

The Strands and Findings of Recent Research on Technology-enhanced Collaborative Writing in EFL Setting: A Systematic Review

Parlindungan Pardede

parlpard2020@gmail.com

Universitas Kristen Indonesia

Article History

Received: 5 March 2024

Accepted: 26 May 2024

Published: 15 June 2024

Keywords

Collaborative writing, EFL, research, TECW

Abstract

More and more researchers and educators have recently focused their attention to technology-enhanced collaborative writing (TECW) in English as a Foreign Language (EFL) setting. Yet, the updated review focusing on research in this field is meager. This study aims at helping researchers and educators get a deeper understanding of the features and development tendencies of recent research on TECW in EFL setting. It systematically reviewed 45 empirical studies published from 2014 to 2023, focusing on strands and findings. In terms of research strands, the results showed the writing process, outcomes, and students and teachers' perceptions and attitudes. In terms of research findings, the review results showed that TECW was effective in enhancing students' writing performance, developing a sense of community, engagement, motivation, collaboration, and satisfaction. The studies' findings also revealed that students and teachers demonstrated a strong disposition towards TECW practices.

How to cite this article (APA, 7th Ed.):

Pardede, P. (2024). The Strands and Findings of Recent Research on Technology-enhanced Collaborative Writing in EFL Setting: A Systematic Review. *Journal of English Teaching*, 10(2), 92-109. <https://doi.org/10.33541/jet.v10i2.6035>

INTRODUCTION

Writing plays an essential role in language acquisition, academic success, and communication due to the accelerating penetration of information and communication technology (ICT), which boosts written interaction in social networks, into all life sectors. Yet, in all language learning settings, particularly in English as a second language (ESL) and as a foreign language (EFL), writing is considered the most challenging skill to teach and to acquire (Klimova, 2014). To assist EFL teachers in helping their students meet the challenge, writers and researchers have proposed various approaches of teaching writing i.e., the product-based, process-based, and genre-based approaches. Since their implementation has not yet satisfactorily facilitated EFL learners to be better writers, researchers and writers (e.g., Tompkins et al., 2014) have recently recommended an approach called collaborative writing, in which a single text is produced through the

collaboration of two or more writers (Storch, 2019). Unlike the previous approaches, which regard writing as a solitary individual act that is best accomplished by the writer alone, supported by cognitive and socio-cognitive theories, collaborative writing emphasizes on two or more students actively collaborating in the writing process to produce a single text. Students' interactions with peers during the learning process allow students to get more opportunities to work, share ideas, and solve language problems together in pairs or small groups. This makes collaborative writing of great practical value for students (Shehadeh, 2011).

Collaborative writing, which is viewed as one of the most effective approaches to developing writing skills (Shehadeh, 2011), has currently been reinforced by the use of technology in learning scenarios (Rosales et al., 2020). The pervasive availability of technology-assisted writing platforms, such as Google Docs, wikis, or blogs, has radically enlarged collaboration scopes, ranges, and patterns. Since these platforms use emphasizes on social interaction in the digital environment, writing has been encouraged as a social activity, leading to an increasing interest in implementing technology-enhanced collaborative writing (TECW) learning (Godwin-Jones, 2018). TECW, defined as collaborative writing activity using digital tools and technologies (Li, 2018; Storch, 2019), is implemented, for instance, in the use of Google Docs, wikis, blogs and other applications as collaborative writing learning environments (Brodahl et al., 2011). The power of technology to serve as a medium for discussing, submitting written assignments, or reconstructing, revising, and editing texts has made TECW gain increasing attention in the field of learning to write. Research on collaborative writing has even shifted from a traditional pen-and-paper approach to a multi-modal technology-assisted approach (M. Li & Storch, 2017).

Various factors support TECW in learning to write. First, technology has a high potential to facilitate learning to write (Pardede, 2024). It does not only offer a learning environment that lets students solve their learning problems independently and learn at their own pace and comfort (Kademi, 2021) but also increases their learning motivation and engagement (Downes & Bishop, 2015), facilitates writing activities, sharing information, knowledge formation, and offers easier collaboration opportunities among students (Aydin & Yildiz, 2014). Second, today's students like using technology. They expect technology to be part of their learning, as it is in all aspects of their lives (Mitchell et al., 2016). They feel more comfortable using digital media for writing than pens and paper (Coskie & Hornof, 2013). Third, technology use can effectively overcome the limited time that writing classes have. In contrast to traditional collaborative writing classes, which often lack time to complete collaborative activities and writing projects, social networks, such as Wikis, blogs, or learning management systems (LMS) can help students stay connected and collaborate. TECW provides some gap and time for thinking and reflection before engaging in a certain discussion. This benefits students who "need time to think and reflect before responding to questions and ideas" (Palloff & Pratt, 2001). Fourth, technology provides teachers with a greater opportunity to provide feedback, evaluate and even trace students' collaborative writing processes (Elola & Oskoz, 2017).

The growing interest and popularity of using technology in writing instruction have significantly expanded research in this area in recent years (M. Li & Storch, 2017). Thus, it would be useful to conduct a systematic review of the literature on TECW to arouse expanded knowledge and afford new insights in this promising area. Few reviews on the use of technology in writing instruction have been conducted. Yim & Warschauer (2017) reviewed 17 studies on Web-based collaborative writing published between 2000 and 2015. Focusing on theoretical/pedagogical framework, technology type, foci of investigations, research design, context and participants, the results revealed that 40% of the studies applied a socio-constructivist framework, 24% applied socio-cultural theory, and 34% were unspecified. The most frequently used technologies were wikis, Google Docs, and blogs. The major research foci included the collaborative writing process (structures, strategies, patterns, phases, behaviors,

roles, and responsibilities of collaborators) and the perception of collaborative writing. The most dominant designs employed were qualitative, followed by descriptive qualitative, and quasi-experimental. Most of the studies were in ESL setting, involving students of higher education (82%) and secondary school students (18). Li (2018) reviewed 21 studies on computer-mediated collaborative writing published from 2008 to 2017, focusing on theoretical/pedagogical framework, context and participants, used technology, writing tasks, and foci of investigations. The results revealed that socio-cultural theory was the most frequently applied framework. Most studies were conducted in ESL setting. Google Docs, Wikis, and chat were the most frequently used technologies. Collaborative writing was mainly assigned in small groups, and most studies focused on three major research strands, i.e., interaction/writing process, students’ perceptions, and writing products/outcome.

