Language Learning & Technology
ISSN 1094-3501 CC BY-NC-ND

2024, Volume 28, Issue 1
pp. 1–13

Using machine translation to support ESL pre-service teachers' collaborative feedback for writing

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Abstract

The application of machine translation (MT) in ESL (English as a Second Language) writing has thrived over the past decade. However, how MT impacts pre-service teachers' (PSTs) provision of collaborative feedback for writing remains an under-explored domain. Such knowledge will facilitate pre-service teacher education to be more scientific and practical. In this study, we investigated the effects of MT in assisting PSTs' provision of feedback, drawing on six PSTs' in-class discussions and the results of their revision. Additionally, we conducted interviews to learn their perception of MT. The findings revealed that MT assisted them in providing feedback on students' L2 writing, especially in improving content, communicative achievement, and language issues. PSTs in the study held positive attitudes towards using MT in their collaborative revision for writing. The findings also suggest that applying MT to ESL pre-service teacher education is beneficial, especially in assisting their writing revision. It is also advisable to utilise MT with other tools. The implications of the findings are discussed.

Keywords: *Machine Translation, Collaborative Feedback, Writing Correction, Pre-Service Teachers*

Language(s) Learned in This Study: English

APA Citation: Fu, L., Gu, M., & Jin, T. (2024). Using machine translation to support ESL pre-service teachers' collaborative feedback for writing. *Language Learning & Technology*, *28*(1), 1–13.
https://hdl.handle.net/10125/73557

Introduction

In recent years, applying collaborative learning has been considered particularly beneficial in teacher education (Häkkinen et al., 2017) because sociocultural theory attaches value to learning through collaboration in that it "precedes and shapes development" (Gánem-Gutiérrez, 2018, p. 391). Collaboration also fosters pre-service teachers' (PSTs) productive interactions and challenging learning activities (Sjølie et al., 2021), such as providing feedback to students' ESL (English as a Second Language) writing. In addition, it is important for PSTs to understand why and how some collaborations work well, as they are also expected to facilitate collaboration among their students in the future, since collaboration is emphasised as one of the key skills in the 21st century (Sjølie et al., 2021). Besides, teachers in secondary schools usually work together to design teaching plans, prepare lessons, and provide feedback to students, so integrating a collaborative approach into PSTs' training programmes allows them to adapt better to future working environments. Moreover, collaboration may also enable PSTs to lessen workloads, increase efficiency, and improve technological skills (Egodawatte et al., 2011).

For ESOL PSTs whose first language (L1) is not English, it remains a challenge for them to provide feedback to students like putting forward some idiomatic English expressions (Rao & Yu, 2021). Machine translation (MT) has been reported helpful in tackling such problems—especially in ESL writing class—by reducing lexicogrammatical errors, choosing context-appropriate words and developing more authentic expressions (S. M. Lee, 2020, 2022; Y. J. Lee, 2021), and hence improving students' writing quality

(Godwin-Jones, 2022). Therefore, MT can be a useful tool in assisting PSTs whose L1 are not English in providing feedback to students, a vital job in teachers' real instructional practices (Li, 2021). However, technologies like MT may bring resistance and anxiety among PSTs, and collaboration, except for the benefits mentioned above, can also help to reduce such technostress (Dong et al., 2020) by alleviating their learning burnout and creating a more conducive environment in technology integration (Thang et al., 2014; Zhao et al., 2022). Therefore, it is meaningful to study how best PSTs can adopt MT in providing feedback with a collaborative approach for students' ESL writing. Collaborative feedback in the current study refers to an activity undertaken by two or more PSTs in the context of teacher education, to analyse students' tasks and terminate in one final proposal for improvement. Few studies to date have investigated such issues. Thus, this study explores how MT can be implemented in PSTs' provision of collaborative feedback for students' ESL writing, and how they perceive MT through their first-hand experience.

