



Expand Technical Vocabulary through Summarizing Technical Manuals

by Using Steller App

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Abstract

This research was conducted to improve the technical vocabulary in the electric field through summarizing electrical user manuals. The participants were 13 students. All of them were male from a public high school, which is located in Manta, Ecuador. Participants were seniors of “Equipos y máquinas eléctricas” whose range of ages was 16-18. The instruments applied in this study to collect data were a pre and post-test, learning logs and a Likert scale post-survey. These instruments provided quantitative and qualitative data. The results showed a significant impact of Cohen’s $d= 0.64$ demonstrating an improvement in the acquisition of technical vocabulary. The findings showed that the present study improved the comprehension of texts which involve technical terms. Moreover, the acquisition was achieved by summarising user manuals to enhance understanding of the main ideas of participants. Implications of this study involve other language teachers who want to strengthen the acquisition of technical terms in private or public institutions.

Keywords: technical vocabulary, summarizing, electrical terms.

Resumen

Esta investigación se realizó con el fin de mejorar el vocabulario técnico en el campo eléctrico mediante el resumen de manuales eléctricos de usuario. Los participantes fueron un grupo de 13 estudiantes, todos varones de un colegio público, que se encuentra situado en Manta, Ecuador. Los participantes eran estudiantes de tercero de bachillerato en “Equipos y máquinas eléctricas” y su rango de edad era de 16 a 18 años. Los instrumentos aplicados en este estudio para la recolección de datos fueron una prueba previa y posterior, registros de aprendizaje y una encuesta posterior a la aplicación de la innovación. Estos instrumentos proporcionaron datos cuantitativos y cualitativos. Los resultados mostraron un impacto significativo Cohen $d= 0,64$ demostrando una mejora positiva en la adquisición de vocabulario técnico. Los hallazgos mostraron que el presente estudio mejoró la comprensión de textos que involucran términos técnicos, además, la adquisición se logró mediante la aplicación de resúmenes de manuales de usuario para mejorar la comprensión de las ideas principales en los participantes. Las implicaciones de este estudio involucran a otros profesores de idiomas que quieren fortalecer la adquisición de términos técnicos en instituciones públicas o privadas.

Palabras clave: vocabulario técnico, resumen, términos eléctricos.

Expand Technical Vocabulary Through Summarizing Technical Manuals by Using Steller App

Nowadays, English is considered as a lingua franca to refer to the communicative interaction between nonnative speakers (NNS) and native speakers (NS; Seidlhofer, 2005). This interaction focuses on groups with different cultural backgrounds and language. Thus, English became a lingua franca worldwide. As a result, the need for using it more in general and specific areas of knowledge brings some opportunities to expand the teaching and learning of this language. Shrestha et al. (2016) also agreed that English had become a lingua franca worldwide, and it is applied in different areas of education, for instance, English for specific purposes.

Consequently, new approaches and pedagogical models were practised to develop linguistic skills in the technical areas, for instance, Content and Language Integrated Learning (CLIL). This model pointed out that learners need to fulfil a wide range of academic skills like reading in specific academic fields (Yemelyanova et al., 2016). Taking this into account, when reading is free and voluntary, it results in better reading comprehension. It also improves writing style, vocabulary, spelling, and grammar development (Krashen, 2004a).

In Ecuador, few types of research about expanding technical vocabulary have been held, like “Expanding Vocabulary through Quizlet to Improve Students’ Writing” and “Dialogues to Promote Speaking in Students of Network " Telecommunications, found in the repository of Casa Grande University. However, no one has been found that has used summarizing technical information and getting new vocabulary. The studies that were mentioned above were applied in Ecuador, and they are mainly focused on the improvement of speaking and writing skills. At the same time, we have to consider that these researches about gaining technical vocabulary have not been applied in senior high

schools where there are technical studies. These researchers have only been applied in technical institutes and universities.

A pre-test about the comprehension of texts was taken to students from the senior high school from a technical high school. The results showed a lack of vocabulary, and they have problems primarily with those words relevant to their field of study. It is a problem since learners must get a B1 English level at the end of their last scholar year. However, participants of this study held an A1-A2 level, according to a proficiency test taken. These antecedents promoted this innovation. It involves individual and group work to learn technical words by reading and summarizing manuals. These components were taken into account to motivate students to learn English as a foreign language and in specific fields or purposes.