Since the previous review studies included research published up to 2017, the latest progress and newest situations in this field are still left uncovered. Due to the rapid advancement of technology-enhanced learning methods, the tools used to be innovative prior to 2017 could have seemed unfashionable today (Shadieff & Yang, 2020). Therefore, conducting a timely review on TECW was useful. This paper is the first part of a systematic review of the empirical research on TECW in EFL setting published in 2014–2023, conducted to explore the research features and development tendency in this field. The present review focuses only on the strands and findings of the selected studies in the review. In this regard, this paper aims at addressing the following question: What is the current state of TECW in terms of research strands and findings?

METHODS

To search and select the studies to review, the three-step process—search, evaluation, and data finalization—employed by Zou et al. (2019) was administered (Figure 1). The search was conducted in Google Scholar database using the combination of keywords ‘computer-mediated communication’, ‘technology-enhanced collaborative writing’, ‘online collaborative writing’, and ‘EFL’ with 2014 and 2023 as the time span. All the articles were then screened (predominantly based on titles and abstracts). They were then narrowed down for inclusion based on the following criteria: (1) research published in established peer-refereed English language teaching (ELT) and applied linguistics, educational technology, or computer-assisted language learning (CALL) journals; (2) empirical research studies; (3) truly collaborative writing learning using a Web 2.0 tool; and (4) accessible online and indexed in Google Scholar sites. Thus, a review article and a synthesis or conceptual paper were not selected.

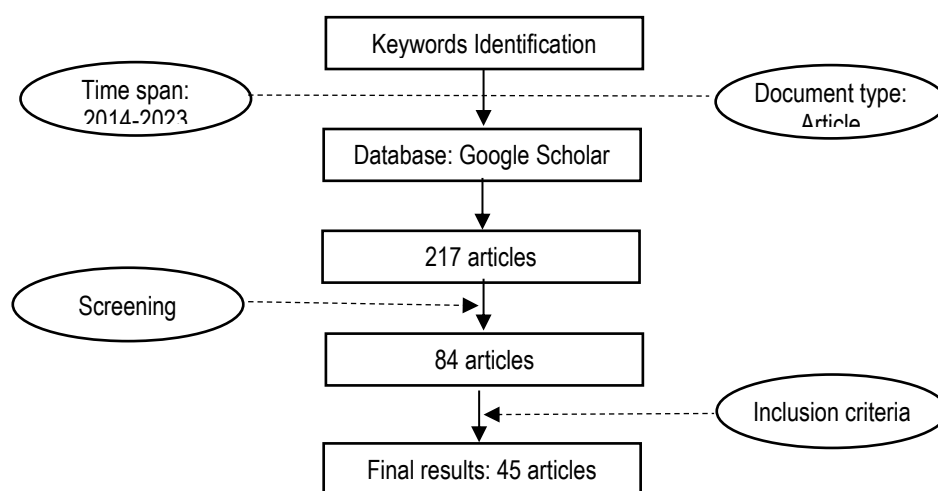


Figure 1. Process and methods of data search, selection, and collection

To analyze the data obtained from the 45 articles, the present author employed the constant comparative method, i.e., the method that merges systematic data gathering, coding, and analysis with theoretical sampling for generating theory that is assimilated, close to the data, and stated in a clear form for further testing (Conrad et al., as cited Kolb, 2012). In this review, the method was applied in four steps: (1) scrutinizing the first selected research; (2) noting its content to create a tentative theme; (3) evaluating the second article; and (4) comparing it to the theme of the first article. If these articles' themes are similar, the third article was examined. If the themes of the first and second articles were discovered to be different, another theme was generated. The review then proceeded by analyzing the next article and comparing it to the previous ones. Thus, every article was examined and compared to another.

FINDINGS AND DISCUSSION

Employing the three-step process and four criteria, 45 articles were selected. Figure 2 displays the distribution of the articles by year of publication. It appears that 53% of the articles were published in the last three years, indicating there was currently an increasing interest in research in the area of TECW.

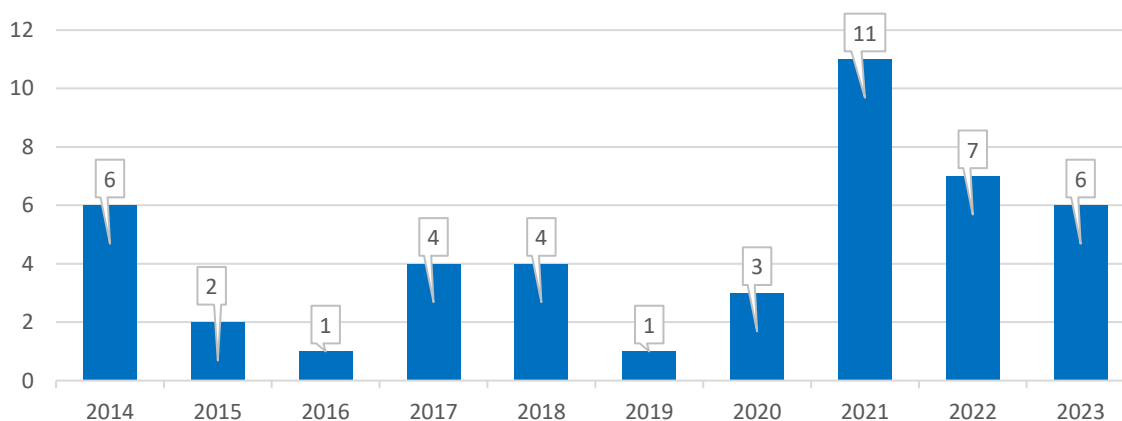


Figure 2. Articles Distribution by Year of Publication

Research Strands

In terms of research strands, the analysis of the selected articles yielded three foci: writing process, outcomes, and students' and teachers' perceptions and attitudes. These findings resemble the results of Li's (2018) review. Table 1 shows that each focus consists of some sub-themes (different number of focuses). Many of the studies investigated more than one focus, employing a mixed-methods design. That is why some studies appear twice in the third column of Table 1. Additionally, various studies focused on similar topics with different dimensions. In Table 1, to make the classification easier, foci with different dimensions are combined into a group of entries. So, although five studies investigated "Students' writing activities and tasks in TECW process," they actually approached it from different perspectives.

