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Systematic Review on the Impact of Technology-Supported Writing Environment for Developing Writing Skills

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Abstract

This study aims to examine the research on applying technology to writing instruction and synthesise the significant findings and trends from 2015 and 2023. Based on pre-set selection criteria, articles from numerous databases and esteemed peer-reviewed publications were chosen for the analysis. The studies were classified according to the study year, research methodology, theoretical framework, technological tools, and writing stage at which technology was used. The study identified critical educational outcomes of technology integration in developing writing skills in language learners and concluded that including technology in writing instruction could have several benefits. The report also makes suggestions for future research and practice. The systematic review will be helpful for researchers in CALL and individuals interested in using technology in language instruction. This study eventually identifies research gaps and suggests areas for additional analysis.

Keywords: Technology integration, Pedagogy, L2 Writing, online learning platforms, virtual and augmented reality

Introduction

The impact of technology can be seen in many different areas, and this holds in the context of education, where it has completely changed how people learn**.** Learners' lives now revolve around using technology, and the COVID-19 pandemic has only strengthened this dependence on technology (Hodder, 2020). The rapid development of technology has had a tremendous impact on education, with virtual and augmented reality and online learning platforms changing how students study, and teachers instruct. Technology in the classroom has given students new ways to access information, resources, and peer collaboration and allows teachers to design more interactive and exciting learning experiences. Technology has advanced quickly in recent years, making it easier for educational institutions to enhance teaching and learning (Taghizadeh & Basirat, 2022).

Virtual classrooms have replaced traditional physical classrooms; teachers now use the same resources as in-person classrooms. Designing modules appropriate for virtual learning environments is critical because it aligns with using ICT as a quality indicator in education. The effective incorporation of technology ensures that students have access to interactive and engaging content, improving active involvement and learning. Educators can enhance learning experiences and prepare students for a technologically driven future by adapting instructional methodologies to the virtual environment (Kivunja, 2013).

Training in using technology in the classroom is essential to guarantee that instructors have unrestricted access to resources and may advance their skills. According to (Ngo et al., 2022), "Although writing is essential to language acquisition, teaching and learning in English as a Second Language (ESL) classroom can be challenging" (p.3). Writing is crucial in the language development of ESL students. Traditional instructional practices, on the other hand, often overlook writing for L2 learners. Writing proficiently while keeping to appropriate conventions is evidence of improved writing skills.(Hinkel, 2003). Recognising this, some experts stress the importance of incorporating technology in the classroom to improve students' writing ability (Sauers & Walker, 2004). Technological teaching tools and methodologies have been shown to help reach the desired learning results, providing a valuable gateway for ESL students to enhance their proficiency in writing. Although using technology in writing instruction should benefit all students, teachers rarely use it to improve their writing abilities. This study emphasises the significance of utilising technology to enhance writing abilities for L2 learners and offers educational professionals a path for applying technological intervention in language classes.

In recent years, virtual and augmented reality, online learning platforms, and other technological advancements in education have fundamentally changed how students learn and how professors instruct (Buchner & Kerres, 2023). Students can work with classmates, access knowledge, and receive individualised feedback. Instructors may create more engaging and interactive lessons and track students' development in real time. Although technology is a crucial component of education, it should be used to enhance rather than replace traditional teaching methods. Technology must be integrated to benefit students and instructors, and consider the limitations and challenges of employing technology in the classroom. Teachers must be taught about technology use if they have unrestricted access to materials and the chance to advance their skills. Using ICT in the classroom is a quality indicator for achieving learning outcomes. The requirement for training for teachers who use technology in the classroom has been emphasised in the literature (Robinson et al., 2019; Mina, 2019). Modules tailored to virtual learning environments must be developed to deploy technological intervention in language classrooms successfully.

Although writing is difficult to teach and master in an ESL classroom, it is an essential part of language development for L2 students. Many experts have underlined the significance of using technology in the classroom to help children write better (Strobl et al., 2019). Technological teaching tools and methods can help students learn the material they need. Although using technology in writing instruction should benefit all students, teachers rarely use it to develop writing skills.

The study emphasises the significance of using technology to improve language learners' writing skills. The rationale for conducting this systematic review is multifaceted. It is critical to evaluate technology's efficacy in advancing writing abilities, a crucial part of language learning, as technology is being integrated into educational practices at an increasing rate (Sarkar, 2012). As educators strive to equip students with essential 21st-century skills, the ability to communicate effectively through writing assumes great importance. While technology-supported writing environments have gained prominence in recent years, a comprehensive synthesis of the available evidence needs improvement. By conducting a rigorous and systematic review, this study seeks to fill this gap in the literature, providing a comprehensive and up-to-date assessment of the effectiveness of technology-

supported writing tools and methodologies. The findings will give educational professionals a blueprint for applying technological intervention in language classes.

In conclusion, using technology in the classroom has significantly changed how teachers and students learn. This comprehensive review will help us better understand how technologically enhanced writing environments affect the development of writing abilities. This systematic review's research objectives centre on two primary questions concerning technology-integrated writing classes in English Language Teaching (ELT) research and their impact on language learners' writing skills.

