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The impact of using machine translation on EFL students’ writing

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ABSTRACT

Although it remains controversial, machine translation (MT) has gained popularity both inside and outside of the classroom. Despite the growing number of students using MT, little is known about its use as a pedagogical tool in the EFL classroom. The present study investigated the role of MT as a CALL tool in EFL writing. Most studies on MT as a tool for L2 learning have focused on student postediting of the translation that MT provides; however, the present study employed a different design with students translating their L1 writing into L2 without the help of MT and then correcting their L2 writing using the MT translation for comparison. Text analysis of students’ writing outcomes revealed that MT helped to decrease lexicogrammatical errors and improve student revisions. Using MT for revisions also positively affected student writing strategies and helped them think of writing as a process. The interviews and reflection papers demonstrated that students viewed the use of MT during writing positively. This study found that MT can be a useful aid to language learning, but for it to benefit student learning, teachers must be aware of its limitations and provide adequate guidance to students.

KEYWORDS

Machine translation; L2 writing; revision; writing strategies

Introduction

Machine translation (MT) is not widely used in the academic context, mainly because of concerns about its reliability with regard to whether it can accurately render the source text in the target language. However, MT technologies have developed considerably during the past decade and offer significantly improved grammatical and lexical accuracy. MT is defined as “the process by which computer software is used to translate and [is] compatible with PC systems and smart phone systems” (Alhaisoni & Alhasysony, 2017, p. 73). Since MT became available on both PCs and mobile phones, it has become increasingly widespread in various settings because of its convenience, multilingualism, immediacy,

Undoubtedly, students are increasingly using MT for diverse academic purposes as well as in their daily lives. They use MT for vocabulary learning, translation, reading comprehension, and writing assignments, considering it to be a good supplementary tool for language learning (Alhaisoni & Alhaysony, 2017). According to the literature, MT benefits student language learning from the cognitive, linguistic, and affective perspectives. From the cognitive perspective, it reduces cognitive load by doing preliminary translations (Baraniello et al., 2016; Lewis, 1997) and promotes self-directed learning (Godwin-Jones, 2015; Wong & Lee, 2016). From the linguistic perspective, MT supports lexico-grammatical knowledge (Bahri & Mahadi, 2016; Doherty & Kenny, 2014; Wong & Lee, 2016), promotes reading comprehension and writing (Alhaisoni & Alhaysony, 2017; Garcia & Pena, 2011; Kumar, 2012), and ultimately fosters language learning (Belam, 2003; Niño, 2009; Shei, 2002a; Wong & Lee, 2016). Williams (2006) pointed out that the use of MT can “force students to think about language as a communication tool, not as a set of decontextualized vocabulary words or phrases” (p. 574). From the affective perspective, it lowers language anxiety (Bahri & Mahadi, 2016; Jin, 2013), increases motivation and confidence (Kliffer, 2008; Niño, 2008), and creates a nonthreatening learning environment (Niño, 2009).

At the same time, studies also report the drawbacks of MT, such as erroneous sentences, incorrect lexis, and inaccurate grammar (Bahri & Mahadi, 2016; Josefsson, 2011; Niño, 2008, 2009).

The current situation can be summarized as follows: the demand for MT is increasing in the learning context, but the reliability of MT has not yet been fully established. Therefore, we need to determine how best to use MT, an imperfect tool, to produce positive learning outcomes in the language classroom. To date, little research on this issue has been conducted. Hence, it is important to investigate how MT can facilitate student language learning based on actual evidence and acknowledge its potential benefits, as well as its dangers, in education. Most studies on MT as a tool for L2 learning focus on MT of students’ L1 writing and postediting the translation provided. Consequently, these reports hold MT as a bad model (Niño, 2004, 2009), full of lexico-grammatical errors that must be corrected through postediting. In contrast, this research takes MT as a CALL tool that can provide students with lexico-grammatical references in the target language and support language learning. As postediting does not enable direct measurement of student improvement, this study employs a different task design with students translating their L1 writing into L2 without the help of MT and then correcting their L2
writing using the MT translation for comparison. The purpose of the current study is to investigate the value of MT for improving students’ L2 writing.