Research Background

Collaborative Feedback for Writing

Feedback is vital in both the training and researching of ESL writing, the provision of which has been considered one of the most important tasks for ESL teachers (Hyland & Hyland, 2019). Traditionally, corrective feedback serves as a ubiquitous pedagogical activity that proved helpful for second language (L2) writers in acquiring specific language features and improving the overall effectiveness and accuracy of writing (Chastain, 1990; Leki et al., 2008).

Research in the domain of collaborative feedback for writing has mainly focused on students' collaborative revision, including their interaction during the process, perceptions towards collaborative feedback (Hanjani, 2015), and the impact of collaboration on L2 quality (Hanjani & Li, 2014). Foreign language learners deem collaborative feedback helpful and practical for enhancing their ESL writing (Zou et al., 2016). However, collaborative feedback generated by PSTs in the context of teacher education has received little attention. PSTs are future professional education practitioners whose insight and skills of collaboration will exert a significant influence on the next generation of learners (Sjølie et al., 2021). However, to date, insufficient research attention has been paid to this research area as well as whether and how technology (like MT in this study) influences PSTs' collaborative work. The current study will address this issue.

MT-Supported Feedback for Writing

Although teachers' feedback has been reported receiving a higher adoption rate than peers' feedback and resulted in greater improvements of ESL writing (Yang et al., 2006), it is still challenging for teachers to balance the effectiveness and constraints of time pressure in foreign language (FL) training. Technologies may be the antidote for this difficult problem. Technology integration in ESL writing instruction has become a research foci nowadays (Hsu & Lo, 2018; Li, 2018; Shi et al., 2022), and MT is one of a kind. Though controversial, MT like *Google Translate*, *Baidu Translate*, or *Bing Translator* are reported to be useful in improving L2 output for Chinese L1 students (Zhang & Torres-Hostench, 2022). MT, as an important and accessible computer-assisted language learning (CALL) tool in language learning class, increases FL learners' motivation and confidence, and also reducing errors in ESL writing—especially in vocabulary, grammar, syntax, and orthography (S. M. Lee, 2020). Besides, peer review could maximise the effectiveness of MT by increasing students' metalinguistic awareness at the content and discourse level in ESL writing (Y. J. Lee, 2021). Notwithstanding the benefits, MT also has deficiencies, such as output inaccuracy (Godwin-Jones, 2022), students' over-dependence on it (S. M. Lee, 2020), or teachers' distrust of it (Ducar & Schocket, 2018). Little research examines in teacher training context how PSTs use MT to assist their collaborative revision and their attitudes towards it. Against this background, this study aims to investigate how a group of PSTs use MT to revise students' English writing assignments via collaboration and their attitude toward applying MT to teaching. The following research questions were addressed specifically:

