Effect Of Computer-Mediated Peer Written Feedback on ESL/EFL Writing: A Systematic Literature Review

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Abstract

The current systematic literature review intends to obtain a comprehensive understanding of the effect of computer-mediated peer written feedback on adult English as a second language (ESL)/English as a foreign language (EFL) writing through a systematic synthesis of primary peer-reviewed studies published from 2000 to 2016. Using a Grounded Theory approach, the included 12 studies were carefully reviewed and coded in a theme-based coding system by the authors. This review summarized information on research design, results, discussions, and limitations extracted from the included studies. The findings confirmed the conclusion from previous research syntheses on the effect of peer feedback and CMC in second language acquisition and acknowledged the positive impact of computer-mediated peer written feedback on adult ESL/EFL writing. However, factors that could fluctuate the effect of this approach were also identified, including CMC technology, types and content of peer feedback, learners' language proficiency and technology anxiety. Based on the findings, this review further proposed a) research needs in the areas of peer feedback in SLA and b) implications for ESL/EFL teachers to effectively employ computer-mediated peer written feedback as an instructional strategy in writing classrooms.

Key Words: computer-mediated communication, peer written feedback, ESL/EFL writing, systematic literature review

Introduction

As one of the main language skills for English as a second language (ESL)/English as a foreign language (EFL) learners to acquire, writing has not received as much interests as speaking in second language acquisition (SLA) until the 1980s (Warshchauer, 2013). Ortega (2012) indicated that SLA researchers often view writing as "a culture-dependent, secondary manifestation of human language" (p. 405). However, the development of computer-mediated communication (CMC) has brought SLA researchers' attention to ESL/EFL writing, focusing on how CMC benefit ESL/EFL writing performance and development. Some of the benefits are that CMC allows learners to generate more complex and formal texts than face-to-face (FTF) setting (Warshchauer, 2013), enables easy editing and text organization (Kessler, 2009), facilitates authoring flexibility, content creation, generation of new knowledge (Elola & Oskoz, 2010), and enhances learners' motivation for learning and writing (Arnold, Ducate & Kost, 2012). Moreover, CMC can also support peer collaboration (Alvarez, Espasa, & Guasch, 2012). Compared to individual ESL/EFL writing, collaborative mode is shown to be a more effective approach for writing practices and exchange of peer feedback (Chen, 2016; Shintani, 2015; Strobl, 2014).

As a key facilitator to collaboration and writing, peer feedback can promote noticing of linguistic gaps, provide mutual learning opportunities, and facilitate independent studies (Cho & MacArthur, 2010; Guasch, Espasa, Alarez & Kirschner, 2013; Yang, Badger & Yu, 2006). Furthermore, researchers indicated that peer written feedback could be more beneficial for ESL/EFL learners compared to oral feedback. Because through written feedback, ESL/EFL learners could have more time to process language input and produce language output (Sauro, 2009). In addition, peer written feedback has more visual saliency that allows learners to revisit the feedback as needed for repeated input (Sachs & Polio, 2007). For the purpose of improving ESL/EFL writing ability, peer written feedback offers more opportunities for learners to critique and reflect their own writing and facilitates learners to become independent writers (Hyland & Hyland, 2006). Comparing peer written feedback in CMC and FTF settings, researchers found that CMC offers features that cannot take place in FTF settings, such as generating feedback with better quality, enabling more evidence for noticing of linguistic gaps, enhance learning motivation (Lee, Cheung, Wong, & Lee, 2013; Wang, 2015). Therefore, the growing research interests in CMC and SLA bring researchers and language educators' attention to the value of

computer-mediated peer written feedback on writing in language classrooms.

Theoretical Frameworks

Vygotsky's (1978) Sociocultural Theory (SCT) and Interactionist Theory (Long, 1981) support the value of computer-mediated peer written feedback. First of all, both theoretical frameworks emphasize on the importance of interaction in learning (Lantolf & Thorne, 2007; Polio, 2012). Specifically, SCT highlights the influence of context on language learning and underlines the importance of scaffolding (Ozfidan, Machtmes, & Demir, 2014). In SLA, feedback is considered as a scaffolding strategy that promotes language learning, which occurs in Zone of Proximal Development (ZPD; Ellis & Shintani, 2015). ZPD represents the distance between the learners' actual self-learning level and the assisted-learning level, in which certain form of guidance or collaboration is needed (Vygotsky, 1978). It occurs that feedback functions as guidance for language learning in ZPD. From an interactionist perspective, learning is a cognitive process that requires not only language input, but also conscious awareness of the input (Long, 1981; Peterson, 2009). In other words, learning can only occur through noticing (Schmidt, 1990, 2001). Researchers acknowledge the crucial role of noticing in SLA and indicate that language development requires ESL/EFL learners to attend to the target language and be aware of the specific instances of language (Robinson, 1995; Schmidt, 2001). To raise learners' attention to notice, a form of language input (e.g., feedback) is needed. Recent studies on ESL/EFL writing favor the use of peer feedback as a means of input to facilitate language development (Ellis & Shintani, 2015).

