



A Systematic Review of Technology-Mediated Feedback Research: Insights and Future Directions

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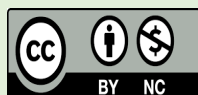
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Abstract

This study builds on previous reviews of technology-mediated feedback up to 2020 to provide an updated account of research conducted from 2020 onwards. It offers an overview of contextual trends, feedback focus, and the types of technology and software used. The analysis focuses on peer-reviewed studies examining technology-mediated corrective feedback on writing in EFL or ESL contexts, using quantitative or mixed methods approaches. Data were coded using an Excel sheet, and frequencies were reported as percentages. The major findings indicate that technology-mediated feedback is more prevalent in higher education, emphasizing the importance of leveraging technology for enhancing feedback practices. Additionally, half of the publications employed a mixed-methods approach, contributing to a more comprehensive understanding of the topic. However, some studies lacked methodological transparency; therefore, the study highlights the need for stricter reporting guidelines. Furthermore, the findings reveal that teachers and computers are the primary sources of feedback in technology-mediated settings, aligning with their significant roles in traditional and online learning environments. According to the findings, educators are encouraged to adopt technology-mediated feedback in higher education and engage in training and professional development in this area. Moreover, researchers are recommended to continue conducting mixed-methods studies by following more rigorous transparency guidelines.

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Introduction

The importance of effective feedback in education is established in the literature. Feedback is a crucial component of the learning process, informing learners about their performance potential, identifying areas for improvement, and motivating them to continue learning (Li, 2010). Constructive feedback helps students understand where they excel and where they need more work, enabling them to focus their efforts. It is notable that, according to Zohrabi and Khalili (2024) written corrective feedback (WCF) can have both short and long-term impacts on learners writing performance. Learners may continue to make the same mistakes or misunderstandings without feedback, leading to frustration and disengagement and less satisfactory learning outcomes (Van der Kleij et al., 2015). Additionally, regular feedback allows teachers to monitor student learning, adjust instruction, and provide guidance tailored to individual needs (Hargreaves, 2012). However, traditional feedback methods, such as written comments or face-to-face meetings, have limitations, ranging from time constraints, inconsistencies and a lack of personalization (Yousefi & Nassaji, 2019). Furthermore, traditional feedback faces challenges such as bias, limited perspective, timing, delivery, and emotional impact. Personal preferences can influence feedback, may not provide a complete picture, may not be timely or relevant, may not be delivered effectively, and can have a negative emotional impact (Denton et al., 2008). Technology-mediated feedback has the potential to overcome these limitations by providing more timely, consistent, and personalized feedback that addresses learners' needs and preferences in an efficient manner (Heift, 2019).

In recent years, the use of technology to provide feedback in various educational settings has gained increased attention since it has the potential to enhance the effectiveness and efficiency of feedback delivery (Cunningham, 2019). With the widespread outbreak of COVID-19 in early 2020, most educators and learners worldwide had to resort to online platforms and hold virtual classes, bringing into focus the imperative of technology-mediated instruction. Since then, reliance on technology-mediated feedback has become even more common due to remote and online learning, which has become the new norm for main educational enterprises (Loncar et al., 2021). Drastic changes in adopting technology as a means of instruction and, by extension, evaluation have also resulted in shifts in research studies conducted in this field (i.e., technology-mediated feedback). For instance, researchers may adopt original ways to measure the efficacy of technology-mediated feedback. This time frame (i.e., 2020 onwards) is significant because, according to Loncar et al., (2021), it captures the period marked by the COVID-19 pandemic, which has significantly accelerated the adoption and integration of technology in education (Vladova et al., 2021). The literature baryl has a systematic review of the publications of this period. To this end, we provide a comprehensive overview of the latest research in this area. We hope to inform and guide future developments and practices in technology-mediated feedback in education. For this purpose, this account will identify the most frequently recurrent trends in the publications, including context-related information, feedback focus, software used, etc.

The current systematic review builds on previous reviews of technology-mediated feedback in education by focusing specifically on studies published after 2020. It aims to identify trends

in technology-mediated feedback research, evaluate its effectiveness compared to traditional methods, and examine factors influencing its implementation. Therefore, this meta-analysis is essential for educators, researchers, and policymakers interested in understanding the current state of technology-mediated feedback in education and its promises to enhance learning outcomes. By synthesizing and evaluating the latest research, the present review will render a comprehensive and up-to-date picture of the effectiveness of technology-mediated feedback and the factors that might influence it, informing best practices and guiding future research in this area.

