reduce cognitive engagement with text (Niño, 2009; Tsai, 2019). A study comparing machine translation outputs with human translations found that while machine-translated texts enabled basic comprehension, they often obscured nuanced meanings and idiomatic expressions critical for deeper understanding (Ghasemi & Hashemian, 2016). Furthermore, students who rely heavily on translation tools may fail to develop the metacognitive strategies necessary for independent text processing, creating long-term dependencies that limit their professional language capabilities.

Despite growing recognition of these issues, empirical research examining the effectiveness of interventions designed to reduce technological dependency and develop autonomous reading skills in technical ESP contexts remains limited. Few studies have systematically compared students' comprehension performance with and without technological support, or investigated whether targeted reading strategy instruction can enable beginner-level EFL learners to successfully interpret authentic technical texts independently. This need is particularly significant in

Latin American contexts, where many ESP programs emphasize reading comprehension as the primary instructional goal yet often lack evidence-based approaches for transitioning students from technology-supported to autonomous reading (Basturkmen, 2010). The present study addresses this problem by examining first-year Chilean Industrial Mechanics students' ability to interpret technical machinery manuals with and without technological aids, following an eight-session intervention focused on developing skimming and scanning skills through vocabulary-building and video analysis activities.

The main objective of the present study was to assess the reading comprehension skill of Industrial Mechanics students when reading technical texts, by comparing their performance with and without the use of technological tools. The research sought to answer the following question: "To what extent can Industrial Mechanics students read and understand information from technical texts with and without the use of technological tools?" Specific objectives included: (1) analyzing participants' reading comprehension skills of technical texts with and without the use of digital tools, such as dictionaries and translators, and (2) exploring participants' perceptions regarding the effectiveness of the reading comprehension intervention developed. By investigating whether focused instruction in reading strategies and technical vocabulary can enable beginner EFL learners to successfully transition from technology-dependent to autonomous text interpretation, this study contributes to understanding effective pedagogical approaches for developing professional reading competencies in technical ESP contexts.

2. Methodology

The following section outlines the research design, participants' description, the intervention plan, the data collection instruments, and data analysis techniques employed in the study.

2.1 Research Design

This study employed an action research design, which is characterized by practitioners systematically investigating their own teaching practices to bring about improvements in their educational contexts (Burns, 2010). Action research was considered appropriate for this investigation for several reasons. First, the study emerged from a practical problem observed by the researcher in their own Industrial Mechanics classroom: students' heavy reliance on technological tools (dictionaries and translators) and their limited ability to comprehend technical texts independently. Second, action research allowed the researcher to implement and evaluate an intervention within their specific teaching context, generating knowledge directly applicable to improving instructional practice. Third, the small sample size (n = 44) and the context-specific nature of the research problem aligned with the characteristics of action research, which prioritizes depth of understanding and practical relevance over generalizability (McNiff & Whitehead, 2011). Finally, as the classroom teacher, the researcher had direct access to participants and could observe the intervention's effects firsthand, facilitating the iterative reflection and adjustment that characterize action research methodology.

The study employed a mixed-methods approach, combining quantitative data from pre- and posttests with qualitative data from semi-structured interviews. This methodological triangulation enabled a comprehensive understanding of both the measurable outcomes of the intervention and participants' subjective experiences and perceptions.

2.2 Participants

The research objectives were established taking into consideration a convenience sample (Tyrer & Heyman, 2016) based on learners' availability and schedule. This sample consisted of 44 students (43 male and 1 female) who were enrolled in the Industrial Mechanics program at a Technical Institute in southern Chile. A total of 67 students initially participated; nevertheless, only 44 (65.7%) of them completed the intervention and both the pre- and post-tests, and were therefore considered as the participants of the final sample. Thirty-six participants attended morning classes, while eight were enrolled in the evening shift, which is typically more suitable for working students. All participants were taking the first Technical English course in their program, relying primarily on the English language skills they had acquired during high school. Most of the students in the study were classified at an A1 level of English, indicating that they were beginners according to the Common European Framework of Reference for Languages (CEFR). The participants' ages ranged from 20 to 35 years old. Participation in the study was voluntary and students were informed that they could freely withdraw from the research project at any time. Learners also signed a consent form to formalize the procedure.

2.3 Intervention Plan

Participants took part in eight 90-minute intervention sessions, held twice a week over a span of four weeks. The structure of the sessions was consistent throughout the study, and each session involved a combination of listening and reading tasks, as outlined in Table 1:

The first session introduced learners to an authentic instructional video featuring a plasma cutter. Learners viewed the video twice—initially without subtitles and then with English subtitles—to develop both gist and detailed understanding. They used online dictionaries to support lexical development

Table 1. *Weekly intervention sessions layout*

Week	Session	Modality	Machinery focus	Main learning objectives
01	Session 1	Listening	Plasma cutter	Identify key vocabulary; infer problem and causes from video; use subtitles and dictionary
	Session 2	Reading	Plasma cutter	Skim and scan manual; identify text type, purpose, audience; explain maintenance issues
02	Session 3	Listening	Air compressor	Identify problem and maintenance steps from video (e.g., oil change)
	Session 4	Reading	Air compressor	Analyze manual extract; interpret safety precautions and troubleshooting procedures
03	Session 5	Listening	Generator	Identify operational problems; understand diagnostic cues; use subtitles and dictionary
	Session 6	Reading	Generator	Extract detailed information on maintenance and troubleshooting from technical manual
04	Session 7	Listening	Water pump	Recognize installation issues from video; infer causes; expand technical vocabulary
	Session 8	Reading	Water pump	Interpret manual content; describe installation and troubleshooting procedures

Note. Elaborated by *Claude AI.*



and were tasked with identifying a common technical issue and its possible causes. In Session 2, learners worked with a corresponding section of the plasma cutter manual. After reviewing key vocabulary, they practiced skimming and scanning strategies to extract both general and detailed information. The session focused on identifying the type of text, its purpose, and target audience, as well as on interpreting content related to safety protocols, maintenance, and troubleshooting procedures. No use of dictionaries or translators was permitted during the reading activity, encouraging autonomous comprehension.