Computer-Mediated Peer written feedback

The effectiveness of peer written feedback is supported by a number of SLA studies, especially on writing (Caulk, 1994; Cho & MacArthur, 2010; Guasch et al., 2013; Paulus, 1999; Yang et al., 2006). Compared to teacher feedback, peer written feedback could intensify the benefit of feedback on writing in terms of revisions quality (Paulus, 1999), frequency of applying feedback in later revisions (Yang et al., 2006), and opportunities for language input and output (Cho & MacArthur, 2010). In addition, implementation of technology can enhance language learning through feedback (Bennett, Bishop, Dalgarno, Waycott, & Kennedy, 2012; Ho, 2012). CMC technology with mature functions is not only a learning tool, but also a means of virtual communication, collaboration and information sharing. Computer-mediated language classroom

allow learners to employ different learning strategies that individualize learning. Consequently, learners are able to take more effort to engage in learning and possibly provide more precious and constructive feedback (e.g., Braine, 1997; Rodgers et al., 2014; Shintani, 2015; Wu, Petit, & Chen, 2015).

However, the variations (e.g., characteristic of learners, technological features, and types of feedback) of studies on computer-mediated peer written feedback were suspected to differentiate its effectiveness on SLA. For instance, the proficiency of ESL/EFL learners might influence learners' participation in interactions and writing, given our common conception that higher proficient learners could have be more confident and actively engaged in communications (Sotillo, 2005; Watanabe, 2008; Ozfidan & Burlbaw, 2017). Additionally, the computer-mediated peer written feedback in synchronous CMC and asynchronous CMC settings could distinguish the impacts on writing and SLA (Bower & Kawaguchi, 2011; Shintani, 2015). Moreover, types of feedback, ranging from simple marks of errors to metalinguistic feedback, could have an impact on writing development and learning outcomes (Alvarez et al., 2011). Therefore, to gain a comprehensive understanding of the nature of computer-mediated peer written feedback necessitates a research synthesis that systematically summarize the effects of peer written feedback in CMC setting for the purpose of classroom implementation.

To bring researchers and educators' attention to peer feedback, Chen (2016) reviewed 20 qualitative research studies from 1990 to 2010 concerning the characteristics, advantages and disadvantages of computer-mediated peer feedback. The findings confirmed that computer-mediated peer feedback could benefit ESL/EFL learners in SLA. However, the included studies in Chen's review varied on the CMC technology used for peer feedback, the types and content of peer feedback, which induced difficulties to draw a generalizable conclusion on the effectiveness of this approach. Moreover, according to other meta-syntheses on the effectiveness of CMC in SLA (Lin, 2015), writing produced the largest effect from CMC facilitation. Therefore, directed by Chen's and Lin's (2015) reviews, this systematic literature review focuses distinctly on computer-mediated peer written feedback and its effect on writing. Because successful manipulation of CMC requires certain level of computer literacy, most of the SLA studies were conducted among adult language learners, given that fact that adult learners could have more experience of using technology than younger learners. Hence, guided by the following research

questions, this review intends to examine the effectiveness of computer-mediated peer written feedback on adult ESL/EFL writing and then based on the findings, further propose implications for effective implementations of computer-mediated peer written feedback as an instructional approach in ESL/EFL writing classrooms.

1) What are the aspects that influence the effectiveness of computer-mediated peer written feedback on adult ESL/EFL writing? If any, how do these aspects affect its effectiveness?

2) How can language teachers effectively implement computer-mediated peer written feedback as a teaching strategy in ESL/EFL writing instruction?

