

Research Article

## Direct and Indirect Written Corrective Feedback: A Literature Review of Sampling and Design Features, Target Structures and Overall Effects

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### ABSTRACT

Scholars' attention on written corrective feedback especially the direct-indirect dichotomy has been increasing due to inconsistencies in its effects toward L2 learners' linguistic accuracy. Therefore, this study was performed to provide a literature review of the increasing number of WCF studies that may provide new perspectives for future research on direct-indirect WCF strategies. This study takes a systematic literature approach to synthesize 16 empirical studies that focusing on the effect of direct-indirect WCF from SCOPUS database. The 7-step systematic review process was used as the main approach for this study. 4 research questions were formulated to guide the study. The findings have revealed the sampling features of ESL context, beginner, and advanced proficiency levels of learners are underexplored. Moreover, it is also suggested that future studies incorporate control groups to compare the effects of direct-indirect WCF strategies with non-treatment groups. Methodologically, other research approaches should also be considered by future studies for most of the studies in the review applied experimental approach. In highlighting the targeted linguistic structures, this study has found the focus of studies in the review as mostly emphasizing on grammatical aspect, thus suggesting for more WCF studies on non-grammatical aspects. Finally, the overall effect suggests that indirect WCF was effective on both grammatical and non-grammatical structures whereas direct WCF was mostly effective on non-grammatical structures.

### Introduction

Error correction has assumed a central position in language acquisition since Truscott (1996) for errors have always been a major concern to both students and teachers. One aspect of error correction in language acquisition study is written corrective feedback. Written corrective feedback is considered a common practice in L2 writing classrooms in both contexts of English as Second Language (ESL) and English as Foreign Language (EFL) where language teachers are expected to use WCF to help learners correct their errors and generally improve writing accuracy. Written corrective feedback, which includes efforts to rectify errors primarily in grammatical systems, is a common pedagogical approach in language classrooms. One of the major responsibilities of language instructors is to provide learners with feedback so that they can see whether they are good writers or whether the pedagogical practices meet learners' expectations of instruction. Thus, the role of corrective feedback is to provide critical information by informing learners about their writing performance and transform them to critical and proficient L2 writers. According to Ferris (2010), the most productive approach to providing corrective feedback in L2 writing has yet been precisely developed despite long debates since the 1970s. This is due to the historical and theoretical trends which made empirical research on corrective feedback (CF) in L2 writing uncommon before the mid-1990s, influenced by Krashen's SLA theory, thus feedback was not valued then in writing instruction. However, after the 1990s, advocating the idea that error correction should be contextualized within the writing process, more research started addressing language issues in

L2 writing that includes error correction (Wang, 2017). An influx of research findings has gotten into the literature with prevalent inconsistencies of the effectiveness of written corrective feedback.

Several review articles have attributed this seeming stagnation of inconsistencies to methodological challenges in existing WCF studies (Bruton, 2009, 2010; Ellis, 2008; Ferris, 2004; Gue'nette, 2007; Truscott, 2007; Van Beuningen, 2010). Some scholars criticised the exclusive focus on edited texts rather than new pieces of writing, lack of control groups, and incomparable due to accuracy measures and inconsistent treatments. However, Storch (2010) concluded that, after the emergence of advanced research design in review papers, many of the methodological flaws had been addressed, referring to a selected group of major studies after Truscot (1996).

Ferris (2012) stated that WCF is still a contentious issue among scholars as empirical studies have led to conflicting, if not inconclusive, findings. Specifically, research findings are channelled to two divisive matters: (1) what type of feedback strategy is effective; and (2) when and how WCF works. The fact that a significant number of researches have been carried out and confirms, on one side, a consistent interest in WCF and suggests, on the other side, that meta-analytic research approach is now possible to be applied in resolving some remaining issues. This approach is deemed desirable and worthwhile for it may identify conflicts in existing findings and gaps, explain confusing areas of study, and guide teacher's practice through practical understanding of WCF. Thus, a systematic analysis of literature review, by its design, focuses on deriving collective findings by integrating and combining findings from numerous primary studies.