1. Literature Review

1.1. Theoretical Background

1.1.1. The Advantages of Technology-Mediated Feedback

Technology integration into L2 English writing education has emerged as an increasingly crucial aspect, as it offers learners access to diverse resources and feedback that can augment their writing development (Williams & Beam, 2019). Technology-mediated feedback is effective in promoting L2 English writing proficiency, as it provides learners with personalized feedback and support that enhances their learning experience. By leveraging technological tools, learners can receive real-time feedback on their writing, enabling them to identify areas of strength and weakness and adjust their writing strategies accordingly. Additionally, technology-mediated feedback can facilitate peer-to-peer collaboration, allowing the learners to share their writing with classmates and receive constructive feedback, further enhancing their writing development. As such, integrating technology in L2 English writing education presents a promising avenue for improving learners' writing skills and fostering a more engaging and collaborative learning environment.

Technology-mediated feedback is important in L2 English writing education because it provides learners with personalized feedback and support that enhances their learning experience. Through various technologies and feedback sources, learners can receive immediate and targeted feedback to promote their writing development and help them achieve their language learning goals. The need for a literature review of technology-mediated feedback for L2 English writing published from 2020 onwards arises from the rapidly evolving nature of technology and the need to explore new trends and insights in this area to inform L2 English writing education and practice. Besides, this time is also marked by the widespread COVID-19 pandemic, which revolutionized and fostered technology-mediated instruction, intensifying the employment of technology-mediated feedback (Loncar et al., 2021).

Various technologies and feedback sources, such as online writing platforms and automated writing evaluation systems, have been shown to improve learners' writing skills and support their language learning goals by providing learners with personalized and immediate feedback that enhances their learning experience (Ryan et al., 2016). (Mathisen, 2012). However, to maximize the effectiveness of technology-mediated feedback, it is important to carefully consider the advantages and limitations of different technologies and feedback sources and to integrate them to support learners' needs and promote their writing development.

1.1.2. Various Technologies to Provide Feedback

Various technologies have been used in L2 English writing education, including computer-mediated communication tools (e.g., email, instant messaging), online writing platforms (e.g., Google Docs), and automated writing evaluation systems (e.g., Turnitin) (Topacio, 2018). These technologies have been shown to promote collaborative writing, facilitate peer feedback, and provide learners with automated feedback to support their writing development (Topacio, 2018). Grammarly is one of the most popular tools that provides feedback on grammatical accuracy. According to Ebadi et al. (2022), incorporating technology-mediated feedback (e.g., Grammarly) with teacher corrective feedback can best influence students' writing performance. In alignment with Ebadi et al. (2022), Cunningham (2019) also revealed a positive attitude regarding technology-mediated feedback on the part of students. What is of significance is the fact that the incorporation of technology-mediated feedback does not deny the constructive role of feedback provided directly by teachers. Therefore, it is important to remember that technology-mediated feedback performs a complementary role.

Computer-mediated communication (CMC) tools, such as email and instant messaging, have also been widely used in L2 English writing education to facilitate real-time feedback and communication between learners and teachers (Lim & Phua, 2019). These tools allow personalized and timely feedback to enhance learners' writing development. Online writing platforms like Google Docs have also facilitated collaborative writing and peer feedback in L2 English writing education (Jiang & Ribeiro, 2017). These platforms allow multiple users to edit and comment on a single document, promoting collaborative learning and providing learners with diverse feedback from their peers.

Automated writing evaluation systems, such as Turnitin, have provided learners with automated feedback on their writing, including grammar, vocabulary, and organization (Alharbi & Al-Hoorie, 2020). These systems can provide learners with immediate feedback supporting their writing development. Still, they also have limitations regarding accuracy and ability to provide feedback on higher-order writing skills, such as argumentation and critical thinking. Overall, technology in L2 English writing education provides learners with various tools and sources of feedback to enhance their writing development. However, it is important to carefully consider the advantages and limitations of different technologies and feedback sources and to integrate them to support learners' needs and promote their writing development.