- What are the main developments in the technology-integrated writing classes in ELT research?
- How has technology impacted language learners in strengthening their writing skills?

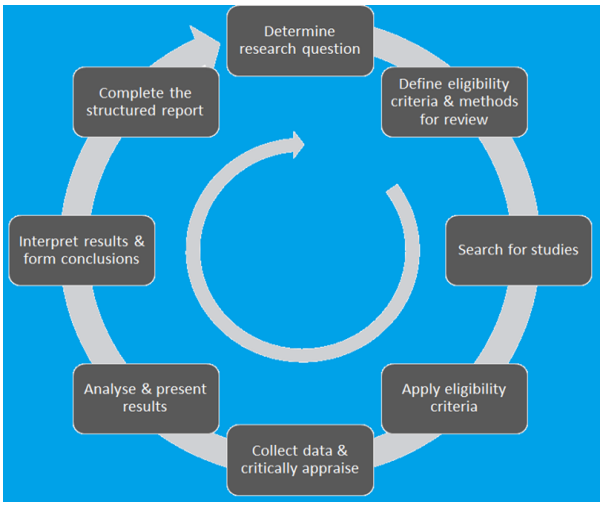
This review seeks to provide significant insights into advancements and trends in technology-supported writing environments within the framework of ELT research through a comprehensive and systematic evaluation of the available literature. The review's results will not only help to create best practices for technology integration, but they will also be a great resource for maximising the effectiveness of digitally assisted language instruction. Furthermore, by providing evidence-based findings, this systematic review will help to create inclusive and successful language learning environments in the digital age.

Methods

This section outlines the systematic approach adopted in conducting the comprehensive review of the literature on the impact of technology in the context of education, particularly in English writing skill development and language teaching. This systematic review paper aimed to synthesise existing research and gain valuable insights into the influence of technology on the learning process. To ensure a rigorous and unbiased assessment, a well-defined methodology was employed. The systematic review followed established guidelines and protocols, adhering to a systematic and transparent process for searching, selecting, and analysing relevant literature (Mulrow, 1994). By adopting such a systematic approach, this study aims to provide a comprehensive and reliable evaluation of the available evidence on integrating technology in educational settings. A systematic procedure of searching, identifying, and critically evaluating relevant works on a specific subject to address a particular research question is the foundation of a systematic review. The major components of a systematic review are shown in the figure.

Figure-1

Overview of the systematic review.



Research questions pertinent to the field were designed as a first step. Study design, population, intervention/exposure, comparison, and outcomes are the factors used to choose relevant research (PICOS). Specifying the review procedures, including the databases to be searched, the search method, and any limitations. Therefore, the researcher focussed on all these aspects. A thorough search of numerous databases is carried out to find relevant studies. All identified studies are checked to see if they fit the inclusion criteria by comparing them to the eligibility criteria. Information is taken from the included studies and evaluated for quality and bias. Eventually, the data is analysed and examined to provide concise estimates of the effect, and the results are then presented in a systematic review report. The conclusions are based on the quality of the evidence presented in the earlier studies, with the results being interpreted in light of the research question. Transparency and all pertinent information about the review process were included in the report.

