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Comparing the Effectiveness of Two Machine Translation-Based Instructional Models for English Writing

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ABSTRACT

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The present study employed a mixed-methods research design to compare the effectiveness of two machine translation (MT)-integrated instructional models for English writing and to examine students' perceptions of each model. A total of 47 university students enrolled in two sections of an English for Academic Purposes (EAP) writing course participated in the study. The two models differed in the instructional role of Google Translate. Model 1 utilized back-translation (English → Korean) to help students identify discrepancies between their intended meaning and translated output, thereby supporting error detection and revision. Model 2 allowed students to selectively use Google Translate (Korean → English) at the word, phrase, and sentence levels to assist with linguistic production during the revision process. Three research questions were investigated and the results can be summarized as follows. First, a *t*-test showed no statistically significant difference in effectiveness between the two models. Second, a Kruskal–Wallis test showed no significant differences in perceived usefulness across English proficiency levels, indicating that instructional designs tailored to English proficiency may not be necessary in this context. Third, students also perceived back-translation as particularly useful for identifying vocabulary errors, and views on its usefulness for grammar correction were divergent. This study provides pedagogical implications for designing MT-integrated writing instruction in similar EAP courses.

KEYWORDS

machine translation, Google Translate, English writing instruction, instructional models

1. Introduction

Students are using machine translation (MT) tools in various ways—both from English into Korean and Korean into English—when searching websites or completing assignments (Ahn and Chung 2020). However, most English writing classes do not routinely allow such tools, as teachers are generally reluctant to use them; students are therefore expected to compose in English without external support during class. This practice significantly differs from real-life writing contexts and therefore lacks authenticity. As information and communication technology, including MT, continues to evolve, the accuracy and fluency of translation tools are expected to improve further. Therefore, it is essential not to simply ban the use of MT in English writing classes but rather to explore how these tools can be leveraged as instructional resources to enhance students' writing skills.

MT-assisted English writing is expected to become increasingly common in academic settings as technology advances. While the concept of MT dates back to the 1950s—when Weaver (1955) introduced sentence-level machine translation—confidence in its accuracy was initially low (Im 2017). However, the transition from statistical machine translation (SMT) to neural machine translation (NMT) has greatly improved both the accuracy and fluency of MT (Im 2017). NMT translates at the phrase or clause level rather than word by word, producing more contextually appropriate output (Kim 2017). Both Google Translate and Papago have adopted NMT technology. Google Translate performs better in translating technical and advanced vocabulary, while Papago excels in sentence structure analysis (Lee and Lee 2020). Ahn and Chung (2020) found that students expressed high satisfaction when using MT for argumentative essay writing and frequently accepted the suggestions provided by the MT tools. As academic writing requires accurate information and concrete reasoning, MT can be particularly useful in such contexts.

The purpose of this study was not to evaluate the translation quality of specific MT systems, but rather to examine how MT can be pedagogically integrated into the revision process of English writing instruction. Although Korean students may prefer Papago due to its popularity and optimization for the Korean language, Google Translate was selected in this study because of its widespread global use and its frequent adoption in prior research on MT-assisted L2 writing. Using Google Translate allowed this study to align with existing research and ensured consistency and comparability with previous findings. Although recent generative AI systems have demonstrated advanced translation capabilities, this study focused on conventional MT tools because they provide more consistent and controlled translation outputs without generating additional explanations, paraphrases, or unsolicited revisions. This allowed the instructional models to focus specifically on the role of MT in supporting learners' revision processes, rather than introducing additional variables associated with generative AI systems.

This study aims to develop and implement two distinct instructional models that systematically integrate MT into English writing instruction and to examine their effectiveness through both quantitative and qualitative data. Unlike previous studies that merely compared writing outcomes between MT and non-MT groups, the present study focuses on how different pedagogical procedures incorporating MT may influence students' perceptions of instructional effectiveness.

The two instructional models differ primarily in the role of Google Translate within the writing process. Model 1 is based on a back-translation approach. In this model, students first write an essay in Korean and manually translate it into English. After producing their English draft, they use Google Translate to translate their English text back into Korean. By comparing the original Korean text, their English draft, and the back-translated Korean version, students identify discrepancies in meaning and revise their English writing accordingly. The primary pedagogical purpose of Model 1 is to promote metalinguistic awareness and error detection through contrastive analysis. That is, this approach was intended to promote learners' reflection on the accuracy and clarity of their

written texts. By comparing the original English draft with the back-translated Korean version, learners could identify linguistic inaccuracies and meaning distortions, thereby facilitating self-directed revision and error detection.