Writing Process in TECW

In terms of writing process in TECW, the identified foci were related to group dynamics in TECW, CW activities and tasks in TECW process, support for students to write collaboratively, students' metacognitive activities, and students' errors in writing using technology.

Since collaborative writing involves two or more people in the production of a shared text, its implementation requires a comprehensive understanding of group dynamics. Defined as "the influential interpersonal processes occurring in and between groups over time, which determine

how members associate and engage with one another and govern the group's fundamental nature and trajectory (Forsyth, 2019), group dynamics determine whether a class or group feels 'good' or 'bad' at different times or all the time (Dörnyei & Murphey, 2009). Due to its essential role in TECW process, no wonder group dynamics became the most prominent focus in the strand of the writing process in TECW.

Table 1. Research Strands of the Reviewed Studies

Strands	Focuses	Studies
Writing Process in TECW	Group dynamics in TECW	Cho (2017), Kitjaroonchai & Suppasetsee (2021), Lai et al. (2016), Kitjaroonchai & Loo, (2023), Ren et al. (2022) Selcuk et al. (2021), Yeh (2021), Yeh & Chen (2019)
	Students' CW activities and tasks in the TECW process	Abe (2020), Aydin & Yildiz (2014), ÖZDEMİR (2021), Razak & Saeed (2014), Saeed & Ghazali (2017)
	Support for students to write collaboratively in TECW	Damayanti et al (2020), Farahian & Ebadi (2023)
	Students' metacognitive activities	Teng (2021)
	Students' errors in writing using technology	Moonma (2021)
TECW Outcomes	Effect of TECW implementation on students' writing performance, behavioral engagement, self-efficacy, critical thinking, and engagement	Ahmad (2020), Alsubaie & Ashuraidah (2017), Çelik & Aydin (2021), Chen et al. (2022), Entezari & Taki (2018), Hsu & Lo (2018). Jiang & Eslami (2021), Li (2013), Liu et al. (2022). Mohamadi (2018), Robillos & Bustos (2023), Shukor & Hussin (2015), Soltanpour & Valizadeh (2017), Suwantarathip & Wichadee (2014), Wang (2014), Wang (2015), Zhang et al. (2014), Valizadeh (2022) Zou et al. (2022)
Perceptions/ Attitudes of TECW	Students' perceptions of (factors related to) learning to write using TECW	Alsubaie & Ashuraidah (2017), Aydin & Yildiz (2014), Brodahl & Hansen (2014), Pitura (2021), Sağlamel & Çetinkaya (2022), Shukor & Hussin (2015), Syarifudin (2023)
	Students' attitudes toward CW using technology	Gündüz (2023), Soltanpour & Valizadeh (2017), Ubaldo (2021), Yeh & Chen (2019)
	Writing motivation and motivating/ demotivating factors in TECW	Çelik & Aydin (2021), Zakaria et al. (2023)
	Students' satisfaction in using technology to learn to write	Moonma (2021)
	Teachers' perceptions of using TECW to teach writing	Pheng et al. (2021)

Eight studies focused on group dynamics in TECW with various sub-focuses, indicating the complexity of this issue. The sub-focuses include group awareness, interaction patterns and dynamics, affecting factors of interaction, members' contribution, group leaders' choosing factors, and group leaders' influence on the members. Lai et al. (2016), for instance, explored students' collaboration patterns and how these patterns relate to the students' perceptions of learning. Kitjaroonchai & Suppasetsee (2021) and Kitjaroonchai & Loo (2023) studied small group interaction patterns and factors that influence collaborators' active and inactive participation in CW using Google Doc. Ren et al. (2022) explored the effect of group awareness tools on student engagement with peer feedback in online CW writing. Selcuk et al. (2021) explored the factors that lead group members to choose their group leader in CW work groups and how group leaders affect their group members during the collaborative process. Yeh (2021) studied the dynamics of students' group interactions across the complex collaborative process of a cloud-based writing task.

Five of the selected studies investigated writing activities and tasks in TECW process. This dimension is crucial in TECW because, in the CW process using technologies, students do not interact only with peers and teachers but also with technological tools (Heinze & Heinze, 2009). Abe (2020) explored students' changing interactional practices for paragraphing during computer-mediated writing tasks and Aydin & Yildiz (2014) examined the role of CW task types (argumentative, informative and decision-making) using wiki in the number of form-related changes, meaning-related changes, self-corrections, and peer-corrections. Additionally, ÖZDEMİR (2021) compared CW activities in the Padlet website and in a face-to-face environment; Razak & Saeed (2014) studied learners' CW revision activities in a community of practice via a *Journal of English Teaching*, 10(2), June 2024. 170-182. <https://doi.org/10.33541/jet.v10i2.6035>

Facebook group, while Saeed & Ghazali (2017) focused on students' interaction and text revisions in an asynchronous online group review of argumentative essays.

Two of the selected studies focused on the support for students to write collaboratively. Damayanti et al (2020) examined how to support students to write collaboratively using Google Docs and types students' feedback during collaborative writing activities. Farahian & Ebadi (2023) focused on the importance of the mediating role of online knowledge sharing in TECW.

