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Integrating Technology in the Instruction and Retention of ESP Vocabulary: A Systematic Review

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ABSTRACT

Integrating various forms of technology in teaching vocabulary in English for Specific Purposes (ESP) contexts might contribute to enhancing second language acquisition and creating new opportunities for learning vocabulary. The aim of this paper is to conduct a systematic review of the efficacy of integrating technology in the instruction and retention of ESP vocabulary as well as the attitude of ESP learners towards technology-supported teaching/learning processes. To this end, the researchers adopted the PRISMA model to include the most relevant and appropriate articles for review. The study procedures included the identification and screening of the most relevant research articles via Google Scholar, Scopus, and Eric platforms. This resulted in a total number of 13 research studies to be included for analysis. The key findings of the review are that different types of technology, including mobile phones, social media platforms, multimedia software, Moodle, Corpora, and chatbots, were used in the studies under analysis and that ESP learners have a positive attitude towards technology-supported ESP vocabulary learning. The findings of the review are likely to be beneficial for ESP course designers, instructors, and decision-makers. They might also inspire researchers to develop a path of research on the efficacy of certain forms of technology in the development and retention of ESP vocabulary.

Keywords: *CALL, ESP vocabulary, MALL, Systematic review, Technology, and ESP.*

1. INTRODUCTION

Acquiring a new language may be a laborious and challenging pursuit. While mastering English requires time and dedication, learning a language for specific professional contexts can be more focused and efficient. This is where English for Specific Purposes (ESP) comes in. English for Specific Purposes (ESP) is "an approach to language teaching that targets the current and/or future academic or occupational needs of learners, focuses on the necessary language, genres, and skills to address these needs, and assists learners in meeting these needs through the use of general and/or discipline-specific teaching materials and methods" (Anthony 2018, 1). For this reason, ESP curricula and teaching methods cannot be selected or decided upon prior to determining course objectives and learners' needs (Hutchinson and Waters 1987; Anthony 2018; Viana, Bocorny, and Sarmento 2018). In this sense, ESP integrates several teaching approaches, such as Communicative Language Teaching (CLT), Task-based Learning (TBL), and Project-based Learning (PBL) (Richards and Rogers 2014, quoted in Anthony 2018).

1.1 Technology Integration in English Language Teaching and Learning

There has been a noticeable increase in the incorporation of technology in English language instruction and learning all across the world (Nawaila, Kanbul, and Alhamroni 2020). Teaching English through digital applications can increase the efficacy of teaching and evaluating students (Susanty et al., 2021). Furthermore, it has also been argued by Assulaimani (2019) that the advancement of

English language education requires not only a push towards technology-enhanced learning and teaching practices, which is a crucial step towards maintaining the knowledge and skills needed to achieve a competitive edge in the twenty-first century but also an appropriate incorporation of effective teaching methods that foster both critical thinking and cooperative learning. Among the technological devices and software applications integrated into teaching vocabulary in both General English and ESP are Computer-assisted Language Learning, Social Media Platforms (SMPs), Mobile Learning, and Corpora.

1.2 Computer-assisted Language Learning (CALL)

Computer-assisted Language Learning (CALL) refers to "a variety of technology uses for language learning including CD-ROMs containing interactive multimedia and other language exercises, electronic reference materials such as online dictionaries and grammar checkers, and electronic communication in the target language through email, blogs, and wikis" (Chapelle 2010, 66). Researchers of CALL are in constant search of new effective techniques for language learning, and, in this pursuit, they comparatively examine studies containing efficient activities and functionalities and describe their drawbacks (Parmaxi et al. 2013). Yet, as indicated by Parmaxi and Zaphiris (2017), the main challenge lies in integrating Web 2.0 technology advancement into task design, instructional objectives, and educational practices, raising awareness of new technologies, and fostering multiliteracy and multimodal competence for social contexts. Furthermore, Akayoğlu (2019) lists a few influential theories on which CALL research is reliant, as illustrated in Figure 1:

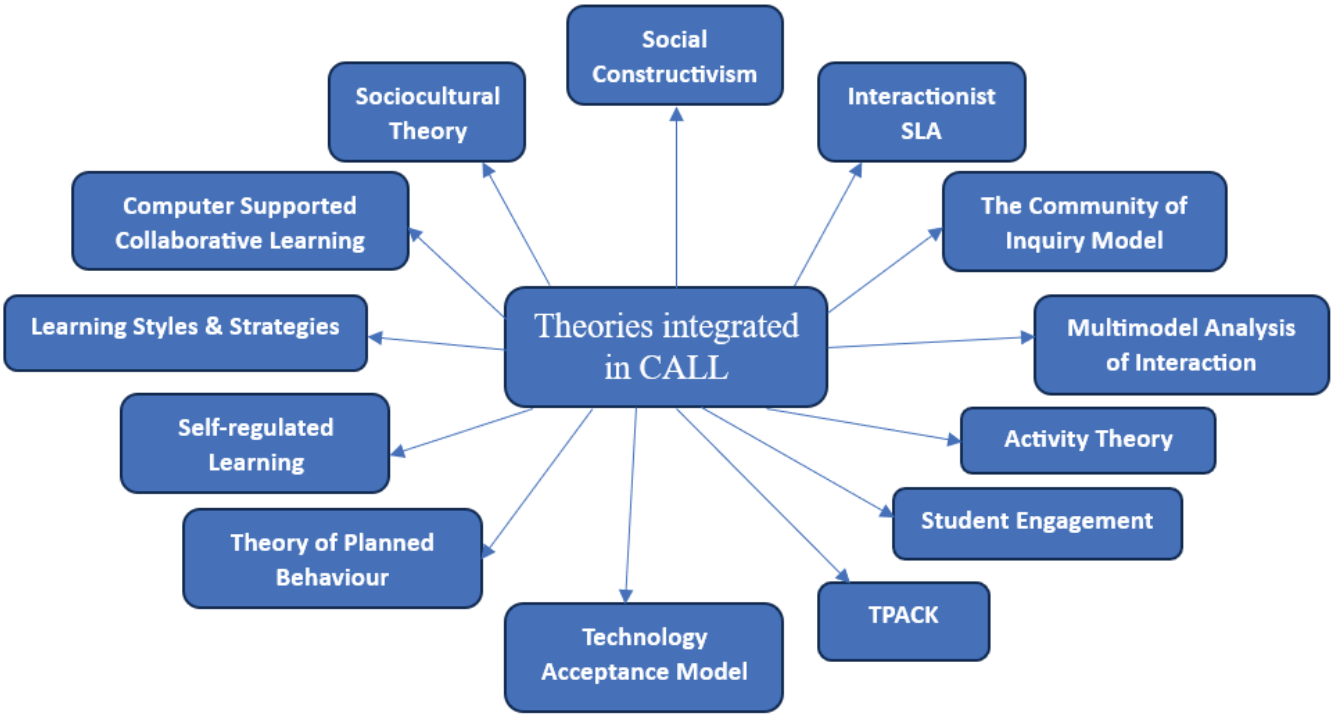

Figure 1: Theories Integrated in CALL Research

Davies (2016) categorizes CALL on the basis of its historical developmental stages: for example, traditional, explorative, multimedia, and web-based CALL. Traditional CALL programs used a screen-presented text for stimulus and keyboard input for response. Some programs used imaginative presentation techniques such as color highlighting grammatical features. Recent CALL strategies have supported learner-centered, explorative strategies over teacher-centered, drill-based strategies. The exploratory method is distinguished by the use of concordance software in language instruction. Early personal computers also struggled to display authentic voice recordings and images, but combining a computer with a 12-inch videodisc player enabled multimedia CALL to combine sound, images, and video recordings. According to Davies (2016), the World Wide Web's introduction in 1992 marked the start of CALL's last development stage. The Web has a lot of potential for teaching and learning languages, but there is still some progress to be made in terms of accessibility and engagement.

1.3 Social Media Platforms

In the modern world, social media are viewed as an integral component of human activities since its many platforms primarily serve to satiate two fundamental human needs: meeting new people and fostering existing connections (Monica-Ariana and Anamaria-Mirabela 2014). According to Monica-Ariana and Anamaria-Mirabela (2014), new phrases like newsfeed, viral, hashtag, and wiki are examples of how social media have had an impact on language. Even renowned dictionaries, like the Oxford Dictionary, now contain trendy terms like *derp*, *selfie*, *phablet*, *emoji*, *dislike*, and others that have just lately become widely used. Many of these terms have been impacted by these rapidly evolving cultural and technological trends. With regard to the educational implications of social media, Khan, Ayaz, and Faheem (2016) define it as " media which is used through various electronic and rechargeable devices like mobile phones, computers, tablets, and so many other ways to facilitate the people while sharing their ideas with others in an easy and systematic way" (591). According to Zheng, Yim, and Warschauer (2018), performing group research projects on social media platforms can improve collaborative writing and knowledge. Additionally, these platforms support intercultural conversation, which increases learners' knowledge of the variations in beliefs, discourses, and practices. To achieve these goals, Zheng, Yim, and Warschauer (2018) have made the case that teachers should embrace their responsibilities, which frequently shift between facilitation and direct teaching depending on the degree of learner autonomy.

1.4 Mobile- Assisted Language Learning (MALL)

Since the introduction of the first mobile phone (the Motorola DynaTAC 8000X) in 1973, the price and physical form of mobile devices have decreased while their strength, speed, memory, and capability have improved (Arvanitis and Krystalli 2021). These gadgets today frequently have internet connection, voice messaging, SMS text messaging, cameras, and even video recording capabilities (Chinnery 2006). All of these capabilities support conversational language practice, access to real information, and task fulfillment in language acquisition. This makes it possible to construct knowledge with reference to individual experiences and practices, making the learning process adaptable in many ways in terms of skills, interests, and preferences (Çakmak 2019). Generally speaking, Mobile phones are among the best devices for a successful education, but their full potential has not been realized in order to fulfill the technical needs of the generation of tech-savvy students (Sarhandi, Teise, and Bugti, 2022).