**Literature review**

Prior studies confirmed that MT can serve as an effective supplementary learning tool during L2 writing. The studies of both Garcia and Pena (2011) and Ali and Alireza (2014) revealed that MT helped students write faster and produce more fluent and natural writing with fewer errors. Garcia and Pena (2011) further found that beginning students benefited most from MT and that MT helped them express themselves better and communicate more in L2 writing. According to Godwin-Jones’s (2015) study, MT promoted students’ writing by scaffolding their learning. Niño’s (2008) study also showed that MT particularly improved students’ paraphrasing skills, which are essential to successful writing (Chen, Huang, Chang & Liou, 2015). Correa (2014) ascertained that postediting with MT helped students develop metalinguistic awareness, contributed to the writing process, and improved the final outcome. Similarly, Amaral and Meurers (2011) claimed that MT can provide linguistic modeling, raise linguistic awareness, and increase lexical, semantic, syntactic, and pragmatic knowledge of L2 during L2 writing.

MT can further facilitate student writing by increasing lexical fluency (Chen et al., 2015). In fact, studies have often compared MT to dictionaries and other electronic reference tools, and they concluded that MT performs better in terms of translating technical jargon, phrases, and collocations than traditional dictionaries (Bahri & Mahadi, 2016; Frodesen, 2007). In addition, MT could better cater to a language learner’s needs, whereas other electronic reference tools and dictionaries are inadequate in helping learners develop lexical knowledge (Chen et al., 2015). Bernardini (2016) maintained that MT in language classrooms functions similar to a corpus that is “fully adaptable to the learner’s individual needs and preferences” (p. 16). This, in turn, leads to data-driven learning, which has been shown to be effective for ESL/EFL students, particularly those at lower levels (Nation, 2001; Wong & Lee, 2016).

Several studies also found that MT could help student revisions during L2 writing. Garcia and Pena (2011) claimed that MT postediting allows students to focus more on editing and the process of writing. Kliffer (2005) stated that MT postediting enables students to apply their existing knowledge of the target language and make corrections in writing. In addition, MT can assist EFL students who often find it difficult to obtain individualized feedback about their writing in the classroom. It can offer
individualized feedback, provide lexical and syntactical alternatives, and therefore help students detect and fix errors. Furthermore, MT focuses more on lexico-grammatical errors and forces students to find their own errors, solve the problem, and make a decision. In doing so, students acquire self-directed and independent learning skills related to L2 writing (Bernardini, 2016; Garcia & Pena, 2011).

Furthermore, MT seems to be helpful not only from the linguistic perspective but also from the affective perspective. According to Amores (1997), students tend to become defensive toward the teacher’s editing of their writing. In contrast, students might be less defensive and more comfortable with MT. Niño (2004) argued that using MT in postediting tasks heightens learner motivation and participation and, as a consequence, increases confidence in language learning. According to several studies (Bahri & Mahadi, 2016; Jin, 2013; Kliffer, 2008; Niño, 2008, 2009), MT helps lower student anxiety and build a nonthreatening language learning environment.

Studies have also reported the drawbacks of MT. Although it is helpful in developing lexical knowledge and increasing awareness of grammar rules in context, it is less useful for providing grammatical solutions (Josefsson, 2011). Moreover, MT supports language learning mostly at the lexico-grammatical level, but not at the discourse level (Groves & Mundt, 2015). Shei’s studies (2002a, 2002b) on MT pre-editing reported idiomatic, lexico-semantic, and cultural limitations. He also pointed to grammatical errors in MT outputs due to ill-formed language input and insufficiencies of MT grammar systems. The dependence of MT quality on the language pair, size, text type, and subject area is also problematic (Godwin-Jones, 2015; Niño, 2009).