1. How did pre-service teachers collaboratively provide feedback with the assistance of MT?

2. What are pre-service teachers' perception of MT in the collaborative provision of feedback for students' writing?

Methods

Instructional Context

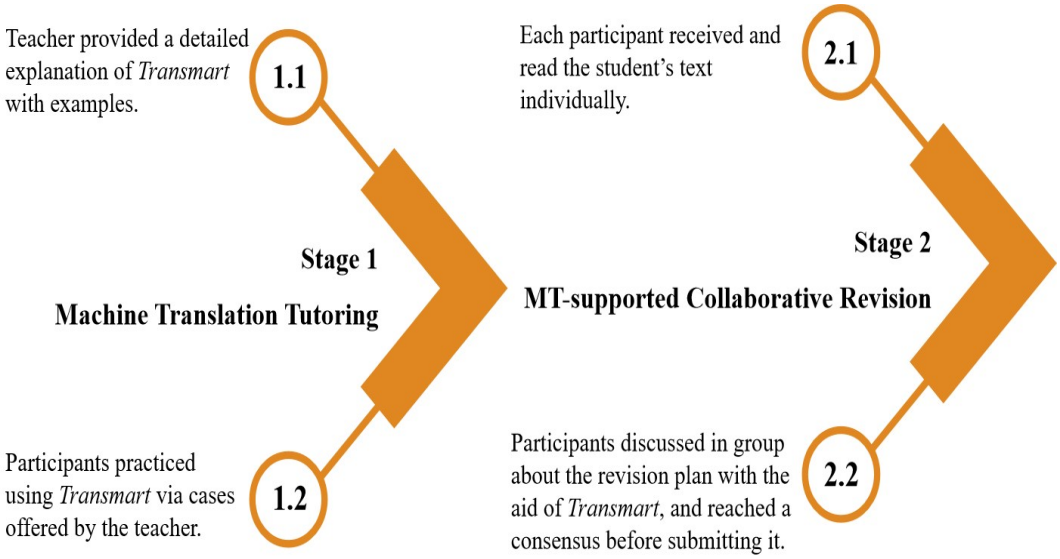
The current study was conducted in the Application Module of a translation course offered to a group of PSTs at a university in Southern China. This course is an important part of the teacher education programme, one major objective of which is to equip PSTs with translation-related methods and technologies for their future career. For PSTs, this course includes several modules, such as Theory, Strategy, and Application. The Application Module is designed to help PSTs integrate cutting-edge translation technologies (e.g. MT) into their future teaching design. In this study, MT was adopted, with the functions elaborated in the next section to assist PSTs' provision of collaborative feedback for students' writing. This was done considering MT's advantages—mentioned above—in facilitating quality improvement of ESL writing, such as reducing grammatical errors and choosing context-appropriate words. They were given the autonomy to form groups and determine their work division voluntarily. There were six groups consisting of six to seven participants each. Two stages were included in the pedagogical design (see Figure 1): machine translation tutoring and MT-supported collaborative revision. At the tutoring stage, the teacher detailed how MT worked and demonstrated the process of using *Transmart*, a human-machine interactive MT system (Huang et al., 2021). Then, a few cases were assigned in class to ensure that the students understood how MT worked.

During the MT-supported collaborative discussion, the teacher handed out the printed draft of a L2-English story continuation task (Wang & Wang, 2015) finished by a Grade-12 L1-Chinese senior high school student. Two different writing texts from the same student were used in two separate classes. By using the same student's assignments, any changes in the group's revision behaviour or decision from Task 1 to Task 2 would not be interfered with by the difference in the writer's language proficiency.

In the collaborative revision, all groups were asked to use *Transmart* as the only auxiliary tool to circumvent the influence of other teaching aids. Participants were given eight minutes to read the English story in the continuation task and then review the Grade-12 student's draft individually. After that, they were given another 15 minutes to discuss, as a group, how to revise the draft, using MT to assist them in making corrections and providing written feedback in either Chinese or English within the electronic documents. At this stage, revision history data were recorded in a word processor—*Jinshan Document*—and the process of using *Transmart* was tracked by screen recorder *EV Capture*. In this way, participants' textual revisions and activities using MT could be recorded. Then, follow-up interviews were conducted with a focus group of six PSTs recruited by purposive sampling based on feedback quality and their willingness to participate. The focus group was representative in that their feedback involved multiple dimensions such as vocabulary, grammar, logic, plot, and so forth. Moreover, the group members exhibited a strong sense of cooperation, responding actively to peers' views. They participated in this study voluntarily and had similar English proficiency levels, assessed by their Test for English Majors-Band 4 (TEM-4) scores. Before this course, they had not participated in any collaborative revising activity nor been trained in using *Transmart*. Participants' consent was obtained before the data collection, and pseudonyms were used in this study. Data on collaborative feedback (see Table 1) and students' perceptions were collected from this group.