Model 2, in contrast, allows selective forward use of machine translation. Students write an essay in Korean and manually translate it into English, but they are permitted to use Google Translate in a limited way—up to seven times—to translate specific words, phrases, or sentences from Korean into English. Full-text translation is not allowed. The purpose of Model 2 is to support linguistic production while encouraging critical evaluation of machine-generated output.

The comparison of these two models was motivated by the need to examine how different pedagogical uses of MT during the revision stage influence learners' writing experiences and perceptions. Although both models incorporated MT as a revision tool, they differed in how MT was used to support the revision process. Model 1 emphasized back-translation, allowing students to translate their English drafts into Korean and review the translated output to identify discrepancies in meaning and expression. In contrast, Model 2 allowed students to use MT selectively to revise specific words, phrases, or sentences they found difficult to express accurately in English. These differences reflect two distinct pedagogical approaches: one focusing on enhancing learners' awareness of meaning accuracy through cross-linguistic comparison, and the other focusing on facilitating revision through targeted linguistic support. By comparing the effectiveness of these two approaches, this study aimed to provide empirical evidence to inform pedagogical decisions regarding how MT can be most effectively integrated into the revision stage of English writing instruction.

Based on these two clearly differentiated instructional designs, the present study addresses the following research questions:

1. Do students' perceptions of effectiveness differ significantly between Model 1 and Model 2, which differed in their use of Google Translate?

2. Do students' perceptions of the two models and procedures differ significantly depending on their English proficiency?

3. How do students characterize the MT-integrated instructional models in their open-ended survey and interview responses?

This study makes three notable contributions to the field of second language writing. First, it proposes concrete instructional models incorporating MT and examines their effectiveness. Few prior studies have explored the pedagogical value of MT in writing instruction, and the existing research (Cancino and Panes 2021) merely compared the writing quality of students who did or did not use MT, without analyzing specific instructional processes. Given the obvious finding that MT-assisted groups outperform non-MT groups in essay quality, more meaningful insights require an investigation of students' perceptions of different instructional procedures involving MT. Second, whereas most previous studies have focused solely on MT error analysis or post-editing outcomes using quantitative methods, this study also includes qualitative data such as open-ended survey responses and interview responses to evaluate instructional effectiveness. Third, prior studies have tended to focus on how MT use affects essay quality but have not offered practical instructional procedures or guidelines for using MT as an educational tool in university writing classes. This study addresses that gap by providing detailed classroom models, procedures, and instructional materials.

2. Literature Review

Prior research on the relationship between machine translation (MT) and English writing ability in the field of second language writing can largely be categorized into two main areas: (1) students' perceptions of MT use and (2) analyses of MT errors and post-editing. Post-editing refers to the process of correcting errors in English drafts generated by MT tools (Bowker and Ciro 2019). Most studies that examined students' perceptions of MT use (Ahn and Chung 2020, Briggs 2018, Byun 2020, Lee 2019, Tsai 2019) conducted surveys among student populations. For instance, Lee (2019) investigated Korean university students' perceptions of the effectiveness of MT use and explored whether linguistic variables such as reading and writing skills, and affective factors such as writing anxiety and writing confidence, influenced students' perceptions. The results showed that students generally believed MT helped with vocabulary, expressions, and error correction during revision, and contributed to overall improvement in their English writing. Moreover, writing proficiency was found to have a notable influence on students' perceptions of the usefulness of MT: while high-proficiency students were less likely to perceive MT as helpful, low- and mid-proficiency students reported greater improvements in their writing through MT.

Similarly, Ahn and Chung (2020) examined Korean university students' perceptions of online machine translation use in L2 writing through survey data collected after actual classroom writing tasks. Their findings revealed that students were generally satisfied with using MT and expressed a strong willingness to use it in future writing tasks. In particular, MT was perceived as most helpful for searching vocabulary and expressions and improving writing efficiency. The study also found proficiency-level differences: low-proficiency learners reported the highest levels of satisfaction, acceptance of MT output, and willingness to use MT, suggesting that less proficient learners may rely more heavily on MT as linguistic support. Additionally, genre-related differences were observed, indicating that students' perceptions of MT usefulness may vary depending on the type of writing task.