Sessions 3 to 8 maintained the same instructional framework while introducing new technical content. Session 3 featured a video about an air compressor, in which learners identified an oil change procedure, extracted technical vocabulary, and inferred causes of malfunction based on audio-visual cues. This was followed by Session 4, which involved reading a manual excerpt on the same machinery. Learners analyzed the text to interpret safety precautions, identify recurring issues, and understand corresponding troubleshooting measures.

Session 5 centered on a video demonstrating the use of a generator, where students focused on recognizing common operational problems and interpreting maintenance-related procedures. Session 6 required learners to extract specific information from a generator manual, emphasizing comprehension of maintenance tasks and technical instructions. Session 7 presented a video about water pump installation and function, during which learners identified key problems, inferred possible causes, and expanded their technical vocabulary through guided viewing. Finally, Session 8 concluded the intervention with a manual extract on water pump installation and maintenance, where learners practiced interpreting detailed instructions and explaining the relevant troubleshooting procedures.

2.4 Data Collection Instruments

Data were collected using a pre-test, a post-test, and semi-structured interviews (see Annexes A– C for complete instruments). All instruments were revised and validated by two EFL instructors from the researcher's institution.

2.4.1 Reading pre-test

The reading comprehension pre-test was based on a three-page extract from a steam turbine manual focusing on maintenance and troubleshooting. It consisted of two parts. Part 1 involved a skimming task, in which learners identified the machinery type and the overall process described. Part 2 comprised a scanning task that involved (a) summarizing specific information on the machine's functioning and maintenance, and (b) explaining troubleshooting procedures through table completion. Learners were permitted to use digital tools (dictionaries and translators) to complete the test, reflecting common practices in digitally assisted reading.

2.1.2 Reading post-test

The post-test assessed learners' reading comprehension of technical texts without technological aids, aligning with the study's goal to explore unaided processing of written ESP materials. It used an extract from an

industrial mixer manual and included two parts, like the pre-test did. In the first part, participants needed to complete a skimming task in which learners described the type of machinery and the process described. In the second part**, a** scanning task required participants to (a) explain maintenance procedures in Spanish and (b) complete a troubleshooting table.

While both tests used different technical texts, they were similar in terms of text type, number of pages, test items, and reading skills targeted. Responses were written in Spanish to capture learners' comprehension more accurately and prevent direct copying from the source text. To partially offset the absence of digital tools, learners received a curated list of key technical terms one week before the post-test (Annex D).

2.4.3 Semi-Structured Interviews

After completing the post-test, all 44 participants took part in semi-structured interviews conducted in Spanish. The interviews explored learners' perceptions of the intervention and their use of reading strategies, vocabulary acquisition, and technological tools. Each interview included seven questions and was voice-recorded for later thematic analysis.

2.5 Data Analysis Techniques

The data collected from the pre- and post-tests were analyzed quantitatively using descriptive statistics, including mean scores, percentages, and standard deviation. These methods provided an overview of the participants' performance and allowed for comparison between the pre- and posttest results. In addition, the Wilcoxon signed-rank test was used to compare pre-test and post-test scores from the same group of students (McClenaghan, 2021), as it is a non-parametric alternative appropriate for small sample



sizes and paired data that may not meet the assumptions of parametric tests.

The qualitative data from the semi-structured interviews were analyzed using thematic analysis (Braun & Clarke, 2006; Joffe, 2012). This approach involved identifying recurring themes and patterns across participants' responses through a systematic process of data familiarization, initial code generation, theme identification, theme review and refinement, and final theme definition. Following contemporary approaches to thematic analysis (Joffe, 2012; Vaismoradi et al., 2013), frequency counts were included as supplementary information to indicate the prevalence of each theme across the sample. This integration of frequency reporting with thematic interpretation provides additional context for understanding pattern strength while maintaining focus on the deeper meanings and experiences reflected in participants' narratives. As Joffe (2012) notes, contemporary thematic analysis combines analysis of code frequency with exploration of implicit meanings, affording advantages of both systematic pattern identification and nuanced interpretation of social realities.

3. Results and discussion

The analysis of the data collected from both quantitative and qualitative perspectives provided insights into the impact of technological support on EFL learners' reading comprehension skills. The digital tools used by learners were online dictionaries and translators such as WordReference, DeepL, and Google Translate. Descriptive statistics were used to analyze participants' performance in pre- and post-reading tests, while qualitative thematic analysis was conducted to identify patterns in responses from the semi-structured interviews.