The subject of written corrective feedback has consistently gathered research attention and focus into two paradigms: identifying possible mediating factors; and developing a general understanding of its effectiveness. In the latter paradigm of developing a general finding of its effectiveness, numerous studies have been conducted to examine WCF's efficacy as a role of its scope in improving learners' overall accuracy, which is focused and unfocused (see Ellis, 2009; Sheen, Wright, & Moldawa, 2009). Ellis (2009) argued that unfocused feedback that targets more errors is less effective than focused feedback that focuses on fewer grammatical errors. The latter is more effective because it focuses learners' attention rather than dispersing it, therefore enables learners to be more aware of the differences in their own piece and the target-like forms or the correct ones.

Another mediating factor that has been the epicenter of recent WCF studies is the type of feedback, that is the focus of this literature review – direct and indirect dichotomy. Direct corrective feedback explicitly corrects an error by integrating two strategies of signaling its locus, which refers to identifying the language form error directly, and providing its correct counterpart. Whereas indirect feedback strategy only signals the locus of an error made by learners. Scholars such as Ellis et.al (2008) argued that direct feedback in its focused or unfocused forms has a lasting positive effect on learners' accuracy in the targeted language forms. Similarly, Shintani, Ellis, and Suzuki (2014) indicated that WFC strategies given in a more corrective and explicit manner such as direct WCF is more advantageous to learners' comprehension. However, there is research evidence in favor of indirect feedback such that it brings more benefits to learners' long-term development (Ferris, 2003). Direct feedback is more suitable and successful for beginner learners when errors are untreatable which do not require self-correction such as word choice and sentence structure. The results show that the correction technique represents an effective tool for the improvement of the grammatically accurate use of subject-verb agreement even when students have a basic level of competence in the foreign language. Similarly, a study by Muñoz and Carrillo (2019) revealed the effectiveness of indirect WCF on improving grammatical accuracy of elementary-level learners measured through a series of post-tests. This finding is similar to early studies on WCF by Lalande (1982) who stated that indirect feedback involves learners more than that of direct feedback because their cognitive ability is triggered and prompted them to look for self-correction.

The previous discussion prompts one's curiosity on the type of corrective feedback as a substantive variable. Thus, Ellis (2009) stated that many scholars think of the effectiveness of CF regardless of its nature, depending on its interaction with other factors, such as learner proficiency. It is explained further that direct feedback is useful for elementary or beginner learners because they still need to expand their linguistic repertoire through explicit guidance on the errors. However, advanced learners have the capacity to understand and differentiate errors which makes indirect feedback adequate for them.

The literature contains several chronicle reviews regarding effectiveness of WCF as a result of its growing interest in ESL and EFL contexts. Some of the prominent ones were published by Bitchener (2012), Ferris (2012), Lee (2012), and Liu and Brown (2015). Bitchener (2012) in his review suggested that future studies in WCF ought to consider diversifying the pedagogical factors such as the number of treatments given to the participants and examining learners' comprehension from a sociocultural viewpoint. Ferris (2012) provided a historical overview of the expansion of the topic based on studies conducted

in EFL context. Furthermore, Lee (2012) focused on reviewing studies that were performed in a realistic classroom environment which bridged the research-practice divide. Additionally, Liu and Brown (2015) provided a methodological synthesis in the hope to advance methodological and reporting practices in the area of WCF studies.

These narrative reviews performed by leading scholars in WCF have provided other researchers with specific and empirical perspective of experts in the focused topics. However, Pae (2015) argued that these reviews are less rigorous and objective in their methodology, in the case of Bitchener (2012), Ferris (2012), and Lee (2012). For instance, Pae (2015) disputed further that the reviews failed to disclose the decisions on validity of the studies reviewed and their relevance.

Li (2010) conducted a meta-analysis of the efficacy of feedback with more sophisticated procedures applied in the approach than its predecessors. Two prevalent findings for the analysis indicated that implicit feedback has a longer-term effect than explicit. Additionally, corrective feedback is more successful in an EFL setting. However, Li (2010) only focused on oral form of CF thus prompted a question of its findings on the written form of CF. Another meta-analysis by Biber, Nekrasova and Horn (2011) investigated the effects of various WCF on learners' writing accuracy revealed a moderate and large effect of WCF was found. However, these findings could not be specified to explain the sole effect of WCF because they integrated a database from L1 and L2 studies. Therefore, the efficacy of WCF has yet to be established.