Literature Review

This research involves the acquisition of technical vocabulary through summarizing user manuals from different electrical equipment. That is why this section contains principles and concepts that are worth for the study since it is fundamental for our research to have the perspective of authors that valid this research.

Content and Language Integrated Learning (CLIL)

CLIL is an approach that focuses on combining language and content to teach a new language (Coyle et al., 2010). Coyle et al. (2010) also pointed out that this approach focuses on developing strong reading skills because learners are exposed to read information from different knowledge areas. Furthermore, learners achieve a wide range of vocabulary, which help them to use in real life.

For conducting this innovation, it is necessary to clarify some principles of the CLIL approach. First, considering students' needs to manage language content from

specific fields, CLIL is a tool used that integrates language learning and content from other subjects to incorporate new terms or vocabulary (Mehisto et al., 2010). Second, Mehisto et al. (2010) also pointed out that there are three forms of CLIL:

- **HARD CLIL:** Teaching and learning is focused on the subject content primarily.
- **SOFT CLIL:** It is focused on teaching and learning the language, it means language-driven.
- **MID CLIL:** Focuses on teaching lesson subjects, using a foreign language with dual-focused aims. This learning process is a combination of both language and content.

This research focuses on the use of mid-CLIL since learners need to understand and summarize technical words that will be involved in the technical texts. Furthermore, the uses of CLIL on sample groups has given better results in English proficiency than control groups in ELF classes for enhancing vocabulary and reading skills (Lasagabaster & Doiz, 2016).

Reading Comprehension

No matter the theoretical position that researchers take when they talk about second language acquisition (SLA), in the end, all of them conclude that input is an essential condition to second language learning (Lessard-Clouston, 2018). Krashen (2004b) mentioned that language is acquired when we understand messages when we know what people are saying, and last but not least, when we understand what we read. The acquisition of the language in this innovation will be handled through reading activities where learners feel free to choose different texts to create an extensive reading (ER) environment. Research on ER has shown many benefits, such as vocabulary acquisition (Senoo & Yonemoto, 2014).

Summarizing

Summarizing is a process that requires a lot of understanding, since it involves the acquisition of ideas to be transferred in the way they were understood. Though there are many methods to summarize, text summarization seems to work very well, using it when briefing vital information from the text since it implements the use of natural language processing methods that allow people to extract keywords to have a better understanding of ideas. Then, it generates a precise and straightforward description from a large document (Vangara et al., 2020). It is mentioned that text summarization can also be interpreted to provide a shorter version of a text, where the most important information of a source is displayed (Al-Abdallah, p. 61-65 2019, as cited in Abualigah et al., 2020).

Two methods are very useful when summarizing:

- **Extraction-based Summarization:** It is an approach that describes the text from its original form by identifying important sections of the text to then subset sentences from the original text. To be more specific, this approach is based on the weight and rephrasing of the essential section of text or words (Vangara et al., 2020).
- **Abstraction-based summarization:** “Abstraction based text summary is closer to human expectations. The algorithm produces phrases and sentences from the original text to express the most useful information. It avoids the grammatical inconsistencies that usually occur when summarizing text based on extraction” (Vangara et al., 2020, p. 3968).

This research primarily focuses on the use of Abstraction-Based Summarization. This method allows participants to express the most helpful information taken from the text to say the same idea in their own words.

Writing

Students have to summarize the manuals they have read to post them in Steller app. Thus, writing becomes a transversal skill in this study since they will transfer the knowledge they have gained by summarizing and uploading it in the app. Writing allows students to communicate effectively because it can transfer their thoughts (Harmer, 2004). We communicate through it. It has the same cognitive process as speaking skill which is conceptualized, formulated and finally articulated in the production skills (Levelt, 1989, as cited in Burns & Hill, 2013).

Furthermore, writing skills play an essential role in our society nowadays, since it allows people to communicate using social media. Mukundan and Nimehchisalem (2013) argued that writing software helps to avoid grammar and spelling mistakes. In this way, people who suffer from anxiety will minimize the fear of making mistakes when writing.

