

Research Trends in the Use of Technology in English Language Education in ASEAN¹

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Abstract

In recent years, technology has become increasingly important and has had a significant influence on education. It has played an important role in many disciplines, including English language teaching and learning. The application of technology in English language education is also a widely researched subject in all countries around the world including ASEAN. This study aims to identify research articles on technology in English language teaching and learning in ASEAN countries published between 2012 and 2021. Data consisted of 298 research articles retrieved from the Scopus database which were analyzed by using content analysis. The articles were examined according to three categories: (1) the number of research articles published in ASEAN countries, (2) English language skills or areas that these articles focused on, and (3) types of technology used and their effectiveness in English language teaching and learning. The research found 298 such articles published in ASEAN countries. The most common research area was perceptions of technology in language learning. Most of the studies reported positive effects of technology on students' language skills, motivation, engagement, and autonomy. Such knowledge will provide an overview of current research as well as insights for future research directions and development in the use of technology in English language education.

Keywords: technology, information and communication technology (ICT), English as a Foreign Language (EFL), English Language Teaching (ELT), ASEAN

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Introduction

The Association of Southeast Asian Nations (ASEAN) consists of 10 countries: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam (Association of Southeast Asian Nations, 2008). The main purpose of ASEAN is to accelerate economic, social, and cultural development to enhance the regional peace and stability of Southeast Asian Nations. In the realm of education, ASEAN aims to promote active cooperation and mutual assistance in research and training (ASEAN Secretariat, 2020). English is important in ASEAN since it is the lingua franca for communication. The ASEAN Charter, Article 34 states, "The working language of ASEAN shall be English" (Association of Southeast Asian Nations, 2008: 29). As a result, English is necessary for everyday life and plays an important role in the ASEAN Community's development.

In recent years, teaching and learning with technology have become essential in education around the world. Technology has continued to evolve, and the range of technology available for educational purposes is very diverse. The development and widespread availability of technology also have profound impacts on education. One of the strongest arguments for using technology lies in its potential to enhance classroom activities and learning experiences (Hashim, 2018). Technology is also viewed as playing a significant role in facilitating authentic, interactive, and collaborative learning (Nagy, 2021; Su and Zou, 2020).

Technology has long been seen as a means of supporting language teaching and learning. Technology can help learners develop their particular language skills (Ahmadi, 2018), experience the target languages and cultures (Kim, 2020), increase learner autonomy and motivation (Shadieff, Huang, and Liu, 2018), and improve lifelong learning (Kang and Lin, 2019). Technology also provides an effective way for teachers to organize course content and interact with learners. Therefore, incorporating technology into language teaching and learning is considered useful, and developing learners' ability to use technology to improve their English language skills is seen as strengthening the

nation at a certain level. As a result, technology has inevitably become important in the language education of ASEAN.

The application of technology in the field of English language teaching and learning has gained considerable attention from researchers (Nawaila, Kanbul, and Alhamroni, 2020). Technology has been used at all levels of education for a variety of purposes. A large body of research has been conducted over the last decade aiming to develop English language teaching and learning by using technology. From a preliminary examination, it can be seen that numerous research articles on technology in teaching and learning English in the ASEAN context have been carried out. However, there is a scarcity of research in ASEAN that analyzes the content of research articles in a systematic way and presents general trends for references. Therefore, the analysis of research on the use of technology in English language teaching and learning in ASEAN is necessary.

The research questions were addressed as follows:

1. How many research articles on technology in English language teaching and learning were published in ASEAN countries?
2. What English language skills or areas were focused on in research articles on technology in English language teaching and learning in ASEAN?
3. What was the technology used, and what was its effectiveness in supporting English language teaching and learning in ASEAN?

The results of the study are expected to indicate the current state and depth of research. As a result, researchers will be able to understand the research trends and use them as guidelines for conducting research on technology in English language teaching and learning in the future.

Methods

Data were collected from research articles published between 2012 and 2021 in the Scopus database. The methods of data collection and the justification of the use of Scopus-indexed journals followed the general recommendations of previous studies (Erfanmanesh et al., 2017,

Ghanizadeh et al., 2015; Golonka et al., 2014). There are two main reasons for using this database. First, all of the research publications have gone through a peer-reviewed quality process. Second, Scopus is a multidisciplinary database that provides a comprehensive quantity and variety of journals. Therefore, as one of the largest and most recognized high-impact online databases, Scopus can provide an all-inclusive list of relevant research articles for examination in this current study.