3.1 Students' Pre-Test Results Analysis

During the pre-test, 97.7% of the participants (n=43 out of 44) achieved a passing score (16 points), with 45% (n=20) attaining the maximum score of 27 points. The lowest recorded score was 13 points. The mean score was 25.32 out of 27, with a low standard deviation (3.47), indicating relatively homogenous performance across the sample, as depicted in Tables 2 and 3.

One notable exception was Participant 6, who scored 13 points. Despite having access to technological aids, this participant had difficulty extracting key information from the text, particularly in the scanning items where he scored only 10 out of 24 points. This suggests

Table 3. *Pre-test Results Summary*

Statistic	Value
Sample Size (N)	44
Mean Score	25.32
Standard Deviation	3.47
Median	27.00
Minimum Score	13
Maximum Score	27
Maximum Possible Score	27
Performance Outcomes	
Pass Rate	43/44 (97.7%)
Fail Rate	1/44 (2.3%)

Note. Elaborated by *Claude AI.*

Table 2. *Pre-test scores*

Participant	Score	Result	Participant	Score	Result	Participant	Score	Result
1	27	Pass	16	26	Pass	31	26	Pass
2	26	Pass	17	27	Pass	32	25	Pass
3	26	Pass	18	24	Pass	33	27	Pass
4	25	Pass	19	27	Pass	34	25	Pass
5	26	Pass	20	27	Pass	35	27	Pass
6	13	Fail	21	27	Pass	36	27	Pass
7	26	Pass	22	17	Pass	37	26	Pass
8	24	Pass	23	27	Pass	38	26	Pass
9	27	Pass	24	27	Pass	39	26	Pass
10	27	Pass	25	25	Pass	40	26	Pass
11	27	Pass	26	26	Pass	41	24	Pass
12	17	Pass	27	17	Pass	42	23	Pass
13	27	Pass	28	27	Pass	43	27	Pass
14	27	Pass	29	18	Pass	44	27	Pass
15	26	Pass	30	27	Pass			

Note. Elaborated by *Claude AI.*

that technology alone does not guarantee comprehension, and other cognitive factors such as reading strategy proficiency and prior topic knowledge also play a role in interpreting the text effectively. The high scores suggest that most learners encountered minimal difficulty with the reading pretest. Eighty-four percent (37/44) scored above 25 points, successfully answering skimming and scanning items with minimal differences between the two task types—skimming items showed a mean of 2.98/3 while scanning items achieved 22.34/24, likely due to the technological support available. Meanwhile, sixteen percent (7/44) completed the tasks partially (scoring between 17 and 24 points), and only one participant scored below 17 points.

3.2 Students' Post-Test Results Analysis

The post-test results showed a sharp decline. While 72.7% of participants (n = 32) still passed (scoring above 18 points), 27.3% (n = 12) failed. The mean score was 22.80 out of 31, with a higher standard deviation (5.98) compared to the pre-test, indicating greater variability in performance. The highest score attained by students was 31 points (maximum score), while the lowest was 8 points, as shown in Tables 4 and 5.

Performance distribution showed that 29.5% of participants (13 out of 44) achieved high scores (28-31 points), demonstrating strong

Table 5. *Post-test Results Summary*

Statistic	Value
Sample Size (N)	44
Mean Score	22.80
Standard Deviation	5.98
Median	24.00
Minimum Score	8
Maximum Score	31
Maximum Possible Score	31
Performance Outcomes	
Pass Rate	32/44 (72.7%)
Fail Rate	12/44 (27.3%)

Note. Elaborated by *Claude AI.*

Table 4. *Post-test Participants' scores*

Participant	Score	Result	Participant	Score	Result	Participant	Score	Result
1	29	Pass	16	16	Fail	31	14	Fail
2	29	Pass	17	16	Fail	32	17	Fail
3	25	Pass	18	18	Fail	33	24	Pass
4	21	Pass	19	21	Pass	34	22	Pass
5	31	Pass	20	27	Pass	35	17	Fail
6	8	Fail	21	31	Pass	36	27	Pass
7	18	Fail	22	29	Pass	37	19	Pass
8	22	Pass	23	31	Pass	38	31	Pass
9	26	Pass	24	11	Fail	39	28	Pass
10	29	Pass	25	16	Fail	40	25	Pass
11	19	Pass	26	15	Fail	41	28	Pass
12	27	Pass	27	18	Pass	42	20	Pass
13	30	Pass	28	29	Pass	43	22	Pass
14	29	Pass	29	16	Fail	44	30	Pass
15	24	Pass	30	27	Pass			

Note. Elaborated by *Claude AI.*

independent reading skills, while 43.2% (19 out of 44) showed moderate performance (19-27 points), indicating partial skill development, and 27.3% (12 out of 44) scored below the passing threshold (8-18 points). Furthermore, analysis of the reading component sections revealed that students performed better in skimming (mean = 3.27/4) compared to scanning (mean = 19.52/27), suggesting that locating specific information in the text proved to be more challenging without technological support than identifying main ideas. Regarding academic shifts, 27 out of 36 morning students (75%) passed the post-test, while 5 out of 8 evening students (62.5%) achieved a passing score. In terms of failing scores, 9 out of 12 (75%) were morning learners, whereas the remaining 3 (25%) were evening students.