Technical Vocabulary

Participants of this study belong to the electrical senior high school. They usually find texts in English in the parts or equipment they use, replace, or fix. Thus the necessity of learning and understanding phrases and words which are relevant to their field. Wanpen et al. (2013) emphasized the importance of technical vocabulary as a crucial and essential factor to learners of different technical areas of study. Mahraj (2018) also pointed out that learners like to be familiar and immersed in the type of language belonging to their fields. Wanpen et al. (2013) argued that they need to convey the meaning of words and phrases to communicate in their areas. According to all these, vocabulary comprehension guarantees to extend strong knowledge of technical terms (Schmitt, 2008).

Steller App

Smartphones can facilitate collaborative learning since we are using authentic resources that are found in the real world for integrating language use (Savignon, 1991). According to these words, it is remarked that the use of technology as a tool to achieve a better learning integration will be critical to engage students' attention and promote interaction between them and with new ways to learn. Furthermore, authors like Hasan (2016) stated that educators must be updated with 21st century needs, and technology is one.

According to Dewi and An'asy (2018/2019), Steller is a content sharing platform that allows users to read passages, stories or something of their interest, emphasising extensive reading. Moreover, it will enable them to create their own stories and post them online as this is an e-learning tool that can be used in different devices like tablets, computers, and smartphones. According to Richards and Rodgers (2014), teachers need to know how to manage ICT well inside and outside the classroom. For this, using an app like Steller will be more interactive and engaging in the language classroom.

Due to the lack of technical vocabulary on students of this technical high school, this study implements the Steller app to expand vocabulary. After the literature review, this research explores the following research questions:

1. To what extend does summarizing expand students' technical vocabulary?
2. What are students' perspectives towards this innovation?
3. To what extend Steller app has facilitated the learning of new technical vocabulary?

Innovation

This innovation allowed 13 students (all of them were males) to use text summarization to improve technical vocabulary from the senior high school. Steller app

was chosen as an e-learning tool to facilitate the process. Students read the manuals of tools and electrical equipment to share their experience using them after reading the manuals. They also created a sort of personal user's manual on the app in order to be read by their classmates. In the manual that they summarized they shared what they have learnt and what was unusual for them.

The final product was to summarize manuals that the students read, using the new terms and meanings acquired according to their context in the technical area they belong to. After that, they had to manage electrical equipment following the instructions step by step in English. Because of the pandemic of COVID-19, classes were online, using Microsoft Teams to interact with the students and guide them in this pre-experimental study.

During the first class, the students were guided through different steps to follow when doing electrical work. Also, technical vocabulary was displayed in a slide to students get familiar with other words and phrases used in their field. They were asked to use their smartphones to take photographs of the slide and check the new things they have learnt that day to be later posted on the Steller app. Thus, all participants could see the meaning and the picture.

Methodology

This study was an action research. According to Ravid (2015), it is a cycle that identifies the problems that need to be improved, search for research-based practices, and implement them to report the results. Taking this into consideration, this research has included quantitative and qualitative instruments to answer the following research questions:

1. To what extend does summarizing expand students' technical vocabulary?
2. What are students' perspectives towards this innovation?

3. To what extent Steller app has facilitated the learning of new technical vocabulary?

Participants

This study was conducted in a Technical High School in Manta. There were 13 participants, where all of them were males. They were senior students. Their ages were between 16 to 18. They were in A1-A2 level according to the Common European Framework (CEFR).

Instruments

For answering the first research question (*To what extent does summarizing improve students' technical vocabulary?*) a pre and a post-test were applied (through Google forms). The pre-post test were the same to see whether there was an improvement or not. In addition, it will measure the knowledge of technical words associated with electricity through a multiple-choice test (see appendix A).

To answer the second research question, (*What are students' perspectives towards the innovation?*) students wrote learning logs, where they answered open questions every week to identify students' feelings about the use of manuals in English and to express whether they feel they are improving or not. There were five questions per week. (see appendix B).