1.5 Corpora for Language Learning

Corpus linguistics is an effective teaching approach that provides teachers with high-quality language examples, enabling hands-on, student-centered instruction, and it speeds up the process of looking up terms in dictionaries, allowing students to learn more quickly and practically (Ma and Mei 2021). Furthermore, it can be used in teaching language and researching linguistic problems and cultural issues (Prasetya et al., 2020). For the examination of natural language, corpus linguistics offers an incredibly potent instrument and significant insights into how language use differs in various contexts, such as spoken versus written language or formal interactions versus informal discussion (Reppen and Simpson-Vlach 2019).

A thorough review of the literature has revealed that most review studies have tackled the issue of integrating technology in teaching General English (Ahmadi 2018; Başar and Şahin 2021; Klimova et al. 2023) while there has been little attention directed to ESP. Driven by the need to fill in this gap in the literature, the current study aims to conduct a systematic review of the articles relevant to the utilization of various technological devices and software in the instruction and retention of ESP vocabulary.

2. METHODOLOGY OF THE SYSTEMATIC REVIEW

The researchers have adopted the renowned PRISMA model (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to include the most relevant and appropriate studies for the review. In conducting the systematic review, the following steps were followed by the researchers:

Step 1: *Framing questions*

The problems addressed by the review were specified in the form of clear and structured questions before beginning the review:

1. What is the effect of technology in maximizing the acquisition of ESP vocabulary?

2. What is the attitude of ESP learners towards using technology to acquire ESP vocabulary?

Step 2: *Identifying and screening the relevant studies*

This step consists of two stages: the first is locating relevant papers for the study's topic, and the second is using the PRISMA model to evaluate those relevant studies. The first stage involved the researchers exploring Google Scholar, Scopus, and the Education Resources Information Centre (ERIC) for pertinent papers using specific strings. "ESP vocabulary and technology," "Using technology to learn ESP vocabulary," and "Effect of Technology on ESP Vocabulary Learning" were some of the strings that were included in this list. Following filtering the articles in this stage, 150 papers that were pertinent to the study's field were found. The PRISMA Model was subsequently employed for more accuracy.

The PRISMA model was used for identifying and screening the most relevant articles. Selection criteria were specified *a priori* (section 2). PRISMA is an evidence-based minimum set of items aimed at helping scientific authors to report a wide array of systematic reviews and meta-analyses, primarily used to assess the benefits and harms of a health care intervention (Page et al. 2021). Utilizing PRISMA increases transparency in the selection of papers for systematic reviews and is expected to enhance the reporting quality of such reviews (Page et al. 2021).

Step 3: *Summarizing the included articles*

The articles included were tabulated, and their main characteristics are presented in the findings section.

Step 4: *Interpreting the findings*

Summary of the key findings, assessment of the distribution of the included articles and directions for future research are provided by the researchers in the discussion part.

Applying the PRISMA model in this systematic review involves two stages: *Identification* and *Screening*. These, in turn, have led to the included articles in the review as illustrated in Figure 2:

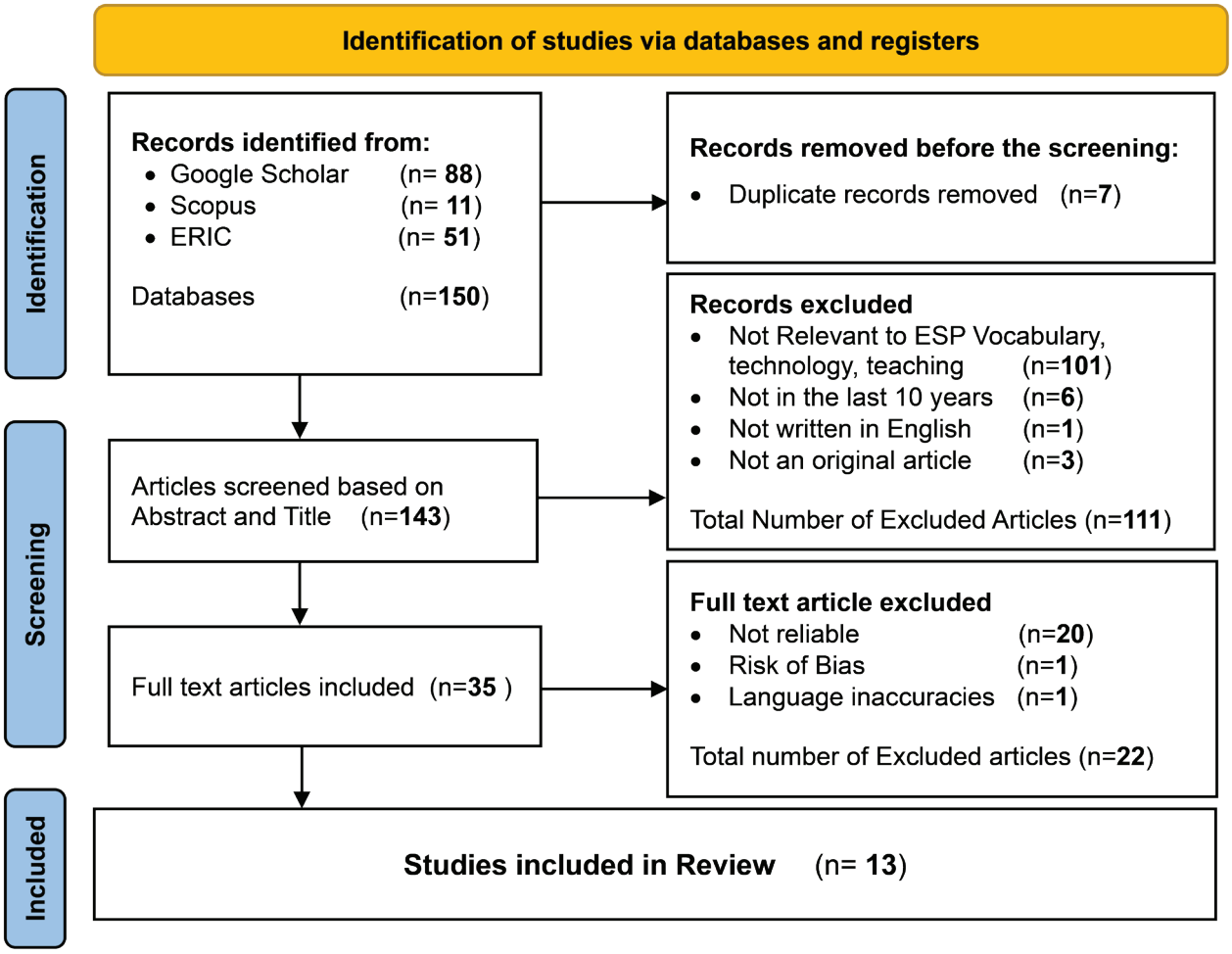

Figure 2: Distribution of Articles in the PRISMA Model
Source: Adapted from Page et al. (2021)

2.1 Identification Stage

During the *Identification* Stage, three databases were searched through Google Scholar, Scopus, and ERIC. Four criteria for selection were adopted. The selected articles should be:

1. Related to the integration of technology in teaching vocabulary in an ESP context.
2. Peer-reviewed.
3. Written in English.
4. Published during the last 10 years (2014 - 2023).

The article selection criteria followed by the researchers ensure credibility, relevance, and up-to-date insights into the integration of technology in teaching and learning vocabulary within the ESP context. This is due to a number of reasons. First, focusing on technology-related studies in the instruction of ESP vocabulary ensures the direct alignment of literature with the study's scope and avoids general language learning research, which in turn may not address the needs of ESP learners. Second, peer-reviewed articles undergo a rigorous evaluation process that guarantees reliability and scholarly integrity and minimizes academic biases. Third, restricting selection to English-language publications prevents translation inaccuracies. Finally, the selected timeframe (2014 – 2023) ensures that the study incorporates the most recent advancements and reflects the current trends and best practices. These criteria collectively strengthen the systematic review by ensuring the inclusion of high-quality, contemporary, and relevant research. The total number of articles found in these databases was 150 articles: 88 on Google Scholar, 11 on Scopus, and 51 on ERIC.

2.2 Screening Stage

Since seven articles were duplicated, 143 articles were screened on the basis of their titles and abstracts. One hundred eleven articles were excluded for several reasons. Firstly, they were not relevant to one of the aspects of the research: technology, ESP vocabulary, or teaching (101 articles). Secondly, they were not published during the last 10 years (2014 to 2024). Third, they are not written in English (1 article). Finally, they are not original articles (3 articles). In the last step of the *screening* stage, only one researcher read the final stage 35 articles so as to succinctly screen them for their methodology, reliability of results, risk of bias, and appropriateness of language. This ensures a uniform application of the inclusion and exclusion criteria, which minimizes the inconsistencies that may arise from multiple interpretations. This approach enhances methodological reliability by maintaining a standardized decision-making process in the screening stage. Additionally, another researcher verified a sample of the selections to mitigate potential bias.

2.3 Included Articles

A total number of 13 articles were finally included in the review, whereas a total of 22 articles were excluded: 18 articles for not employing a mixed-method approach, two articles for not having reliable results, 1 article for the risk of bias, and another for containing too many language errors. The included articles fulfilled all the required criteria for the systematic review on the topic of technology and teaching ESP vocabulary. Table 1 presents an overview of the articles selected for the systematic review in terms of author(s), the year of publication, and the research questions they attempted to answer:

Table 1. Overview of the Included Articles

No.	Article	What is the effect of technology in maximizing the acquisition of ESP vocabulary?	What is the attitude of ESP learners towards using technology to acquire ESP vocabulary?
1	Hou (2014)	✓	
2	Sabater and Begoña Montero (2015)		✓
3	Khalili, Tahririan, and Bagheri (2015)	✓	✓
4	Ventura and Martín-Monje (2016)		✓
5	Alfarania and Shioumai (2016)	✓	✓
6	Dashtestani and Stojković (2016)	✓	✓
7	Simanjutak (2020)	✓	✓
8	Hrdlicková (2020)	✓	✓

9	Bieńkowska et al. (2021)	✓	✓
10	Lytovchenko et al. (2022)	✓	✓
11	Wannas and Hassan (2023)		✓
12	Qasem et al. (2023)	✓	✓
13	Hsu and Chao (2024)		✓

All articles except for Sabater and Begoña Montero (2015), Ventura and Martín-Monje (2016), Wannas and Hassan's (2023) and Hsu and Chao (2024) answered the first question of the systematic review which is related to the effect of technology in maximizing the acquisition of ESP vocabulary. Furthermore, all articles answered the second research question, which is concerned with the attitude of learners toward technology in maximizing the acquisition of a second language, except for Hou (2014).

3. FINDINGS OF THE SYSTEMATIC REVIEW

This section presents the data collected from the articles (n=13) included in the systematic review. A summary of the included studies in terms of the author(s), year of publication, methods of data collection, number of participants, and main findings are presented in Table 2:

Table 2. Characteristics of the Included Studies

Articles	Methods	Form of Technology	Participants no.	Results
Hou (2014)	Pre-/post-tests	Corpora Lexical tutor/ AntConc	42 CLIL program participants	• Based on the corpora analysis results, vocabulary lists, the LCBO website, and the in-house corpora introduced to the students as supplementary materials, the • Pre and post-test results indicate that the students gained significant progress in both content and language knowledge.
Sabater and Begoña Montero (2015)	A questionnaire & observations (sessions debriefings)	Social Media Twitter	75 interns in architectural firms	• ESP students do not frequently experience problems using vocabulary specific to their specialized field of study. • In terms of peer feedback, students often approved their peers' Tweets, were unable to detect errors, and preferred feedback from their teacher. • A significantly positive outcome is the role of Twitter in enhancing student participation. • Regarding communication skills, a particularly important finding was the effectiveness of this blended approach in involving the learners in the classroom and beyond, creating a sense of a learning community.
Khalili, Tahririan, and Bagheri (2015)	Vocabulary post-test classroom observations	Multimedia Software	120 Iranian ESP learners	• There was a great level of disparity between the experimental and the control groups of learners regarding their acquisition of new vocabulary - in other words, multimedia software had a positive effect on students' vocabulary learning. • In addition, learning with technology also showed positive activity engagement.

Ventura and Martín-Monje (2016)	Students tracking on the MOOC platforms, questionnaire, observations	MOOC platforms Facebook network	657 professional English MOOC students	• There was a positive impact of the Facebook network in the motivation of students to learn specialized vocabulary • and an improvement in their progress in the MOOC, as well as fighting the two main problems that MOOCs currently are said to have: high drop-out rates and lack of student engagement.
Alfarania and Shioumai (2016)	Pre-/post-tests & a questionnaire	Mobile Application (NCLEX RN)	51 nursing students	• Although the improvement in the post-test could not be entirely attributed to the use of the NCLEX RN Mastery 2015 mobile app, students with high motivation to take the RN test considered the mobile app appealing and useful in their vocabulary learning. • Students were willing to purchase the full version of the mobile app.
Dashtestani and Stojković (2016)	Pre-/post-tests & a questionnaire	MALL (SMS)	60 EAP students	• Learning academic vocabulary can be enhanced through the use of SMS. • Students generally had positive attitudes towards SMS-based learning of academic vocabulary. • The perceived factors that might affect students' SMS-based learning of academic vocabulary comprise the length of the text message, the language of the text message and definitions, and the frequency of receiving text messages containing academic vocabulary.
Simanjutak (2020)	Pre-/post-tests & interviews	MALL	113 Computer Science students with an intermediate level of English	• There was a significant learning improvement in the use of MALL to students' vocabulary knowledge. • Students perceived learning using MALL to be both positive and rewarding. • Interestingly, students revealed the use of MALL could not replace human interactions.
Hrdlicková (2020)	A post-test & a questionnaire	LMS Moodle	97 students (64 experimental, 33 control)	• LMS Moodle increased students' motivation to study English. • The results prove that "Economics and Law" students greatly enlarged their legal vocabulary and that both groups were interested in learning idiomatic expressions.
Bieńkowska et al. (2021)	Pre-/post-tests & a questionnaire	MALL	114 ESP students	• The obtained results illustrate the acceptance of mobile devices as a learning tool, indicating that the process of learning does not have to be limited to classroom activities only. • MALL increases the student's knowledge of vocabulary, and the learners' attitude towards using mobile devices is positive. • Implementing mobile devices as learning tools reinforces students' motivation, the sense of belonging to a particular community, autonomy, and flexibility of learning.