Method

Data Collection

The authors followed a four-step searching process to retrieve studies for current systematic literature review (See *Figure 1*). First, 45 electronic database were searched through the ProQuest search engine and the ERIC databases using the following search terms: "adult ESL writing" or "adult EFL writing" or "collaborative writing" or "collaborative writing task", and "peer written feedback" or "peer written corrective feedback" or "corrective feedback" or "feedback", and "computer-mediated communication" or "CMC" or "technology-mediated communication" or "technology". Searches were limited to peer-reviewed journal articles published from 2000 to 2016 in English. The initial searches yielded 621 studies. Second, the primary author screened the abstracts using the following four inclusion criteria:

1. The study carried out among adult ESL/EFL learners that include learners who were adult learners (e.g., age above 18) and learning English in a native-English speaking or a non-native-English speaking country/region/area.

2. The study investigated certain aspects of peer written feedback, which includes any type of written feedback provided by peers on linguistic knowledge and writing skills.

3. The study addressed the effect of computer-mediated peer written feedback on writing, including learning linguistic knowledge through writing, develop writing skills, individual and collaborative writing activities, and any other form of language learning carried on writing.

4. The study included certain forms of CMC technology, including but not limited to

blogs, computer software, online discussion, websites, emails, online conference and online system.

Third, in order to maintain inter-coder reliability, the second author reviewed 10% of initial search results using the same inclusion criteria. The inter-coder screening reached 98% of agreement and the number of included studies was narrowed down to 25 studies. Last, the two authors carefully read and reviewed the 25 studies identified after abstract screening. Through a close reading, 13 out of 25 studies could not be included in the analysis due to the nature of their research purposes and questions. Therefore, 12 studies were included for the final review (See *Table 1*).

Table 1. Included Studies

Authors	Year	Title	Journal
Jun Liu; Randall W. Sadler	2003	*The Effect and Affect of Peer Review in Electronic Versus Traditional Modes on L2 Writing*	Journal of English for Academic Purposes
Shoichi Matsumura; George Hann	2004	*Computer Anxiety and Students' Preferred Feedback Methods in EFL Writing*	The Modern Language Journal
Hyland, K; Hyland, F	2006	*Feedback on Second Language Students' Writing*	Language Teaching
Yi Xu	2007	*Re-Examining The Effects and Affects of Electronic Peer Reviews in a First-Year Composition Class*	The Reading Matrix
Annick Rivens Mompean	2010	*The Development of Meaningful Interactions on a Blog Used for the Learning of English as a Foreign Languag*	ReCALL
Maria Belen Diez-Bedmar; Pascual Perez-Paredes	2012	*The Types and Effects of Peer Native Speakers' Feedback on CMC*	Language Learning and Technology
Mei-Ching Ho	2012	*The Efficacy of Electronic Peer Feedback: From Taiwanese EFL Students' Perspectives*	International Journal of Arts & Sciences
Phuong Thi Tuyet Nguyen	2012	*Peer Feedback on Second Language Writing Through Blogs: The Case of a Vietnamese EFL classroom*	Computer-Assisted Language Learning and Teaching
Saovapa Wichadee	2013	*Peer Feedback on Facebook: The Use of Social Networking Websites to Develop Writing Ability of Undergraduate Students*	Turkish Online Journal of Distance Education-
Yu-Fen Yang; Wen-Ting Meng	2013	*The Effects of Online Feedback Training on Students' Text Revision*	Language Learning & Technology