Although it remains controversial, previous research has found diverse educational benefits of MT in language learning. Moreover, as MT technologies advance, MT is expected to be used more widely in the academic EFL context. Therefore, it is imperative to investigate the effects of MT on L2 writing. However, mainly because researchers and practitioners are still skeptical of its accuracy and usefulness (Barr, 2013), adequate amounts of empirical research on this issue have not yet been published to prove its pedagogical effectiveness. Most previous studies have focused on the reliability of MT and have held MT to be a bad language model. Moreover, the research methods used in those studies were mostly limited to surveys that did not measure student learning outcomes after using MT (Case, 2015). Therefore, this study investigates MT as a CALL tool in L2 writing based on multiple data sources: student writing outcomes, interviews, and reflection papers. Whereas prior studies focused mainly on MT postediting (student editing of the MT version...
to enhance the accuracy and quality), this study asked students to edit their own writing with the help of MT. In the current study, the following questions are addressed:

1. In what ways did MT influence EFL students’ English writing?
2. How did MT influence students’ writing strategies during revision?

**Method**

**Participants and task description**

Data for the present study were collected over six weeks in a multimedia-assisted language learning course at a university in Korea. The subjects were 34 students (21 females and 13 males) who majored in English. Their L1 was Korean and English proficiency generally ranged between 70 and 95 on the iBT TOEFL (between intermediate and high-intermediate). The students were given a writing task about the texting language of today’s young people that involved the following five steps: (1) watching a TED video (15 minutes) on the topic, (2) writing a one-page paper about the topic in their L1 (source text), (3) translating their writing into English (initial English version without the help of MT), (4) translating their writing into English solely using MT (MT version), and (5) editing their initial English translation by comparing it with the MT version (final version with the help of MT). During Step 3 and 5 the students were allowed to use other resources, including dictionaries. The students were allowed to choose MT, and except four students who used Papago (MT developed in Korea), all of the students used Google Translate. Both tools were similar in function and performance and both were easy to use. After completing the task, the students were...
interviewed during individual writing conferences with their instructor. They also submitted reflection papers at the end of the task.

**Data collection and analysis**

The present study employed a mixed method, which included quantitative text analysis of all the versions of the students’ writing and qualitative analysis of their interviews and reflection papers. Data collection and analysis are summarized in Figure 1.

All versions of the students’ writing were analyzed using text analysis with multiple steps. During the first step of the analysis the L1 writing was analyzed to check its overall quality. Particular attention was paid to the content and meaning because they were supposed to remain the same in both the students’ translation and the MT version. The structure and logic of the sentences were also checked since they can influence the quality of the translation, particularly with MT (Godwin-Jones, 2015; Ruiz & Federico, 2014).

During the next steps, the errors appearing in the students’ English writing (without the help of MT) and their final version (with the help of MT) were calculated and categorized as lexical or grammatical errors. While previous MT studies used error analysis to evaluate the accuracy of MT (Aiken & Balan, 2011; Groves & Mundt, 2015; Kliffer, 2008), the current study was unique in that it used error analysis to measure how much the students’ L2 writing improved with the help of MT. In addition, previous studies measured only grammatical errors, but the current study examined errors in two dimensions, the level and type of errors. Error levels included the use of symbols, words, phrases, or clauses/sentences; error type distinguished grammatical and lexical errors. According to Barkaoui & Knouzi (2012), lexical errors include two categories, type and form. A lexical type error refers to wrong word choice for the given context, such as “use texting distinctively in reality and on the internet.” A lexical form error indicates the wrong form of a word, such as “destruct of the language.” However, because lexical form errors overlap with one of the grammatical error categories, misinformation, they were categorized as grammatical errors and only lexical-type errors were counted as lexical errors in this study.