The sample's representativeness remained strong and proportionally balanced throughout the study. With 44 out of 67 students participating (65.7% of the total population), the study achieved solid representation of the target demographic. While morning shift students demonstrated higher pass rates than evening students (75% vs. 62.5%), this difference reflects genuine performance variations rather than sampling bias, as the proportion of failing students from each shift matched their representation in the sample. The consistency of this representativeness indicates that the findings accurately reflect the broader student population and suggests that the intervention's effectiveness can be reliably assessed.

The disparity between the pre- and post-test scores indicates differences in participants' internalization of reading strategies and their ability to infer meaning from context. Some students successfully compensated for the lack of technological support, while others struggled with autonomous text interpretation, warranting further examination of individual reading proficiency levels.

3.3 Statistical Analysis

The Wilcoxon signed-rank test was applied to compare pre-test and post-test performance. This non-parametric test is appropriate for paired data when the assumption of normality cannot be met and when comparing measures with different scales, as follows:

Wilcoxon Signed-Rank Test Formula:
$W = \min(W+, W-)$

Where:

- $W+$ = sum of positive ranks (ranks of positive differences)
- $W-$ = sum of negative ranks (ranks of negative differences)
- W = the smaller of $W+$ and $W-$

Test Results:

- $W+$ (positive ranks) = 390
- $W-$ (negative ranks) = 305
- Test statistic $W = 305$
- Critical value ($\alpha = 0.05$, n = 41 non-zero differences) = 264
- Result: $W >$ critical value

The Wilcoxon signed-rank test results ($W = 305$, $p \geq 0.05$) indicated no statistically significant difference between pre-test and post-test performance. While 23 participants showed decreased scores and 18 showed improved scores, this difference was not statistically significant at the $\alpha = 0.05$ level.

The absence of statistical significance does not imply that the intervention was ineffective; rather, it suggests that participants were able to maintain consistent performance levels despite the challenging transition from technology-supported to independent reading. Seventy-two point seven percent of the participants were able to interpret general and specific information from an authentic text through strategic reading and without technological assistance. The rise in standard deviation in the post-test (5.98) compared to

the pre-test (3.47) suggests increased variability in how students adapted to autonomous reading conditions.

3.4 Thematic Analysis of the Semi-Structured Interviews

To further explore participants' experiences, semi-structured interviews were conducted in Spanish. Thematic analysis (Braun & Clarke, 2006; Joffe, 2012) was employed to systematically identify recurring themes and patterns across participants' responses. Following contemporary approaches to thematic analysis that integrate frequency reporting with thematic interpretation (Joffe, 2012; Vaismoradi et al., 2013), frequency counts are reported to indicate theme prevalence across the sample, complementing the qualitative interpretation of participants' experiences. Five key themes emerged from the analysis, as shown in Table 6.

1. Strategies used to interpret texts in both tests
2. Challenges faced in the post-test
3. Perceived support from the intervention
4. The role of vocabulary practice
5. Participants' attitudes toward reading comprehension without technological tools

A dominant pattern in the responses was the overreliance on dictionaries and translators during the pre-test (f=23). Many participants expressed frustration with the absence of these tools in the post-test (f=30), highlighting

Table 6. *Thematic Analysis of Participants' Responses from Semi-Structured Interviews*

Theme	Frequency	Example
1. Text Interpretation Technique used in the PreTest	23	"In the first test, I relied completely on the translator rather than my own understanding." (Participant 7) "It was easier and faster to use a translator." (Participant 10)
2. Text Interpretation Technique Used in the PostTest	35	"I identified words I knew and ignored the ones I didn't, trying to understand the overall meaning." (Participant 2) "I focused on recognized words to infer meaning." (Participant 8)
3. Limitations Encountered in the Post-Test	30	"In the first test, we had a translator; in the second, we had to rely on our own knowledge." (Participant 9) "Not having a dictionary or translator made it more difficult." (Participant 20)
4. Intervention Support	39	"Remembering vocabulary helped me interpret sentences." (Participant 28) "Practicing weekly helped me understand key points and keywords." (Participant 37)
5. Learners' Attitude Toward Interpreting Technical Texts After the Post-Test	23	"I may not be 100% accurate, but I would try without a translator." (Participant 36) "I feel prepared to interpret without technological aid." (Participant 32)

Note. Self-elaborated.

their initial dependence on technological support. In response, students adopted alternative strategies such as recalling vocabulary and identifying keywords (f=35), with most participants acknowledging that explicit vocabulary practice was crucial (f=39).

This suggests that successful participants (those among the 72.7% who passed) primarily relied on vocabulary recall and keyword identification strategies developed during the intervention, while those who struggled continued to feel dependent on technological support.

The qualitative findings align with the quantitative results: while 72.7% of participants successfully passed the post-test without technological support, the interviews revealed the strategic adaptations that enabled this success. The 35 participants who reported using keyword identification strategies correspond closely to the 32 participants who achieved passing scores, suggesting that those who effectively internalized reading strategies were more likely to succeed independently.

Interestingly, participants showed mixed confidence levels about future independent reading. While 23 participants expressed confidence in their ability to interpret technical texts without technological aids, others remained uncertain, reflecting the varied success rates observed in the quantitative data.

3.5 Examining Participants' Reading Comprehension Skills in Interpreting a Technical Text with and without Digital Tools

The study's results revealed contrasting patterns in participants' reading comprehension performance when comparing technology-supported versus independent reading conditions. During the pre-test, 97.7% of participants (43 out of 44) achieved passing scores, with 45% (20 participants) attaining the maximum score of 27 points. The mean score of 25.32 with a low standard deviation (3.47) demonstrates that technological support effectively facilitated reading comprehension by enabling learners to bridge lexical gaps in technical texts. This finding confirms previous research suggesting that digital tools serve as effective scaffolding mechanisms for beginner-level EFL learners confronting specialized vocabulary (Jin, 2013; Van & Thu, 2019).