1.1.3. Challenges of Technology-Mediated Feedback

Challenges of technology-mediated feedback in EFL (English as a Foreign Language) writing instruction are multifaceted. Alsahli & Meccawy (2022) highlight a significant challenge in the disparity between teachers and students regarding perceptions of Online Corrective Feedback (OCF). This incongruence underscores the importance of aligning feedback practices to ensure effectiveness in improving EFL students' writing skills. Additionally, Wang (2022) points out that engaging in extended feedback dialogues in the L2 (second language) poses a central challenge for EFL teachers, emphasizing the complexity of providing comprehensive feedback within language learning contexts. Moreover, the study by Wang (2022) emphasizes the necessity of addressing negative perceptions and enhancing the effects of computer-mediated feedback in ESL/EFL writing. This suggests that overcoming resistance or skepticism towards

technology-mediated feedback is crucial for its successful implementation in EFL writing education. Furthermore, Wibowo (2021) on teaching EFL writing using Google Docs for feedback underscores the importance of innovative approaches to technology integration in providing feedback, indicating the need for educators to adapt to new tools and platforms to enhance the feedback process effectively. The use of technology in L2 English writing education also poses challenges, such as the need for learners and educators to develop digital literacy skills, the potential for technological glitches and errors, and the risk of overreliance on technology at the expense of other important writing skills (Bahari & Gholami, 2022). Overall, the challenges of technology-mediated feedback in EFL writing instruction encompass issues such as discrepancies in feedback perceptions, the complexity of engaging in extended feedback dialogues, addressing negative perceptions towards technology, and the necessity for innovative approaches to feedback provision. Educators in EFL contexts must navigate these challenges by fostering alignment in feedback perceptions, developing strategies for comprehensive feedback dialogues, addressing resistance towards technology, and embracing innovative tools for feedback provision to enhance EFL writing instruction effectively.

1.1.4. Empirical Background

The literature suggests that technology-mediated feedback is a practical approach to promoting L2 English writing development. Technology in L2 English writing education provides learners with a range of tools and feedback sources that can enhance their writing skills and support their language learning goals. However, it is important to continue investigating the effectiveness of different technologies and feedback sources and to develop best practices and effective strategies for integrating technology into writing instruction.

The latest systematic review of technology-mediated feedback was conducted by Loncar et al. (2021). However, for the reasons mentioned above, it has failed to consider the studies published after 2019. This study best serves as a basis for the present account as they advocate the same objectives: identifying trends and commonalities, pointing out weaknesses in research, and suggesting ideas for modifications in research trends. This study's summary of Loncar et al. (2021) is provided below.

The study by Loncar, Schams, and Liang examines trends in the literature on technology-mediated feedback for L2 English writing published between 2015 and 2019. The researchers systematically reviewed 79 studies that identified leading journals and contextual trends. They found that multiple technologies and sources were used for feedback, including automated feedback systems, peer feedback, and teacher feedback. The study also identified several factors that influenced the effectiveness of technology-mediated feedback, such as the type of technology used, feedback provided, and learner characteristics. The findings of this study provide insight into the current state of technology-mediated feedback for language learning and highlight areas for future research and development.

However, a major limitation of this study was the number of databases on which the search for articles was based; therefore, a more meticulous search process can be followed in other studies of the sort that take into account more databases. Identifying methodological trends in technology-mediated feedback research can help guide future studies on the topic and illuminate areas where more attention and work are required. Additionally, identifying

methodological trends facilitates knowledge exchange and promotes the adoption of best practices across different disciplines and contexts. Due to the aforementioned reasons, suggestions, and limitations, the literature on the topic requires further investigation. Thus, the following research questions were addressed in this study:

Research Question 1: What are the most recurrent contextual trends in the publications on technology-mediated feedback in writing from 2020 onwards?

Research Question 2: What are the recurrent trends for feedback focus, type of technology and software used in the publications from 2020 onwards?

2. Method

2.1. Design of the Study

The present study quantitatively measures the major trends of the publications of prestigious journals on technology-mediated feedback from 2020 onwards. Initially, the researchers defined some research questions based on the start of the data collection process. All of the research questions of this study concern the same domain of technology-mediated feedback. After defining the research questions, our search for articles started. As is inferable from the study's title, all qualitative studies were excluded. The researchers included publications from 2020 onwards since previous studies (i.e., Loncar et al., 2021) have already investigated studies up to 2019, and according to the same study, publications after 2020 “would best be addressed in a separate review” (p.9).

3. Materials

3.1. Study Selection

We conducted a literature search in Google Scholar and Web of Science using the following keywords: technology-mediated feedback, computer-assisted language learning (CALL), feedback in EFL/ESL, online feedback, digital feedback, automated feedback, intelligent tutoring systems, and second language writing feedback.

The researchers tried to take the same steps as previous reviews (e.g., Loncar et al., 2021). It should be noted that data were treated objectively, and the researchers tried to minimize bias in selecting and reporting data; moreover, all sources selected for further analysis were acknowledged.