Data collection

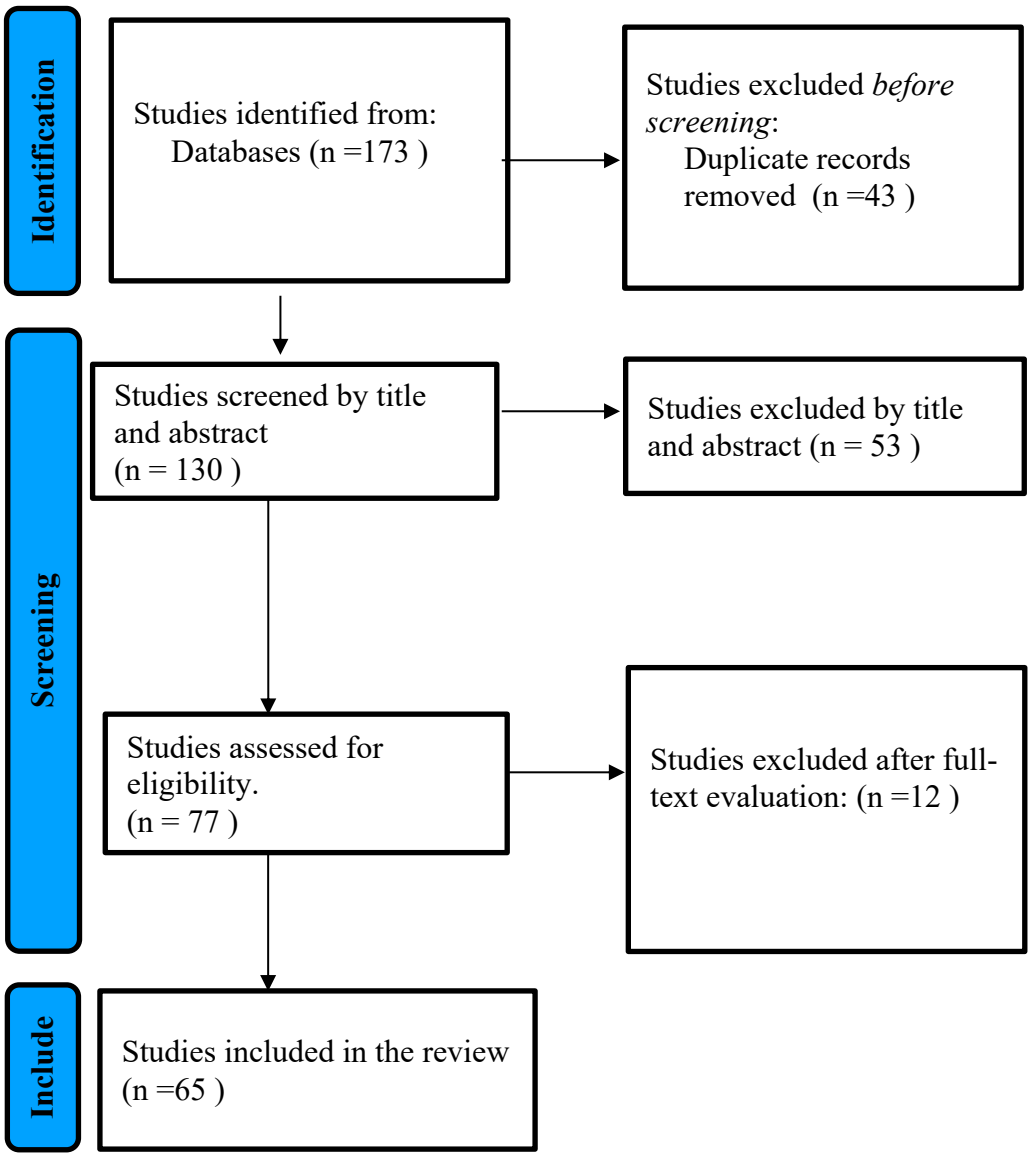
To find pertinent studies on the issue of interest, the researchers examined four databases: ERIC, ScienceDirect, Google Scholar, and JSTOR. These databases were chosen since it is well-known that they contain a sizable number of papers on education. The researchers conducted a comprehensive literature search using a combination of specific search terms to identify relevant articles. The search phrases employed were "Technology and English writing skill," "online writing instruction," "computer-adapted English language teaching," and "technology-aided English writing classroom." By utilising these terms, the researchers aimed to encompass a broad range of research on integrating technology in English writing skill development and language teaching. The search was refined by employing Boolean operators (OR and AND) to ensure the inclusion of articles that address any or all specified topics. This approach allowed us to systematically gather a diverse set of studies, providing a comprehensive overview of the subject matter and supporting the objectives of this systematic review. These search criteria were used to locate studies specifically concerned with the application of technology in teaching and learning the English language and writing.

In contrast to other sorts of literature, such as reviews or opinion pieces, this implies that the researchers were explicitly interested in actual study that has been done on the subject of interest. Researchers thoroughly searched the use of technology in English language teaching and writing instruction. The papers found are more likely to be pertinent to the study subject being addressed when particular search terms are used, and an emphasis

is placed on empirical research. The results of database searches explored only the research studies.

Figure-2

Identification of studies via databases(adapted from (Page et al., 2021).



Data analysis

Two researchers coded and analysed each study that was considered for this work. The researchers employed the content analysis approach, frequently used for textual analyses, enabling comparison, contrast, and data categorisation. First, a form was created using Microsoft Excel to document the findings. This analysis included areas about the research topics, such as the study's year, theoretical framework, technological tools and pedagogical aspect.

After carefully reading each article, the related information was entered into the table. Each study's form was filled out, and then Microsoft Excel was utilised to organise codes and categories for analysis. Table 1 shows that the first research question (RQ1) and its subcategories comprised descriptive information explicitly expressed in the papers under examination. In contrast, the second research question (RQ2) and associated subcategories aimed to elucidate specifics regarding the reviewed documents. The initial stage in defining the theoretical framework and pedagogical aspect and identifying research gaps was to study all the studies, after which the codes and categories were found.

Findings

Trends in Online writing instruction in English language Classrooms

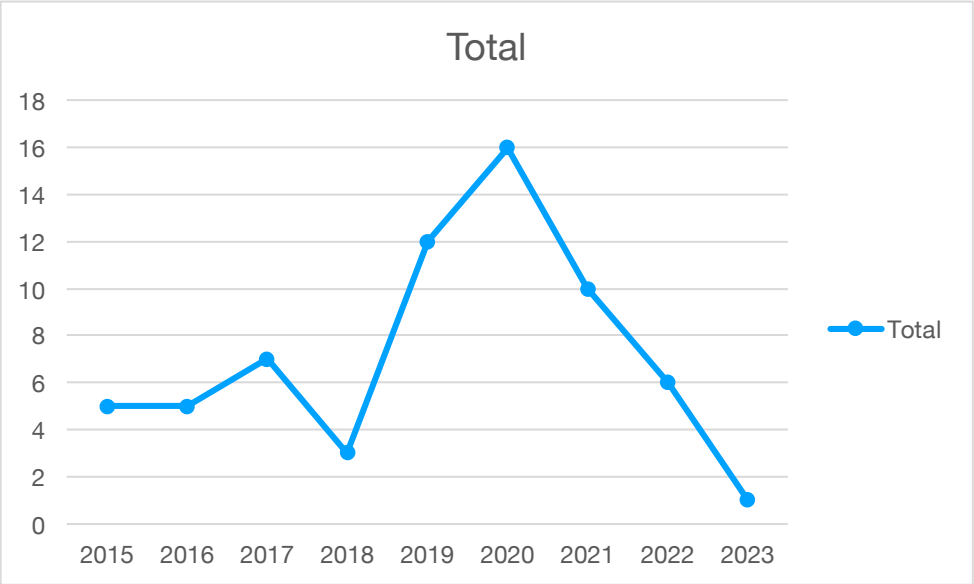
The distribution of the studies by year and the research methodologies utilised were two subcategories the writers looked at in answer to RQ1. The descriptions of each category are in the section that follows.