In order to identify relevant studies, the search strategy using keywords was employed. The search keywords were: 'English language teaching/ learning' or 'EFL/ ESL teaching/ learning' combined with 'technology' or 'ICT' and names of countries in ASEAN. After obtaining possible research articles, the titles and abstracts of all studies were examined. The study established criteria and narrowed down the selection of research articles for inclusion. Three inclusion criteria were used for screening research articles. First, the title and abstract must be related to technology in English language teaching and learning in ASEAN countries, which is the focus of the study. Second, research articles must be written in English. Third, a full text must be available. In total, 298 potential research articles were finally selected for data analysis.

After the articles were selected, the coding process was carried out. The researcher read the article content, highlighted it, and coded the data by labelling concepts based on the themes of research on technology in language teaching and learning. After that, the codes were categorized into groups and discussed independently.

Results

Results of the study are presented and discussed in the following themes: (1) the number of articles published in ASEAN countries, (2) English language skills or areas that articles focused on, and (3) types of technology used and their effectiveness. Examples of research articles are included to illustrate how technology is used for enhancing English language teaching and learning.

Number of Research Articles on Technology in English Language Teaching and Learning in ASEAN

Table 1 shows the number of articles on technology published in each ASEAN country from 2012 to 2021. Focusing on articles over the past ten years can provide sufficient insights into the application of technology in English language teaching and learning. A total of 298 articles were found. The results show that 2021 was the year when the highest number of articles was published ($n = 79$), while 2013 was the year with the lowest number of articles ($n = 11$). Indonesia published the highest number of articles ($n = 79$), and Lao PDR published the lowest ($n = 7$).

Table 1 Research articles on technology in English language teaching and learning published in ASEAN countries

Country	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Indonesia	0	0	1	2	4	9	12	10	23	18	79
Thailand	1	4	4	2	3	6	5	10	11	14	60
Malaysia	8	4	2	1	2	1	3	2	7	8	38
Vietnam	0	0	2	0	2	1	0	2	6	10	23
Brunei	2	0	3	4	1	2	1	0	4	5	22
Singapore	1	3	0	4	5	4	1	0	1	1	20
Myanmar	0	0	0	0	0	0	4	5	2	7	18
Philippines	0	0	1	0	2	1	1	2	4	7	18
Cambodia	0	0	0	0	0	2	0	3	1	7	13
Lao PDR	0	0	1	0	1	1	1	1	0	2	7
Total	12	11	14	13	20	27	28	35	59	79	298

English Language Skills or Areas of Research on Technology in English Language Teaching and Learning in ASEAN

The results show that technology was used in English language education to support the development of almost all language skills (e.g. listening, speaking, reading, writing, vocabulary, grammar, pronunciation, communicative competence, intercultural competence, cognitive skills, and thinking skills). The researchers also focused on other areas such as perceptions or attitudes, motivation, learner autonomy, peer feedback, student engagement, self-efficacy, learning strategies, testing or assessment, second language acquisition, learning behaviors, literature, and anxiety. The majority of articles focused on one specific skill or area,

while some articles focused on more than one. An example of the latter is Ghufron and Nurdianingsih (2019), who investigated the use of flipped teaching² with CALL³ in EFL students' writing and learner autonomy.

As shown in Table 2, studies on perceptions or attitudes ($n = 105$) were the most frequently found. In terms of language skills, researchers focused more on improving writing ($n = 49$) and reading skills ($n = 23$). Some articles did not identify the language skills or areas. For example, Mali (2017) investigated students' experiences in learning CALL through project-based instruction. As a result, these articles were counted and categorized as unidentified skills or areas.

Table 2 English language skills or areas of research on technology in English language teaching and learning