Google Scholar and Web of Science are widely used academic search engines offering access to scholarly literature. However, there are differences in terms of comprehensiveness, coverage, and functionalities between the two platforms. Google Scholar indexes a vast range of scholarly literature and covers various disciplines. One of the key strengths of Google Scholar is its ability to search across multiple languages and provide citation metrics, which can help assess the influence and impact of scholarly work. However, it may have limitations regarding search accuracy and lack certain advanced search features available in dedicated databases.

Web of Science focuses on scientific disciplines and indexes a curated selection of high-quality, peer-reviewed journals, conference proceedings, and patents. It includes citation data, allowing users to track citations, identify influential works, and analyze citation patterns. It

also offers advanced search options, such as field-specific search filters, citation network analysis, and the ability to track research trends. It is widely considered a reliable and authoritative source for scientific research.

In summary, while Google Scholar provides a comprehensive search across disciplines and sources, Web of Science offers a more focused and curated selection of high-quality research literature with advanced search functionalities. The researchers combined both platforms to ensure a more comprehensive coverage of relevant literature for their specific research needs.

The following inclusion/exclusion criteria were employed to decide which articles to be included for further analyses.

Table 1. *Inclusion/Exclusion Criteria*

Inclusion Criteria	Exclusion Criteria
Studies published in peer-reviewed journals after 2020	Studies that are not published in peer-reviewed journals after 2020
Studies that focus on technology-mediated corrective feedback in EFL or ESL contexts	Studies that do not focus on technology-mediated corrective feedback in EFL
Studies that employ quantitative or mixed-methods approaches	Studies that use correlational or descriptive designs
Studies that include a comparison group (e.g., control group, alternative feedback group)	Studies that employ qualitative approaches
Studies that include measures of language proficiency (e.g., grammar, vocabulary, writing, speaking, listening)	Studies that do not report empirical data on the effectiveness of technology-mediated corrective feedback in EFL
Studies that use established measures of language proficiency (e.g., TOEFL, IELTS, CEFR, proficiency exams)	Studies that do not include a comparison group
Studies that are available in English	Studies that do not include measures of language proficiency
	Studies that use measures of language proficiency that are not established or validated
	Studies that are not available in English

We selected ten articles for our analyses based on our keyword search and inclusion/exclusion criteria. Table 2 represents the selected articles.

Table 2. *Selected Articles*

Title	Author	Year
Exploring the effect of computer-mediated teacher feedback on the writing achievement of Iranian EFL learners: Does motivation count?	Sherafati, N., Largani, F. M., & Amini, S.	2020
Accuracy development in L2 writing: Exploring the potential of computer-assisted unfocused indirect corrective feedback in an online EFL course	Brudermann, C., Grosbois, M., & Sarré, C.	2021
A Journey to Learner Autonomy and Self-Efficacy via Technology-Mediated Scaffolding	Eguara, O.	2021

Exploring Different Technology-mediated Feedback Modes on EFL Learners' Writing Performance in a Cross-cultural Learning Project	Huang, H. W., Zhu, Y., & J. Mills, D.	2021
Technology-Mediated Written Corrective Feedback: EFL Teachers' Beliefs and Their Practices	Al Maqbali, A. M. K., & Mohin, M.	2022
The Effects of Mobile-mediated Explicit and Implicit Feedback on EFL Learners' Use of English Prepositions	Azizi, D. B., Gharanjik, N., & Dehqan, M.	2022
Public Speaking and Online Peer Feedback in a Blended Learning EFL Course Environment: Students' Perceptions	El Mortaji, L.	2022
Synchronous Computer-Mediated Corrective Feedback and EFL Learners' Grammatical Knowledge Development: A Sociocultural Perspective	Mardian, F., & Nafissi, Z.	2022
Exploring the effects of automated written corrective feedback, computer-mediated peer feedback, and their combination mode on EFL learners' writing performance	Tan, S., Cho, Y. W., & Xu, W.	2022
Multimodal Technology-Mediated Feedback in Second Language Writing Classes Through Screen-casting.	Savaşçı, M., & Akçor, G.	2023

4. Procedure

Coding

The selected articles were reviewed and coded for (A) author, year, and journal; (B) research site country; (C) educational context (primary, secondary, or tertiary); (D) feedback focus (global, local, or both) and level or scope of focus (highly-focused, semi-focused, or comprehensive); (E) feedback type (direct/indirect), treatment (formative/summative), delivery mode (synchronous/asynchronous); (F) technology type; (G) research orientation and design; and (H) source of feedback (Loncar et al., 2021, p. 34). Contextual trends were analyzed to understand the usage patterns and contexts in which technology-mediated feedback is implemented. Analyzing feedback focus enabled the researchers to provide implications for future researchers. Exploring types of technology and software offers insight into available technologies and their potential affordances for enhancing feedback provision in L2 writing. [See the Appendix for a complete demonstration of the codes, which served as the basis of further analyses in this study].