Concerning grammatical errors, the four categories proposed by Dulay, Burt, and Krashen’s (1982) Surface Structure Taxonomy, addition, omission, misinformation, and misordering, were utilized. While lexical errors were simply counted in terms of occurrence, grammatical errors were weighted differently depending on their significance. For instance, the omission of content words, such as subjects and verbs, was taken more seriously than the omission of function words, such as articles, or
the misuse of prepositions. Thus, student writing with more errors did not necessarily score lower than that with fewer errors. It should be noted that the error-free T-unit ratio, which is widely used in ESL writing research, was not used in this study because it cannot count multiple errors in a single T-unit. The multi-trait scoring system was used, as it was more suitable for the purposes of this study than holistic or analytic scoring systems, which incorporate more criteria than required for this study. Based on the number of errors, the significance of each error, the clarity of meaning, and the correctness of lexical usage, each piece of the second and final versions was scored from 1 to 6. Then the lexical and syntactic complexity of each piece of writing was calculated.

The last step was investigating changes appearing in the final version and identifying each change on the basis of its level and purpose. Level refers to symbols, words, phrases, clauses/sentences, or paragraphs. Purpose indicates the reason for the change: mechanics corrections, word use corrections, grammatical corrections, changes to better express the same meaning, and changes in content. Two trained raters scored the students’ writing outcomes and identified the errors. The interrater reliabilities were 91% and 93%, respectively, for the initial and final versions of the students’ English writing.

On completion of the task, interviews and reflections papers were collected. All of the participants participated in interviews with the instructor and each interview took about 5–10 minutes based on the analysis of the students’ writing. The interview questions covered the advantages and disadvantages of MT in L2 writing, procedures for correcting errors during revision, and the reasons underlying the changes (Appendix). Interviews were individually conducted during writing conferences and recorded. In the reflection papers, the students evaluated MT as a supplementary learning tool for L2 writing in half to one page. Interviews and reflection papers helped to elucidate the students’ perceptions of MT and their intentions in making the changes they did in their final versions, which could not have been determined otherwise. The interviews and reflection papers were coded with multiple steps from open to selective coding to indicate emerging themes and used to triangulate the results of writing analysis.

Results

Analysis of student writing

Most students generated acceptable writing quality in L1. The students’ initial L2 versions had scores ranging from 2 to 6 with a mean of 3.76 on a 6-point scale (four students with a score of 2; 10 students, 3; 14 students, 4; two students, 5; and four students, 6). Compared with the initial versions,
the mean score significantly increased in the final version (mean = 4.59). The average number of total errors in the students’ initial English version was 21.94, with grammatical errors (mean = 15.67) occurring more than twice as often as lexical errors (mean = 5.97). The average number of total errors decreased significantly in the final version (mean = 13.64), with the average number of lexical errors and grammatical errors falling to 3.82 and to 9.82, respectively, because the students meticulously edited their initial English version by comparing it with the MT version. The average number of changes that the students made to the final version was 16.0, with changes at the lexical level (mean = 8.57) occurring twice as frequently as changes at the phrase level (mean = 3.55) or clause/sentence level (mean = 3.91). No changes were found at the symbol and paragraph levels. It was noticeable that the students did not simply adopt the MT translation in their revision. This will be further discussed later in the paper.

With regard to purpose, replacing expressions appeared the most frequently (mean = 7.8), followed by editing grammar (mean = 6.4) and fixing vocabulary (mean = 3.6). Changes to vocabulary were mostly limited to the lexical level, while changes to grammar and expressions ranged from changing a single word to phrase- or sentence-level revisions. Whereas changes in vocabulary and grammar contributed to correcting errors, changes in expressions did not necessarily reduce the number of errors in the students’ writing, although they did enhance comprehensibility and authenticity. However, sometimes grammatical or lexical errors were corrected concurrently when one expression replaced another. It should also be noted that the sum of the changes in each purpose category exceeded the number of total errors marked in some students’ writing because a single error was sometimes edited for two or more purposes. For example, a student changed “the destruct* of the language” to “the decline of the language,” simultaneously fixing both a lexical and a grammatical error. The students did not make any change for mechanics or content in the final version. Among the changes, 68.9% turned out to be correct, whereas the rest were still incorrect (Table 1).