To answer the third research question (*To what extent Steller app has facilitated the learning of new technical vocabulary?*) a post-survey will be applied with a Likert scale where participants answered their opinions about how Steller app has facilitated the acquisition of new technical vocabulary. The survey had 5 questions with four possible options according to the students' appreciation. (see appendix C).

Ethical Considerations

Permission was granted from the authorities as the first step to apply for this study. Students were also informed about the objectives of the research and the procedures. The instruments were examined and validated by experts to raise reliability. The instruments included a legend with the study's main purpose and a reminder to students that they were participating voluntarily.

Data Analysis

RQ1: To what extend does summarizing improve students' technical vocabulary?

Participants took a pre and post-test to get the results for this research question, where the data of the median, and standard deviation were obtained. At first, the researcher used excel to collect all the data. Later the results were introduced in the SPSS program. Cohen's d was also obtained from the same data since the difference between two means was analyzed, so then, the impact of this innovation could be known.

RQ2: What are students' perspectives towards innovation?

To obtain the results of this research question, participants responded to learning logs after classes, where they answered to open questions about the innovation. Their opinions were coded into categories where their comments had similities, so that, have an interpretation of their ideas toward the innovation.

RQ3: To what extend Steller app has facilitated the learning of new technical vocabulary?

The data obtained from this research question was collected through a post Likert scale survey. This data was taken per each question and the results were calculated in order

to have the percentage of the question, so that, the researcher had an idea about how the use of the app facilitated the acquisition of technical vocabulary.

Results

Q1. To what extent does summarizing improve students' technical vocabulary?

The results shown in Table 1 express the number of pre-test and post-test values, standard deviation, and the effect size. The effect size value ($d=0.64$) is considered as a medium effect. Data from the pre-test displays a mean of 4.14 (SD=2.41). Contrary, data collected from the post-test displays a mean of 5.36 (SD=3.18). The p -value was 0.01, so we concluded with the observation that it is statistically significant. Thus, all the results were positive due to the intervention and not to any other variable.

Table 1

Pre and post-test descriptive statistics

Pre and post-test descriptive statistics					
	N	Mean	Std. Deviation	Effect size	p -value
Pre-test	13	4.14	2.41	0.64	0.01
Post-test	13	5.36	3.18		

Q2. What are students' perspectives towards innovation?

Learning logs were responded to by participants, where they described their feelings about the study through driven questions. The data collected was coded into categories to be then interpreted. Table 2 displays the questions, categories and the interpretation which were written based on students responses.

Table 2

Interpretations of coded categories

	Driven questions	Categories	Interpretation
1	How do you feel about the reading activity?	Focus, improving	These categories refer to how they felt when performing reading activities and their responses express they felt like getting better through performing this sort of activities.
2	How useful have been the electrical manuals for you? Why?	Learned new terms, important in the field	These categories are associated with the importance of new words and expressions found in their field and how these new terms help them better understand electrical manuals.
3	What aspects of summarizing the manuals did you find more challenging?	Master manuals, Follow steps systematically, electrical ranges	These categories express the difficulties that participants found when summarizing electrical manuals. Students felt that the most difficult parts of summarizing these sort of manuals were to write about electrical ranges as volts, amperes, resistance among others, at the same time to express some ideas systematically ordered and to master the summarization in a 100%
4	What did you learn from this experience?	Read manuals, technical terms	These categories represent the strengths that participants achieved as long as the study lasted; according to participants' comments, new technical terms and expressions were learnt. Furthermore, they expressed that they learnt how to read and interpret electrical manuals.
5	Do you feel any improvement in the use of new technical words through the reading and summarizing activities? Why yes or why not?	Familiar words, basic English language.	The categories are related to the improvement the participants had in the study. At first, they expressed some limitations because of their English level, but as time and classes go by, they recognized more and more words. They became familiar to them, since participants realized that these words and expressions were familiar to their field of study. They noticed improvement, since they could understand a more comprehensive range of

technical terms at the end of this research.

According to these appreciations, which were based on the sample provided, the results show improved technical vocabulary on participants. Furthermore, their comments are favourable toward the innovation. It means that participants well accepted the innovation.