Figure 1

Pedagogical Design

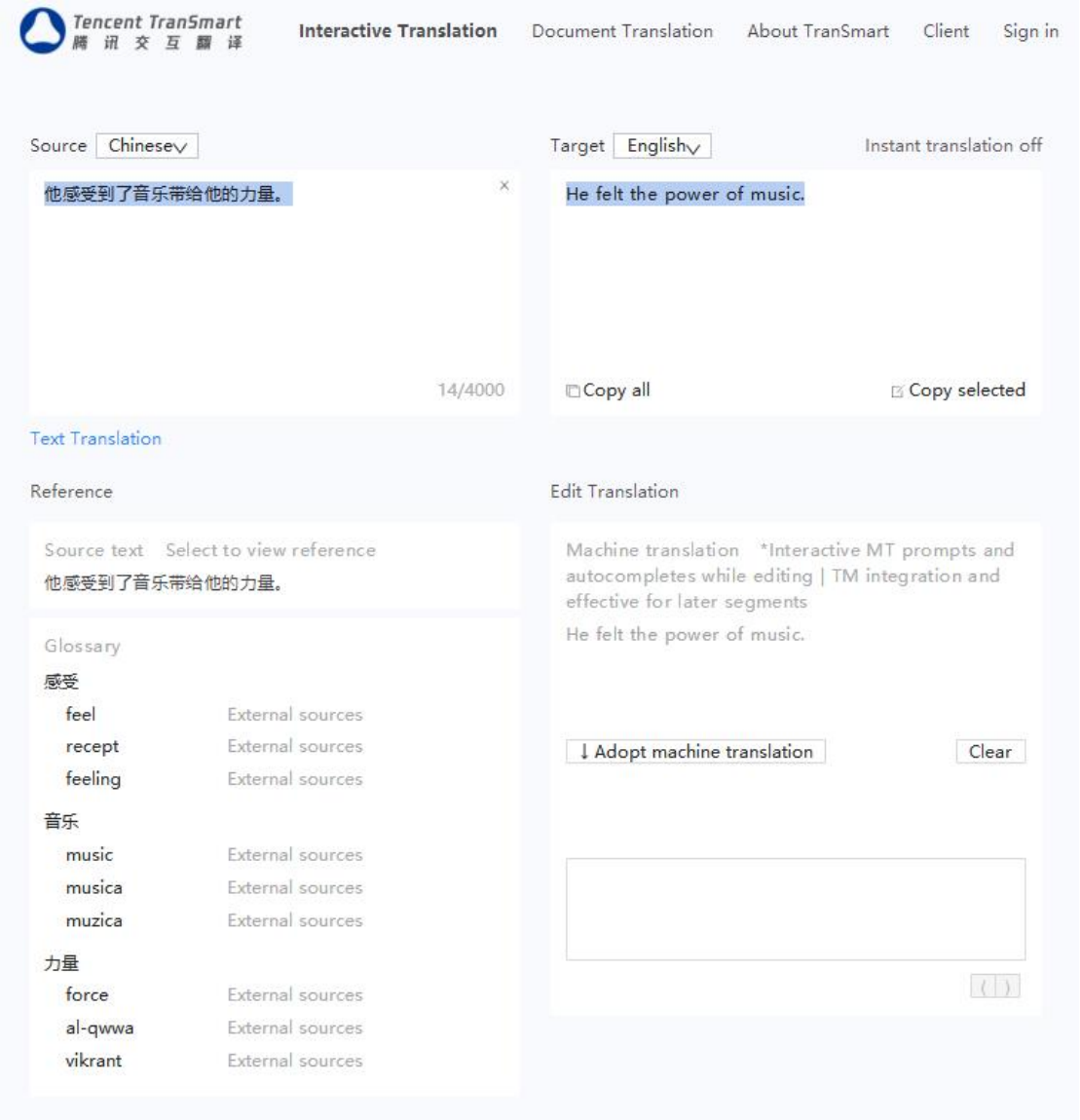


Machine Translation Tutoring

The translation system applied in the study was *Transmart*, a web-based interactive machine translation system (Huang et al., 2021). When users input the source text in the Source section, the suggested translation is synchronised in the Target section (see Figure 2). Compared with other translation systems, *Transmart* can better facilitate its users in two ways. Firstly, glossaries can be automatically extracted from the source text, and their translations will be provided in the Reference section. Sometimes, this section will also recommend sentences with high similarity to the source sentence. If users find the translation in the Target section unsatisfactory, they can correct it in the Edit Translation section, consulting the given glossaries and sample sentences. Secondly, whenever users correct their translation in the Edit Translation section, the correction will be stored in the translation memory, and machine learning can avoid similar mistakes next time.