In light of the inconsistencies of WCF effectiveness and the advancement of tools developed in helping researchers in meta-analysis and systematic literature review studies, more properly designed meta-analysis and systematic literature review studies came to light in the literature. Many have been producing significant findings that helped to shape the direction of future researchers in corrective feedback through their summarised suggestions and recommendations. Several meta-analysis and systematic review studies in WCF such as Jiang and Ribeiro (2017); Chong (2019); Kang and Han (2015); Wang and Jiang (2015); and Liu and Brown (2015) have given perspective of the current issues, directions, and gaps concerning written corrective feedback.

However, there are several aspects of direct-indirect WCF strategies investigated in the studies that were not defined clearly which includes sampling-features of direct-indirect studies, the study design features of direct-indirect WCF studies, the target structures investigated in the WCF studies, and the overall effects of direct-indirect WCF studies. Additionally, the English language grammatical and non-grammatical aspects that are underexplored by WCF researchers are not clarified in the literature, except the findings by Wang and Jiang (2015) that call for more WCF studies in non-grammatical context. This is vital for future researchers to embark on a new direction in WCF studies by tapping into the underexplored areas to provide insight of the efficacy of direct and indirect WCF strategies.

### **Research questions**

The current study seeks to find answers to the following questions:

1. What are the sampling features in direct-indirect WCF studies?
2. What are the study design features in direct-indirect WCF studies?
3. What are the target structures investigated in direct-indirect WCF studies?
4. What are the effects of direct-indirect WCF strategies in the reviewed studies?

### **Literature Review**

A systematic literature review (SLR) is a quality-focused and protocol-driven approach in summarising research findings in order to inform research and practices (Bearman, Smith, Carbone, Slade, Baik, Hughes-Warrington & Neumann, 2012). The structure of SLR is different from other types of reviews such as literature review and narrative review in terms of comprehensiveness and replicability. Chong (2019) argues that there has been a shortage of SLR in higher education, applied linguistics, and language education literature whereas systematic review is used to summarise evidence-based practice in several education research fields such as health education and technology in education. There are several reasons that contributed to the lack of systematic literature review in the aforementioned fields (Chong, 2019).

Conducting a systematic literature review is a time-consuming process. Researchers in SLR are bound to adhere to strict protocols of literature search and synthesising the findings, which often includes six to nine steps. Gough (2007) proposed a nine-step protocol in conducting a systematic literature review while Petticrew and Roberts (2008) suggested a shorter seven-step process. The current study employed a framework of SLR protocols suggested by Petticrew and Roberts (2008). The framework consists of seven-step process: (1) formulating research questions; (2) identifying the types of studies; (3)

establishing inclusion and exclusion criteria for literature search; (4) performing a literature search; (5) screening and evaluating the search results using the criteria; (6) synthesising findings; (7) identifying differences and similarities in the findings.

Another issue associated with the lack of SLR in the aforementioned fields is that SLR may not be widely adopted in several educational research fields because there are an excess of research approaches applying post-structuralist, social justice, positivist, and interpretivist (Bearman *et al.*, 2012). Therefore, due to the challenges posed by SLR when attempting to synthesise findings from very different research paradigms, systematic reviews are not encouraged in the research fields influenced by diverse research cultures.

Furthermore, thorough understanding of the differences between different types of review is not established as there exist a myriad of reviews such as scoping review, narrative/critical review, and systematic review. According to Bearman *et al.*, (2012), narrative review presents a specific perspective on the literature that is framed through the authors’ perspectives. On the other hand, scoping review differs from systematic review in terms of their purpose that maps the existing literature by looking at the volume, characteristics, and volume of primary research (Pham, Rajić, Greig, Sargeant, Papadopoulos, & McEwen, 2014). Additionally, scoping review can form the basis for analysing the feasibility and worthiness prior to conducting a systematic literature review.