Lytovchenko et al. (2022)	A post-test & A questionnaire with open-ended questions	Online Mode of Instruction through videoconferencing technologies	70 third-year university students	• The factor of authenticity plays a vital role in vocabulary learning, makes it more enjoyable and meaningful for students, promotes their motivation and self-direction. • The use of online vocabulary learning tools and videoconferencing technologies provides the students with a considerable degree of flexibility and autonomy and creates an opportunity to study at various locations. • The online mode of instruction is appropriate for the context of distance learning, which is especially valuable during the pandemic.
Wannas and Hassan (2023)	A questionnaire & Interviews	Social media platforms	210 professional Healthcare Providers	• Social media platforms tremendously assist non-native healthcare providers in acquiring medical English vocabulary and enhancing language learning autonomy. • Among the features of social media that proved to be beneficial to Egyptian healthcare providers are ease of usage, free-of-charge availability, ability to edit, copy and share, ability to store data forever, emoticons to express feelings, choice to join private conversations, and choice to join public discussions and debates.
Qasem et al. (2023)	Pre-/Post-tests & Informal Interviews	Dialogflow chatbot	40 Business English Undergraduate students (20 experimental, 20 controlled)	• The study explored that the use of chatbots plays a major role in enhancing and learning ESP vocabulary. • The students who used the chatbot Dialogflow in the experimental group outperformed their counterparts in the control group.
Hsu and Chao (2024)	Questionnaire	MALL (Quizlet App)	45 military students	• Perceived usefulness positively influenced behavioral intention through attitude towards use. • However, perceived ease of use did not significantly influence perceived usefulness or attitude towards use because of the limited convenience of studying at the military base.

3.1 Mobile-Assisted Language Learning (MALL) in Teaching and Learning ESP Vocabulary

With regard to Mobile-assisted Language Learning (MALL) in teaching and learning ESP vocabulary, Dashtestani and Stojković (2016) investigated the use of SMS in learning academic vocabulary. To this end, the research design consisted of a pre-/post-test for the measurement of the effect and a questionnaire for obtaining the opinions of 60 EAP students. The results showed a significant improvement in academic vocabulary learning and retention, and their attitude was positive. Furthermore, the length of the text message, the language of the text message and definitions, and the frequency of receiving texts containing academic vocabulary are considered elements that might influence students' SMS-based acquisition of academic vocabulary. Similarly, Alfarania and Shioumai (2016) examined the use of the NCLEX RN Mastery 2015 mobile app on 51 nursing students using a pre-/post-test design and a questionnaire. It was concluded that students with a high level of motivation to take the RN test found the mobile app. to be interesting and helpful in their vocabulary acquisition, even if the improvement in the post-test

could not be totally attributable to the usage of the app. The complete edition of the mobile app. was also something they were open to purchasing.

Another mobile-assisted learning study is Simanjutak's (2020). The study consists of pre-/post-tests and interviews, and the sample of the study included a total number of 113 Computer Science students with intermediate levels of English. It was found that there was substantial vocabulary acquisition enhancement when MALL was used with youngsters. Students asserted that learning with MALL was pleasant and positive. Additionally, they interestingly stated that using MALL could not substitute interpersonal interactions. Likewise, Bieńkowska et al. (2021), with a pre-/post-test design and a questionnaire, investigated the use of MALL over 114 ESP students. The results showed that mobile devices are widely accepted as a tool for learning, proving that learning is not just a process that happens in the classroom. Additionally, MALL has helped the children's lexical knowledge grow, and they have a positive attitude toward using mobile devices. Students' motivation, sense of belonging, autonomy, and adaptability in their academic endeavors are increased by the usage of mobile devices as learning tools. Another piece of research investigating MALL is Hsu and Chao (2024). The study included 45 military students using the Quizlet application in an attempt to learn engineering vocabulary. A questionnaire was utilized to measure their attitude in order to identify the perceived usefulness of the application, which was positive, and the perceived ease of use, which was not significant because of the limited appropriateness of studying at the military base.

3.2 Social Media Platforms (SMPs) in Teaching and Learning ESP Vocabulary

Social Media Platforms (SMPs) have also proved to be beneficial when it comes to learning ESP. In this sense, Sabater and Fleta (2015) explored, through a questionnaire and a few observation sessions, the usefulness of Twitter in improving ESP vocabulary. The sample included a total number of 75 architectural firms' employees. The results revealed that ESP students seldom have issues employing terminology that is particular to their field of study. When it came to peer evaluation, students frequently merely gave their friends' Tweets their approval, were unable to see mistakes, and preferred comments from their teacher. Twitter's involvement in increasing student participation has a really beneficial effect. The success of this blended method in immersing the learners in the classroom and beyond, fostering the feeling of a learning community, was another crucial result related to communication skills. Furthermore, Ventura and Martín-Monje (2016) tracked students' usage of MOOC platforms, deployed a questionnaire, and conducted observations. The findings suggested that Facebook's network has a positive influence on students' motivation to learn specialized vocabulary and an improvement in their progress through the MOOC, combating the two main issues that MOOCs are currently thought to have: high drop-out rates and a lack of student engagement.