Distribution of the studies by years

Figure 3 displays the breakdown by years of studies mentioning the technology-aided English writing classroom. Only one article was included because the deadline was February 2, 2023. The distribution of studies carried out from 2015 to 2023 is depicted in the graph. The number of studies conducted is on the Y-axis, while the years are on the X-axis. We can see from the chart that the quantity of studies carried out has changed from year to year. 2020 saw the maximum number of studies (16), while 2023 saw the fewest studies completed (1). Overall, the graph demonstrates that there has been some variation in the number of studies carried out over time, with no discernible trend in terms of numbers rising or falling. The graph can aid in data visualisation and offer a quick and straightforward method to see the distribution of the articles by year.

Figure-3

Distribution of studies



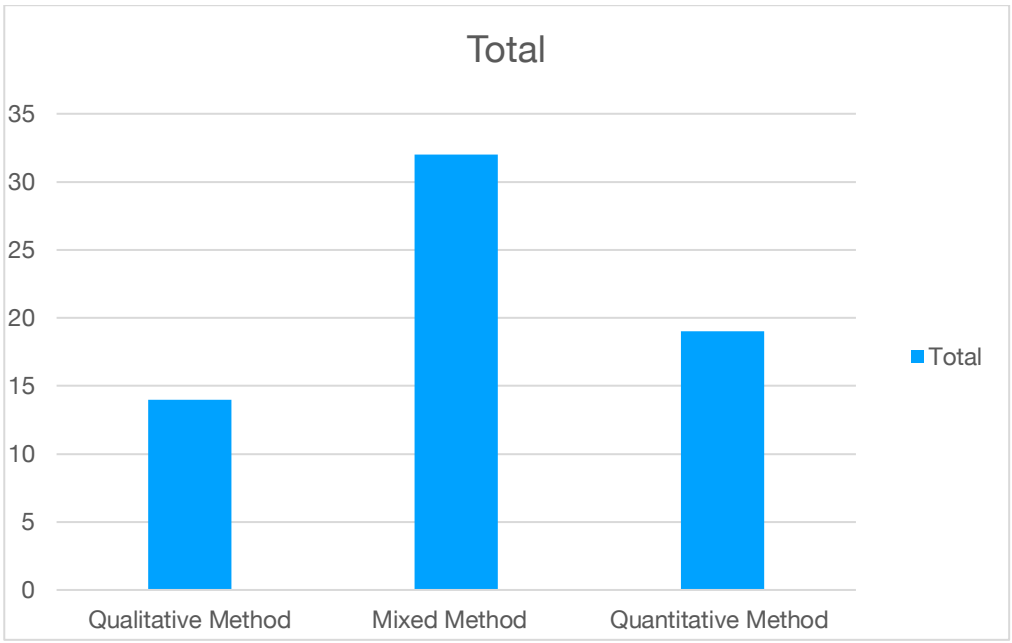
Research methods used in the reviewed articles

The mixed method (n=32) and the quantitative method (n=19) were the two study methods employed most frequently, as indicated in Figure 4. The qualitative method (n=14) was the least often utilised approach. The two study methods most commonly used were the mixed method (n = 32) and the quantitative approach (n = 19), as seen in the above picture. This shows that the study's researchers combined both qualitative and quantitative methods. The mixed method strategy usually entails gathering both quantitative and qualitative data in a single study, which can assist researchers in gaining a more thorough grasp of their research issue.

On the other hand, the quantitative approach often entails gathering numerical data and employing statistical methods to analyse it. The researchers may have placed less emphasis on gathering and interpreting qualitative data in their study because the qualitative method (n=14) was the one that was used the least frequently. The qualitative approach often entails gathering non-numerical data.

Figure 4.

Research methods used in the reviewed articles



The main findings of the online writing instruction in English writing classroom

To respond to RQ2, the researchers established and examined the following subcategories. They are: 1. The phase of writing where technical support is employed. 2. The pedagogical framework used in these classrooms, and 3. Technological tools used in previous studies. There is an elaborate discussion on the subcategories.