Teng (2021) dealt with students' metacognitive activities by comparing students' writing achievement and metacognitive activities and co-regulation patterns among groups who learned through TECW, face-to-face whiteboard-integrated collaborative writing, and face-to-face collaborative writing without a whiteboard. Moonma (2021) dealt with students' errors in writing using technology by comparing the errors conducted by students in online collaborative writing using Google Docs and in face-to-face collaborative writing.

TECW Outcomes

Overall, the 19 studies investigating TECW outcomes focused on the impact of TECW implementation on four aspects: students' writing performance, attitudes and/or motivation, social interaction, and critical thinking. Some studies investigated more than one of these four types of outcomes. These studies employed various technologies, writing genres, and treatment procedures (teaching approaches).

Among the four types of outcomes, the effect of TECW on students' writing performance was the most frequently investigated. Fourteen studies focused on this outcome type. Entezari & Taki, (2018), Hsu & Lo (2018), Liu et al. (2022), and Robillos & Bustos (2023) investigated the effect of using technological-mediated collaborative writing on students' writing performance using different technologies and teaching approaches. Ahmad (2020) investigated the effect of CW using Google Doc on Egyptian EFL students' writing quantity and quality. Alsubaie & Ashuraidah (2017) and Valizadeh (2022), with different text genres, compared the writing performance of students who worked individually and collaboratively using Google Docs. Jiang & Eslami (2021) investigated the impact of using Google Doc in a classroom setting on Chinese EFL learners' development of writing skills and linguistic knowledge. Mohamadi (2018) investigated the effect of online summative and formative assessments on students' writing ability. Shukor & Hussin (2015) tested the effectiveness of Facebook as a collaborative writing tool. Soltanpour & Valizadeh (2017) investigated the effect of feedback provided by MS Word processor on EFL learners' writing accuracy. Wang (2015) explored EFL students' business writing improvement by learning with TECW tasks. Zhang et al. (2014) investigated the effect of using blogs as out-of-class assignments to develop learners' writing competence. Suwantarathip & Wichadee (2014) investigated the effect of learning in groups in a F2F classroom and collaboratively using Google Docs on students' writing abilities.

Five studies focused the impact of TECW on students' attitudes and/or motivation. Çelik & Aydın (2021) focused on the effects of CW using Wiki on students' writing motivation. Shukor & Hussin (2015) investigated the impact of TECW on students' perceptions of the effectiveness of TECW. Li (2023) investigated the impact of TECW on students; writing self-efficacy and motivation. Wang (2015) explored the improvement of students' attitudes and perceptions regarding learning business writing through TECW.

Four studies focused on the impact of TECW on social interaction. Wang (2014) focused on the potential of Wiki to facilitate students; interaction and collaboration in CW. Liu et al. (2018) examined the effect of Cooperpad App which continuously gathers group members' writing behavior and analyzes and visualizes their engagement intensity to enable them to compare their participation with that of others, on students' behavioral engagement. Chen et al. (2022) investigated the effectiveness of social learning analytics (SLA), a tool integrating multi-method analytics to present social interactions, writing topics, and topic connections, to foster students'

social engagement and cognitive engagement in an online CW. Finally, Zou et al. (2022) investigated the impact of technology-enhanced peer, teacher and self-feedback on students' CW, critical thinking tendency and engagement. Zou et al. (2022) was the only study that focused on the impact of TECW on students' thinking. Besides students' CW and engagement, it also included critical thinking disposition as one of the dependent variables.

Attitudes and Perceptions of TECW

In terms of attitudes and perceptions of TECW, the studies included in this review covered five focuses. The first focus was related to students' perceptions of factors related to learning to write using TECW. Brodahl & Hansen (2014), for instance, involved 40 Turkish university students to explore their perceptions of TECW based on gender, age, digital competence, interest in and opinion on the importance of digital tools. Pitura (2021) studied the perception of Polish master in education students' of technology-enhanced socialization necessity in writing in English. Sağlamel & Çetinkaya, (2022) focused on students' perceptions of peer collaboration through Google Docs in TECW. Syarifudin (2023) explored Indonesian students' perceptions of the implementation of flipped TECW class.

The second focus, students' attitudes toward CW using technology was explored in four studies. Gündüz (2023) and Yeh & Chen (2019). Employing different technologies, explored students' attitudes towards wiki-based collaborative EFL Writing. Soltanpour & Valizadeh (2017) focused on students' attitudes towards feedback provided by MSW processor in writing process. Two studies explored the third focus, writing motivation in TECW. Çelik & Aydin (2021), involving 42 Turkish EFL students, investigated the effects of using Wiki on writing motivation. Zakaria et al. (2023) involved 30 Malaysian EFL learners to explore their perceptions of online CW and their motivating/demotivating factors for writing collaboratively. Each of the fourth and fifth focuses was explored in one study. Moonma (2021) focused on Students' satisfaction with collaborative writing using Google Docs and in face-to-face mode. Pheng et al. (2021) explored secondary school English teachers' perceptions of technology use in teaching writing.

Various studies have long revealed that perception, defined as the process of forming the world's picture (Mannopovna, 2019), is an essential success factor in learning. In technology-assisted language learning, learners' perspectives are vital because their views of the learning systems and materials influence their engagement, and engagement is crucial to their learning and satisfaction due to the limited opportunity for face-to-face engagement with teachers (Martin & Bolliger, 2018). Research has also shown the importance of attitude and belief in second and foreign language learning because attitudes and beliefs affect language learners' success or failure (Thompson, 2021). Language learners with positive attitudes persist on achieving mastery of new languages, while those with negative attitudes impede learning. Therefore, TECW research focusing on learners and teachers' perceptions and attitudes is necessary, as the results will provide a better understanding of learners and teachers' observed behavior of TECW process, activities, and outcomes. Regarding this, because only one study focused on teachers' perceptions of TECW, more future TECW studies are needed to focus on this strand.