Briggs (2018) also explored students' use and perceptions of neural machine translation tools in the language learning classroom and reported that learners frequently used MT to facilitate writing and improve linguistic accuracy. Students viewed MT as a convenient and useful tool for generating initial drafts and supporting revision, although they were aware of its limitations and the need for critical evaluation of MT output. Furthermore, Byun (2020) investigated the usefulness of machine translation in extended writing and found that MT supported learners' self-editing and error correction processes. The study further showed that low-proficiency learners particularly benefited from MT use, as it helped them identify grammatical errors and improve the accuracy of their written texts. These findings suggest that MT can serve as an effective scaffolding tool, especially for learners with limited linguistic resources, by supporting revision and facilitating greater awareness of language form.

Park and Choi (2023) investigated Korean university students' perceptions of machine translation (MT) use in a general English course that incorporated post-editing activities. Using pre- and post-course surveys, the study examined learners' experiences, attitudes, and perceived learning benefits associated with MT-supported translation tasks. The findings indicated that students generally held positive perceptions toward MT use, emphasizing its convenience, efficiency, and usefulness for understanding vocabulary and sentence meaning. Many learners reported that MT reduced psychological burden when dealing with difficult English texts and increased their interest in English learning. Students also perceived improvements particularly in vocabulary knowledge and reading comprehension after participating in MT-based classroom activities. Despite recognizing limitations such as mistranslations and contextual inaccuracies, most participants supported the integration of MT into English classes and acknowledged the continued importance of teacher feedback when using MT tools.

The second category focuses on studies that examined learners' post-editing and their ability to identify and

revise MT-generated errors. For example, Shin and Chon (2022), Lee and Lee (2020), Chung (2020), and Chon and Shin (2020), and Cancino and Panes (2021) analyzed MT-assisted writing using various text analysis tools such as Syntactic Complexity Analyzer, WordSmith Tools, and Coh-Metrix to investigate error patterns and linguistic features. Shin and Chon (2022) examined how post-editing affected the appropriateness and lexical/syntactic features of writing using Syntactic Complexity Analyzer. Fifty-seven students wrote essays in Korean, translated them into English using MT, revised the drafts for errors, and submitted final versions. Two raters scored the drafts on a five-point scale for writing appropriateness. The average score for the initial English drafts was 4.468, while the revised versions scored 4.553—a statistically significant difference. Additionally, the number of sentences and the use of coordinate phrases were significantly higher in the post-edited essays.

Lee and Lee (2020) examined the impact of MT on English writing among 173 high school students through error analysis. Following instruction on the use of machine translation and pre-editing strategies, students were asked to write a 200-word essay in 50 minutes about their future plans as adults, without the aid of dictionaries or translation tools**.** Subsequently, the students wrote another essay about their plans after retirement in 50 minutes using Naver Papago. Using WordSmith Tools 7.0, the researchers compared error types found in essays written without Naver Papago and those written with its assistance. The frequency of errors significantly decreased in MT-assisted writing, especially regarding articles, nouns, punctuation, spelling, verb forms, and subject-verb agreement. The positive effect was more pronounced for lower-proficiency students, aligning with findings from Shin et al. (2021), who reported improvements in writing quality when students used online dictionaries and corpus tools.

Chung (2020) asked 59 Korean university students to edit errors in a paragraph-length English translation of a Korean movie review. The researcher analyzed the number of corrected errors and the linguistic levels (i.e., word, phrase, clause, sentence) at which they occurred. The results showed that high-proficiency students identified significantly more errors, especially at the sentence and phrase levels. In other words, high-level students showed higher correction rates of errors at the sentence and phrase levels, while low-level students exhibited lower correction rates at these levels; this difference was statistically significant according to the ANOVA results.

Chon and Shin (2020) examined how MT affected essay quality by comparing three writing conditions: (1) direct writing in English, (2) student translation from Korean into English, and (3) MT-assisted translation from Korean into English. Sixty-five Korean university students wrote essays on three different topics under these conditions. Using the Coh-Metrix tool, the researchers analyzed essays for vocabulary, syntactic complexity, and cohesion. Results indicated that MT use encouraged students to use less frequent, more content-rich vocabulary while reducing pronoun usage. MT also increased noun overlap between adjacent sentences, contributing to greater cohesion. In terms of syntactic complexity, MT increased the average number of words before main verbs, suggesting the use of more complex sentence structures. However, due to limitations in the number of syntactic indicators available in Coh-Metrix, the full extent of MT's impact on syntactic sophistication remains uncertain.