On statistical analysis, t-tests supported significant differences in writing scores and the number of lexical and grammatical errors in the initial and final versions. On the other hand, there were no statistically meaningful differences in lexical complexity (lexical diversity and density) or sentence complexity between the initial and final versions (Table 2).

Qualitative data results

Two types of qualitative data, interviews and reflection papers, were collected, and both types were consistent with the other results of this study. Most of the students mentioned in their reflection papers that
using MT helped their writing ($N = 30, 88\%$). They wrote that they were initially skeptical about its accuracy based on their own previous experiences or hearing from others about MT, which made them dismissive of MT, especially in an academic setting. However, during the task, they were “very impressed to find that MT was a lot more accurate than expected,” as one student remarked.

Most of the students mentioned that MT was useful, particularly for finding a more accurate word or an authentic expression for a given context ($N = 23, 67\%$), and about 70% of them ($N = 23$) mentioned that they would use MT to find vocabulary next time. They explained that they were often flooded with words in the dictionary, did not know which one was the most appropriate for their context, and often ended up choosing the wrong word. The students mentioned that MT was effective for lexical choices ($N = 19, 55\%$) because it automatically ruled out some options, saying that “MT, unlike a dictionary, selected a word based on the context.” The students felt that MT’s selection of a word was more accurate and contextualized than their own choices from the dictionary in certain cases. They further said that having another option could make their writing better. They compared MT’s choice with theirs and then selected the word that best fit the context. When they were uncertain, they checked the usage of the word on the internet or in the dictionary.

**Table 1. Sample of changes.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Original version</th>
<th>Final version</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symbol</td>
<td>No changes found</td>
<td>The standard for right and wrong should be definite.</td>
</tr>
<tr>
<td>Word</td>
<td>The standard for right and wrong should be definite.</td>
<td></td>
</tr>
<tr>
<td><strong>Phrase</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clause/Sentence</strong></td>
<td>It is not obvious that the arrival of the texting language is profitable to one’s linguistic area.</td>
<td>Even at this moment it is doubtful whether emergence of the text language is beneficial in the individual language domain.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paragraph</td>
<td>No changes found</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>No changes found</td>
<td></td>
</tr>
<tr>
<td>Mechanics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grammar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No changes found</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contents</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No changes found</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In a similar way, when they noticed sentence structure different from theirs in the MT version, they “became aware” of potential issues and “reconsidered” the grammar they used to determine the right choice. In other words, MT improved the students’ lexico-grammatical awareness and pushed them to correct errors. This study revealed that the students took advantage of MT in expressions as well. The students commented that MT introduced them to many authentic expressions and showed them an alternate way to express the same meaning. As one student remarked during the interview, “I realized there was an easier way to express the same meaning and, moreover, it made more sense.” In addition, 12 students (34%) mentioned that they did not usually edit before submitting writing assignments; however, they spent more time editing during the MT task.

On the other hand, the students noted several drawbacks with MT. First, they questioned its accuracy ($N=9$, 27%). When they found ungrammatical sentences in the MT version, they said that they became more cautious and did not directly adopt the MT version. Second, although MT translated text in a more contextualized manner than a dictionary, the students still found awkward literal translations ($N=8$, 23%). Third, certain writing styles were less accurately translated by MT. For instance, run-on sentences tended to generate more grammatical errors. A student remarked in the reflection paper that he would “write in Korean more simply and clearly and then translate into another language next time” to minimize the errors generated by MT. Several students also mentioned that MT should be able to understand the context and culture of the target language. Additionally, words with elusive or double meanings were often inaccurately translated.