Research Findings

Table 2 shows that the 19 studies investigating TECW outcomes reported positive results, among which, as evidenced by 11 studies, the most prominent outcome was participants' writing performance improvement after learning in TECW. This outcome is supported by two other outcomes revealing the effectiveness of TECW—students learning in TECW outperformed the students in F2F group writing (3 studies) and students in individual technology-assisted learning (1 study). These three outcomes validate the significant contributions technology has made to facilitate writing practice (P. L. Liu et al., 2022). The next outcomes demonstrate the effectiveness of technological tools to create a sense of community and enhance students' engagement. The affordability of various communication and collaborative editing tools in technology has a high potential to promote and advance collaboration, participation, and knowledge construction and sharing (Veerman & Veldhuis-Diermanse, 2001). Other outcomes

reveal the usefulness of peer and teacher feedback to increase students’ motivation, collaboration, and satisfaction.

Table 2. Distribution of Studies in Terms of Findings

Strands	Main Findings	F	
Writing Process in TECW	Technological tools, e.g., chatroom and group awareness tools, promoted students’ engagement in seeking and providing advice, eliciting and responding to elicitation, and asking questions, and these improved their writing performance	6	
	TECW facilitated students to conduct revision strategies. negotiation and reciprocal scaffolding and helped students to orient to other learners’ understanding of writing organizational aspects and to acquire complex and multimodal interactional skills to manage TECW FL writing	3	
	Students involved in TECW tended to engage in knowledge sharing, and this promoted their metacognition level in writing	2	
	Team collaboration's affecting factors included learners’ English proficiency, individual goals, individual roles, and the use of collaborative agency. Students with higher English proficiency levels contributed more.	2	
	Group leaders in TECW should be a facilitator and affective domain supporters to other members	1	
	Using the argumentative tasks in TECW promoted more peer corrections than the informative and decision-making tasks, while the informative task yielded more self-corrections than the argumentative and decision-making tasks	1	
	TECW environment had more advantages in terms of time, flexibility, and supporting creativity through multimedia tools, while F2F writing was better in terms of communication and simultaneous changes by group members	1	
	*The use of an improper collaboration style, such as a parallel composing approach, caused a majority of the students to not demonstrate a collaborative approach to writing.	1	
	TECW Outcomes	TECW improved the students’ writing performance	11
		Students learning in TECW outperformed the students in F2F group writing	3
Students learning in TECW outperformed the students in individual technology-assisted learning.		1	
Social learning analytics (SLA) added to TECW improved students' social and cognitive engagement		1	
TECW process created a sense of community		1	
Peer feedback in TECW significantly correlated with learners’ motivation, collaboration, and course satisfaction.		1	
In TECW, peer and teacher feedback were significantly more effective than self-feedback in assisting CW		1	
Perceptions/ Attitudes of TECW		Students had a positive perception of TECW	4
		*Due to technical difficulties, poor internet connection, time management, and personal dimensions, students found TECW implementation challenging.	3
		Students perceived technologies as useful/effective tools for learning writing	3
	Students had an overall positive attitude toward TECW	2	
	Students believed that their writing performance improved after learning to write using TECW	1	
	Students welcome Technological tools for giving and receiving feedback	1	
	Technology helped improve students’ writing skills, assist teachers as a teaching aid, and promote student engagement	1	

*Indicates negative results

In terms of the writing process in TECW, the potential power of technological tools to promote students’ engagement and collaboration were the most prominent results. This validates how the capabilities of technology can be used to build collaborative learning environments that permit students to cooperate on projects and other collaborative activities (Peeters & Pretorius, 2020). Other outcomes show how technology facilitates students’ collaboration, which engaged them in knowledge sharing during the writing process. This is feasible because technology offers students collaborative editing tools and facilitates new forms of interaction. However, technology integration into CW may have an unexpected effect, as shown by Lai et al., (2016), which reported a negative result. The study revealed that the use of an improper collaboration style

named parallel composing, in which each group member takes care of one section of the work, but only one member or nobody is involved in revising, caused most students to demonstrate a non-collaborative approach to writing (Lai et al., 2016). This confirms Mak & Coniam's (2008) finding that students' interactions and collaborations affect the nature of the writing task. TECW implementation, therefore, needs a careful consideration of the factors affecting collaboration, including students' English proficiency, individual goals, individual roles, and the use of collaborative agency (Nakhon Kitjaroonchai & Suppasetsee, 2022).

Similar to the studies investigating writing process in TECW, most studies on attitudes and perceptions of TECW also reported positive results. That is, students had positive attitude and perception of CW learning using technology; they enjoyed being involved in online CW, and found technology useful in CW learning. Teachers also voiced that technology is useful in students' writing skills improvement and in assisting teachers to promote student engagement. Three studies, on the other hand, perceived learning in TECW challenging due to, among others, technical difficulties (Brodahl & Hansen, 2014), internet constraints (Syarifudin, 2023), time management and lack of concentration (Zakaria et al., 2023). This confirms (Pardede & Purnamasari's (2021) findings showing that ICT constraints consisting of inadequate technological skills, a lack of internet quotas, and slow internet signal make online research supervision complex and challenging. Pitura (2021) suggested that even MA TEFL supervisors need guidance and regular writing opportunities to succeed in TECW. In Wang's (2014) study, the experimental group members using Wiki to practice writing were initially familiarized with the tool's features and practiced how to collaborate in it. The students in the experimental group of Valizadeh (2022) were also initially taught the collaborative writing functions of Google Doc employed in the study. Stickler & Hampel (2015) emphasized that to infuse technology effectively into their learning and teaching practices, students and teachers should improve their skills in both technical and pedagogical areas.

CONCLUSION

This paper reviewed the strands and findings of empirical research on TECW in EFL setting published from 2014 to 2023. The review results show that the research strands of the 45 selected studies concentrate on three foci: writing process, outcomes, and students' and teachers' perceptions and attitudes. CW in face-to-face or in-class setting is different from TECW; and since TECW is relatively new, researchers from the reviewed studies, to a greater extent, intended to get new insights concerning these dimensions of TECW.