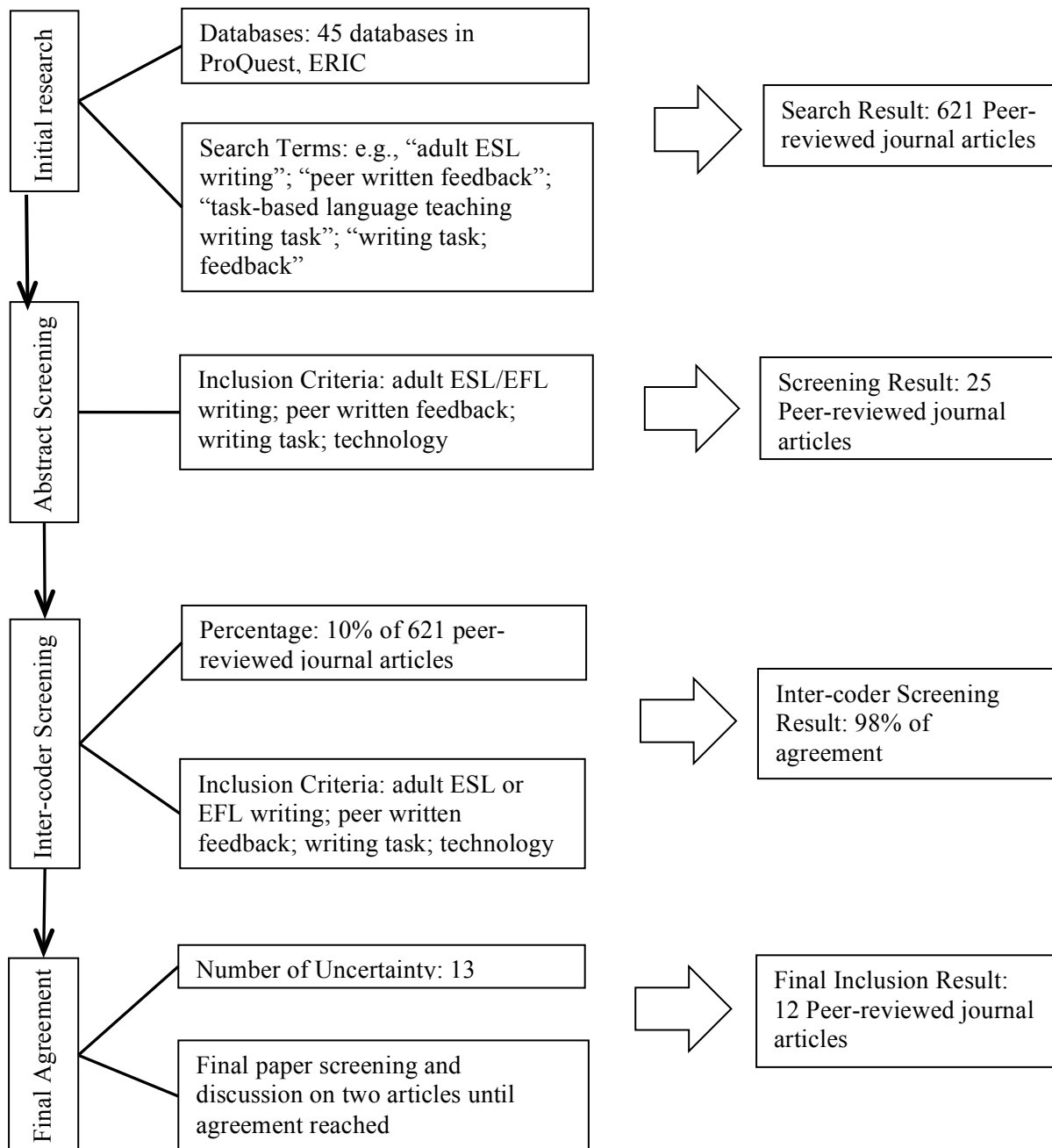| Authors	Year	Title	Journal
Ali AbuSeileek; Awatif Abualsha'r	2014	*Using Peer Computer-Mediated Corrective Feedback to Support EFL Learners' Writing*	Language Learning & Technology
Chanho Park; Sookyung Cho	2014	*The Effects of Korean Learners' Online Experiences on Their English Writing*	TOJET: The Turkish Online Journal of Educational Technology

Figure 1. Study Searching Process

Data Analysis

This review used the Grounded Theory approach to analysis the 12 included studies (Kim, 2014). A theme-based initial coding system was formed after both authors read the 12 studies in-depth (See *Table 2*). The coding system built a matrix for analyzing each detail of the studies focusing on four areas: research design, results, discussion, and limitations. Specifically, the coding system includes the following themes: methodology, country in which the study was conducted (i.e., Country), participants, CMC technology used for writing and feedback (i.e., CMC Tools), types of peer written feedback (i.e., Types), content of peer written feedback (i.e., Content), and effectiveness of computer-mediated peer written feedback (i.e., Effectiveness). One of the 12 studies was a literature review, from which the authors were not able to locate the above four coding areas. Therefore, only the 11 empirical studies were coded in the coding system; the one literature review was included in finding discussions. The two authors coded all 11 included studies and reached agreements on all decisions.