Bearman *et al.*, (2012) argued that systematic reviews posed manifold values to educational research. Readers are provided with adequate information to evaluate the quality of the evidence through the transparency of the methodology adopted in conducting a literature search and synthesising findings. Furthermore, systematic review enables a more comprehensive and objective selection of studies on a focused topic by employing a set of predetermined exclusion and inclusion criteria of selecting appropriate studies in the literature. Moreover, a collective evidence on educational practices is made possible through a well-written systematic review that is also concise and accessible.

## Methodology

This study employed a systematic review process suggested by Petticrew and Roberts (2008) that consists of 7-step protocols. The study began with the first step of formulating research questions which are presented in the previous section. Specifically, the present study was aimed to identify the sampling characteristics, study design, target structures, and overall effects of direct-indirect WCF studies in the literature.

The next step was specifying the types of studies. This process involved setting the timeframe and identifying the primary studies in the literature. Major and Savin-Baden (2010) indicated that the setting of a timeframe is one of the primary concerns in conducting a systematic literature review. Thus, the present study established the timeframe of 1997 until 2019 because Truscott’s controversial article that sparked waves of WCF debate was published in 1996. However, the SCOPUS database contains research articles on direct and indirect WCF from 2008 onwards only. Furthermore, only primary WCF research articles focusing on direct and indirect dichotomy were selected for the review while articles written in conceptual, narrative, reporting of practice, meta-analysis were excluded. Additionally, research articles in the WCF domain that investigated the effect of other WCF strategies such as oral, metalinguistic, and computer feedback were also excluded for the review.

SCOPUS database was made as the primary source for data mining of research articles. Wang and Waltman (2016) stated in their study that the SCOPUS database has the highest number of peer-reviewed publications, journals, and categories compared to other databases. Additionally, SCOPUS database allows researchers to find research articles according to year, affiliations, countries, subject areas, frequency of use over time, and the author's highly cited paper, among other features. These search features are very useful to researchers who are constantly looking to analyse journal information, publishing trends, and terminology.

The third step in the systematic review process involved setting inclusion and exclusion criteria for searching research articles in the body of literature. Table 1 summarises the exclusion and inclusion criteria for literature search.

Table 1. Inclusion and exclusion criteria

Description	Include	Exclude
Year of publication	2008 – 2019	Before 2008
Language	English	Other languages

Focus of the study	Written corrective feedback by teachers only	Oral corrective feedback and other modes of CF given by teachers, peers, or computers
Types of feedback	Direct and indirect feedback	Other types of WCF
Context of study	ESL or EFL	Other languages
Nature of publication	Primary research articles and indexed conference proceedings	chapters published in books

The fourth step involved conducting a literature search. Additionally, a series of search strings were applied in the SCOPUS database to search for relevant research articles. Initial search string produced 104 documents which included research articles, conference proceedings, chapters in books, and review. A refined search string was applied that finally produced 75 documents. Table 2 illustrates the search strings applied in searching for relevant research articles in SCOPUS database.

Table 2. Search strings applied in SCOPUS Database

Search string	Documents produced
ALL (efficacy AND effectiveness AND direct AND indirect AND written AND corrective AND feedback)	104
ALL (efficacy AND effectiveness AND direct AND indirect AND written AND corrective AND feedback) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (SUBJAREA, "SOC1") OR LIMIT-TO (SUBJAREA, "ARTS"))	75

The next step in the process is screening and appraising the search results using inclusion and exclusion criteria presented in Table 1. A total of sixteen research articles were included for the review. All these articles investigated the effect of direct and indirect WCF on various English language systems. Table 3 lists the SCOPUS-indexed journals and the primary research articles included in the present review.

Table 3. List of research articles included in the review

SCOPUS indexed journal	Primary research articles included
English Language Teaching	Ghandi & Maghsoudi, (2014)
Language Teaching Research	Karim & Nassaji (2018)
Procedia Social and Behavioural Sciences	Jamalinesari, Rahimi, Gowhary & Azizifar (2015) Eslami (2014)
The Journal of Asia TEFL	Han (2012) Tan & Manochphinyo (2017)
Language Learning	Van Beuningen, De Jong & Kuiken (2012)
English Language Teaching	Hashemnezhad & Mohammadnejad (2012)
Theory and Practice in Language Studies	Maleki & Eslami (2013)
Asian EFL Journal	Ruegg (2015)
	Septiana, Sulistyono & Kadarisman (2016)