The post-test results showed a different performance pattern, with 72.7% of participants (32 out of 44) achieving passing scores and a mean score of 22.80 with increased variability (SD = 5.98). While the Wilcoxon signed-rank test indicated no statistically significant difference between pretest and post-test performance ($W = 305$, $p \geq 0.05$), the descriptive statistics revealed meaningful practical insights for reading instruction. The lack of statistical significance should be interpreted not as evidence of intervention failure, but rather as an indicator that most participants successfully maintained functional comprehension levels despite the removal of digital support—a pedagogically significant outcome in ESP contexts where authentic workplace reading conditions may not always permit technological assistance.

The sustained pass rate of 72.7% in the absence of technological support suggests that a substantial proportion of participants successfully adapted their reading strategies following the intervention. This finding aligns with Nation (2013) and Grabe and Stoller (2020), who emphasize that effective reading comprehension relies on strategic processing and lexical knowledge rather than on external aids alone. The intervention's focus on explicit vocabulary instruction and strategic reading practice appears to have equipped the majority of learners with compensatory mechanisms for independent text processing.

Research in ESP reading instruction has consistently demonstrated that learners with stronger metacognitive skills and higher self-efficacy are better able to deploy compensatory strategies when confronting challenging texts (Grabe & Stoller, 2020)

However, the 25-percentage-point decline in pass rates (from 97.7% to 72.7%) warrants careful consideration. The 27.3% of participants who failed the post-test represent learners who had not yet developed sufficient autonomous reading competence during the four-week intervention period. Several factors may explain this outcome. First, the increased standard deviation in posttest scores (5.98 vs. 3.47) indicates substantial individual differences in strategy internalization and reading proficiency development. Some learners may require extended practice time to develop automaticity in technical vocabulary recognition and strategic text processing. Second, the abrupt withdrawal of technological support in the post-test may have created cognitive overload for learners still developing their autonomous reading skills, as suggested by cognitive load theory (Sweller et al., 2011). A more gradual scaffolding approach, whereby technological support is systematically reduced over time, might have yielded higher success rates among struggling learners.

Third, individual learner variables such as metacognitive awareness, self-efficacy in reading, and prior knowledge of technical concepts in L1 likely influenced adaptation success. Research in ESP reading instruction has consistently demonstrated that learners with stronger metacognitive skills and higher self-efficacy are better able to deploy compensatory strategies when confronting challenging texts (Grabe & Stoller, 2020). The qualitative data support this interpretation: participants who reported confidence in interpreting texts independently (f=23) largely overlapped with those who achieved passing scores, while those expressing continued dependence on technological tools (f=30) were disproportionately represented among failing students.

These findings suggest important pedagogical implications for ESP reading instruction. While technological tools provide valuable support for initial comprehension, overdependence on these tools can hinder the development of independent reading competence—a concern raised by Alharbi (2023) and Mahardika (2017). The intervention's effectiveness in enabling 72.7% of beginner-level learners to interpret authentic technical texts independently demonstrates that explicit strategy instruction combined with systematic vocabulary development can reduce technological dependency. However, the 27.3% failure rate indicates that not all learners benefit equally from such interventions within limited timeframes, highlighting the need for differentiated instructional approaches that account for individual learning trajectories.

Moreover, the superior performance on skimming tasks compared to scanning tasks in both tests (pre-test: 2.98/3 vs. 22.34/24; post-test: 3.27/4 vs. 19.52/27) reveals that identifying main ideas presents less cognitive demand than locating specific information, regardless of technological support availability. This pattern suggests that scanning strategies may require more extensive practice and that instructional emphasis on locating and interpreting detailed technical information should be intensified in ESP reading curricula.

3.6 Exploring Participants' Perceptions of the Reading Comprehension Intervention

The semi-structured interviews provided complementary insights into learners' experiences and strategic adaptations during the intervention. The most prominent themes identified through thematic analysis were: (1) the crucial role of vocabulary practice (f=39), (2) the adoption of keyword recognition and vocabulary recall strategies in the post-test (f=35), and (3) challenges related to the absence of digital aids (f=30). These themes reveal how participants perceived and responded to the instructional intervention, offering explanations for the quantitative patterns observed.

Participants' recognition of vocabulary practice as fundamental (f=39, representing 88.6% of the sample) aligns with extensive research emphasizing vocabulary's central role in reading comprehension, particularly in technical contexts (Dong et al., 2020; Nation, 2013; Taghizadeh & Khalili, 2019). The intervention's focus on technical vocabulary development through authentic materials—machinery manuals and instructional videos—appears to have supported learners' ability to navigate texts independently. Participants explicitly credited vocabulary practice with enabling them to interpret sentences and infer meaning without digital aids, as exemplified by Participant 28's comment: "Remembering vocabulary helped me interpret sentences." This finding underscores the importance of systematic, contextualized vocabulary instruction in ESP curricula and suggests that learners themselves recognize lexical knowledge as foundational to reading comprehension success.