Most of the participants expressed that this innovation gave them a chance of improving their vocabulary; in addition, they mentioned that this acquired vocabulary will be helpful for their future works. Expressions like *“I feel good, I feel that I am learning new words and terms that I will see in the future in my work, so, I can understand many phenomena related to the electricity.”*, *“Very useful because I learned to read unknown words.”*. Furthermore, participants felt focused in reading activities where they mentioned, *“I felt concentrated in the reading activities, so, I acquired new vocabulary”* and *“That is very good because when reading we can know new words and learn things that we did not know through reading.”* Based on these comments that the participants gave, it can be understood that there was improvement in the acquisition of technical vocabulary through some reading and summarization activities.

Participants also expressed that they could manage electrical manuals much better by following steps and they were able to understand ranges of electrical terms like Volts, Resistance, Amps, among others. Participants wrote comments like *“Manuals are so important to know about the characteristics of a device, and how to use it, for example, if it uses AC or DC, or the maximum voltage that it can be used or measure, depending on the device.”*, *“It helped me read each part of the elements that the manual may have, but I knew how to master it.”* And *“I learned to identify parts in which you have to analyze about the exact measurements of voltage, current, resistance, and continuity”*.

It should be remarked that participants got familiar with the sort of words used in the electrical user manuals since these words were repeated very often in any reading activity they had. Moreover, they were repeated even in their classmates' comments in their post in the Steller app. It should also be considering the language limitations they had to do the activities, but they highlighted how little the vocabulary was being acquired. Their appreciations were *“I understand some words, and I know what the manual means or what it refers to.”*, *“I noticed some improvement because it is difficult for me to learn since I do not have much knowledge in English, but little by little, the words are taxed.”* And *“When I do reading activities and see the familiar words make easier to understand.”* These comments show an improvement on participants that is linked to the observations per each class.

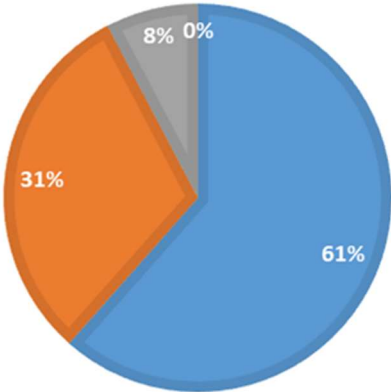
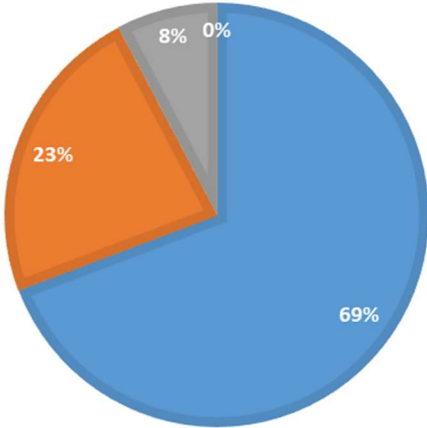
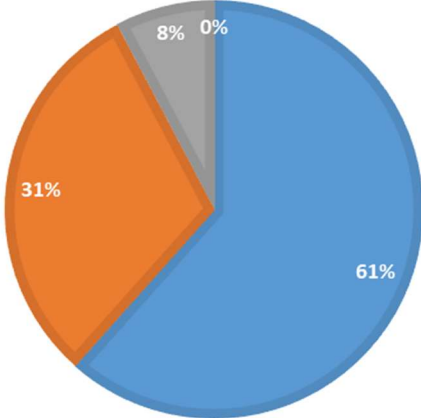
AQ3. To what extend Steller app has facilitated the learning of new technical vocabulary?