Indonesian Journal of Applied Linguistics

Ikala, Universidad de Antioquia  Cogent Education  3L: Language, Linguistics, Literature  International Journal of Educational Technology and Applied Linguistics  The Modern Language Journal	Westmacott (2017)  Banaruee, Khatin-Zadeh & Ruegg (2018)  Nusrat, Ashraf & Narcy-Combes (2019)  Suzuki, Nassaji & Sato (2019)  Nicolas-Conesa, Manchon & Cerezo (2019)
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The sixth step by Petticrew and Roberts (2008) involved the process of synthesising findings. Specifically, the analysis procedure by Plonsky and Glass (2011) was referred to answer the research questions. After the research articles were identified from the database, they were coded for an array of categories as depicted in appendix 1. Furthermore, frequencies and percentages were calculated for sampling practices, study design, target structures, and overall effects of direct and indirect WCF were also presented. The final step in the process involved a discussion of differences, similarities, and suggestions for future research efforts.

**Results and Discussion**

Research question 1: sampling features of direct and indirect WCF studies

Table 4. Sampling Features of Research Articles

Variable	Level	<i>k</i>	%
Setting	ESL	3	18.75
	EFL	13	81.25
L2 Proficiency	Advanced	0	0
	Intermediate	12	75
	Elementary	2	12.5
	Not reported	2	12.5
Education Level	University	12	75
	High School	4	25
	Elementary/middle school	0	0
Age	Adult (18+)	12	75
	Teen (13-17)	4	25
	Children (1-12)	0	0

Note: *k* represents number of articles

Table 4 summarises sampling practices of all research articles in the review. The first variable indicates that 81.25 percent (*n* = 13) of direct-indirect WCF studies were conducted in the EFL setting. There are only 3 studies conducted in the context of ESL (See Karim & Nassaji, 2018; Van Beuningen, De Jong & Kuiken, 2012; Nusrat, Ashraf & Narcy-Combes, 2019 for discussion about WCF studies conducted in ESL setting). This pattern shows that studies of direct-indirect WCF were focusing mainly on EFL leaving ESL setting under investigation. According to Liu and Brown (2015), this pattern is contradicting with L2 research patterns that empirical findings of L2 research must be balanced on both settings, ESL and EFL.

It is also indicated in the table that there are more direct-indirect WCF studies conducted with learners of intermediate proficiency level (75%) with less researchers focusing on elementary proficiency learners (12.5%) whereas no study was conducted with advanced proficiency learners. This indicates that advanced and elementary learners are under investigated. Furthermore, 75 percent of the studies were conducted with university students while only 25 percent were conducted at schools. In terms of age of the participants, a large majority (75%) of them were identified as adults over 18 years of age while

only 25 percent of the participants were identified as teens in the age bracket of 13-17 years of age. The classification of age in this review follows Liu and Brown (2015).

Research question 2: Study design features of direct-indirect WCF studies.

Results and discussion of study design are separated into two sections of analysing the research designs and testing procedures. Table 5 shows the study design features of all studies included in the review. There are 93.75 percent of the studies ( $n = 15$ ) that applied experimental research design to investigate the effect of direct-indirect WCF with only one study identified applying action research design. Furthermore, over half of the studies ( $n = 11$ ) applied full experimental design to investigate the effect but only four studies applied quasi-experimental. The difference between the two is that fully experimental design allows a researcher to randomly assign the participants into respective groups while it is not possible to do so in the quasi-experimental design. Interestingly, more than half of the studies ( $n = 9$ ) in the review did not incorporate a control group in their experiment. Wang and Jiang (2015) argued that four early studies (Kepner, 1991; Robb et al., 1986; Semke, 1984; Sheppard, 1992) that investigated the effectiveness of WCF were criticised due to design flaw which is related to the absence of a strictly controlled group. Thus, findings from further studies that avoid criticised design flaws will have the final say on the effectiveness of WCF (Wang & Jiang, 2015).