Skills or Areas	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Perceptions/Attitudes	3	4	5	5	3	10	10	13	20	32	105
Writing	2	3	3	2	9	2	2	4	7	15	49
Reading	1	2	1	1	2	1	2	2	6	5	23
Motivation	1	1	0	1	2	2	3	4	4	3	21
Speaking	0	0	0	1	0	2	2	5	3	4	17
Vocabulary	2	1	0	1	3	1	1	2	4	2	17
Learner autonomy	0	1	0	1	1	2	0	3	4	1	13
Listening	0	0	2	0	0	1	2	1	1	3	10
Peer feedback	0	1	0	0	2	1	0	2	2	2	10
Student engagement	0	0	0	2	0	1	0	1	4	1	9
Grammar	0	0	1	0	1	0	1	1	3	1	8
Communicative competence	0	0	0	0	0	1	3	0	3	1	8
Intercultural competence	0	0	2	0	0	1	1	0	2	0	6
Cognitive skills	1	1	0	0	0	1	0	1	1	0	5
Self-efficacy	0	0	0	0	1	0	1	0	1	1	4
Learning strategies	0	0	1	0	0	2	0	0	1	0	4
Testing/Assessment	0	0	0	0	1	0	0	1	0	1	3
Pronunciation	0	0	0	0	0	1	0	1	0	1	3
Thinking skills	0	0	1	0	0	1	0	0	0	1	3
Second language acquisition	0	0	1	1	0	0	0	1	0	0	3
Learning behaviors	0	0	0	0	0	0	0	1	1	0	2
Literature	0	0	0	0	0	0	0	1	0	0	1
Anxiety	0	0	0	1	0	0	0	0	0	0	1
Unidentified skills or areas	2	0	0	0	0	0	4	0	0	5	11

² Flipped teaching is an instructional strategy which aims to increase students' learning engagement by introducing them to content at home and practice working through it at school.

³ CALL stands for computer-assisted language learning.

Types of Technology Used and Their Effectiveness in English Language Teaching and Learning

The use of technology in English language teaching and learning is defined in several terms. Varied modes of delivery were identified in some articles.⁴ As shown in Table 3, online learning (n = 51) and mobile learning (n = 33) are modes of delivery with the highest number of articles, particularly in recent years.

Table 3 Modes of delivery for technology used in English language teaching and learning in ASEAN

Modes of Delivery	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Online learning	1	0	1	1	0	3	1	7	14	23	51
Mobile learning	0	1	0	2	2	2	3	3	10	10	33
Blended learning	1	2	0	0	2	0	1	3	5	4	18
E-learning	2	0	1	1	1	0	3	1	0	4	13
Web-based learning	0	0	0	0	1	1	2	2	3	1	10
Flipped classroom	0	0	0	0	0	2	0	3	2	3	10
CALL	0	0	1	0	0	1	0	0	1	1	4
Internet-based learning	0	1	0	0	1	0	0	0	1	0	3
MOOC	0	0	0	0	0	0	0	1	1	1	3
Virtual learning	0	0	0	0	0	0	0	0	2	0	2

Apart from modes of delivery, types of technology found in articles are shown in Table 4. The results show that articles focused on an extensive range of technologies to assist English language teaching and learning. The technologies most used were social networking (n = 37) and videos (n = 25). In some articles, one technology was used, while some articles used more than one technology. The term 'ICT' was used interchangeably with the term 'technology.' However, researchers did not identify the technology they used in several articles. For example,

⁴ Examples are online learning or online education (e.g. Pasaribu and Dewi, 2021), mobile learning or mobile-assisted language learning (MALL) (e.g. Hoi and Mu, 2021), blended learning (e.g. Sujannah, Cahyono, and Astuti, 2020), e-learning (e.g. Rahim and Chandran, 2021), web-based learning (e.g. Bashori et al., 2020), flipped classroom (e.g. Arifani et al., 2020), computer-assisted language learning (CALL) (e.g. Mali, 2017), internet-based learning (e.g. Cahyono and Mutiaraningrum, 2016), Massive Open Online Course (MOOC) (e.g. Ginting et al., 2020), and virtual learning (e.g. Jacinto and Alieto, 2020).

Pardede (2020) investigated students' perceptions of ICT use in EFL classrooms. As a result, it is not possible to determine what type of technology the researchers used.

Table 4 Types of technology used in English language teaching and learning in ASEAN

Technology	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Social networking	2	0	2	4	7	3	2	7	7	3	37
Facebook	1	0	1	1	3	1	0	3	1	1	12
YouTube	0	0	0	0	1	0	0	1	1	1	4
Whatsapp	0	0	1	0	0	0	0	2	1	0	4
LINE	0	0	0	0	0	0	1	0	1	1	3
Instagram	0	0	0	0	0	0	0	0	1	0	1
Unidentified social networking	1	0	0	3	3	2	1	1	2	0	13
Videos	1	0	1	3	0	4	4	6	3	3	25
Multimedia	0	1	2	0	0	0	1	3	4	1	12
Websites	0	0	0	0	1	1	2	2	3	2	11
Digital tools	0	0	1	0	0	3	1	1	4	1	11
Mobile applications	0	0	0	0	0	2	1	2	2	2	9
Automated feedback	0	0	0	0	3	1	0	1	1	2	8
Blogs	1	3	1	0	1	0	1	0	0	0	7
E-resources	1	0	0	0	2	0	0	1	0	2	6
Online games	0	1	0	0	0	0	3	0	0	2	6
Google Classroom	0	0	0	0	0	0	0	1	2	0	3
Cloud-based tools	0	0	0	0	0	0	0	0	0	3	3
Video conferencing	0	0	0	0	0	0	0	0	0	2	2
Online dictionaries	1	0	0	1	0	0	0	0	0	0	2
Podcasts	0	0	0	0	0	0	1	0	0	1	2
Unidentified technology	6	6	7	5	7	13	12	14	33	55	158

All of the technologies and some examples of how they were used to support English language teaching and learning are presented below.