Wannas and Hassan (2023) investigated the attitude of healthcare providers (doctors, nurses, technicians) towards SMPs in learning medical English vocabulary. A questionnaire was disseminated to 210 healthcare professionals, and interviews were conducted with a subset of that number. It was found that social media are an immense asset to non-native healthcare professionals in developing their medical English vocabulary and increasing their independence in language acquisition. Easy use, free availability, the ability to edit, copy, and share content, the ability to store data indefinitely, emoticons to express emotions, the option to join private conversations, and the option to participate in public discussions and debates are some social media features that have proven useful to Egyptian healthcare providers. According to the study, WhatsApp is, by far, the most favored platform by healthcare providers in Egypt.

3.3 Multimedia Software in Teaching and Learning ESP Vocabulary

As for Multimedia software, Khalili, Tahririan, and Bagheri's (2015) study was conducted with over 120 Iranian ESP students. A post-test was given to the participants, and classroom observations were conducted. There was a significant difference between the experimental and control groups of students in terms of their learning of new vocabulary; in other words, multimedia software was effective in helping pupils acquire new words. Additionally, technology-assisted learning demonstrated effective activity engagement. Another similar study is Lytovchenko et al.'s (2022). The study's participants were more than 70 third-year university students. The study employed a post-test and a questionnaire with open-ended questions. Its conclusion was that the element of authenticity is crucial to vocabulary acquisition since it increases students' motivation and sense of self-direction while also making it more pleasurable and meaningful for them. The combination of videoconferencing technology and online vocabulary learning resources gives students a great deal of freedom and autonomy and gives them the chance to study anywhere. The remote learning setting is suited

for the online form of education, which is particularly useful during the pandemic.

3.4 Chatbots, Corpora, and LMS Moodle in Teaching and Learning ESP Vocabulary

Qasem et al. (2023) examined the use of a Dialogflow chatbot through a pre-/post-test design and informal interviews. The study was conducted over 40 business English undergraduate students (20 experimental groups, 20 controlled groups). Compared to their peers in the control group, the students in the experimental group who utilized the chatbot Dialogflow demonstrated superior performance. In addition, Hou (2014) concluded that the corpora analysis results, vocabulary lists, the LCBO website, and the in-house corpora were introduced to the students as supplementary materials. The pre-and post-test results indicate that the students gained significant progress in both content and language knowledge. The study used Lexical Tutor/ AntConc tools and pre-/post-tests, which were implemented by over 42 CLIL program participants. Hrdlicková (2020) also revealed that students were more inclined to study English thanks to the LMS Moodle. Students who enrolled in the Economics and Law course significantly increased their legal vocabulary, and both groups were motivated to learn idiomatic expressions. The study was implemented on 97 students: 64 experimental and 33 control. The research tools were a post-test and a questionnaire.

4. DISCUSSION

The review has attempted to answer two research questions: the first is concerned with the effect of technologies in teaching, learning, and retention of ESP vocabulary, while the second is pertinent to the attitude of learners towards these technologies. Findings of the systematic review have generally revealed that the implementation of new technologies enhances the acquisition and retention of vocabulary in ESP contexts and makes learners more engaged and motivated to learn. They have further revealed that ESP learners have a positive attitude towards technology-supported teaching. It fosters learners' autonomy, improves independent learning, and upgrades teamwork skills. Findings of the four studies concerned with the effect of MALL in teaching and learning ESP vocabulary (Alfarania and Shioumai 2016; Bieńkowska et al. 2021; Dashtestani and Stojković 2016; Simanjuntak 2020) have commonly shown a substantial vocabulary acquisition enhancement when MALL is used with youngsters and a positive attitude towards using mobile devices. The use of mobile devices as learning tools enhances ESP learners' motivation, sense of belonging, and autonomy.

Similarly, findings from three studies examining the effects of SMPs (Sabater and Fleta 2015; Ventura and Martín-Monje 2016; Wannas and Hassan 2023) have demonstrated that involvement with Twitter fosters a sense of a learning community. Additionally, Facebook's network has a positive influence on ESP learners' motivation to learn specialized vocabulary, leading to improved progress in their MOOCs and helping combat high dropout rates and lack of student engagement. For non-native healthcare professionals, social media have a positive effect on developing their medical English vocabulary and increasing their independence in language acquisition. In a similar vein, findings of the two studies concerned with the effect of multimedia software (Khalili, Tahririan, and Bagheri 2015; Lytovchenko et al. 2022) have shown that multimedia software is effective in helping pupils acquire new words. Additionally, technology-assisted learning demonstrates effective activity engagement. The combination of videoconferencing technology and online vocabulary learning resources provides learners with freedom and autonomy. Hou's (2014) study concludes that corpora analysis results, vocabulary lists, the LCBO website, and the in-house corpora introduced to the students helped them gain significant progress in both content and language knowledge. Hrdlicková's (2020) study also reveals that students are more inclined to study English thanks to the LMS Moodle. Therefore, such findings are beneficial for ESP instructors, course designers, and decision-makers.