Figure 2

A Snapshot of Transmart



Data Collection

Different data types were collected, including revised drafts, the whole MT-supported correcting histories, group discussions, and interviews with the six participants. Group discussions and the process of using *Transmart* were video and audio recorded, then transcribed verbatim. Semi-structured interviews were conducted with the participants individually after they finished all the revising tasks (Cohen et al., 2018). In the individual interviews, we adopted a stimulated recall approach to enquire into crucial issues during the whole revising process and their reflections and stances on this MT-supported collaborative correcting design.

Data Analysis

Three main types of data were involved in the current study. First, corrective feedback for two drafts of the same Grade-12 student was collected and coded based on the coding scheme. Regarding the corrective

codes of writing, Byrne's (1988) codes—deemed as "simple and practical" in making corrections neater (Hyland, 2003, p. 181)—have covered typical language problems in ESL writing, so it is adopted as the analytical framework in the current study. But Byrne's codes are not impeccable in that "various rhetorical and communicative aspects remain outside its reach" (Hyland, 2003, p. 182). To remedy this problem, Cambridge Assessment English—a comprehensive framework for instructors to evaluate students' writing—was integrated into the present study, including content, communicative achievement, organisation, and language items (UCLES, 2022). An extra code of *theme* is also added for analysing students' narrative writing, given that theme is fundamental for good storytelling (McConnell, 2019). Sixteen codes under four items were ultimately adopted as an analysis framework (see Table 1) for students' writing hereafter. Second, group discussions were transcribed and then translated into English. The first two types of data were used to answer the first research question: to analyse the focus and process of participants' correction with the aid of MT. Additionally, interview transcripts were utilised to examine the participants' perception of MT-supported feedback design as the response to the second research question.

Findings

MT-Supported Collaborative Feedback for Writing

Data from the group discussion revealed that the participants divided their focal points into macro and micro levels. While the former referred to content-related issues, the latter involved language-related ones, such as grammar and sentence patterns. In both assignments, the group started their collaborative correction by discussing problems at the macro level. The group had attached importance to issues of content, which turned out to be the main foci throughout the discussion. The group's editing history revealed that MT facilitated the participants' dealing with content-related issues. Deficiency in content refers to the lack of information in the plot development, for which the reviser has to add more details to manifest the characters' emotions or the theme. The story in Assignment 1 is about a boy named Dj who loved singing but couldn't handle social situations well. He decided to accept an invitation to sing a verse in a music programme but became anxious when he went on stage. The ending was left open to compose. At the beginning of the continuation part, the group agreed to add details to show Dj's nervousness as he stepped onto the stage. Then, they came up with a sentence in Chinese: "手拿着麦克风颤抖，嘴巴张开却发不出声音" (literally meaning "Holding the microphone in hand, trembling. His mouth was open but made no sound.") and used *Transmart* to translate it. A target sentence, "His hands trembled with the microphone, his mouth was open, and no sound came out," was generated. Cora, one of the participants in the focal group, suggested revising the latter part of this sentence to "...and he opened his mouth but couldn't say a word." At this point, another member, Bobby, felt it awkward to say "couldn't say a word" here because Dj was singing instead of delivering a speech. The group finally agreed on "His hands trembled with the microphone; he opened his mouth, but no sound came out," adapted from *Transmart*'s output.

The data also suggested that MT could help reduce ambiguity in expression, as exemplified in Assignment 2. It is a story about a group having found a bunch of keys on the ground and assuming the owner to be someone in the neighbourhood. After waiting in the same place for two hours, the group went back to the neighbourhood and tried to find the owner by going door to door. Then, an old lady showed up, and the story was left open here. The sentence, "a red car became lighting and spoke some sound," confused the participants in that they were not sure what the student originally wanted to say. When Cora suggested changing "became lighting and spoke some sound" into a word, Bobby proposed a Chinese word, "车鸣" (literally meaning "a car honks"), and entered it in *Transmart*, which generated a phrase ("car noise") they deemed unacceptable. They then turned to the example sentences in the Reference section and adopted the phrase "sounding its horn" from a sample sentence.