Table 5. Study design features

Type	<i>k</i>	%
experimental design without control group	6	37.5
experimental design with control group	5	31.25
Quasi-experimental design without control group	3	18.75
Quasi-experimental design with control group	1	6.25
Action research	1	6.25

Table 6. Testing procedure

Procedure	<i>k</i>	%
A series of writing draft / test	3	18.75
Pre-test and post-test	3	18.75
Pre-test, post-test, delayed post-test	6	37.5
Pre-test, immediate post-test, delayed post-test	4	25

Table 6 depicts the testing procedures that were applied in the reviewed studies. 81.7 percent of the studies ( $n = 13$ ) incorporated pre-test and post-test instruments. All the studies that had pre-test in their design used it as a tool to test the homogeneity of the respondents. Specifically, there is a variation in terms of immediate post-test and post-test alone. A test is defined as an immediate post-test if it is taken less than 7 days after the treatment whereas delayed post-test if it is taken 30 days or later after the treatments (Keck, Iberri-Shea, Tracy-Ventura & Wa-Mbaleka, 2006). Furthermore, most of the studies ( $n = 10$ ) gave post-test, which is one week after the treatment, compared to only 4 studies that gave immediate post-test to the respondents.

Research question 3: The target structures investigated in direct-indirect WCF studies

The third research question in the review concerns the English language structures that became the focus of researchers in investigating the effect of direct-indirect WCF. As can be seen in table 7, the target structures are categorised into two major structures of grammatical and non-grammatical. Prepositions, articles, verb forms, syntax and morphology, subject-verb agreement, tenses, pronouns, preposition, adjective, adverbs, conjunction and determiner are categorised as grammatical structures. On the other hand, non-grammatical structures consist of vocabulary, word choice, capitalisation, spelling, punctuation, orthographical errors, pragmatic errors, and sentence structures. The patterns show that more direct-indirect

WCF studies were focusing on the grammatical aspect of the language leaving the non-grammatical aspect under investigation. In particular, verb form has become the central focus of WCF researchers. Thus, future researchers should embark on investigating WCF effects on non-grammatical structures of the language, specifically lexical aspects such as collocation.

Table 7. Target structures of error feedback studies

Target structures	Types	k
Grammatical	Prepositions	1
	Articles	6
	Verb forms	9
	Syntax and morphology	1
	Subject-verb agreement	3
	Tenses	3
	Pronouns	2
	Preposition	4
	Adjective	1
	Adverbs	1
	Conjunction	2
	Determiner	1
	Non-Grammatical	Vocabulary
Word choice		3
Capitalisation		1
Spelling		1
Punctuation		2
Orthographical errors		1
Pragmatic errors		1
Sentence structures		3

#### Research question 4: Overall effect of direct-indirect WCF

Results and discussion of research question 4 are divided into two parts and followed by an overall overview of direct-indirect WCF effectiveness. Ruegg (2015) suggested that indirect WCF is effective for lexical problems which are non-grammatical, related to essay structure. Additionally, lexical problems and problems relating to essay structure should be simply underlined or highlighted. On the same note, Ghandi and Maghsoudi (2014), Van Beuningen *et al.*, (2012) also argued that indirect feedback was more effective in rectifying students' spelling error, which is non-grammatical structure. However, Jamalinesari *et al.*, (2015), Eslami (2014), Han (2012), Maleki and Eslami (2013), Westmacot (2017), Tan and Manochphinyo (2017), Suzuki *et al.*, (2019) proved that indirect feedback groups performed better in their study of investigating its effect on grammatical aspects. Furthermore, the retention effect of indirect WCF was observed in the studies by Nicolas-Conesa *et al.*, (2019), Suzuki *et al.*, Tan and Manochphinyo (2017), Maleki and Eslami (2013), Han (2012), and Eslami (2014).

The positive effect of direct WCF strategies was observed in Ruegg (2015) who stated that direct feedback strategy is more effective for surface-level grammatical errors. Similarly, Han (2012), Van Beuningen *et al.*, (2012), Hashemnezhad and Mohammadnejad (2012), Nusrat *et al.*, (2019) and Nicolas-Conesa *et al.*, (2019) argued that direct WCF strategies in their study successfully reduced errors in new pieces of writing which indicate that the writing accuracy of L2 learners was improved.