In terms of research results, TECW outcomes were the most prominent, as 42% of the studies reported the effectiveness of TECW to enhance students' writing performance and develop a sense of community and engagement. Other results in this category revealed the usefulness of peer and teacher feedback to increase students' motivation, collaboration, and satisfaction. The second category of research results revealed was the writing process in TECW, covering 37.8% of the selected studies. In general, these results revealed the potential power of technological tools to promote students' engagement and collaboration, how technology facilitates students' collaboration, and how the use of improper collaboration style caused most students to practice a non-collaborative approach, implying the importance of careful consideration of the factors affecting collaboration in TECW implementation. The last category of research results revealed the positive perceptions and attitudes of students and teachers toward TECW. Therefore, both students and teachers demonstrated a strong disposition towards TECW practices. Three research results, however, revealed that technical difficulties, poor internet connection, time management, and a lack of concentration could make TECW challenging.

This review focused on the strands and findings of TECW in EFL setting, soother aspects of the reviewed studies, such as research methods, group sizes, participants' ages, educational and English proficiency levels, technologies employed, data collection methods and instruments, and data analysis techniques, were not analyzed. To fill the gap, future studies are recommended to review research on TECW in EFL setting from a wider range of aspects.

REFERENCES

- Abe, M. (2020). Interactional practices for online collaborative writing. *Journal of Second Language Writing, 49*(June), 100752. <https://doi.org/10.1016/j.jslw.2020.100752>
- Ahmad, S. Z. (2020). Cloud-based collaborative writing to develop EFL students' writing quantity and quality. *International Education Studies, 13*(3), 51–64.
- Alsubaie, J., & Ashuraidah, A. (2017). Exploring writing individually and collaboratively using Google Docs in EFL contexts. *English Language Teaching, 10*(10), 10.
- Aydin, Z., & Yildiz, S. (2014). Using wikis to promote collaborative EFL writing. *Language Learning and Technology, 18*(1), 160–180.
- Brodahl, C., Hadjerrouit, S., & Kristian Hansen, N. (2011). Collaborative Writing with Web 2.0 Technologies: Education Students' Perceptions. *Journal of Information Technology Education: Innovations in Practice, 10*(January), 073–103.
- Brodahl, C., & Hansen, N. K. (2014). Education students' use of collaborative writing tools in collectively reflective essay papers. *Journal of Information Technology Education: Research, 13*(1), 91–120. <https://doi.org/10.28945/1960>
- Çelik, Ş. S., & Aydın, S. (2021). Wiki effect on EFL Writing motivation. *Language and Technology, 3*(1), 32–47.
- Chen, S., Ouyang, F., & Jiao, P. (2022). Promoting student engagement in online collaborative writing through a student-facing social learning analytics tool. *Journal of Computer Assisted Learning, 38*(1), 192–208. <https://doi.org/10.1111/jcal.12604>
- Cho, H. (2017). Synchronous web-based collaborative writing: Factors mediating interaction among second-language writers. *Journal of Second Language Writing, 36*(April 2016), 37–51. <https://doi.org/10.1016/j.jslw.2017.05.013>
- Coskie, T. L., & Hornof, M. M. (2013). E-Best principles: Infusing technology into the writing workshop. *The Reading Teacher, 67*(1), 54–58.
- Damayanti, I. L., Abdurahman, N. H., & ... (2020). Collaborative writing and peer feedback practices using Google Docs. *Advances in Social Science, Education and Humanities Research, 546*, 225–232.
- Dörnyei, Z., & Murphey, T. (2009). *Group dynamics in the language classroom* (4th ed.). Cambridge University Press.
- Downes, J. M., & Bishop, P. A. (2015). The intersection between 1:1 laptop Implementation and the characteristics of effective middle level schools. *RMLE Online, 38*(7), 1–16.
- Elola, I., & Oskoz, A. (2017). Writing with 21st century social tools in the L2 classroom: New literacies, genres, and writing practices. *Journal of Second Language Writing.*
- Entezari, J., & Taki, S. (2018). Investigating collaborative learning through social networking on Iranian EFL learners' writing. *Journal of Applied Linguistics and Language Research, 5*(2), 261–274. <http://www.jallr.com/~jallrir/index.php/JALLR/article/view/814>
- Farahian, M., & Ebadi, S. (2022). Collaborative digital writing and metacognitive knowledge in writing among TEFL students: the mediating role of online knowledge sharing. *Research and Practice in Technology Enhanced Learning, 18*, 005.
- Fen Yeh, S. (2021). Collaborative writing on Google Docs: Taiwanese students' participation, behaviors, and writing trajectories with real-work online tasks. *Advances in Language and Literary Studies, 12*(3), 73. <https://doi.org/10.7575/aiac.all.v.12n.3.p.73>
- Forsyth, R. D. (2019). Group dynamics. In *Theory and Practice of Curriculum Studies* (7th ed.). Wadsworth Cengage Learning.
- Godwin-Jones, R. (2018). Second language writing online: An update. *Language Learning &* <https://scholarspace.manoa.hawaii.edu/handle/10125/44574>
- Gündüz, Z. E. (2023). Teaching writing with wiki-based collaborative writing tasks in an EFL context at higher education. *Acuity: Journal of English Language Pedagogy, Literature, and*