Phase of writing and technological support employed

Table1
Technology Integration in the Writing Phase

Phases	**No.of Articles**
Collaborative Composition	4
Composition	19
Composition and Feedback	1
Evaluation	1
Feedback	3
Post writing feedback	3

Pre-writing and feedback	1
Pre-Writing instruction	12
Pre-Writing Instruction and Composition	1
Pre-writing instruction, Composition, Post-writing	2

Researchers are increasingly interested in using technology in writing since it can help writers in various ways. The number of articles focusing on the integration of technology at several stages of the writing process is shown in the data table. According to the data, 19 out of the 33 articles focus on the composition phase. It involves writing and structuring thoughts. This phase demonstrates how vital it is for writers to have technology on their side during this critical writing process phase. Writers can use technology to give them access to various tools and resources that can aid in organising their ideas, such as mind-mapping software, outlines, and digital note-taking apps. By giving writers access to computerised grammar checkers, spellcheckers, and other language aids, technology can also assist writers in improving the quality of their writing. With 12 articles exploring the use of technology to provide guidance and help throughout the planning and preparation phase of writing, the usage of technology in the pre-writing stage is also discussed. This step is crucial because it builds the foundations for the composition phase and establishes the framework for the writing process.

Technology can assist writers in planning their essays by giving them access to various resources, like writing prompts, story generators, and brainstorming tools. Technology may also enhance training throughout the pre-writing process by providing online tutorials, video lectures, and interactive writing exercises. The table also emphasises how technology is used throughout the feedback phase. Three articles concentrate on how technology can provide feedback during the composition phase, and three focus on post-writing feedback. Feedback is a critical step in the writing process since it allows authors to recognise their strong points and areas for development. Technology can aid in feedback by giving students various feedback tools, including peer-review platforms, online writing workshops, and writing forums. Technology can also facilitate real-time feedback and easy access to feedback from multiple sources, including peers, teachers, and writing experts.

Additionally, there is one article each on using technology for pre-writing and feedback, collaborative composition, and evaluation. Evaluation is crucial because it enables writers to assess the impact of their work and pinpoint areas for development. Technology can aid the review process by giving writers access to various evaluation tools, including online assessments, writing portfolios, and writing rubrics. Another crucial step in the writing process is collaborative composition, which allows writers to collaborate and exchange ideas. Technology can facilitate collaborative composition by giving writers access to various collaborative writing tools, such as online writing workshops, group writing projects, and writing forums.

Lastly, two articles discuss how technology may be used for every step of the writing process, from pre-writing instruction to post-writing feedback. This emphasises the importance of considering technology's contribution to writing rather than merely in isolation. Technology can assist authors at every stage of the writing process, from pre-writing through feedback, and it can also aid in speeding up the procedure and raising the writing's quality. The table-1 gives a broad overview of how technology is utilised to assist writers at different stages of the writing process. It emphasises the value of technology in

assisting writers throughout the entire writing process, including the composition phase, pre-writing phase, feedback phase, evaluation phase, and collaborative creation. Researchers, educators, and authors interested in examining how technology might help language learners strengthen their writing skills will find this data helpful.

Theoretical lens used by the previous studies

The table-2 summarises the various theoretical frameworks adopted in studies on integrating technology in the writing phase. The table lists the theoretical framework and the number of articles adopting each framework. Twenty-five articles were analysed.

Table 2

Table 2: Theoretical Framework adopted in these studies

Theoretical Framework	No.of articles
Multimedia Learning Theory.	1
Constructivism	1
Vygotsky's Zone of Proximal Development	1
BALL Blog Assisted Language Learning	1
Knowledge-transforming model of writing.	1
Blended Learning Approach	2
CALL	2
Collaborative Learning	1
Educational Digital Storytelling (EDS)	1
Flower and Hayes' (1981) model	1
Hayes' (1996) Writing Model	1
Kagan's cooperative model	1
Mobile Assisted Language Learning	1
Multimodal composing	1
Pragmatism	1
Project-based language learning task	1
Scaffolding, Wood, Bruner and Ross (1976)	1
Self-regulated Learning Zimmerman (2000),	1
Social presence theory	1
Technology Pedagogical Content Knowledge (TPACK	2

The data in the table shows that the most commonly adopted theoretical frameworks are Blended Learning Approach (2 articles), CALL (2 papers), and Technology Pedagogical Content Knowledge (TPACK) (2 papers). The authors of these studies have adopted a range of theoretical frameworks to guide their research. This variety highlights the complexity of the topic and the need for multiple perspectives to understand the impact of technology on the writing process.

(Muñoz-Carril et al., 2021) explored the components and processes that contribute to the efficacy of Computer Supported Collaborative Learning (CSCL). They discovered that satisfaction and perceived impact upon learning are important factors in determining CSCL efficacy, particularly in the context of teaching. Few scholars have used CSCL as a theoretical lens to drive learning outcomes in the setting of technological integration. The suggested model significantly and positively improved students' satisfaction with CSCL by exhibiting strong predictive performance, perceived utility, and perceived enjoyment. The perceived impact on learning was determined by attitude and reported enjoyment, which was positively and significantly influenced by perceived usefulness and simplicity. For CSCL to succeed, these elements should be considered when developing it to be implemented institutionally and in classrooms. Both teachers and students should understand these interdependencies. Cooperation and negotiation are essential for learning in CSCL because they impact how satisfied teachers and students are with their involvement.