1. Social networking

There are a variety of social networking sites, such as Facebook, YouTube, LINE, Instagram, and WhatsApp, which have been used extensively to support the teaching and learning process. Various studies (n = 37) have been conducted to show the integration of social

networking into English language teaching and learning. Examples are described in the following paragraphs.

Facebook has been the subject of many studies ($n = 12$) in the field of English language teaching. Several articles focused on the use of Facebook to improve writing skills. The results of these studies show that Facebook could effectively improve students' writing ability and was appropriate for presenting writing instruction (Nguyen and Suppasetsee, 2016; Susanto et al., 2021). Facebook was found to enhance students' creative ideas and writing confidence, bring an active discussion into written form, and encourage students to express themselves in the target language (Rahmah, 2017). Students perceived improvement in their writing, especially in vocabulary and grammar (Rodliyah; 2016; Suthiwartnarueput and Wasanasomsithi, 2012). Besides assisting writing practices, Facebook could promote students' high engagement since students could learn English anytime and anywhere (Ulla and Perales, 2020). In speaking skills, Ramdani and Widodo (2019) showed that Facebook not only created an interactive virtual classroom but also encouraged students to become critical reflective language learners. Several studies on perceptions on Facebook were also carried out (e.g. Purnamasari, 2019). The findings show the positive perceptions of both students and teachers regarding the use of Facebook as a language learning platform. Facebook has the potential to provide students with a sense of convenience, simplicity, and relaxation while also reducing the cultural power distance between teachers and students.

Another social networking site mentioned in the research articles is YouTube ($n = 4$). For example, Sari, Dardjito, and Azizah (2020) investigated students' improvements through a reflective YouTube video project. The findings indicate that students improved their teamwork skills, stress management abilities, technological competence, and creativity. In an attempt to enhance students' speaking skills, Muslem and Zulfikar (2019) showed that the use of English video clips selected from YouTube had a positive effect on improving students' speaking performance. In listening skills, Yaacob et al. (2021) revealed

that YouTube yielded a significant positive impact on listening comprehension among young learners by increasing their participation and understanding, developing team spirit, and enhancing learners' interest and motivation.

The use of WhatsApp as one of the social networking sites was also found in articles ($n = 4$). WhatsApp is a mobile-based instant messaging service that allows users to send text and voice messages, make audio and video calls, and share photographs, documents, user locations, and other information (Annamalai, 2019). The use of WhatsApp has proved to be an effective tool to support language teaching and learning. For example, a study by Annamalai (2019) indicated that the use of WhatsApp in a blended classroom positively facilitated students' interaction, academic growth, and self-efficacy. Another study by Arifani et al. (2020) suggested that collaborative WhatsApp learning activities can serve as an appropriate alternative to improve students' cohesion in writing.

LINE as one of the top social networking sites has been used to assist language teaching and learning, according to some recent articles ($n = 3$). Some studies focused on using LINE to enhance students' writing ability. The findings reported students' improved their writing ability after practice on LINE in terms of vocabulary, grammar, organization, content, and mechanics (Jumariati and Febriyanti, 2020). Both teachers and students also reflected positive attitudes towards using LINE, which they felt was more enjoyable and less stressful in teaching and learning (Mejang and Suksawas, 2021; Suthiwartnarueput and Ratanakul, 2018).

The last social networking site that has been incorporated into teaching and learning English is Instagram. Only one research article on Instagram was found, Prasetyawati and Priyatno (2020), which investigated how the site can promote student engagement in writing. The findings show that Instagram promoted student engagement in five ways, namely, allowing students to be more actively involved in the learning process, providing a new learning environment for students, providing more target readers, facilitating collaboration and interaction among students, and allowing students to choose their own learning style during the writing process.