Table 3. Codes

Codes and Definitions
Author, year, journal
Research site country
Educational context: primary, secondary, tertiary
Feedback focus: global, local, both
Feedback scope: highly focused, semi-focused, comprehensive
Feedback type: direct, indirect
Treatment: formative, summative
Delivery mode: synchronous, asynchronous
Technology type
Research orientation
Source of feedback

Interrater reliability is quite significant for making decisions in science. In synthetic studies, where one coder might make a mistake in coding, inter-coder reliability can be used to guarantee that such mistakes have been dealt with and solved. Interrater reliability (IRR) /inter-coder reliability (ICR) is the degree to which a pair of raters agree in their judgment of a specific issue (Warrens, 2015). IRR and ICR are significant in that they show the degree to which the collected data are correct representations of the measured variables. Several methods exist for calculating IRR/ICR, including: 1. Percent agreement for two raters, 2. Percent agreement for multiple raters, 3. Interclass correlation, 4. Intra-class correlation, 5. Cohen's Kappa, 6. Fleiss' Kappa, and 7. Krippendorff's Alpha (Everitt & Skrondal, 2010).

In the present study, 10% of the articles were peer-rated and selected randomly. Riazi et al. (2018) also reported that "to establish reliability, we conducted inter-coder analyses of 25 randomly selected articles (about 10% of the sample)" (p.43). In the present study, the peer was a former classmate and friend. She is currently an MA student of English Language and Literature. All the employed codes and the whole coding process were explained to her in detail. The researcher asked the peer to code the data in a parallel Excel sheet (a parallel to the sheet the researcher had developed) and later calculated the inter-coder reliability. For this study, and because we have only two coders, the researcher used simple percentage agreement to calculate the amount of inter-coder reliability. We reached an overall agreement of 88% by negotiating some issues.

5. Data Analysis

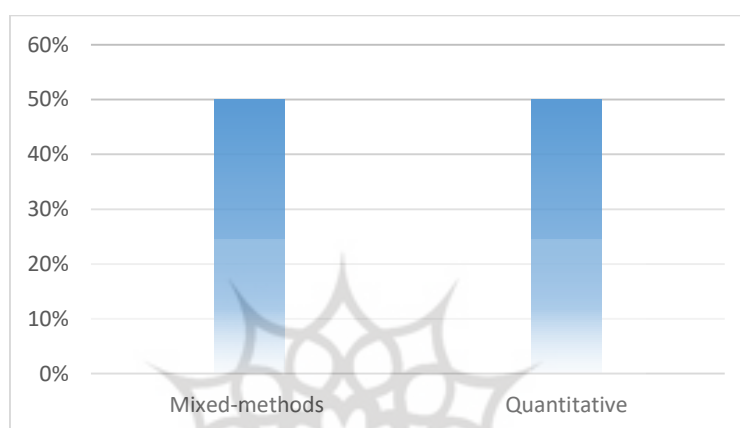
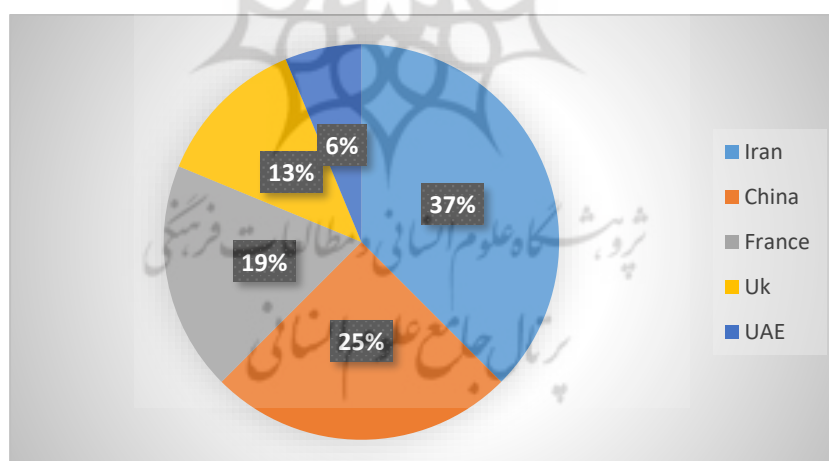
For the primary synthesis, the researchers utilized spreadsheet software (Excel) to apply coding to the articles, and the extracted data were subsequently subjected to additional analyses. The primary statistical calculation employed in this study was the calculation of simple percentages. The articles were examined for the themes above and categorized based on the presence or absence of these themes in the manuscripts. The frequency of the extracted data related to each theme was calculated, and the results were visually represented using graphs that effectively illustrate the variations among the most prevalent themes. It is important to emphasize that the data selected for presentation in the graphs comprised the most frequently coded information among the articles.