Findings

This review included 12 peer-reviewed journal articles, published from 2003 to 2014. Eleven studies were empirical studies that used mixed method (*n=6*), quantitative methods (*n=4*) or qualitative methods (*n=1*) for data collection and data analysis. One of the 12 included studies was a literature review (Hyland & Hyland, 2006) that was not included in coding. For demographic information of the participants in each study, nine of the 11 empirical studies were conducted with EFL adult learners (i.e., learners from France, Japan, Jordan, Korea, Spain, Taiwan, Thailand and Vietnam). The other two studies were conducted with ESL adult learners in the United States. The wide range of geographical areas showed that studies on computer-mediated peer written feedback and writing had received a worldwide attention from SLA researchers in recent decades. Furthermore, two themes emerged from the coding analysis: 1) the types and content of computer-mediated peer written feedback and the associated effect on ESL/EFL writing, and 2) the influence of technology on the effectiveness of computer-mediated peer written feedback.

Types and Content of Computer-Mediated Peer Written Feedback

The data showed that due to the purpose of each study, different classifications of types of peer written feedback were adapted, including purpose-driven feedback, content-specific

Table 2. Theme-based Coding System with Descriptive Information

Study	Method	Country	Participants	CMC Tools	Types	Content	Effectiveness
Liu & Salder (2003)	Quantitative	United States	Native English Speakers & ESL learners	Microsoft Word & MOO	Evaluation, clarification, suggestion and alteration	Local and global areas	A combination of traditional and technology-enhanced modes can be useful for learners that more likely result in more effective peer reviews.
Matsumura & Hann (2004)	Quantitative	Japan	EFL learners	Online class bulletin board	Online direct teacher and peer feedback; online indirect teacher and peer feedback; fact-to-face feedback	Not specified	Greatest improvement yielded from online direct teacher and peer feedback.
Xu (2007)	Mixed method	United States	ESL learners	Microsoft Word & Caucus software	Evaluation, clarification, suggestion and alteration	Local and global areas	All types were effective in both modes in improving essay quality.
Mompean (2010)	Mixed method	France	EFL learners	Blog	Comments after completion of the blog	General comments	Blog is an effective tool for collaborative writing with modifications of assessment for pedagogical purpose and using comments as the medium of giving feedback.
Diez-Bedmar& Perez-Paredes (2012)	Mixed method	Britain & Spain	Spanish as a Foreign Language (SFL) learners & EFL learners	Moodle	Affective goal-oriented feedback, simple lexical specific feedback, morphosyntactic/ lexical/affective commentary	Lexical item & morphosyntax	Different native language may affect types and acceptance rate of corrective feedback.

Study	Method	Country	Participants	CMC Tools	Type	Content	Effectiveness
Ho (2012)	Mixed method	Taiwan	EFL learners	Microsoft Word & Online Meeting	Revision-driven comments	Not specified	Modes of peer review don't influence the number of incorporated review in revision.
Nguyen (2012)	Qualitative	Vietnam	EFL learners	Blog	Revision-oriented or non-revision-oriented	Language usage & content	Students reflected on the language use in their own writing while providing peer feedback.
Wichadee (2013)	Mixed method	Thailand	EFL learners	Facebook	Revision-oriented or non-revision-oriented	Content, grammar, language use, organization, creativity	Learners writing performance significantly improved after receiving peer comments.
Yang & Meng (2013)	Mixed Method	Taiwan	EFL learners	Computer-supported collaborative learning (CSCL) system	Not specified	Local and global areas	Less-proficient students made more improvement on writing than the more-proficient students did.
AbuSeileek & Abualsha'r (2014)	Quantitative	Jordan	EFL learners	Microsoft Word	Track changes, recast, or metalinguistic	Content, structural organization (text and sentence levels), grammatical accuracy, lexical appropriateness, punctuation, and spelling	Providing computer-mediated corrective feedback by peers seemed to have enhanced students' writing performance
Park & Cho (2014)	Quantitative	Korea	EFL learners	Blog Text message	Clarification and suggestion	Not specified	Regular online writers were more active in improving their writing drafts with peer assistance.

feedback, technique-based feedback, and non-specified types. Purpose-driven feedback categorized feedback based on the functional objectives, such as revision-oriented feedback and non-revision-oriented feedback, direct and indirect feedback (Ho, 2012; Matsumura & Hann, 2004; Nguyen, 2012; Wichadee, 2013). Content-specific feedback was categorized based on the content areas of the feedback, including simple lexical specific feedback, morphosyntactic/lexical/affective commentary (Diez-Bedmar & Perez-Paredes, 2012). Another group of studies adapted Lyster and Ranta's (1997) classification, focusing on the techniques of providing feedback, such as evaluation, clarification, alteration, and suggestions (AbuSeileek & Abualsha'r, 2014; Liu & Salder, 2003; Park & Cho, 2014; Xu, 2007). However, not all studies specified the investigated feedback types. For instance, Mompean (2010) only focused on the general peer comments ESL/EFL learners provided on blog writing. Yang and Meng (2013) investigated the effect of peer written feedback provided through a computer-mediated language learning system without specific types.