During analysis of the students’ reflection papers, two strikingly different groups of responses emerged in terms of students’ perceptions of the accuracy of MT. A closer look at the data revealed that they viewed MT differently depending on their English proficiency. That is, the students with initial English writing scores $\leq 4$ on a scale of 6 ($N=28$) mentioned the positive side of MT more frequently. They wrote that MT was
“useful,” “helpful,” and “effective” for correcting grammar and vocabulary, in that it “helped improve my writing” and “I could learn a lot about grammar from MT.” On the other hand, students with scores ≥5 (N = 6) often mentioned the downsides of MT. They remarked that “although MT was helpful at the vocabulary level, it did not help much at the sentence level.” They also pointed out that MT was not accurate in translating longer text, and therefore it was not appropriate for academic purposes. Interestingly, one student added that although MT was not particularly helpful for her, she believed that “it would benefit elementary-level students.” In summary, the reflection papers showed that MT was more beneficial to lower-level students, particularly with regard to appropriate word choice as well as identifying and fixing lexico-grammatical errors.

**Discussion**

**MT’s influence on student revisions**

Compared with their own English writing, the students significantly improved their final version using MT. The number of errors in both vocabulary and grammar decreased dramatically in the final version. Editing with MT in this study ultimately heightened grammatical accuracy in student writing. Previous studies claimed that improved grammar is characteristic of enhanced text quality (Min, 2006) and that grammar correction facilitates the communicative effectiveness of writing (Rahimi, 2009). While lexico-grammatical accuracy is not a single criterion for good English writing, it can certainly contribute to the quality of writing. Students at the intermediate and lower levels are challenged by various lexical and grammatical errors in their English writing, which often hinder communication and lower the quality of their writing (Lee, 2014). Even when students can produce quite good writing in their L1, like those in the current research, lexico-grammatical errors and inauthentic expressions are detrimental to their English writing. In such cases, improvements in vocabulary, grammar, and expressions enhance the overall quality of writing. In the current study the students improved the quality of their writing by decreasing lexico-grammatical errors with the help of MT.

The students also found MT useful for context-appropriate word choice and developing more authentic expressions. Whereas dictionaries show vocabulary without considering the context in which it will be used, MT is generally more sensitive to context because it translates entire sentences (Doherty & Kenny, 2014). Therefore, students regarded MT as a useful substitute for a dictionary. In summary, MT helped
students minimize grammatical errors, select more appropriate and contextualized vocabulary and more authentic expressions, and thus enhanced the overall quality of their writing. In this study, as in Niño’s argument (2004), editing with MT could “promote accuracy and therefore grammatical, lexical and stylistic correctness in the foreign language classroom” (p. 183). Additionally, in terms of types of feedback, previous studies found that direct correction was most effective for grammar revision and students were most satisfied with it compared to indirect correction and other types of feedback (Chandler, 2003; Saito & Fujita, 2004). In this study, MT provided immediate and individualized direct correction of grammatical errors, and the students found grammatical correction with MT during revision easy.