2. Videos

The use of videos as a teaching resource was found in several research articles (n = 25). Videos are available in many forms, such as video clips, digital videos, online videos, movies or films, and mobile-based videos.⁵ Several studies showed the benefits of using videos for improving students' English language learning in general (e.g. Anas, 2019; Yaseen and Shakir, 2015) and specific skills such as listening, speaking, reading, and writing skills, and vocabulary. Examples of research articles are described in the following paragraphs.

Several studies aimed to improve students' listening skills using videos. For example, Yasin, Mustafa, and Permatasari (2017) indicated that using videos was effective in improving students' listening, motivation, responses, participation, and teamwork. Another study, by Gavenila, Wulandari, and Renandya (2021), employed a specific video program, TED Talks, for teaching extensive listening. The results show that TED Talk videos helped students improve their vocabulary, develop their academic skills, and gain new information and knowledge. In speaking skills, Masruddin (2018) and Muslem, Mustafa, and Usman (2017) conducted similar studies using video clips with small groups and individual learning activities to improve students' speaking skills. The findings suggest that the use of video clips through group work was effective in teaching speaking to EFL students. In reading skills, Kusumaningputri (2020) examined the potential of reading-mediated tasks using videos to enhance students' reading experience. The findings reveal that videos improved their comprehension in meaning, interaction, connection, and interpretation of the text, as well as in the creation of reflection-based tasks for their reading activities. In writing skills, Maru, Nur, and Lengkoan (2020) indicated that the use of videos for the writing of descriptive texts in EFL classes during the COVID-19 pandemic was effective. However, videos seemed to be helpful mostly to low-level students as they displayed higher gains.

⁵ Examples are the following: video clips (e.g. Muslem, Mustafa, and Usman, 2017), digital videos (e.g. Gromik, 2015), online videos (e.g. Angkananon and Wald, 2018), movies or films (e.g. Kalra, 2017; Kartikasari, Retnaningdyah, and Mustofa, 2019; Truong and Tran, 2014; Yaseen and Shakir, 2015), and mobile-based videos (e.g. Imelda, Cahyono, and Astuti, 2019).

Video technology in some articles also focused on the integration with mobile devices as a new pedagogical platform. For example, Imelda, Cahyono, and Astuti (2019) revealed that the process writing approach combined with video-based mobile learning was effective in enhancing students' writing skills across their creativity levels. In terms of vocabulary learning, Yawiloeng (2020) showed that using videos increased students' vocabulary knowledge and learning engagement. Students also enjoyed learning vocabulary through videos with both L1 and L2 subtitles, engaging and related images, and audio at the appropriate volume.

3. Multimedia

Multimedia is a type of technology that combines several content forms such as text, audio, photos, or video into a single interactive display (Berk, 2009). Research articles (n = 12) that used multimedia in English language teaching and learning were found. The multiple components in multimedia learning can assist students in their language learning. For example, in listening skills, Arono (2014) found that learning with interactive multimedia can improve students' critical listening skills more than audio media because listening has not only an aural aspect but also a visual aspect. In reading skills, Abdul Samat and Abdul Aziz (2020) indicated that the implementation of multimedia improved students' reading comprehension as the combination of multiple elements of media scaffolded the process of understanding.

Several studies revealed the benefits of using multimedia in teaching vocabulary and reading. For example, Chavangklang et al. (2019) showed that improved vocabulary size and reading comprehension were largely due to the use of online multimedia-based extensive reading activities. In addition, Riensumettharadol (2019) demonstrated students' positive attitudes towards the use of multimedia to enhance their vocabulary knowledge in terms of promoting out-of-class language learning motivation and autonomous learning. Another study, by Durongbhandhu and Suwanasilp (2021), showed that multimedia not only increased students' English vocabulary acquisition but also allowed teachers to use it as a potential supplemental tool in vocabulary

instruction. Multimedia have also been studied in other areas. For example, Prin and Joaquin (2020) examined how multimedia affected student engagement in an English for academic purpose class and found that students reported higher engagement and active learning.

4. Websites

Web-based learning is considered an alternative paradigm for teachers and students. The use of websites to facilitate English language teaching and learning was found in several articles (n = 11). For example, Tananuraksakul (2019) employed phonetics websites to improve students' ability to speak English intelligibly. The findings demonstrated that students enjoyed learning pronunciation through the use of the phonetics website because it helped boost their confidence in speaking, improve their pronunciation, and give them a chance to practice pronunciation in the classroom and attain a native-like accent. Another study, by Bashori et al. (2020), revealed that students had positive attitudes towards the automatic speech recognition learning websites and believed that web-based language learning could lower their speaking anxiety.