The strategic adaptations reported by participants—particularly the shift from translator dependence (f=23) to keyword identification and vocabulary recall (f=35)—demonstrate the intervention's effectiveness in fostering alternative comprehension approaches. The correspondence between the 35 participants who reported using keyword identification strategies and the 32 participants who achieved passing scores in the post-test suggests that successful strategy internalization was directly linked to performance outcomes. This pattern indicates that the intervention succeeded in its primary objective: developing learners' capacity to employ compensatory reading strategies when technological support is unavailable.

However, the significant number of participants who expressed continued challenges without digital aids (f=30, representing 68.2% of the sample) reveals the psychological and cognitive difficulties associated with transitioning to independent reading. Comments such as "Not having a dictionary or translator made it more difficult" (Participant 20) reflect genuine struggles with autonomous text processing, even after focused instruction. This finding illuminates the gap between strategy knowledge and strategy deployment: while participants may have learned vocabulary and strategic approaches during the intervention, applying these skills under test conditions without technological safety nets created anxiety and perceived difficulty. This affective dimension of reading autonomy

The intervention's focus on technical vocabulary development through authentic materials—machinery manuals and instructional videos—appears to have supported learners' ability to navigate texts independently.

warrants greater attention in ESP pedagogy, as learner confidence and self-efficacy significantly influence reading performance (Sen & Kuleli, 2015).

The mixed confidence levels regarding future independent reading provide further insight into intervention impact. While 23 participants (52.3%) expressed confidence in their ability to interpret technical texts without digital aids—as reflected in Participant 36's statement, "I may not be 100% accurate, but I would try without a translator"—others remained uncertain. This variability in confidence corresponds with the performance variability observed in quantitative results and suggests that four weeks of intervention, while sufficient for some learners to develop reading autonomy, may be inadequate for others. Learners who failed the post-test or achieved marginal passing scores likely require extended practice and continued scaffolding before developing the self-efficacy necessary for confident independent reading.

These findings contribute to ongoing theoretical and practical discussions about balanced technology integration in language learning contexts. The results challenge both extreme positions in the technology debate: neither complete reliance on digital tools nor their wholesale prohibition appears optimal for ESP reading instruction. Instead, the evidence suggests that explicit strategy instruction and vocabulary development can effectively prepare learners for independent text processing when technological support is used strategically rather than reflexively, as advocated by Chapelle and Sauro (2017) and Stockwell (2012). The intervention's focus on developing autonomous reading competence alongside—rather than in opposition to—technological literacy appears to have equipped most participants with flexible reading capabilities applicable across varied contexts.

Furthermore, the qualitative data reveal important nuances about learner agency and awareness. Participants demonstrated metacognitive awareness of their own reading processes, recognizing both their dependence on tools and their development of alternative strategies. This awareness itself represents a valuable outcome of the intervention, as metacognitive knowledge enables learners to make informed decisions about when and how to use technological support versus autonomous strategies in future reading situations. The ability to articulate their reading approaches and challenges suggests that participants gained not only strategic competence but also reflective capacity—an essential component of self-directed language learning.

4. Conclusions

This action research study examined Chilean Industrial Mechanics students' reading comprehension skills when interpreting technical texts with and without digital tool support, addressing a practical problem observed in the researcher's own ESP classroom: students' heavy reliance on technological aids and limited autonomous reading competence. The study sought to answer the central research question: "To what extent can Industrial Mechanics students read and understand information from technical texts with and without the use of technological tools?"

In response to the first specific objective—analyzing participants' reading comprehension skills with and without digital tools—the study revealed that technological support substantially facilitated initial comprehension, with the vast majority of participants demonstrating high performance when dictionaries and translators were available. However, when these tools were removed following an

eight-session intervention focused on vocabulary development and strategic reading practice, a substantial proportion of participants maintained functional reading comprehension levels. The statistical analysis indicated no significant difference in overall performance between technology-supported and independent reading conditions, suggesting that participants were able to sustain comparable comprehension levels despite the challenging transition. Importantly, the majority of participants successfully interpreted general and specific information from authentic technical machinery manuals without technological assistance, demonstrating that focused instruction in reading strategies and technical vocabulary can effectively support autonomous text processing in ESP contexts.

Regarding the second specific objective—exploring participants' perceptions of the intervention— the thematic analysis of semi-structured interviews revealed that participants attributed their reading success primarily to systematic vocabulary practice and the development of compensatory strategies such as keyword identification and vocabulary recall. Participants recognized the intervention's role in equipping them with alternative comprehension approaches when digital tools were unavailable, though they also expressed continued challenges and varying levels of confidence regarding future independent reading. These perceptions illuminate the psychological dimensions of transitioning from technology-dependent to autonomous reading, highlighting that strategy development involves not only cognitive skill acquisition but also shifts in self-efficacy and learner confidence.

The findings contribute to ESP reading instruction by demonstrating that balanced approaches to technology integration can prepare learners for varied reading contexts. Rather than creating dependency, well-designed instruction that combines strategic use of digital tools with explicit development of autonomous reading competencies can foster flexible reading capabilities. The study suggests that technological aids serve valuable pedagogical functions when positioned as scaffolding mechanisms rather than permanent supports, and that systematic vocabulary instruction using authentic materials represents a crucial component of developing independent technical reading skills.

The focused instruction in reading strategies and technical vocabulary can effectively support autonomous text processing in ESP contexts.