4.1 Implications

Assessment of the included articles has demonstrated that researchers have invariably measured the effectiveness of technological tools in teaching ESP vocabulary: mobile phones (5 studies), social media platforms (3 studies), multimedia software (2 studies), Moodle (1 study), Corpora (1 study) and chatbot (1 study) as illustrated in Figure 3:

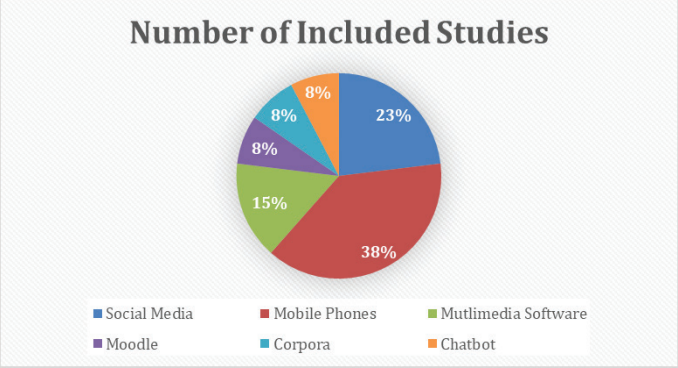

Figure 3: Distribution of the Included Studies and their Technologies

Therefore, there is a dearth of research with regard to the integration of technology in enhancing ESP learners' vocabulary. That might inspire researchers to conduct further research on the efficacy of technology, particularly Moodle, Corpora, and chatbots, in enhancing the acquisition, development, and retention of ESP vocabulary.

Since technology constitutes a significant component in today's education, language learning does not take away from this direction. This process is driven by the desire to make language acquisition more appealing to learners, to meet the up-to-date level of technological performance in today's marketplace, and to enthuse and guarantee the continuation of the educational process. To thoroughly explain this, learners become interested in language learning when their experience is formed through an inviting environment created by the instructor, the learning resources, and the educational institution. In this sense, the instructor has a greater responsibility to integrate technological techniques in the instruction of ESP vocabulary and the appropriateness and efficacy of implementation. In addition, not all technologies (e.g., techniques, devices, applications, or programs) are feasible in language education as some are complicated, requiring considerable time and effort to be used effectively, which poses important questions to ESP instructors and researchers. These questions are: How is it possible to determine the efficacy and efficiency of a technological device, application, or program in language acquisition without any kind of bias? What are the ethical and educational criteria upon which a teacher decides to use technology in language classes? And why is it important to consider such criteria before using technology in language classes?

On another scale, communication in the marketplace is bound to being skilled in using English proficiently (Rajprasit, Pratoomrat, and Wang 2015; Ting et al. 2017). The language classes require some realistic outcomes based on the needs of stakeholders and learners. Since technology is almost incorporated in every business, using technology in language classes guarantees a skilled and knowledgeable user of technology with its various forms (e.g., laptops and smartphones). Referring to this, the relationship between technology and communication is reciprocal, and the language of communication around the world is English. That is why learners should use smartphones, computers, iPads, and other technologies to learn General English and ESP. Some questions are also posed here: which MALL or CALL applications or programs are the most effective for the marketplace in terms of their practicality? How do we know them?

The last driving force behind the use of technology in language classes is the encouragement of language education and its consistency (Kuimova et al., 2018; Shadiev and Yang, 2020). Various researchers seek to uncover the attitude of learners with respect to CALL and MALL techniques and applications. This is because knowing the attitudes and perceptions of learners reveals whether the technology can be adopted and employed or not so as to guarantee the continuation of the language learning process. Moreover, adopting and employing the wrong technology or techniques may discourage learners from taking further steps in the process.

5. CONCLUDING REMARKS

In conducting a systematic review of the efficacy of technological tools in learning vocabulary in ESP contexts and the attitude of ESP learners towards technology-supported teaching, the researchers have followed a sequence of steps:

1. Formulating the research questions
2. Identifying and screening the most relevant articles adopting the PRISMA model
3. Summarizing the included articles
4. Interpreting the findings

The adoption of the PRISMA model by the researchers in conducting the systematic review of integrating technology in the teaching and retention of ESP vocabulary has proved effective in identifying and screening the relevant articles and finally arriving at the articles to be included in the systematic review. It is recommended that the model is used in conducting further research in ESP-related learning and teaching issues.

It is also worth noting that one of the limitations of the systematic review is the incorporation of only three scholarly research engines: Google Scholar, Scopus, and ERIC. Therefore, further systematic reviews might incorporate more research engines seeking a higher degree of reliability. The dearth of research with regard to the integration of technology in enhancing ESP learners' vocabulary inspires researchers to conduct further research on the efficacy of technology, particularly Moodle, Corpora, and chatbots, in enhancing the acquisition, development, and retention of ESP Vocabulary. Further research can be conducted on the effectiveness of Virtual Reality (VR) and Artificial Intelligence (AI) in learning ESP vocabulary.

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