5. Digital tools

According to Williams, Abraham, and Bostelmann (2014), there is a variety of information about digital tools in second and foreign language education; as a result, the term 'digital tools' is very broad and difficult to define. The use of digital tools in different forms was found in several research articles (n = 11) and has been proven to help students and teachers in English language teaching and learning. For example, Thang et al. (2014) found that teachers perceived digital storytelling as beneficial to students; however, some teachers were resistant to using digital tools, which could lead to technology integration failure. Pasaribu (2020) also examined how digital reader response tasks in EFL reading promoted learner autonomy and found that they enabled students to organize, execute, and evaluate their own learning. Using digital tools not only motivated students to engage in meaningful language learning experiences, but also encouraged them to develop social dimensions of autonomy. Another study, by Azmuddin, Mohd Nor, and Hamat (2020),

found that digital annotation tools improved students' reading comprehension since they were able to paraphrase, extend, and synthesize ideas.

6. Mobile applications

The use of mobile devices or applications in language learning is called mobile-assisted language learning (MALL) (Howlett and Waemusa, 2019). Mobile applications were used for various purposes in several articles (n = 9). For example, Thedpitak and Somphong (2021) showed that students had positive attitudes towards the use of mobile applications to improve their listening skills and suggested that guidance from teachers on how to use applications effectively and properly should be provided. Soparno and Tarjana (2021) also revealed students' positive attitudes towards using mobile applications in terms of facilitating them in practicing speaking and making learning enjoyable. These positive attitudes were influenced by factors such as the flexibility and ease of mobile applications. Similarly, Muslaini, Kristina, and Sutomo (2019) indicated that mobile applications for reading skills should be simple and easy to use, up-to-date, motivating, facilitating, and portable so that they could be used inside and outside the classroom, and provide various reading activities. Some articles mentioned specific mobile applications. For example, Ardi (2017) used a Schoology mobile learning application to promote learner autonomy in an EAP class and found that it helped students to exercise learner autonomy over learning management, the cognitive process, and selection of learning materials.

7. Automated feedback

A range of automated feedback tools was found in research articles (n = 8). The use of automated writing evaluation (AWE), which has been regarded as a potential pedagogical technique that utilizes technology to improve students' writing, has received considerable attention. Several studies that used AWE were found. For example, Hoang and Kunnan (2016) examined the effectiveness of an automated writing program called 'MY Access.' The results showed that 'MY Access' scoring had a moderate correlation with human ratings. Since 'MY Access' scoring was limited to content word recognition rather

than how these words are structured at the discourse level, it could not detect off-topic essays or plagiarism. Lim and Phua (2019) found that the use of a linguistic feedback tool improved students' writing, helped identify their language errors, and assisted in the writing process. However, they noted that the tool was not always accurate.

Another AWE tool is Grammarly, which detects duplicate content and errors in grammar, vocabulary, mechanics, and language style. The use of Grammarly was found in several studies. For example, Miranty and Widiati (2021) showed that students perceived that they received immediate and comprehensive feedback, notifications of errors, and suggestions about revising errors in writing. However, Thi and Nikolov (2021) indicated some limitations of Grammarly in that it only provided feedback on surface-level errors, whereas teacher feedback covered both lower- and higher-level writing concerns. Apart from AWE, automated feedback was also used with other language skills or areas such as pronunciation. For example, Moxon (2021) found that automated pronunciation evaluation using speech recognition technology could improve students' pronunciation accuracy.

8. Blogs

Several studies using weblogs or blogs in English language teaching and learning were found ($n = 7$). For example, Kitchakarn (2014) investigated the use of blogs as a peer feedback platform for EFL students. The findings showed that peer feedback activity through blogs improved students' writing abilities, and students had overall positive attitudes towards the usefulness of blogs for peer feedback. Students thought that it was a new interesting experience to work with their classmates on blogs. However, Lakarnchua and Wasanasomtithi (2013) found that students had only a neutral opinion of using blogs as a channel for peer feedback.

9. E-resources

Electronic resources have been found in research articles ($n = 6$) in different forms, such as e-Portfolio, e-Writing, and e-Pictionary. For example, Thang, Lee, and Zuljifli (2012) demonstrated that e-portfolios had positive effects on students' development of computer

and writing skills. Another study, by Kawinkoonlasate (2021), examined the effectiveness of the e-Writing instructional design program in developing students' writing skills. The results indicate that students had a higher level of writing achievement, satisfaction, and learner autonomy after learning with e-Writing. Regarding vocabulary learning, Rafiah, Yee, and Kee (2016) studied the effectiveness of e-Pictionary using the software of iSpring Pro 6.2 to enhance English vocabulary learning. e-Pictionary consisted of words from different categories under the theme, World of Knowledge. The findings show that students' vocabulary performance improved after using e-Pictionary. They were also motivated and enjoyed using e-Pictionary as an enrichment learning tool.