6. Results

According to the data, most articles on technology-mediated feedback that suited the inclusion/exclusion criteria of the present study were published in 2022 (%50). Since the researchers had decided to include mixed-methods studies as well, half (%50) of the included studies had employed mixed-methods designs. The publications were selected from Education and Information Technologies, ReCALL, Proceedings of ICERI 2021 Conference, International E-Journal of Advances in Social Sciences, Theory and Practice of Second Language Acquisition, ELT, IJLTR, Interactive Learning Environments, and New Directions in Technology for Writing Instruction respectively. The publications were mainly conducted in Iran, China, France, the UK, and UAE. The following table represents the leading journals in publishing studies on technology-mediated feedback for writing.

Table 4. *Leading Journals*

Education and Information Technologies
ReCALL
Proceedings of ICERI 2021 Conference
International E-Journal of Advances in Social Sciences
Theory and Practice of Second Language Acquisition
ELT (English Language Teaching)
IJLTR (Iranian Journal of Language Teaching Research)
Interactive Learning Environments
New Directions in Technology for Writing Instruction

**Figure 1.** *Distribution of Research Orientations***Figure 2.** *Distribution of Publications*

In the analyzed studies, most publications included university-level participants (50%), suggesting that technology-mediated feedback better suits and is more applicable at tertiary levels. Most of the researchers provided feedback directly at a global level, suggesting that indirect methods of feedback delivery (e.g., highlighting and underlining) are not accounted for well in research. The scope of the present study also revealed that the types of feedback provided were used for formative purposes (90%) in both synchronous and asynchronous ways. This implies that technology-mediated feedback does not suit summative assessment purposes and is better compliant for informing teaching throughout writing courses.

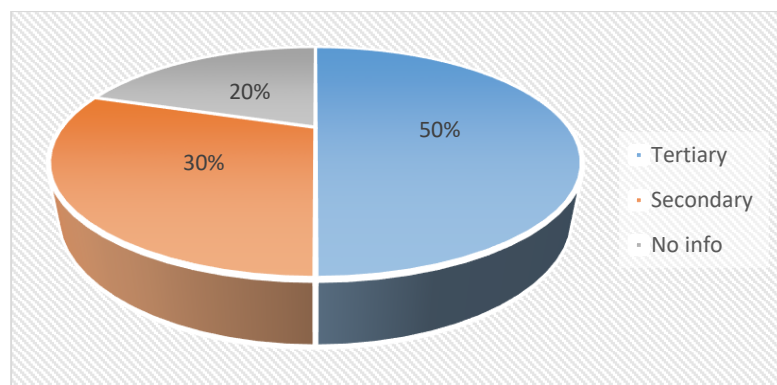


Figure 3. Educational setting

The following table summarizes the most outstanding features of technology-mediated feedback provided in studies published after 2020.

Table 5. Technology-mediated feedback focus

Feedback focus	Feedback type	Treatment	Delivery mode
Global	Direct	Formative	A/Synchronous

The finding that both synchronous and asynchronous technology-mediated feedback was employed in research papers supports that this type of feedback applies for both in-class and out-of-class purposes. Figure 1 best summarizes the percentage of the most frequently reported educational contexts, feedback focus, feedback type, treatment and delivery mode. The table's significance is that in about 20 percent of the studies, the synchronous/asynchronous type of feedback or the direct/indirect mode of feedback delivery was not identifiable. This lack of transparency in reporting practices can cause a lack of engagement of the reader in the critical evaluation of the work and can make replication processes quite demanding. Furthermore, as it appears, such publications do not adhere to the Open Science guidelines, which advocate maximum methodological transparency and even encourage data availability.