The item of communicative achievement is employed to evaluate whether the writing "uses an appropriate style and relevant functions" for the task (UCLES, 2022, p. 1). Both drafts in this study turned out to be style-proper. The reason may be that in the story continuation task, the first few paragraphs given to students

can serve as a style guide for them to get acquainted with or imitate.

In regards the theme, it is a writer's duty to elaborate on it through narrative. The team provided feedback in Assignment 1, suggesting that the writer refine the content in Paragraph 2 to echo the story's theme. Then, they advised adding "He felt the power of the music. For the first time, he overcame his fears," when Dj's father stepped onto the stage and sang with him. The added sentences were adjusted from *Transmart*'s results.

The organisation item was used to gauge if the writings were well-organised, logical, and ordered (UCLES, 2022), so codes of cohesion and coherence were set up under this item. Revisions related to cohesion and coherence were done without MT in this study.

It was found that language problems were prevalent in both assignments, corresponding to Tanpoco et al.'s (2019) findings that language errors were the most prevalent in senior high school students' L2 writing. Nevertheless, the participants had reached a consensus on fixing this type of error with barely any divergence. Revision data showed that all the linguistic errors were corrected without the assistance of MT except for *inappropriate use* and *unidiomatic expression*.

In terms of inappropriate use of language, it can be categorised into several sub-types according to the group's annotation, such as using words with improper sentiment and misuse of function words or auxiliary verbs. For instance, in the first paragraph of Assignment 2, "we" in the story tried to look for the key owner but failed, so "we felt blue." The group were not sure if "blue" was appropriately used here. "Would 'upset' be a better choice?" asked Bobby. Judy advocated entering the sentence into *Transmart* for confirmation, and the translation turned out to be "我们感到忧郁" (literally meaning "we feel melancholy"), which validated their claims that "blue" was not sentiment-proper for the plot. The team reached a consensus that "we" may feel disappointed or upset rather than melancholy when "we" failed to find the key owner. Thus, they suggested changing "blue" into "upset."

When modifying unidiomatic expressions, participants used *Transmart* frequently. PSTs in the current study, like many ESL in-service teachers in China, had taken Mandarin as their L1, so they tended to use computer-aided tools to explore and verify idiomatic English expressions. For example, when they saw a sentence in Assignment 2 that said "...there are some followers will come to open," they guessed what the student had intended to say and reached an agreement on a Chinese sentence, "那里有些含苞待放的花" (literally meaning "there are some flowers that are in bud form") before using *Transmart*, yet they ran into a hiccup since the target sentence "there are some flowers in bud" from *Transmart* sounded alien to them. Consequently, they agreed on a revised version, "...where there were flowers just about to blossom," enlightened by an example sentence in the Reference section.

In sum, data from the revision and group discussion showed that participants have utilised MT mainly in explicating the story's theme, remedying deficiencies in content or linguistic components, ambiguity, unidiomatic L2 expressions, and inappropriate use of language. When using *Transmart*, team members would propose a new sentence or phrase in their L1 based on the context and then translate it into the L2 via MT. If they found the output proper, they would accept it as it was. When the L2 output was not quite satisfactory, participants would adjust the L1 expression until they reached acceptable outcomes from *Transmart*. Meanwhile, they might refer to the glossaries and example sentences in the Reference section. It should be admitted that if the participants were allowed more time and additional computer-assisted instruction (CAI) tools besides MT, they might have provided more considerate and constructive suggestions. Different tools may be complementary to each other in providing solutions to users.