The current study established that MT functioned similar to peer-editing: neither is perfect, but both are helpful to student writing. Numerous studies support the positive role of peer-editing. Those studies assert that students obtain more positive attitudes toward writing (Garcia & Pena, 2011; Min, 2005), acquire insight into the revision process, and generate better revisions (Lee, 2014; Min, 2006) after peer-editing. Just as students were shown to be selective when adopting from peer-editing in previous studies (Enkin & Mejias-Bikandi, 2016; Lee, Wong, Cheung, & Lee, 2009; Min, 2006), the students in this study also selectively embraced MT. However, a noticeable difference between peer-editing and editing with MT was observed. In previous studies (Lee, 2009; Min, 2006; Sengupta, 1998), changes in grammar were less frequent among the various purposes of revision after peer-editing, whereas the students in this study were more open to making grammatical changes after comparing their writing with the MT version. The main cause of the low rate of grammatical revisions that appeared in both Sengupta’s (1998) and Lee’s (2009) study was the students’ low language proficiency. In Min’s study (2006), the cause was assumed to be that the students’ revisions were done for a variety of purposes at various levels as they focused on meaning, and, accordingly, peer-editing also included more than grammar. On the other hand, the students’ more frequent grammatical changes in this study indicate two things. On the one hand, most of the students in this study were proficient enough to notice their grammatical errors after consulting with MT, and moreover, as Lee’s (2009) study pointed out, students at the intermediate level were most sensitive to their grammatical errors, so they actively made grammatical corrections. On the other hand, too much focus on grammatical changes indirectly shows the limitations of revision using MT. Although MT was a good resource for lexical and grammatical revisions, it could not provide any feedback beyond the sentence level, unlike peer-editing. In other words, MT was helpful
for micro-revisions at the sentence level, but it was not helpful for macro-revisions at the discourse or content level.

In addition, no significant differences in lexical or grammatical complexity were found before and after revision. Both lexical density and lexical diversity remained the same in the final version because the students replaced one word with another, which did not change the overall lexical complexity. There were no significant differences in syntactic complexity either, presumably because the students adopted only parts of sentences rather than entire sentences from the MT version, which did not result in differences in structure.

The current study thus shows that MT greatly improved the quality of student English writing in terms of vocabulary, grammar, and expression, but it could not help the students beyond that. Therefore, teachers need to remind students to focus on issues beyond lexico-grammatical changes during revision. Moreover, the changes that the students made were not always correct. As MT is not perfectly accurate yet, it is hard for the students with low language proficiency to select proper use of the language. Accordingly, teachers should advise them to double-check the translation of MT with other resources rather simply adopting it. Additionally, teachers should list the drawbacks of MT, such as grammatical inaccuracy, literal translations, the influence of L1 writing styles, and erroneous translations of words with ambiguous meanings, so students can avoid these potential pitfalls. With the help of MT, students can produce writing or make revisions more easily in a low-stress environment. As MT helps to reduce errors in spelling, vocabulary, and grammar, they can put more effort into global revisions for meaning instead, or, as Groves and Mundt (2015) argued, they can “begin to focus on the deep literacies” (p. 119).

**MT influence on student writing strategies**

In the current study, the students made use of diverse writing strategies while editing with MT, such as double checking, using previous knowledge, inferencing, paraphrasing, and rewriting. Comparing their versions with the MT version encouraged the students to identify and fix their own errors. During revision, MT functioned as an individualized feedback system for each student. It could not suggest the best language model to the students, but it was sufficient to show alternatives, which required them to give their word choice more thought and double-check their grammar and expression. EFL students’ reading proficiency is usually higher than their writing proficiency; therefore, even though the students could not generate accurate text in English on their own, they
were often able to distinguish the best choice for a given context when given concrete options. Thus, rather than simply adopting everything from the MT version, the students critically and strategically selected from alternatives based on their previous knowledge, and sometimes combined their original with the MT version to produce a sentence. When they were uncertain, the students consulted other resources, such as dictionaries or the internet.

This process fostered not only writing but also language learning in general because it raised their metalinguistic awareness of L2, which is positively correlated with L2 proficiency (Enkin & Mejias-Bikandi, 2016). Bernardini (2016) stated that MT can help students become more aware of patterns, correlations between form and meaning, lexical choices, and collocational patterns. In the same vein, MT in this study alerted the students to errors by suggesting alternatives and raised their metalinguistic awareness, which helped them correct erroneous sentences and benefited their L2 proficiency. According to Wong and Lee (2016), language learning with MT can cultivate student language awareness and noticing skills. During the learning process with MT, students first notice their lack of L2 knowledge and identify items to be learned from the MT version (noticing). Then, they recall the newly learned items (retrieving) and use them in new contexts to create new sentences (creating). Similar to Wong and Lee’s argument, the students in the current study compared, detected errors, considered alternatives, and rewrote, and in doing so they learned grammar and new words in context and consolidated the newly learned items by using them in the final version. As Carroll and Swain (1993) emphasized, error detection and correction enhances grammatical accuracy in FL writing and promotes interlanguage development. Moreover, being exposed to alternatives can help students become aware that more than one form or expression can have the same meaning and that there is no one-to-one translation between languages (Baraniello et al., 2016).