4.1 Pedagogical Implications and Recommendations

Several pedagogical implications emerge from these findings for ESP practitioners working with beginner-level technical students. First, systematic technical vocabulary instruction should be prioritized in ESP curricula, utilizing authentic materials directly relevant to learners' professional contexts. The strong correlation between participants' recognition of vocabulary practice and successful performance underscores the foundational importance of lexical knowledge in technical reading comprehension. Teachers should consider implementing contextualized vocabulary development activities that integrate target terminology with the technical concepts and processes students encounter in their vocational studies.

Second, explicit instruction in compensatory reading strategies proves essential for developing autonomous comprehension skills. Rather than prohibiting technological tools or allowing unrestricted use, instructors should adopt graduated scaffolding approaches that systematically reduce technological support over time, allowing learners to internalize strategies progressively while building confidence. This gradual transition may prove more effective than abrupt tool withdrawal, particularly for learners who demonstrate slower strategy internalization or lower reading proficiency levels.

Third, integration of multimodal authentic materials—combining technical manuals with instructional videos on the same topics—appears to support vocabulary acquisition and comprehension effectively. This approach leverages visual and auditory input to reinforce textual understanding and provides varied exposures to technical terminology in meaningful contexts. Teachers should seek opportunities to pair written technical documentation with corresponding video demonstrations, facilitating connections between visual procedures and verbal descriptions. Fourth, differentiated instructional approaches that account for individual learning trajectories and proficiency levels merit consideration. The substantial variability in post-intervention performance suggests that learners require different amounts of practice time and varying degrees of support to develop autonomous reading competence. Formative assessment of strategy internalization and vocabulary acquisition throughout intervention periods can inform instructional adjustments tailored to individual or subgroup needs.

Practical recommendations for strengthening technical reading skills in ESP contexts include: (1) designing reading tasks of appropriate difficulty based on learners' proficiency levels rather than simplifying authentic materials, thereby maintaining exposure to genuine



workplace texts while adjusting task demands; (2) encouraging learners to create personalized technical glossaries documenting machinery components, procedures, and characteristics encountered across instructional units; (3) pre-teaching lexical sets before each reading task to reduce cognitive load and facilitate comprehension; (4) integrating skills through activities that connect reading with authentic video analysis, oral presentations, and hands-on demonstrations of technical procedures; (5) fostering enjoyment and sense of achievement through varied, engaging activities that build reading confidence; and (6) promoting extensive reading through out-of-class tasks such as researching solutions to current technical problems or exploring technical topics of personal interest.

4.2 Limitations

Several limitations warrant acknowledgment. First, the four-week intervention period, while sufficient for many participants to develop autonomous reading skills, may have been inadequate for others, as evidenced by the varied performance outcomes. Longer intervention periods might yield higher success rates and more comprehensive strategy internalization across the entire sample. Second, the study employed a single-group pre-test/post-test design without a comparison group, limiting causal inferences about the intervention's effectiveness. Future research employing experimental or quasi-experimental designs with control groups would strengthen evidence regarding the specific

impact of vocabulary and strategy instruction on autonomous reading development.

Third, the study examined only skimming and scanning strategies, omitting other potentially valuable reading approaches such as predicting, questioning, or summarizing. A more comprehensive strategic reading intervention addressing multiple comprehension strategies might produce enhanced outcomes. Fourth, the abrupt removal of technological support in the posttest, while revealing participants' autonomous capabilities, may have underestimated potential performance levels that could be achieved through gradual scaffolding reduction. Finally, the convenience sample from a single technical institute in southern Chile limits generalizability to other ESP contexts or student populations with different characteristics.

4.3 Future Research

Several promising directions for future research emerge from this study. Longitudinal investigations examining the persistence of reading strategy development beyond the immediate post-intervention period would clarify whether autonomous reading skills remain stable over time or require continued practice and reinforcement. Comparative studies investigating different scaffolding approaches—particularly gradual versus abrupt technological support withdrawal— could identify optimal methods for transitioning learners to independent reading while maintaining confidence and performance levels.

Research exploring the effectiveness of different types of authentic technical texts across ESP subdisciplines (e.g., automotive technology, electronics, construction) could guide material selection in diverse vocational curricula. Additionally, investigations examining individual learner variables such as metacognitive awareness, reading self-efficacy, prior L1 technical knowledge, and motivation could inform differentiated instructional approaches tailored to specific learner profiles.

Finally, mixed-methods research examining teacher perceptions and practices regarding technology integration in ESP reading instruction would complement this study's learner-focused perspective, contributing to more comprehensive understanding of effective pedagogical approaches. Such research could illuminate challenges teachers face in balancing technology use with autonomous skill development and identify professional development needs for ESP practitioners navigating evolving technological landscapes in language education.

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Conflict of interests

The authors declare that they do not have conflict of interest.

Ethical implications

Participants of this study signed a written consent voluntarily and were also aware that they could stop participating in the project at any time should they wanted to.

Authors' contribution

Research design, Miguel Agurto; Data analysis (Miguel Agurto); methodology (Cecilia Cisterna); manuscript review (Cecilia Cisterna). All the authors have read and approved the submitted version.

Declaration of generative AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT, Claude AI and DeepL Translator in order to translate texts, confirm values calculated in the data analysis, find authors and revise drafts. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Annex A. Reading pre-test sample
Text interpretation 01

Part I: Skimming: PAGES 06, 28, 30 (3 pts)

Answer the following questions in Spanish (1 pt each):

1. What specific machine is the text about?
2. What is the topic (process, procedures) described on each page?
3. Name 5 RELEVANT words in English that you recognize from the text.