In terms of content area of feedback, six studies mainly addressed the effectiveness of feedback on local areas (i.e., lexical appropriateness, grammar, punctuation and spelling) and global areas (i.e., idea development, purpose, organization of writing, and sentence level structural organization; AbuSeileek & Abualsha'r, 2014; Liu & Salder, 2003; Nguyen, 2012; Xu, 2007; Wichadee, 2013; Yang & Meng, 2013). Diez-Bedmar and Perez-Paredes (2012) only examined lexical items and morphosyntax learning in writing. Whereas, the other four studies intended to study the effectiveness of computer-mediated peer written feedback on writing as a whole (Ho, 2012; Matsumura & Hann, 2004; Mompean, 2010; Park & Cho, 2014).

The findings also revealed that adult ESL/EFL learners tended to provide more direct feedback on local areas of writing. One explanation was that if the CMC technology used for writing and feedback had supportive functions for providing feedback (e.g., track changes in *Microsoft Word*), learners would take advantage of the technology and make less effort on spotting other areas for improvement (AbuSeileek & Abualsha'r, 2014; Liu & Salder, 2003; Nguyen, 2012; Xu, 2007). If the technology was not equipped with such functions (e.g., blogs), learners tended to provide less focused and less direct feedback (Mompean, 2010).

Effectiveness. The effectiveness of computer-mediated peer written feedback on writing reflected on the application of feedback in revisions. Such effectiveness is strongly associated

with the types and content of the feedback. First of all, even though this review only limited to computer-mediated peer written feedback, the diverse classification of the types restricted generalization of the findings. Even so, regarding the content of peer written feedback, learners showed a tendency of employing feedback on local areas in revisions. For instance, Yang and Meng (2013) found that the learners incorporated only feedback on local errors. Participants in Wichadee's (2013) and Nguyen's (2012) studies also preferred feedback that can help with detecting local errors in writings. Similarly, Xu (2007) mentioned that the participants were more comfortable with making local revisions based on their peers' feedback compared to global areas. The following aspects can explain such preference on local feedback. First is that local error revisions took less effort to correct; therefore, ESL/EFL learners had less resistance to accept local feedback from their peers (Yang & Meng, 2013; Wichadee, 2013; Xu, 2007). Second, ESL/EFL learners have less faith in the quality of global area peer feedback, because learners can use other tools (e.g., CMC technology, dictionary, online resources) to spot local errors, which is not applicable for global errors. Naturally, the quality of local peer feedback could be higher than global feedback (Yang & Meng, 2013; Xu, 2007). Third, because of the lack of support to provide global feedback, learners could provide less global feedback because of the lack of confidence in English and writing or resist making more effort on review peer's writing (Nguyen, 2012).

CMC Technology

This review also confirmed Chen's (2016) and Lin's (2015) findings that CMC technology has a positive effect when used for learning purposes in SLA. Due to differences in research purposes, included studies have employed a variety of CMC technology, ranging from single computer software (e.g., *Microsoft Word*) to a mixture of systems (e.g., *Microsoft Word* + online discussion). Four studies used *Microsoft Word* for both writing and feedback (AbuSeileek & Abualsha'r, 2014; Ho, 2012; Liu & Salder, 2003; Xu, 2007); three studies investigated feedback on blog writing (Nguyen, 2012; Mompean, 2010; Park & Cho, 2014); the others carried out studies within a variety of online systems or websites (e.g., *Moodle*, *OnlineMeeting*) that equipped with collaboration and discussion functions (Diez-Bedmar & Perez-Paredes, 2012; Ho, 2012; Matsumura & Hann, 2004; Wichadee, 2013; Xu, 2007; Yang & Meng, 2013). The CMC technology influenced not only the effectiveness of feedback but also on learners' decisions of

which type and what content they used to provide feedback. Additionally, we also found two features of CMC technology – the existence of editing function and the publicity of the software – contributed the most to the impact on feedback effectiveness.