To ensure that social relationship components of implementation and to assure the articulation of cognitive features connected to task completion and the desired building of knowledge, the collaboration should be carefully defined throughout the CSCL design phase. In this aspect, intra-group emotional support is very crucial. (Jeong, 2016) investigated the use of Google Docs as a Web-based collaborative learning platform for college students receiving EFL writing instruction, as well as their opinions of the cloud-based writing system and how well it affected their writing. Positive effects on student autonomy and critical thinking are also among the study's findings.

In online collaborative learning environments (Jiang & Zhang, 2020), students would perform better during the learning stages if peer-assisted. By participating in explicit socialising activities compared to implicit socialising activities, they would also experience less working memory load and more social presence. Several academics have adopted Computer-Assisted Collaborative Learning as a theoretical paradigm, including (Naykki et al., 2017). They discovered that the technical resources utilised in CSCL have a favourable, considerable impact on the learning processes and the underlying dynamics of collaboration. Technology resources must be chosen per the desired learning outcomes and aligned with the deliberated pedagogical, cognitive, and social objectives. Thus, the technology that supports collaborative learning must be able to organise complex tasks, support group analysis, and facilitate the discussion that will result in their resolution. In their study, (Hsu et al., 2018) looked at the impact of wiki-mediated collaborative writing among L2 learners. The reports of students who created content for wikis showed a notable improvement in content and linguistic accuracy. The study offers advice to writing teachers on implementing wikis in the classroom.

Table-3

Tools used in these studies

Tool/System	**Category**	**Studies**
Blogs	Online platform for writing	(Akdağ et al., 2017),(Mabuan, 2018),(Muslem et al., 2022)

Tool/System	Category	Studies
CyWrite system	Writing assessment tool	(Ranalli et al., 2019)
Edmodo	Learning management system (LMS)	(Wihastyanang et al., 2020)
Google Docs	Document editing and collaboration	(Ebadi& Bashir, 2020)(Neumann &Kopcha, 2019)(Jeong, 2016)(Ambrose &Palpanathan, 2018)(Saadi Ali &Sarok, 2022)
Twitter	Social media	(Ali Said, 2015)
LMS and Dropbox	Document storage and collaboration	(Ezza et al., 2019)
Whatsapp	Messaging and communication	(Ebadi& Bashir, 2020)(Fathy et al., 2015)(Abdel-Baqi& Khalil, 2017)
Wridea	Online platform for writing	(Marleni, 2020)
PEG Writing AEE Tool	Writing assessment tool	(Wilson &Czik, 2016)
EJP-Write system	Writing assessment tool	(Hsu & Liu, 2018)
Facebook	Social media	
Essay Critiquing System 2.0	Writing assessment tool	(Lee, 2019)
Google Slides	Presentation software	(Irwin, 2020)
Peermark	Writing assessment tool	(Law & Baer, 2017)
Multimedia	Audio, video, and images	(Alobaid, 2020)
Writing prompts-online resources	Writing prompts and resources	(Shin et al., 2021)
Coh-Metrix automated writing evaluation tool	Writing assessment tool	(Petchprasert, 2021)
Linguistic Feedback Tool (LiFT) and Automated marking tool	Writing assessment tool	(Lim &Phua, 2019)
Social media	Platforms for sharing information and connecting with others	(Verheijen et al., 2020)(Alam, 2019)

| Tool/System | Category | Studies |

Chatbot	Artificial intelligence-powered chat	(Lin & Chang, 2020)
PowerPoint	Presentation software	(Khoshsima&Sayadi, 2016)
Wordle	Online word puzzle tool	(Rashtchi&Porkar, 2020)
WhiteSmoke Writing Software	Writing assessment tool	(Ghaemi&Bayati, 2021)
Microsoft Word	Document editing software	(Zaini& Mazdayasna, 2015)(Omer Ismael et al., 2022)
YouTube and Podcasts	Video and audio platforms	(Chaikovska et al., 2022)
Schoology, Padlet, Facebook, Edmodo, Google Classroom	Learning management system (LMS)	(Abidah, 2023)
Inputlog 8.0, a KL program	Writing assessment tool	(Zarrabi&Bozorgian, 2020)
Augmented-reality context-aware ubiquitous writing (ARCAUW)	Augmented reality tool for writing	(Lin et al., 2020)
Plotagon	Animation and movie-making tool	(Guzmán Gámez& Moreno Cuellar, 2019)
Criterion	Writing assessment tool	(Koh, 2017)
Screencast Feedback and Electronic Text Feedback	Feedback and assessment tool	(Cunningham, 2019)
The CALL package developed by the researcher contained audio, video, captured pictures, and the script of a short film on related topics,	Writing resources	(Ghafoori et al., 2016)
Digital tools	Writing resources	(Nobles &Paganucci, 2015)
Quizizz	Writing resources	(Malvado et al., 2022)
Moodle Learning Management System Youtube Podcasts	Writing prompts and resources	(Chaikovska et al., 2022)

People can interact with written materials, tools, and resources in the digital online writing environment. The abovementioned tools and resources offer assistance and chances for writing, learning, and assessment. One writing assessment tool that provides comments and criticism on essays authored by students or other writers is the Essay Critiquing System 2.0 (Lee, 2019). Users can create, edit, and share multimedia presentations with Google Slides (Irwin, 2020), a presentation tool. Peermark (Law & Baer, 2017) users of the writing

assessment application can get peer comments and evaluations on their writing. Multimedia (Alobaid, 2020) refers to various digital media formats to supplement and reinforce written material, including audio, video, and images. A collection of writing prompts and tools called writing prompts-online resources (Shin et al., 2021) can be used to motivate and instruct writers.