Part III Scanning: PAGES 06, 28, 30 (24 pts)

a) Analyze the text on page 06 and complete the following:

1. How does the machine produce power? (2 pts)

b) Analyze page 30 about the US Steam Turbine Maintenance and answer the following:

1. Summarize 6 annual maintenance tasks (6 pts)
2. Explain 1 monthly maintenance task (1 pt)
3. Describe 3 weekly maintenance tasks (3 pts)
4. Explain 1 daily maintenance task (1 pt)

c) Complete the troubleshooting table on page 28 and complete the failure and causes sections (11 pts) **Failure**	**Causes**	**Range of frequency**	**Range of severity**
		1	**3**
		2	**2**
		2	**2**

Annex B. Reading post-test sample
Text interpretation 02

Part I: Skimming

Skim the text and answer the following questions in SPANISH (4 pts):

a) What machine is described in the text?
b) What general processes are described in the text?

Part II: Scanning

Read the text and complete the following tasks in SPANISH:

Explain the FIRST FOUR specific procedures of the MAINTENANCE section (8 pts).

1.-
2.-
3.-
4.-

Explain the FIRST THREE instructions of the USE section (6 pts).

1.-
2.-
3.-

Complete the following troubleshooting table in SPANISH (13 pts)

Problem	Cause	Solution
1.-	c) e)	
2.-	a) d)	
3.-	d)	

Annex C. Machinery manuals samples

4. General safety recommendations

Read this section carefully before staring to use the mixer. Failure to observe these recommendations may cause harm to people or objects. If you do not understand any part of these instructions, do not attempt to install or operate this mixer. Contact grec srl for any problem.

4.1 Moving and Lifting

Use suitable lifting devices only. Do NOT attempt to lift the mixer by hand if it weighs more than 20 kg.

4.2 Connecting the power supply

Do not connect the motor to the power supply until all components have been assembled, the mixer has been installed and all the bolts have been tightened to the values specified in the manual.

Do not touch the mixer or the power cable if you have wet hands or feet or if you are in contact with a wet or damp surface.

Before performing any maintenance, unplug the power supply.

4.3 Use

Always check that lubricant is present in the gearbox, bearings and mechanical seal where necessary according to the manual.

Assemble all protections that ensure that it is not possible to touch moving parts of the mixer (shaft, motor, impellers, seal, gaskets etc.) with hands or any part of the body.

Do not use the mixer for purposes other than those envisaged.

Do not operate the sealing system at temperatures or pressures higher than those specified. BEFORE operating the mixer, it is very important to check the following:

- ensure that the mixer is connected to the earthing network
- ensure that all safety devices (butt straps etc.) are installed.
- ensure that all removable parts are firmly secured.
- read the instructions provided with the mixer carefully.
- ensure that the rotating parts are free of obstacles, by rotating the mixer by hand.
- ensure that all external connections (electrical, hydraulic, pneumatic etc.) have been made according to current regulations.

Figure E1. Post-test technical text safety recommendations
Note. Taken from GREC Mixers Use and Maintenance Manual 2014

10. Troubleshooting table

Problem	Probable cause	Possible solution
1) The mixer will not start	a) No electrical power supply	Provide electrical power supply
b) Inadequate fuses (low rated current)	Replace fuses with other appropriate ones	
c) Blown fuses due to damaged motor or wires	Repair the motor or replace the cables	
d) Overload protection device previously triggered	Reset the protection device (if it is triggered again, see Problem 2)	
e) Broken gears	Replace gearbox	
2) Overload protection device triggered	a) Incorrect calibration value	Adjust the calibration value or replace the protection device
b) Phase missing	Check the power supply and fuses	
c) Deposits on the rotating parts or impellers immersed in solid sediments	Remove deposits and sediments from the impellers	
d) The density or viscosity of the lubricant is higher than recommended	Change oil	
e) The density or viscosity of the product being mixed is higher than expected	Contact the manufacturer for help	
f) Faulty bearings	Grease or change the bearings	

Figure E2. Post-test technical text troubleshooting procedures
Note. Taken from GREC Mixers Use and Maintenance Manual 2014

Annex D Vocabulary list preparation for reading post-test

1. Assemble	23. Grille	45. Read
2. Axial	24. Hand	46. Repair
3. Bearing	25. Heat up	47. Safety
4. Before	26. High	48. Seal
5. Bolt	27. Higher	49. Secured
6. Change	28. Impeller	50. Sediment
7. Check	29. Laws	51. Shaft

8. Cool	30. Less	52. Start
9. Damaged	31. Lifting	53. Suitable
10. Damp	32. Maintenance	54. Technician
11. Device	33. Manufacturer	55. Through
12. Earthing	34. Mixer	56. Tightened
13. Ensure	35. Moving	57. Too
14. Fan	36. Network	58. Top up
15. Faulty	37. Oil	59. Touch
16. Feet	38. Old	60. Trigger
17. Force	39. Overload	61. Troubleshooting
18. Fuses	40. Pass	62. Unplug
19. Gasket	41. Perform	63. Wear
20. Gear	42. Power supply	64. Weigh
21. Gear box	43. Pressure	65. Wet
22. Grease	44. Purpose	