- Culture*, 8(1), 68–86. <https://jurnal.unai.edu/index.php/acuity/article/view/2807>
- Heinze, A., & Heinze, B. (2009). Blended-learning skeleton of conversation: Improving formative assessment in undergraduate dissertation supervision. *British Journal of Educational Technology*, 40(2), 294–305.
- Hsu, H. C., & Lo, Y. F. (2018). Using wiki-mediated collaboration to foster L2 writing performance. *Language Learning & ...*, 22(3), 103–123.
- Jiang, W., & Eslami, Z. R. (2021). Effects of computer-mediated collaborative writing on individual EFL writing performance. *Computer Assisted Language Learning*, 35(3), 1–30. <https://doi.org/10.1080/09588221.2021.1893753>
- Kademi, A. S. (2021). The Impact of ICT Towards Saudi EFL Students' Writing Skills: A Quasi-Experimental Study. *ELT Worldwide*, 8(2), 206–221.
- Kitjaroonchai, N., & Suppasetsee, S. (2021). A Case Study of ASEAN EFL Learners' Collaborative Writing and Small Group Interaction Patterns in Google Docs. *English Language Teaching*. <https://eric.ed.gov/?id=EJ1296620>
- Kitjaroonchai, Nakhon, & Loo, D. B. (2023). Who are active and inactive participants in online collaborative writing? Considerations from an EFL setting. *Theory and Practice in Language Studies*, 13(10), 2565–2576. <https://doi.org/10.17507/tpls.1310.15>
- Kitjaroonchai, Nakhon, & Suppasetsee, S. (2022). The effects of online collaborative writing via Google Docs on learners' writing performance and interaction: A case study of Asian EFL learners. *English as a Foreign Language International Journal*, 2(6), 6–32.
- Klimova, B. F. (2014). Constraints and Difficulties in the Process of Writing Acquisition. *Procedia - Social and Behavioral Sciences*, 122, 433–437.
- Kolb, S. M. (2012). Grounded theory and the constant comparative method: Valid research strategies for educators. *Journal of Emerging Trends in Educational Research and Policy Studies*, 3(1), 83–86.
- Lai, C., Lei, C., & Liu, Y. (2016). The nature of collaboration and perceived learning in wiki-based collaborative writing. *Australasian Journal of Educational Technology*, 32(3), 80–95. <https://doi.org/10.14742/ajet.2586>
- Li, M., & Storch, N. (2017). Second language writing in the age of CMC: Affordances, multimodality, and collaboration. *Journal of Second Language Writing*, 36(May), 1–5.
- Li, Y. (2023). The effect of online collaborative writing instruction on enhancing writing performance, writing motivation, and writing self-efficacy of Chinese EFL learners. *Frontiers in Psychology*, 14(June), 1–15. <https://doi.org/10.3389/fpsyg.2023.1165221>
- Liu, M., Liu, L., & Liu, L. (2018). Group awareness increases student engagement in online collaborative writing. *Internet and Higher Education*, 38, 1–8.
- Liu, P. L., Ginting, A. M. G., Chen, C. J., & Yeh, H. C. (2022). Students' performance and perceptions of Wiki-based collaborative writing for learners of English as a foreign language. *SAGE Open*, 12(4), 1–12. <https://doi.org/10.1177/21582440221144953>
- Mak, B., & Coniam, D. (2008). Using wikis to enhance and develop writing skills among secondary school students in Hong Kong. *System*, 36(3), 437–455.
- Mannopovna, J. O. (2019). Psychological and pedagogical foundations of the formation of the artistic perception of students in secondary schools. *European Journal of Research and Reflection in Educational Sciences*, 7(10), 9–14.
- Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning*, 22(1), 205–222. <https://doi.org/https://doi.org/10.24059/olj.v22i1.1092>
- Mitchell, G. W., Wohleb, E. C., & Skinner, L. B. (2016). Perceptions of public educators regarding accessibility to technology and the importance of integrating technology across the curriculum. *Journal for Research in Business Education*, 57(2), 14–26.
- Mohamadi, Z. (2018). Comparative effect of online summative and formative assessment on EFL student writing ability. *Studies in Educational Evaluation*, 59(July 2017), 29–40. <https://doi.org/10.1016/j.stueduc.2018.02.003>
- Moonma, J. (2021). Comparing collaborative writing activity in EFL classroom: Face-to-face

- collaborative writing versus online collaborative writing using Google Docs. *Asian Journal of Education and Training*, 7(4), 204–215.
- ÖZDEMİR, O. (2021). A case study regarding the comparison of collaborative writing in digital and face-to-face environments. *International Journal of Psychology and Educational Studies*, 8(2), 246–258. <https://doi.org/10.52380/ijpes.2021.8.2.425>
- Palloff, R. M., & Pratt, K. (2001). *Lessons from the cyberspace classroom: The realities of online teaching*. Jossey-Bass Publishers.
- Pardede, P. (2024). Collaborative writing in EFL setting : A review. *Journal of English Teaching*, 10(1), 92–109. <https://doi.org/https://doi.org/10.33541/jet.v10i1.5631>
- Pardede, P., & Purnamasari, A. (2021). Views on the Challenges and Complexities of Online Research Supervision amid COVID-19. *Journal of English Teaching*, 7(3), 315–328. <http://ejournal.uki.ac.id/index.php/jet>
- Peeters, W., & Pretorius, M. (2020). Facebook or fail-book: Exploring “community” in a virtual community of practice. *ReCALL*, 32(3), 291–306.
- Pheng, K. T., Hashim, H., & Sulaiman, N. A. (2021). The use of technology in teaching of writing among Malaysian ESL teachers. *Arab World English Journal (AWEJ)*, 7, 314–330.
- Pitura, J. (2021). Technology-enhanced socialisation into disciplinary writing in L2: insights from the perceptions of MA TEFL students. *Computer Assisted Language Learning*, 35(9), 2361–2390. <https://doi.org/10.1080/09588221.2021.1880440>
- Razak, N. A., & Saeed, M. A. (2014). Collaborative writing revision process among learners of English as a foreign language (EFL) in an online community of practice (CoP). *Australasian Journal of Educational Technology*, 30(5), 580–599.
- Ren, J., Su, Y., Song, X., & Guo, H. (2022). Using group awareness tools to enhance students’ behavioral and cognitive engagement with peer feedback in online collaborative essay writing. *Proceedings of the 30th International Conference on Computers in Education. Asia-Pacific Society for Computers in Education*, 1, 537–542.
- Robillos, R. J., & Bustos, I. G. (2023). Unfolding the potential of technology-enhanced task-based language teaching for improving EFL students’ descriptive writing skill. *International Journal of Instruction*, 16(3), 951–970.
- Rosales, L. U., Álvarez, L. G., & ... (2020). Collaborative writing of argumentative essays in an EFL blended course: Chilean pre-service teachers’ perceptions and self-assessment. In *Íkala, revista de ...* scielo.org.co.
- Saeed, M. A., & Ghazali, K. (2017). Asynchronous group review of EFL writing: Interactions and text revisions. *Language Learning & Technology*, 21(2), 200–226.
- Sağlamel, H., & Çetinkaya, Ş. E. (2022). Students’ perceptions towards technology-supported collaborative peer feedback. *IJELTAL (Indonesian Journal of English Language Teaching and Applied Linguistics)*, 6(2), 189. <https://doi.org/10.21093/ijeltal.v6i2.978>
- Selcuk, H., Jones, J., & Vonkova, H. (2021). The emergence and influence of group leaders in web-based collaborative writing: Self-reported accounts of EFL learners. *Computer Assisted Language Learning*, 34(8), 1040–1060.
- Shadiev, R., & Yang, M. (2020). Review of studies on technology-enhanced language learning and teaching. *Sustainability (Switzerland)*, 12(2). <https://doi.org/10.3390/su12020524>
- Shehadeh, A. (2011). Effects and student perceptions of collaborative writing in L2. *Journal of Second Language Writing*, 20(4), 286–305.
- Shukor, S. S., & Hussin, H. (2015). ESL students’ perceptions on the use of facebook as a collaborative writing tool in improving writing performance. *Proceedings of the International Seminar on Language Teaching (ISeLT) 2015*, 3, 205–227.
- Soltanpour, F., & Valizadeh, M. (2017). The effect of the collaboration of reflective notes with CALL on EFL learners’ writing accuracy. *European Journal of English Language Teaching*, 2(2), 22–52. <https://doi.org/10.5281/zenodo.495361>