10. Online games

Online games were employed in research articles ($n = 6$) and were found in different forms such as computer games (Franciosi, 2017), tablet games (Vungthong, 2018), and mobile games (Azman and Dollsaid, 2018; Hasram et al., 2021). Research done in this field proved that online games promote positive and long-lasting effects on students' engagement and motivation in English language learning of different skills. For example, Azman and Dollsaid (2018) verified the viability of multiplayer online games as a potential tool for English language learning. Multiplayer online games helped language learners socialize and communicate by allowing them to engage in authentic active interactions with native and non-native speakers of the target language. In vocabulary learning, Hasram et al. (2021) found that online games increased students' comprehension and understanding of vocabulary.

11. Google Classroom

The use of Google Classroom in English language teaching and learning was discussed in some articles. For example, Chuaphalakit, Inpin, and Coffin (2019) showed that online peer feedback activity in Google Classroom helped students improve their writing; however, adequate training should be provided before implementing the online peer feedback activity. Similarly, Sujannah, Cahyono, and Astuti (2020) also revealed the positive effects of Google Classroom on students'

writing ability across autonomy levels. They noted that high autonomous students outperformed low autonomous students in their writing ability.

12. Cloud-based tools

Cloud-based tools enable users to share, edit, and store information that can be accessed anywhere, anytime (Hartmann et al., 2017). Researchers have shown an increasing interest in using cloud-based tools in EFL classrooms. For example, Rubaai and Hashim (2021) employed cloud-based tools for English reading activities. The findings showed that cloud-based tools were easy to use and improved students' motivation and reading frequency. Cloud-based tools also helped students to effectively keep the record of their reading materials. In addition, one of the many cloud storage systems available is Google Docs, which is now widely used for teaching and learning purposes (Alqahtani, 2019). Kitjaroonchai and Suppasetsee (2021) investigated students' collaborative writing and small group interaction patterns on Google Docs. The findings revealed different interaction patterns across collaborative writing tasks. Both groups added and corrected their essays while editing, and they employed similar writing change functions and language functions, such as recommending, agreeing, and asserting. Using cloud-based technology to complete classwork online encouraged students to negotiate and interact with each other outside of the classroom in ways that would be difficult in a traditional classroom.

13. Video conferencing

Video conferencing is a technology that allows users in different locations to hold face-to-face meetings online and is a teaching tool to facilitate communication and engagement between teachers and students, especially during a pandemic (Nguyen and Nguyen, 2021). Prijambodo and Lie (2021) investigated students' online-learning exposures involving their readiness and motivation to learn English through synchronous video conferences during the COVID-19 pandemic. The findings show that students were confident with their technical skills and their familiarity with the use of technology. There was also a significant positive correlation between readiness and motivation; therefore, the readiness and motivation factors of online

learning cannot be disregarded. Moreover, the roles of teachers in managing classes, designing and providing meaningful learning activities, acting as models to engage students in online discussions, and employing effective strategies to deliver direct instruction should be considered when using synchronous video conferences in synchronous video conferences.

14. Online dictionaries

The use of online dictionaries has been reported to facilitate language teaching and learning. For example, Tananuraksakul (2015) investigated the effects of online dictionary usage on students' autonomy in writing classrooms. The researcher selected Cambridge Dictionaries Online as a learning tool to support students' writing. The findings show that students had positive attitudes towards and motivation in learning English autonomously. Students reported that Cambridge Dictionaries Online was useful, practical, and up-to-date and that they were determined to learn how to write in English independently.

15. Podcasts

The term 'podcast' is derived from 'iPod' and 'broadcast,' and is a series of video and digital audio broadcasts that can be downloaded and played on smartphones (Basaran and Cabaroglu, 2014). Some articles employed podcasts in English language teaching and learning. For example, Abdulrahman, Basalama, and Widodo (2018) investigated students' listening comprehension through the use of podcasts in EFL classrooms. The findings show that using podcasts has a significant impact on students' listening comprehension. Students perceived that podcasts provided authentic materials, interesting listening activities, and meaningful tasks for them, so they felt more motivated to learn English. Similarly, a study by Yaacob et al. (2021) also showed that podcasts helped students improve their English listening comprehension skills and lower listening anxiety. They also increased students' interest, motivation, participation, and understanding, along with developing team spirit.