Additionally, options for more automatic writing evaluation and assessment are available in the online writing environment. Examples include the Coh-Metrix automated writing evaluation tool, the Linguistic Feedback Tool (LiFT), and the Automated marking tool (Petchprasert, 2021). (Lim &Phua, 2019). These tools offer evaluation and feedback on several writing-related factors, including coherence and syntax. Social media is a significant component of the online writing environment, allowing users to share information, participate in debates, and cooperate with others (Verheijen et al., 2020; Alam, 2019). (Lim &Phua, 2019) reported on the effectiveness of using language feedback technology when teaching writing. A mixed method approach reveals that teachers and students have a positive attitude and reception to using language feedback technology as it also saves teachers marking time. (Neumann &Kopcha, 2019) Their study suggests that using Google Docs for the peer-then-teacher process to review can be helpful.

(Md Yunus et al., 2019)investigated the potential benefits of using social media to improve the English writing skills of students in rural schools in Malaysia. A questionnaire consisting of a survey and open-ended questions were used to understand the student's perception of social media usage. Their accessibility to social media, preferences, factors affecting social media usage and competency were analysed in this study. The findings revealed that learners have a positive attitude toward learning using social media tools.

Along with these tools, the online writing environment features learning and teaching platforms like Moodle, digital learning tools like Quizizz (Malvado et al., 2022), and the CALL package (Ghafoori et al., 2016). Users can access podcasts and video and audio platforms like YouTube (Chaikovska et al., 2022), allowing them to interact with digital content and gain new knowledge. The online writing environment is rich and varied, providing various resources and tools to assist and improve writing, learning, and evaluation.

Discussion

Sixty-five publications were retrieved from ERIC, ScienceDirect, Google Scholar and JSTOR and were examined for trends and key findings in this study. The results of this study demonstrate that there has been no discernible upward or downward trend in the number of research undertaken from year to year. The year with the most studies, 2020, saw the publication of 16 papers. Only one article has been released thus far in 2023. Studies reveal that the researchers of these studies used a variety of theoretical frameworks and tools to direct their research. This diversity underlines the intricacy of the subject and the demand for the use of technology in the writing process.

The results indicate that researchers are increasingly interested in investigating how technology is used during the writing process, and they frequently employ mixed and quantitative methodologies to do so. While quantitative approaches may be more concentrated on numerical data and statistical analysis, using mixed methods may be

advantageous for developing a more thorough knowledge of the research subject. The relatively low utilisation of qualitative techniques may indicate that non-numerical data collection and interpretation are less crucial in this field of study. As this illustrates, the use of technology in writing and its potential advantages for writers need to be further investigated and explored.

Table 1: Technology integration in the Writing Phase demonstrates how several stages of the writing process are supported by technology. The most considerable attention is paid to the composition phase, where writers compose and organise their ideas; 19 of the 33 papers examine how technology was used in this period. The processes of pre-writing and feedback are also discussed. Technology gives writers access to various tools and services, including peer-review platforms, online tutorials, and mind-mapping software, which can help with collaboratively planning, receiving feedback, and creating written content. The table also emphasises how crucial it is to consider technology's overall impact on writing. This information will be helpful for researchers, teachers, and authors who want to employ technology to enhance language learners' writing abilities.

The most popular theoretical frameworks used in studies on technology and the writing process are listed in Table 2. In addition to Constructivism, Vygotsky's Zone of Proximal Development and other frameworks include the Blended Learning Approach, CALL, and TPACK. Many theoretical frameworks emphasise how complicated the subject is and how different viewpoints are required to comprehend how technology has affected writing *fully.* Various tools and resources are available in the online writing environment that can help with writing, learning, and evaluation. These resources include peer review software, multimedia technologies, social media platforms, and automated writing evaluation systems. According to studies, students are open to adopting social media tools for learning, and that language feedback technology might be helpful in teaching writing. The Internet writing environment offers many materials to advance digital literacy and writing abilities. The digital setting for online writing provides various tools and resources to support writing, learning, and assessment. Peermark and the Essay Critiquing System 2.0 are two writing assessment programs offering written work comments and evaluation.

Research shows that using Google Slides and other multimedia tools assists in creating presentations. Feedback on writing-related issues can be provided by automatic writing evaluation systems like Coh-Metrix, Linguistic Feedback Tool (LiFT), and Automated marking tool. Social media platforms offer collaboration, information sharing, and discussion engagement opportunities. Writing, learning, and evaluation can also be aided by additional materials and tools like Moodle, Quizlet, the CALL package, podcasts, and video and audio-sharing websites like YouTube.