Table 1

Collaborative Feedback for Writing Across Two Assignments

Assignment	Item	Code	Frequency	MT-supported*
1	**Content**	● **Deficiency-C**	**5**	● **Y**
		● Redundancy	1	● N
		● **Ambiguity**	**3**	● **Y**
	Communicative Achievement	● Style	0	● N
		● **Theme-related**	**2**	● **Y**
	Organisation	● Lack of cohesion	0	● N
		● Lack of coherence	1	● N
	Language	● Deficiency-L	5	● N
		● Unidiomatic expression	0	● N
		● Incorrect spelling	2	● N
		● Wrong word order	0	● N
		● Wrong tense	4	● N
		● Wrong concord	0	● N
		● Wrong form	2	● N
		● **Inappropriate use**	**5**	● **Y**
		● Wrong punctuation	0	● N
2	**Content**	● Deficiency-C	1	● N
		● Redundancy	2	● N
		● **Ambiguity**	**2**	● **Y**
	Communicative Achievement	● Style	0	● N
		● Theme-related	1	● N
	Organisation	● Lack of cohesion	2	● N
		● Lack of coherence	1	● N
	Language	● Deficiency-L	1	● N
		● **Unidiomatic expression**	**5**	● **Y**
		● Incorrect spelling	5	● N
		● Wrong word order	0	● N
		● Wrong tense	2	● N
		● Wrong concord	0	● N
		● Wrong form	5	● N
		● **Inappropriate use**	**8**	● **Y**
		● Wrong punctuation	1	● N

Note. Deficiency-C stands for deficiency in content; Deficiency-L stands for deficiency in language components.
*In this column, Y stands for collaborative feedback supported by machine translation. N means the opposite (i.e., unsupported by machine translation).

Pre-Service Teachers' Perceptions of MT-Supported Collaborative Feedback for Writing

Participants in this study maintained a positive attitude toward applying MT in collaborative feedback for writing. They showed the greatest appreciation for the glossary and example sentences in the Reference section, which they could draw on to improve the target language. Five out of the six members thought it helpful to use them and considered this section as a unique advantage of *Transmart* compared to other MT systems. In addition, using *Transmart* could enhance the effectiveness, accuracy, and naturalness of the language when revising students' writing. Another merit, mentioned by Judy, was the neat web page design of *Transmart*. Moreover, human-machine interaction, one of the strongest competitive edges for *Transmart*, was mentioned as impressive by Cora and Bobby.

Regarding their motivation for applying *Transmart* to their collaborative feedback, the participants stated that they used it because their teacher had shared this tool in class, and they found it useful. On the other hand, they would use it when confronting uncertainty in providing feedback.

The answers varied from person to person regarding the most effective function of MT. Vicky voted the efficiency of MT, whereas, to Jessy, providing advanced L2 vocabulary was the most helpful MT feature. Lynn recalled that whenever she needed to add additional content, she would refer to MT first and then post-edit the result until it was appropriate. Yet Cora found MT beneficial in that it could assist users in confirming if a certain expression befitted its context and sentiment.

Concerning the deficiencies, two participants mentioned the target texts from *Transmart* didn't conform to their expectations due to the lack of accuracy and diversity. Also, the output was sometimes rigid, so post-editing was indispensable. Moreover, in the Reference section (see Figure 2), some glossaries extracted from the source sentence turned out to be neither the key words nor the complex expressions, thus having limited value as reference information. Besides, the quantity of example sentences was limited, so it was sometimes difficult for users to post-edit the target text facilitated by the glossaries and example sentences. As a result, five out of the six participants suggested using it with other systems (e.g. *Google Translate*, *Linggle*) or CAI tools.

Concerning the collaborative working mode, the team maintained a very positive attitude towards it, evidenced by expressions such as "love it," "very good," "efficient," and "complementary" in the interview. They welcomed collaboration because team members could give full play to their strengths through the division of work, and thus the collaborative work made mutual learning more effective. Nonetheless, the mode of collaboration was not flawless. Members' views differed sometimes, so reaching a consensus was not always easy. Team members might risk offending the opinion leader, if any, if putting forward different ideas or opposing viewpoints. Also, making full use of each member's expertise is vital and challenging.