Discussion

In this study, 298 research articles were analyzed to identify what technologies were used and how they were effective for English language teaching and learning. The highest number of articles was published in 2021 ($n = 79$), whereas the lowest number was published in 2013 ($n = 11$). The countries that published most research articles in ASEAN were Indonesia ($n = 79$) and Thailand ($n = 60$). The most common research topic related to students' perceptions of technology in language learning ($n = 105$). In terms of language skills, researchers employed technology to support students' writing most ($n = 49$). Online learning ($n = 51$) and mobile learning ($n = 33$) were the delivery modes found in most research articles. Fifteen technologies were identified. The use of social networking was found in the highest number ($n = 37$) of articles.

Most studies reported positive effects of technology. That is, students, gained better outcomes in listening, speaking, reading, writing, vocabulary, and pronunciation.⁶ Technology also helped increase students' motivation, autonomy, and engagement.⁷ However, some studies reported negative effects of technology, such as lack of interaction, learning distraction, and frustration with technology. Moreover, some reported negative effects on students' well-being, such as physical discomfort or negative emotions (Pasaribu and Dewi, 2021; Sukman and Mhunkongdee, 2021) and barriers to implementing technology in EFL contexts such as low internet connection, high costs of technological tools, or lack of ICT knowledge (Rahim and Chandran, 2021). Therefore, these constraints should be taken into account when integrating technology into English language teaching and learning.

⁶ Examples include the following: listening (e.g. Arono, 2014; Yaacob et al., 2021), speaking (e.g. Muslem and Zulfikar, 2019), reading (e.g. Abdul Samat and Abdul Aziz, 2020; Azmuddin, Mohd Nor, and Hamat, 2020), writing (e.g. Kawinkoonlasate, 2021; Jumariati and Febriyanti, 2020; Kitchakarn, 2014), vocabulary (e.g. Hasram et al., 2021; Rafiah, Yee, and Kee, 2016; Yawiloeng, 2020), and pronunciation (e.g. Moxon, 2021).

⁷ Examples include the following: motivation (e.g. Prijambodo and Lie, 2021; Rahmah, 2017), autonomy (e.g. Ardi, 2017; Pasaribu, 2020; Tananuraksakul, 2015), and engagement (e.g. Prasetyawati and Priyatno, 2020; Prin and Joaquin, 2020; Ulla and Perales, 2020).

The findings show an increasing trend in research on technology. This has highlighted the increasing role of technology in English language teaching and learning during the COVID-19 pandemic. When comparing the various technologies used between 2012 and 2021, the findings reveal changes in technology usage and some research trends in terms of which new technologies have emerged, which ones are still in use, and which ones are outdated. Some technologies such as Facebook and videos have been used continuously from 2012 until the present, whereas some old technologies such as online dictionaries are disappearing or outdated. Some new technologies such as automated feedback have limitations as they are not always accurate (Lim and Phua, 2019) and provide feedback only on surface-level errors (Thi and Nikolov, 2021), suggesting that automated feedback technology will be developed in the future. Social networking, such as YouTube, WhatsApp, LINE, and Instagram, as well as other technologies like mobile applications, Google Classroom, cloud-based tools, and video conferencing, have emerged and have been increasingly applied to English language teaching and learning in recent years due to the COVID-19 pandemic. As a result, these technologies are likely to play an important role in enhancing English language teaching and learning in the future. Examining the opportunities of using new emerging technologies to create a constructive English language learning environment is worth researching further.

Conclusion

This study provides some useful information about both the ways in which technologies can be used in English language learning and teaching as well as their benefits and drawbacks. All of the technologies discussed in this article show that they are useful for enhancing students' language learning abilities. However, there is a limitation in the study that should be acknowledged. That is, intercoder reliability (the extent to which independent coders agree on how to code the same content) was not employed. Therefore, further research should use an intercoder

reliability check to enhance the reliability of the results in performing the content analysis. This article can serve as a guide for English language learners and teachers, as well as for researchers when they employ technologies to support the English language learning and teaching process. To contribute to the field, such knowledge can inform researchers to conduct studies on the application of new emerging technologies with new learning and instructional design. Technologies are developing so quickly that we need to keep track of technological advancements to highlight their advantages in English language learning and teaching. This study provides insights into the potential integration of technologies in English language education in the midst of and after the COVID-19 pandemic.

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