- Stickler, U., & Hampel, R. (2015). Transforming teaching: New skills for online language learning spaces. In R. Hampel & U. Stickler (Eds.), *Developing Online Language Teaching: Research-Based Pedagogies and Reflective Practices*, 63–77. Palgrave Macmillan.
- Storch, N. (2019). Collaborative writing. *Language Teaching*, 52(1), 40–59.
- Suwantarathip, O., & Wichadee, S. (2014). The effects of collaborative writing activity using Google docs on students' writing abilities. *Turkish Online Journal of Educational Technology*, 13(2), 148–156.
- Syarifudin, S. (2023). Online collaborative flipped writing classroom for EFL writing instruction in the new normal era: Students' perceptions. *International Journal of Arabic-English Studies*, 23(1), 257–280. <https://doi.org/10.33806/ijaes2000.23.1.14>
- Teng, M. F. (2021). Interactive-whiteboard-technology-supported collaborative writing: Writing achievement, metacognitive activities, and co-regulation patterns. *System*, 97(102426). <https://doi.org/10.1016/j.system.2020.102426>
- Thompson, A. S. (2021). Attitudes and Beliefs. In T. Gregersen & M. S. (Eds.), *The Routledge handbook of the psychology of language learning and teaching* (pp. 149–160).
- Tompkins, G., Campbell, R., Green, D., & Smith, C. (2014). *Literacy for the 21st century*. Pearson Australia.
- Valizadeh, M. (2022). Collaborative writing on Google Docs: Effects on EFL learners' descriptive paragraphs. *IJELTAL (Indonesian Journal of English Language Teaching and Applied Linguistics)*, 6(2), 277. <https://doi.org/10.21093/ijeltal.v6i2.1053>
- Veerman, A., & Veldhuis-Diermanse, E. (2001). Collaborative learning through computer-mediated communication in academic education. In P. Dillenbourg (Ed.), *Proceedings of the 1st European Perspectives on Computer-Supported Collaborative Learning: European Conference on Computer-Supported Collaborative Learning* (pp. 625–632).
- Wang, Y. C. (2014). Using wikis to facilitate interaction and collaboration among EFL learners: A social constructivist approach to language teaching. *System*, 42(1), 383–390.
- Wang, Y. C. (2015). Promoting collaborative writing through wikis: a new approach for advancing innovative and active learning in an ESP context. *Computer Assisted Language Learning*, 28(6), 499–512. <https://doi.org/10.1080/09588221.2014.881386>
- Yeh, S.-W., & Chen, C.-T. (2019). EFL learners' peer negotiations and attitudes in mobile-assisted collaborative writing. *Language Education and Assessment*, 2(1), 41–56.
- Yim, S., & Warschauer, M. (2017). Web-based collaborative writing in L2 contexts: Methodological insights from text mining. ... *Learning & ...* <https://scholarspace.manoa.hawaii.edu/handle/10125/44599>
- Zakaria, N., Ibrahim, N., Rahmat, N. H., Noorezam, M., & Sa'adan, N. (2023). Exploring online writing collaboration through Herzberg's two factor theory: A case study. *International Journal of Asian Social Science*, 13(5), 155–164.
- Zhang, H., Song, W., Shen, S., & Huang, R. (2014). The effects of blog-mediated peer feedback on learners' motivation, collaboration, and course satisfaction in a second language writing course. *Australasian Journal of Educational Technology*, 30(6), 670–685.
- Zou, D., Huang, Y., & Xie, H. (2019). Digital game-based vocabulary learning: where are we and where are we going? *Computer Assisted Language Learning*, 34(5–6), 1–27.
- Zou, D., Xie, H., & Wang, F. L. (2023). Effects of technology enhanced peer, teacher and self-feedback on students' collaborative writing, critical thinking tendency and engagement in learning. *Journal of Computing in Higher Education*, 35, 166–185.