Discussion

Perceived Benefits of MT-Supported Collaborative Feedback for Writing

The findings of this study are consistent with previous research on MT's benefits in improving students' ESL writing quality (Godwin-Jones, 2022). MT proved to be specifically useful in correcting inappropriate use of language and unidiomatic expressions, which were also highlighted in previous studies (S. M. Lee, 2020, 2022; Y. J. Lee, 2021). Meanwhile, our findings contribute to the current research by exploring the effects and challenges for PSTs—an important and special group of students who are trained to become professional teachers—in adopting MT to support their revision of students' English story continuation writing task. MT turned out to be helpful in correcting deficiencies in content, ambiguous information, and theme-related problems for such writing tasks, which was almost unmentioned in the literature before.

Six PSTs recounted the following merits of MT that assisted their collaborative revision. Firstly, providing hints from its glossary and example sentences was reported as being of specific help by most participants. Moreover, providing neat and accessible web design, together with iconic human-machine interaction, were

also considered impressive thanks to *Transmart*'s unique system design. In addition, the effectiveness of collaborative feedback and the accuracy and genuine use of L2 were another two advantages mentioned that align with previous research results (Hanjani & Li, 2014; Zou et al., 2016). This study also showed that through the MT-supported collaborative correcting mode, the efficiency and accuracy of revisions were improved, and the burden on the revisers was reduced. In addition, this mode also helps PSTs adapt to the real working environment in advance.

Perceived Challenges for MT-Supported Collaborative Feedback for Writing

Despite the merits of MT, some language teachers feel reluctant to use it mainly due to their doubts about its accuracy (Godwin-Jones, 2022; Y. J. Lee, 2021). Lack of accuracy and diversity in MT's output was also a problem perceived by the participants in the current study. Besides, glossaries extracted from the source text were not precise and accurate enough, so they sometimes had limited value for reference. Additionally, there was a limited number of example sentences in the Reference section, which they expected to be improved in the future. Furthermore, balancing different opinions among all the participants and making the best of each member's expertise remains an enormous challenge in group work.

Implications

The procedure and perception discussed in this study shed light on training PSTs to use MT to support their collaborative feedback for ESL writing. Firstly, it is highly advisable to impart training on cutting-edge tools to PSTs so that they are motivated to use them after getting acquainted with them, as shown in the present study. Secondly, computer-assisted instruction tools such as MT usually help PSTs in language learning and also language teaching in the future, but tools could also have limited or even counter effects sometimes. Thus, it is important that PSTs improve their linguistic competence and understand how computer-aided tools function. The human factor is decisive in the result of feedback for writing (Zou et al., 2016), especially in the context of collaborative working mode for PSTs. As Bobby commented, using MT made her realise that teachers themselves still played an essential role in ESL teaching and learning, and they should avoid relying too much on the tools. Lastly, perspective-taking is vital in ESL teaching, particularly writing, which means that teachers should put themselves in students' shoes. The purpose of correcting students' writing is not to change what the students originally wanted to convey according to the teacher's wishes; on the contrary, it is the teacher's duty to help the students perfect their content and language based on students' intentions. This process will be more accurate and efficient with the support of MT, preferably a combination of MT and other CAI tools, as found in this study.

Conclusion

The current study has shown the benefits of MT in supporting PSTs' collaborative revision of students' ESL writing in terms of efficiency and accuracy. MT is especially helpful under the circumstances the PSTs share the same L1 (non-English) with their students and they are indecisive about choosing a context-appropriate English word, or providing more diverse expressions. Additionally, the collaborative working mode prepares them for a more interactive working environment. Nevertheless, this study is only an exploration with limited numbers of writing assignments and participants. Future studies can dwell on the application of MT in PSTs' collaborative revision of writing with diversified text types and participants of different language levels. Besides, it would be conducive to investigate the reasonable frequency of collaboration and efficiency-effectiveness balance of more CALL tools integration in providing feedback for ESL writing.

Acknowledgements

This research was supported by the Guangdong Philosophy and Social Science Fund (GD22WZX02-04) and the Center for Translation Studies of Guangdong University of Foreign Studies (CTS202001). We would like to express our gratitude to the editors and the anonymous reviewers for their constructive comments. Particular thanks also go to the six pre-service teachers who participated in this study.

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