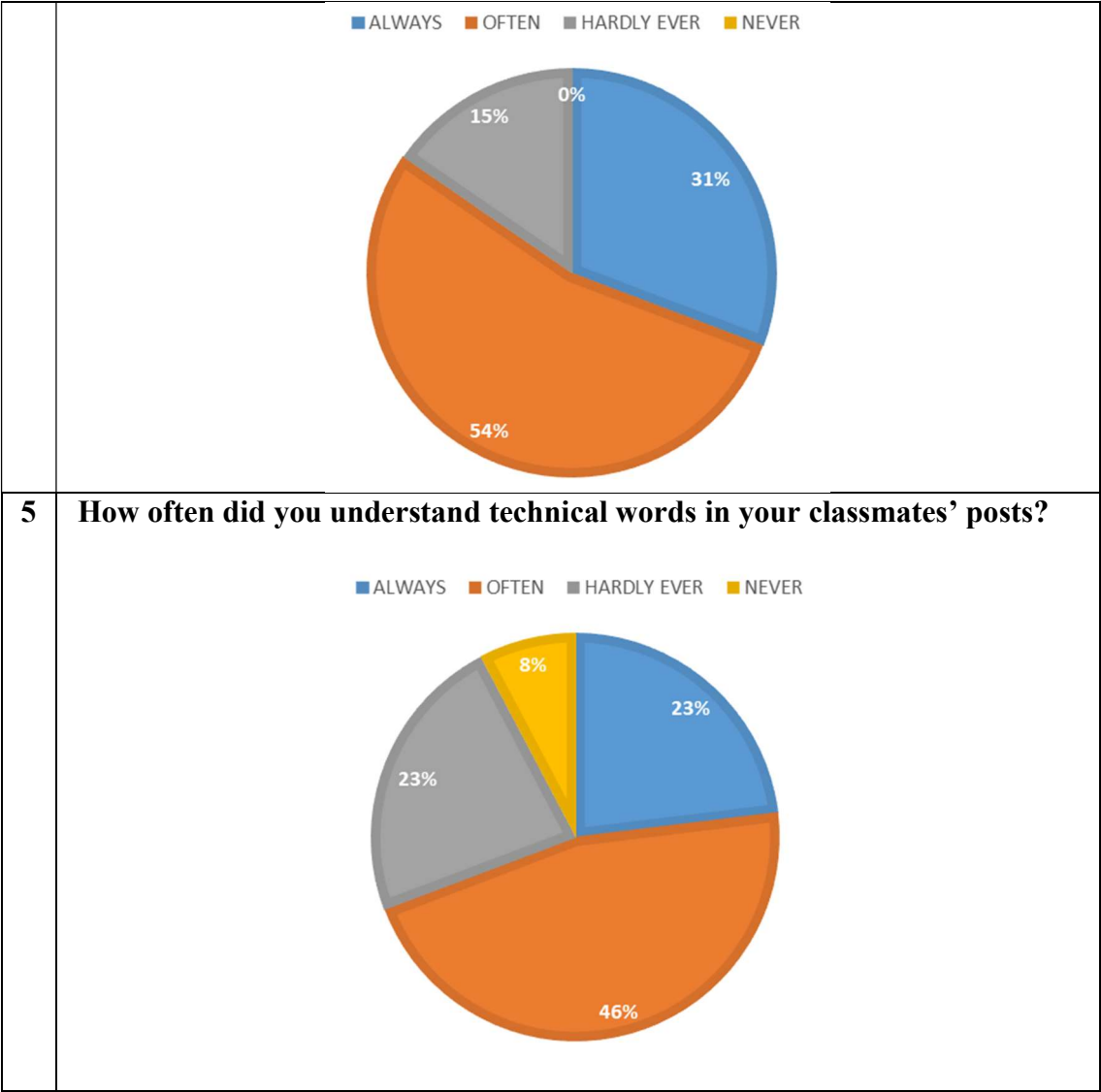
A Likert scale survey was taken at the end of the study to know how Steller app impacted in the learning of new technical terms. The results showed a good acceptance by participants to Steller app. These results are expressed in percentage in the table below.

Table 3

Percentage of acceptance of Steller app

1	Did the use of “Steller app” encourages you to contrast ideas and new terms about what you and your classmates have understood from the technical manuals?
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4	<div><p>How often did you remember the meaning of technical words?</p></div>										



Discussion

The results presented in this study clearly show an improvement in the acquisition of technical vocabulary on participants. Furthermore, they were able to enhance their comprehension to develop summarized manuals. It emphasizes the words of Vangara et al. (2020), who claimed that summarizing texts implements the use of natural language processing methods that allow people to extract key phrases to have a better understanding of ideas. Furthermore, they generate a precise and straightforward description from a large document.