As a widely used word-processing software, *Microsoft Word* had the most developed and mature functions for text editing compared to other tools. The track-change and the error-highlighting functions of *Microsoft Word* can lead learners' attention to local errors (AbuSeileek & Abualsha'r, 2014; Liu & Salder, 2003; Xu, 2007). However, the peer written feedback provided through blogs and other online systems had less focus on local areas because of the lack of editing function (Matsumura & Hann, 2004; Wichadee, 2013; Xu, 2007; Yang & Meng, 2013). As for the publicity, among the selected CMC technology in this review, *Microsoft Word* is a private software in which information is not shared publicly unless the authors intentionally published it on public platforms; blogs could be either public or semi-public with restricted-access; the other online systems were accessible to registered users only. The findings showed that ESL/EFL learners felt more comfortable and confident in providing peer feedback in a private or a semi-public setting (e.g., *Microsoft Word*, restricted-accessed blogs) because they felt less embarrassed when making mistakes in writing and feedback (Nguyen, 2012; Park & Cho, 2014). On the other hand, CMC technology with public access (e.g., blogs) might not provide such sense of security for learners (Mompean, 2010). As a result, the quantity and quality of peer written feedback were affected. Furthermore, in a private or semi-public setting, the quantity of feedback was higher; the content of feedback was more focused and direct on local errors (AbuSeileek & Abualsha'r, 2014; Liu & Salder, 2003; Nguyen, 2012; Park & Cho, 2014). Whereas in a public setting, learners provided fewer numbers of feedback that were more general and focused on global areas (e.g., comments on the overall structure; Mompean, 2010).

Discussion

The findings showed that even though the range of studies was limited to computer-mediated peer written feedback on adult ESL/EFL writing, it was still challenging to draw a generalizable conclusion on the effectiveness of peer feedback. However, the findings showed that more direct, revision-driven and detailed feedback on local areas were more effective on ESL/EFL learner's writing development and language learning. Additionally, it was evident that the selection of CMC technology had the most influence on the effectiveness of peer feedback.

ESL/EFL learners' preferences on types and content of feedback, regardless of the quantity and quality of the feedback, also affected the frequency of feedback application in revisions. Moreover, this review did not find any differences between EFL and ESL learners' attitudes about peer written feedback in writing.

Several possibilities may cause the inconclusive findings on the effectiveness of computer-mediated peer written feedback. First of all, although evidence showed that compared to writing with no feedback, peer written feedback could promote writing development and language learning, it was not clear whether the correction and the improvement could sustain over time and eventually facilitate SLA. According to Schmidt's (1990, 2001) Noticing Hypothesis, learning only occurs through conscious awareness of the errors. Viewing corrections made based on feedback provided through technological editing function as the evidence of learning can be questionable. Hyland and Hyland (2006) identified the drawbacks of automated feedback by technology that it had the "potential dangers of ignoring meaning negotiation in real world contexts" (p. 95). Yang (2010) suggested that learners need to self-reflect on the errors and corrections, monitor and evaluate their writing to pursue text improvement rather than only rely on the feedback. Therefore, CMC technology with editing functions needs to be carefully evaluated and assessed to limit automated feedback and give learners more opportunities to self-reflect and self-evaluate.

Second, besides the three aspects (i.e., types and content of feedback and the CMC technology) Chen (2016) mentioned, the effect of computer-mediated peer written feedback could also be fluctuated by other factors. For instance, Yang and Meng (2013) mentioned that learners with different language proficiency levels treated peer feedback differently. Higher proficient learners provided more feedback but incorporated less feedback than lower proficient learners, which is consistent with the findings of other studies on the relations between language proficiency and peer interactions (Sotillo, 2005; Watanabe, 2008). In addition to language proficiency, learners' ability to provide feedback is also an influential factor (Diez-Bedmar & Perez-Paredes, 2012). A line of studies have already tackled the issue of the necessity of trained peer feedback in SLA and given credits to pre-task/pre-instructional training (e.g., Min, 2006). For example, Min (2006) compared the effectiveness of peer feedback provided before and after training and found that the number of peer-triggered revisions improved significantly after

training. Third, individual technology anxiety could also differentiate on the effectiveness of computer-mediated peer feedback (Matsumura & Hann, 2004). Studies on computer-mediated learning indicated that learner's familiarity about the technology strongly influenced the learning outcomes (Lin, 2015). Lin (2015) synthesized 59 peer-reviewed studies on CMC in SLA concluded that incorporating CMC as in-class activities supplemented with sufficient technical instruction generated a significantly larger effect than CMC after-class activities, which are lack of guidance on technology. Therefore, proper technology training is encouraged to be included before CMC activity or instruction to maximize the learning effect in CMC setting.