Limitation

This study has various limitations regarding technology's role in English language instruction. First, because the study relied on secondary data, the researcher needed more control over how variables were calculated or altered. The secondary data used in this study came from various sources, some of which may have had distinct research aims and methods. This might limit the study's generalisation ability and alter how easily the results can be compared. The fact that the data for this study were collected over eight years is another drawback. This implies that a few of the technological aids examined in this study might no longer be applicable or accessible and that some more recent technologies that

might be more useful or well-liked might not have been included. This could impact the completeness and accuracy of the study's conclusions. This lack of specificity may limit the study's findings' applicability to educators or researchers who operate in particular environments and require specialised advice.

Notwithstanding these drawbacks, this in-depth analysis of technological tools for English language learning represents a significant advancement in the field. This study lays the groundwork for future research on the new technological affordances in teaching writing in various contexts by synthesising existing research and identifying trends and gaps in the literature. Conducting more in-depth research on particular technological aids or learning environments and comparing their efficacy using standardised metrics is one potential route for future research. This might make it easier to determine which technologies work best for various learning objectives or populations and give instructors more specialised suggestions for technology integration.

Another promising area for future research is to examine technological assistance when used with other instructional tactics, such as peer feedback or formative assessment. This could provide a more nuanced comprehension of how technology can be most effectively incorporated into language learning and find the best ways to support learning and teaching in different circumstances. Notwithstanding several limitations, this study on technological support for English language learning lays a solid groundwork for future research. This study provides insights into technology integration in language learning and highlights topics for further research and improvement by pointing out patterns and gaps in the literature.

Recommendations for future research

Future researchers should concentrate on several areas of technological integration in writing skill development. Future academics may examine using AI-powered writing tools to enhance writing abilities, such as automatic grammar checkers and summarisation tools. They might assess how successfully they catch and fix errors and how they affect writing flow and overall writing quality.

Gamification of Writing: Researchers could examine how students' motivation to write and writing abilities are affected by gamifying writing tasks, such as by employing writing challenges and games. Future studies could look into the effect of virtual reality writing environments on writing skills and creativity and their potential to produce immersive and interactive writing experiences.

Mobile Writing Apps: Researchers could use mobile writing apps like note-taking and outlining tools to facilitate writing on the go and increase writing effectiveness.

Online Writing Communities: Future studies should look at how forums and other online writing communities affect authors' motivation, feedback, and collaboration, as well as how they affect writers' writing abilities.

Technology-Enhanced Writing Assignments and Assessments: Researchers may examine how technology-enhanced writing assignments and assessments are used in the classroom and how they affect students' development of writing abilities. Future researchers can progress in the field and assist teachers and writers in harnessing the power of technology to enhance writing abilities by concentrating on these areas.

Conclusion

This systematic review investigates how technological advancements affect the acquisition of writing abilities. It is evident from a thorough evaluation of the research and the analysis of various case studies that technology can be a valuable tool for teaching and enhancing writing abilities. While peer review and teacher feedback are still essential components of traditional writing instruction, technology has unique advantages that can improve student learning and engagement. This study is anticipated to serve as a roadmap for academics who wish to investigate the effects of online writing instruction in developing English language learners' writing skills.

Technology's capacity to provide tailored feedback is crucial for teaching writing. Several online resources and platforms have been proven to assist students in writing better essays by offering criticism on grammar, syntax, and style. This immediate, personalised feedback can be applied to subsequent writing assignments. Additionally, these tools frequently provide ideas for improvement, which can aid pupils in honing their writing abilities and gaining self-assurance. The capacity to give pupils focused practice is another benefit of technology in writing instruction. Platforms offer pupils personalised writing assignments that cater to their interests and skill levels. With these tools, students can get quick feedback and monitor their development. They can also be used to practise particular writing skills, such as sentence construction, paragraph organisation, transitional vocabulary and phrases.

Technology can also improve how interested students are in writing lessons. Collaboration opportunities are available through digital tools and platforms, a crucial element of efficient writing education. Students can collaborate on writing tasks in real-time using Google Docs, for instance, giving them a chance to give and receive peer criticism. Similarly, blogging services allow students to share their writing with a larger audience, encouraging them to generate high-quality work.

However, it is crucial to understand that there are better solutions than technology for teaching writing. Although digital resources and platforms have some distinct advantages, they should be used in addition to other teaching strategies. Effective writing instruction still depends on age-old techniques like direct instruction, teacher feedback, and peer evaluation. Teachers must carefully weigh the advantages and disadvantages of various teaching techniques to choose the ones most suited to their pupils' needs and objectives. The usefulness of multiple technology interventions and their potential effects on student writing outcomes should be further investigated in the future. Research should also examine how technology affects students' motivation for writing and their views regarding the report. New tools and platforms will probably appear as technology develops, providing new writing training potential.

In conclusion, technological advancements can benefit the growth of writing abilities. Students can receive individualised feedback, practise particular writing strategies, and work with peers and teachers to enhance their writing using various digital resources and platforms. However, given that technology is not a miracle solution for writing training, employing these tools in addition to conventional teaching techniques is crucial. Teachers can use technology to improve their writing education and support their students in becoming good communicators with careful planning and thought.

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