As described above, producing the final version using MT entailed a complex revision process that encouraged the students to view writing as a process. Previous studies pointed out that EFL students do not focus much on revision and usually view writing as a product (Lee, 2009, 2014; Min, 2006), but the students in this study acknowledged the importance of writing as a process. As in Garcia and Pena’s study (2011), in which students viewed translation and editing as a process of writing during MT editing, the students in this study focused more on editing and shifted their view of writing from a product to a process. They even began to pay attention to their L1 writing (pre-editing) after realizing that their source text could determine the quality of the MT
version. Viewing writing as a process can in turn promote learner autonomy and self-directed learning strategies, which is essential for successful writing, especially in an EFL writing classroom with limited instructor feedback (Bernardini, 2016; Niño, 2008; Saito & Fujita, 2004).

Conclusion

The present study investigated the role of MT as a CALL tool by examining students’ L2 writing outcomes with MT and their perceptions regarding its use. Text analysis of two versions of student writing indicated that MT improved their vocabulary, grammar, and expressions, which ultimately resulted in writing quality improvement. This study also found that MT positively influenced student writing strategies during revision. At the same time, the students found various drawbacks of MT, such as inaccuracy, literal translations, and dependence on L1 writing style.

Despite the mixed results of prior studies, there is generally agreement about the potential of MT as a pedagogical tool for language learning, with more recent studies confirming that MT technology has advanced and become more accurate (Correa, 2014; Enkin & Mejias-Bikandi, 2016). As Myles (2002) mentioned, many FL students have problems with even basic grammar, which makes them prone to producing errors. Moreover, instructor feedback for individual students is limited in the classroom. In this situation, MT can be an effective supplementary tool. However, to benefit student learning, the teacher must understand the role of MT in language learning and provide adequate guidelines on the use of MT, explaining both its strengths and weaknesses to students, along with ways to use MT as a language resource. Clifford, Merschel & Munné (2013) reported that teachers held negative attitudes toward the use of MT in an academic setting. This is understandable because of the potential pitfalls, such as being exposed to inaccurate language models, cheating, or becoming overdependent on MT; nonetheless, the accuracy of MT seems highly likely to improve (Case, 2015; Groves & Mundt, 2015), with its use becoming more prevalent in the near future. Given the increasing demand for MT, teachers need to find ways to embrace it rather than ignoring it. Niño (2009) pointed out that MT systems were not originally designed for language learning; therefore, it is crucial that teachers prepare students for how to deal with it in a language learning context (Bahri & Mahadi, 2016; Davis, 2006).

The current study is significant in that it empirically examined the role of MT based on multiple data sources from multiple perspectives. However, the sample size was insufficient to generalize the results. Other
variables, such as different types of MT, writing procedures, language pairs, and language proficiency levels, might cause different results. In addition, the students in the study did not correct errors that were not indicated by MT, possibly due to task design. Different task designs may lead to different student behaviors during revision. Therefore, more research needs to be done on these issues.

Disclosure statement

No potential conflict of interest was reported by the author.

Notes on contributor

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References


**Appendix**

Interview questions

1. What were the advantages and disadvantages of using MT during revision?
2. Why did you accept or reject the translation of MT in your revision? How did you decide?
3. Did you use any other resources during writing other than MT? How did you use it?
4. Did you experience any technical difficulties while using MT?