To promote the use of CMC technology in ESL/EFL writing classroom, Mompean (2010) indicated that using single CMC technology might not result the best learning outcome and recommended SLA researchers and teachers to implement multiple CMC technology in one setting. For example, Mompean anticipated that a combination of public writing platforms (e.g., blogs) and private communication systems (e.g., discussion board) could be more effective, given that learners were able to publish the writing and gain sense of authorship, at the same time, feel more comfortable and confident while exchanging peer feedback. However, studies followed Mompean's suggestion had dissatisfied findings. Diez-Bedmar and Perez-Paredes (2012) used *Moodle*, a system equipped with both online private discussion forum and public writing function, for writing and feedback. However, learners did not provide as much feedback as the researchers expected in the private group discussion forum. Similarly, Ho (2012) also used different CMC technology for writing (e.g., *Microsoft Word*) and feedback (e.g., *OnlineMeeting*). Although both in private setting, Ho did not find any benefit on the quantity and effectiveness of peer feedback by using two separate systems for writing and interaction. One explanation to the unexpected results is that the subject matters and writing objectives may influence the quantity of peer written feedback (Diez-Bedmar & Perez-Paredes, 2012; Novakovich, 2016). When the learners are familiar with the writing topic, they would easily self-perceive as expert and would actively take the responsibility of providing feedback to others (Novakovich, 2016). In addition, the group discussion format could be difficult for learners to track feedback, especially in synchronous CMC settings (Peterson, 2009), which might discourage learners to engage in discussions.

Conclusion and Recommendations

This review confirmed that computer-mediated peer written feedback has a positive impact on language learning and writing development in SLA. However, the effect of this approach could be influenced by several factors, such as types and content of peer feedback and other contextual factors (e.g., CMC technology, learner's proficiency). However, this systematic literature review is not without limitations, which may affect the generalizability of the findings. Compared with other systematic literature reviews, the present review only included peer-review journal studies that may underrepresent the studies on computer-mediated peer written feedback. The relatively specific search terms and inclusion criteria may also cause the relative small number of included studies. Another limitation is that although the review focused on computer-mediated peer written feedback only, the classifications of types of feedback were relatively diverse, which may influence the interpretation of findings. Therefore, this review only reveals part of the findings of computer-mediated peer written feedback on ESL/EFL writing in SLA.

In recent decades, SLA has been reconnected with classroom instruction and researchers' attention was raised on the importance of classroom teaching (Loewen, 2014; Ortega, 2005). The findings of this review revealed that the effects of computer-mediated peer written feedback on writing might fluctuate depending on contextual variables, such as learner features, technology availability and learning objectives in writing. Therefore, to ensure ESL/EFL learners were able to effectively obtain both linguistic knowledge and writing skills from their peer in computer-mediated writing and interaction, here are some implications that ESL/EFL teachers could take away from the current systematic literature review.

First, teachers need to evaluate the learning objectives and learners' language proficiency before designing the task or activity. Proper evaluation of learning objectives gives teachers an overview of which types of feedback are more suitable for the learning target. Together with learners' language proficiency and computer literacy, teachers will be able to choose the proficiency-appropriate method to instruct learners on how to provide the selected types of feedback. For example, metalinguistic feedback requires learners to explain the errors using the target language. This type of feedback could lead to better learning outcome on grammar aspects (Gutiérrez, 2008). However, learners need to have sufficient language proficiency to explain errors in target languages. Therefore if the learning target is a grammatical rule and the learners

are highly proficient, metalinguistic feedback could be beneficial according to previous studies in SLA. Then teachers will need to teach learners how to provide metalinguistic feedback on the learning target before the actual tasks.

Another implication draws from this review is that teachers need to assess learners' computer literacy and choose appropriate CMC technology. Because learners' computer anxiety could influence their performance during writing and online interaction (Kim, 2008; Kim, 2014), it is important for teachers to select a technology that learners are familiar with or comfortable to use. Depending on learners' computer ability, the complexity of CMC technology varied. For a beginner use of computer, even typing on keyboard can be a challenging task. Therefore, assess learners' computer literacy can help teachers select a proper tool, predict issues that may occur and provide necessary instruction and guidelines about using the tool.

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