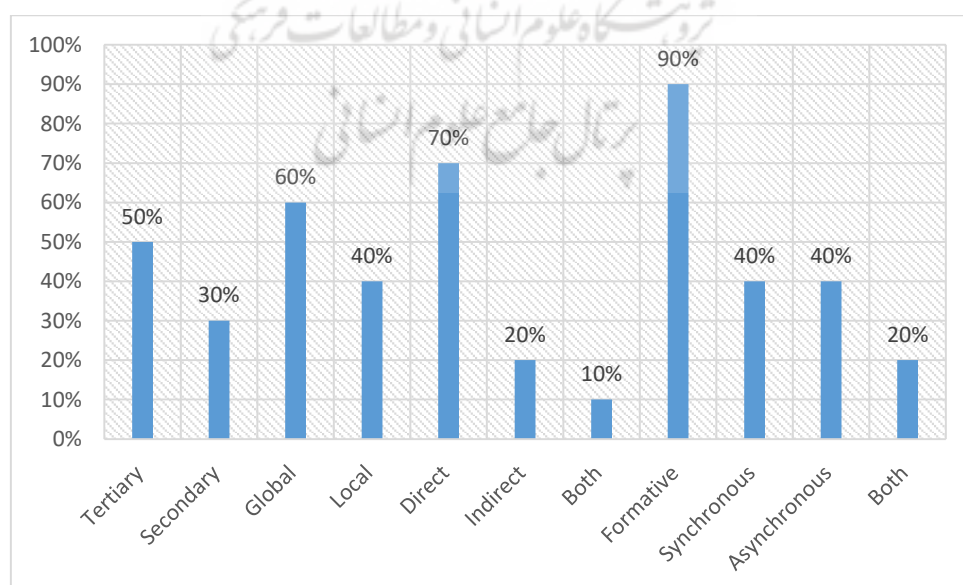


Figure 4. Frequency Percentages

Analyses of the data also suggest that computers, video-based feedback blogs, WhatsApp, Skype, and screen-casting are among the most popular technologies used to provide feedback to learners. Moreover, teachers and computers are considered recurrent sources of feedback in the publications. In about 20 percent of the publications, peers also turned out to be useful sources of providing feedback, although research on this feedback source is still scarce and requires further investigation. Table 3 best visualizes the findings.

Table 6. *Themes, Subthemes, and Frequency Percentages*

Themes	Subthemes	Frequency Percentages
Context	Tertiary level	50%
	Secondary level	30%
Feedback focus	Global	60%
	Local	40%
Feedback type	Direct	70%
	Indirect	20%
Feedback purpose	Formative	90%
Feedback mode	Synchronous	40%
	Asynchronous	40%
Feedback Source	Teachers	60%
	Computers	40%

7. Discussion

This study's findings significantly contribute to the existing knowledge on technology-mediated feedback in EFL and ESL contexts. Firstly, the predominance of tertiary-level participants in the studies reviewed aligns with the findings of prior research (Loncar et al., 2021), indicating that technology-mediated feedback is more prevalent and useful in higher education settings. This finding is in line with prior research, such as the work by (Zhao, 2010), which delves into the role of peer feedback in enhancing ESL/EFL learners' writing proficiency. Additionally, Chen (2014) underscores the significance of technology-supported peer feedback in ESL/EFL writing classes, emphasizing the value of grounded theory and asynchronous communication in feedback processes. The study by Alsahli & Meccawy (2022) on challenges faced by EFL teachers and learners in providing online corrective feedback underscores the need to overcome obstacles in utilizing technology for feedback effectively. Thus, the findings underscore the importance of leveraging technology to enhance feedback practices in higher education, which collectively contribute to enhancing our understanding of the complexities and opportunities associated with technology-mediated feedback in EFL writing education.

Secondly, the widespread use of mixed-methods approaches in approximately 50% of the publications reviewed is a positive development that reflects an increasing recognition of the value of combining quantitative and qualitative methods to gain a more comprehensive understanding of the topic. Johnson and Onwuegbuzie (2004) emphasize the significance of mixed methods research, highlighting the value of combining quantitative and qualitative methods to gain a more comprehensive understanding of research topics. This finding highlights the need for researchers to adopt rigorous and transparent research practices to

enhance the reliability and validity of their findings. Methodological transparency can further initiate debates and discussions concerning the rigor and trustworthiness of publications. However, the fact that 20% of the publications did not report their methodologies in full detail is a cause for concern, as it may indicate a lack of methodological transparency and rigor in some studies. This finding underscores the importance of adhering to rigorous research practices and reporting guidelines to ensure the validity and reproducibility of research findings in technology-mediated feedback.