According to the first research question: To what extent does summarizing improve students' technical vocabulary? The results were positive since students had better results in the post-test than in the pre-test. The test was a multiple-choice test where options were a sort of summary of the completed text, where they had to understand the main ideas to then be chosen into a different text form with the same meaning. These results highlight what Al-Abdallah (2019, as cited in Abualigah et al., 2020) mentioned about text summarization. He said that it could also be interpreted to provide a shorter version of a text. The most critical information of a source or multiple references of information is displayed.

For the second question: What are students' perspectives towards innovation? Most participants' beliefs were about how good they felt in the process and how technical vocabulary learning will help them in their future careers. According to this, Mahraj (2018) established that learners like to be familiar and immersed with the type of language that belonged to their fields. The participants' thoughts also expressed how important the acquisition of technical vocabulary in their field of study and how it can get more accessible for them to manage electrical equipment just by understanding the manuals in the English language and using lots of technical words. These implications go hand in hand with what Wanpen et al, (2013) argued, they mentioned that they need to convey the meaning of words and phrases to communicate in their fields.

Finally, the last research question: To what extent Steller app has facilitated the learning of new technical vocabulary? Participants answered to a Likert scale post-survey. Their responses showed a high percentage of participants who agreed that the app helped them improve their technical terms by summarizing the manuals. Furthermore, it should be highlighted that the use of the Steller app encouraged participants to be more motivated since e-tools like platforms engage teenagers in learning new things. It is what Dewi and An'asy (2018/2019) expressed about the app. They stated that Steller is a content sharing

platform that allows users to read passages, stories or something of their interest, emphasising extensive reading. Moreover, it will enable them to create their own stories and post them online to be seen by people interested in the type of post.

Conclusions

After five weeks of implementation, the instruments used to measure the improvement of participants showed positive results. They demonstrated that most of the participants had improved their understanding of technical terms by summarising technical manuals. They also showed that participants gained new vocabulary related to the electrical field since they could recognize a wide range of these types of words at the end of the study. This statement was based on the post-test they took, which was implemented as the final part of this study.

Most of this study focused on the acquisition of technical vocabulary to enhance the comprehension of electrical manuals, but at the same time summarization was introduced as a method to achieve this goal, and the results were positive in most of the cases. Participants developed an Abstraction-based summarization method. They extracted the most important information of a text to express it with their own words what was understood in the texts.

For the most part, it was demonstrated that the use of summarization in company with technology is an effective strategy to enhance vocabulary acquisition. Even though this study was conducted in a public school with 13 participants whose English level was A1-A2 according to the Common European Framework of Reference for Languages (CEFR), it can also be applied in other institutions with a different English level, where students have the necessity of acquiring technical vocabulary so that, they can improve their reading comprehension in technical texts.

Limitations

Even though the implementation of this innovation had good results in most participants, some limitations were presented when working on this research study.

Because of the pandemic of Covid-19 platforms adapted to have classes through them, most participants were not familiar with these learning tools, so it took some time for them to get familiar with these platforms. Another limitation was the internet connection since some participants presented problems with the internet when posting their summaries on the Steller app or connecting to the classes. This limitation also implies low monetary incomes in some families where the internet connection is limited.

English level was another limitation since A2 students understand specific directions faster than A1 students. Furthermore, A2 students performed activities more quickly. This limitation was presented at the beginning of the implementation, but at the end of it, all participants finished their activities almost at the same time.

Finally, the sample was small since it was expected to work with 22 participants at the beginning of the innovation. Still, because of circumstances, only 13 of them were able to work on this study.

Recommendations

For futures studies, it is recommended to work in an extended period since taking this into account will help to develop in a better form the skills that participants need to achieve to positive results.

It is also recommended to have a more extensive sample; this will help increase the study's reliability. At the same time, it would be recommended to applied different instruments to evaluate results in various stages of the study.

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Appendix A

Pre-post test

Available upon request.

APPENDIX B

Learning Logs' Questions

Available upon request.

Appendix C

Survey

Available upon request.

APPENDIX D

Design from Your Goals

Available upon request.