It is a clear indication based on the selected studies for this review that indirect WCF was more effective in reducing learners' errors on various components of the language, as opposed to direct WCF strategy. The pattern also indicates that indirect WCF strategy was able to reduce learners' errors both in grammatical aspect as well as non-grammatical aspect. However, direct WCF strategy, based on the approved studies in the review, was able to reduce learners' grammatical errors only. Also noteworthy is that all the treatment groups in the studies, regardless of the type of feedback given, showed positive improvement in post-test scores, compared to the control groups.



## Conclusion

This systematic literature review provides a synthesis of sampling features, study design, target structures and overall effect of direct-indirect WCF studies pooled from SCOPUS database. In response to the growing inconclusive empirical findings on the effectiveness of WCF in L2 learning, this review was commenced to map the explored areas of direct-indirect WCF thus revealing the underexplored areas. Based on the findings of this review, it is suggested that future researchers conduct direct-indirect WCF studies in the context of ESL learners because it is under investigated, evident in table 4. There is indeed a variation of effects as learners in ESL settings tend to benefit from written feedback more than learners in EFL settings (Kang & Han, 2015). Furthermore, little is known about the effect of direct-indirect WCF strategies on advanced and beginner proficiency learners, because the focus of most studies in this review is on the intermediate proficiency level. The effect of direct-indirect WCF on advanced and beginner proficiency is equally important for according to Pienemann (1998) that developmental readiness should be considered when providing feedback to learners.

Several early WCF studies (Kepner, 1991; Robb et al., 1986; Semke, 1984; Sheppard, 1992) were criticised due to methodological flaws of the absence of control groups. There are in fact several studies in the review that did not incorporate control groups. It is suggested that future WCF studies incorporate control groups to compare the effect of WCF strategies with non-treatment groups. It is also observed in the design pattern of current studies leading up to this review which included delayed post-test to measure the retention effect. Additionally, there were several studies in the review that either included immediate post-test or post-test. It should be made clear that immediate post-test is conducted in less than a week after the treatment, in most cases of the studies, immediate post-test was given on the same day of the WCF treatment. However, post-test is conducted after a period of one-week but not more than thirty days. If so, it is known as delayed post-test (Keck et. al., 2006). In the case of post-test instead of immediate post-test, learners have plenty of time to study the feedback or search from external sources other than the feedback itself to aid their comprehension. Thus, further investigation is required by means of a qualitative method to investigate other external factors that might influence a learner's post-test result.

Most major studies in the literature adopted experimental design which is also proven in this review as only one study had adopted action research. This has led to a dearth of empirical findings on effectiveness of WCF from other study designs such as action research and longitudinal study design. Additionally, a mixed method design should also be considered by future researchers as there are certain details beyond the limit of quantitative design which should be discoverable through quantitative methods.

WCF studies mainly focus on investigating the effect of WCF strategies on various aspects of the language system. Based on the findings of this review, the language aspects can be classified into two major classifications of grammatical and non-grammatical aspects. The pattern of target structures of error feedback mainly focused on grammatical structures with all the eight parts of speech have been in the spotlight. However, not many researchers have investigated the effect of direct-indirect WCF on non-grammatical structures, in which little is known about other lexical structures such as collocations. Thus, this creates a gap in the literature that should prompt future researchers to investigate. The finding on this area supports Wang and Jiang (2015) despite their call for more studies focusing on non-grammatical aspects.

It is discovered from this review that indirect WCF was able to reduce non-grammatical and grammatical errors made by learners in revision and new piece of writing whereas direct WCF strategy was effective in improving learners' accuracy mostly in non-grammatical aspects. Furthermore, indirect strategy was shown as more effective than direct WCF strategy. Additionally, all groups that received WCF strategies in the review performed better than the control groups.

This review has several limitations as it was performed by pooling research articles from the SCOPUS database only. Therefore, there are other databases that were not considered into the review which may contain research proceedings, articles, and reviews pertaining to similar interests. Furthermore, several thesis databases were not included in the review which may contain more recent direct-indirect WCF studies. Therefore, future research that intends to perform literature reviews should consider the said databases.

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