Finally, the finding that teachers and computers are the major sources of feedback in technology-mediated settings is not surprising, given their respective roles in both traditional and online learning environments (Cunningham, 2019). This finding, in alignment with Ebadi et al. (2022), highlights the need for educators to leverage technology in innovative ways to enhance feedback practices and improve student learning outcomes. Delgado and Hidalgo (2020) found that teachers' corrective feedback remains the main source for effective feedback, while technology-mediated methods are increasingly recognized as valuable sources for effective feedback in ESL/EFL contexts. This evolution emphasizes the importance of educators adapting to technological advancements to optimize feedback provision. Additionally, Boling and Beatty (2010) demonstrated that cognitive apprenticeship in computer-mediated feedback can enhance both the quantity and quality of feedback over time, benefiting students' learning experiences. This suggests that integrating technology into feedback processes can improve students' learning not only from teachers but also from peer interactions. The findings of study showcased the significance of collaboration between teachers and technology in providing feedback that can result in more effective and comprehensive feedback practices in EFL writing education.

Overall, the study's findings have important implications for educators, researchers, and policymakers seeking to enhance feedback practices in EFL and ESL contexts. The study's findings underscore the need for continued research and innovation in this area and the importance of adopting rigorous and transparent research practices to ensure the validity and reliability of research findings. It is also highly recommended that educators constantly seek professional development opportunities (e.g., teacher preparation courses, article reading, etc.) to keep their knowledge of technological tools of feedback up-to-date and realize how and when they should be incorporated in class. Such opportunities can significantly help employ technology-mediated feedback more efficiently. For Example, teachers must understand technology and its capabilities to integrate it into their classrooms effectively. Professional development opportunities can help them develop the necessary skills to use technology tools and platforms and to navigate the digital landscape.

Conclusion

In conclusion, this systematic review provides insights into the current research on technology-mediated feedback after 2020. Although this study only focused on quantitative studies and did not explore all relevant databases, it still provides valuable information on the prevalence and significant sources of technology-mediated feedback and the use of mixed methods in research. One of the limitations of this study is that it did not include qualitative studies, which may provide a more in-depth understanding of the experiences and perceptions

of participants in technology-mediated feedback settings. Future studies should consider including qualitative research methods to gain a more comprehensive understanding of this topic. Another limitation is that the study did not explore all relevant databases, which may have excluded some relevant studies. Researchers should address this limitation by searching a broader range of databases and sources to ensure that all relevant studies are included in systematic reviews. Furthermore, researchers should prioritize transparency in reporting their methodologies and results, as this will improve the rigor and reproducibility of research. Journal editors in chief should also emphasize the need for transparency in submissions and work to promote transparent reporting in published research. Finally, further research is needed to synthesize the results of studies on technology-mediated feedback and identify best practices for using technology to enhance learning and improve student outcomes. This can be achieved through comprehensive systematic reviews that include quantitative and qualitative research methods and the exploration of a broader range of databases. Overall, this systematic review points towards the need for further research and the importance of transparency and rigor in research practices. Based on these findings, future studies can build on this review, including a broader scope of publications and exploring the effectiveness of different types of technology-mediated feedback. Additionally, researchers can work to improve the methodological transparency and reporting of their methodologies to ensure that their findings can be simply and properly accessed, evaluated, and replicated. Overall, this review provides valuable insights into the current research on technology-mediated feedback and highlights areas for future investigation and improvement.

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Appendices

Codes and Definitions

1. Author, year, journal: who is/are the writer(s) of the work? When was it published? Which journal published the work?
2. Research site country: where was the study conducted?
3. Educational context: in which educational setting was the study conducted? 1: primary, 2: secondary, 3: tertiary
4. Feedback focus: at what level was feedback provided? 1: global, 2: local, 3: both
5. Feedback scope: how focused was the provided feedback? 1: highly focused, 2: semi focused, 3: comprehensive
6. Feedback type: how was feedback provided to the sample? 1: direct, 2: indirect
7. Treatment: what kind of purpose did the feedback serve? 1: formative, 2: summative
8. Delivery mode: what was the mode of feedback delivery? 1: synchronous, 2: asynchronous
9. Technology type: what technology was applied to provide feedback?
10. Research orientation: what was the study's orientation? 1: mixed-methods, 2: quantitative
11. Source of feedback: what as the source of feedback in the experiment?