Cancino and Panes (2021) further expanded this line of research by investigating the impact of Google Translate on the linguistic quality of writing produced by 61 Chilean EFL high school learners. Writing quality was assessed through objective linguistic measures, including syntactic complexity (subordination ratio), accuracy (error-free T-units), and T-unit length. The findings revealed that groups with access to Google Translate produced significantly longer texts with higher levels of syntactic complexity and accuracy compared to the control group. The researchers concluded that Google Translate can serve as a valuable pedagogical scaffold to enhance the writing outcomes of low-proficiency learners by allowing them to produce more linguistically rich and accurate output.

To summarize, prior research on MT in English education has largely centered on two domains: students'

perceptions of MT use and the quantitative impact of MT on writing quality and error reduction. Based on this review, two research gaps are evident. First, there is a lack of research that systematically compares the effectiveness of different instructional designs for MT integration, particularly at the university level. Second, few studies have employed a mixed-methods approach to capture the nuanced ways in which students perceive and navigate diverse MT-based tasks. We need to move beyond simple "MT vs. non-MT" comparisons—which often yield predictable results—and instead investigate how specific, structured pedagogical procedures influence the writing process. The current study aims to fill these gaps by developing and implementing two distinct instructional models: a back-translation approach (Model 1) and a selective forward-translation approach (Model 2). By examining these models through both quantitative and qualitative data, this study seeks to provide empirical evidence on which pedagogical procedures most effectively support L2 learners' revision processes.

3. Methodology

3.1 Participants

Forty-seven students majoring in English Language and Literature and enrolled in two sections of an English writing course participated in the study. The course was primarily intended for second-year students, and participants ranged in age from 19 to 23 years. Section 1 consisted of 23 students, and Section 2 included 24 students. The two sections were pre-existing classes formed through the university's registration system. Students in Section 1 received instruction using Model 1 (i.e., back-translation from English into Korean), whereas those in Section 2 were taught using Model 2 (i.e., selective use of Google Translate from Korean into English at the word, phrase, or sentence level).

3.2 Instructional Procedures

During the MT-integrated writing sessions, students were informed that machine translation is not perfect, and class discussions were held to examine its limitations with authentic examples. Additionally, a training session on producing more accurate English translations from Korean drafts was offered**.** In the first phase of the instructional model, the instructor introduced common MT errors and strategies for effective MT use, as outlined below.

3.2.1 Introductions to the limitations of machine translation

Introducing typical MT errors to students is crucial when designing MT-integrated instructional models to prevent them from blindly trusting the MT output. The main error types include mistakes in translating Chinese-derived Korean words and literal translation errors. Figures 1 and 2 present examples of mistranslations involving Chinese-derived Korean words. In Figure 1, Naver Papago mistranslated the Korean word "진지(jinji)" as "a serious meal," while in Figure 2, Google Translate incorrectly rendered it as the adverb "seriously." Figures 3 and 4 present examples of errors arising from literal translation. In Korean, the expression "감정이 있다(gamjeong-i itda)" has two meanings: one refers to "having affectionate or positive feelings toward someone", and the other refers to "holding negative feelings toward someone". However, both Naver Papago and Google Translate provided only the first meaning, which implies romantic interest rather than animosity. In this particular context, however, the second meaning—conveying negative sentiment—is the intended and appropriate interpretation.

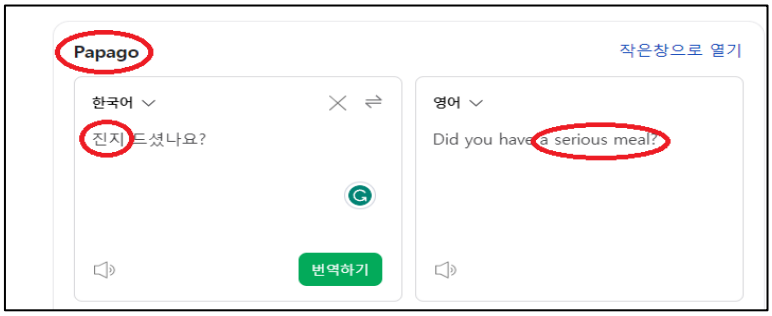

Figure 1. Example of a Papago Translation Error: Chinese-Derived Korean Words

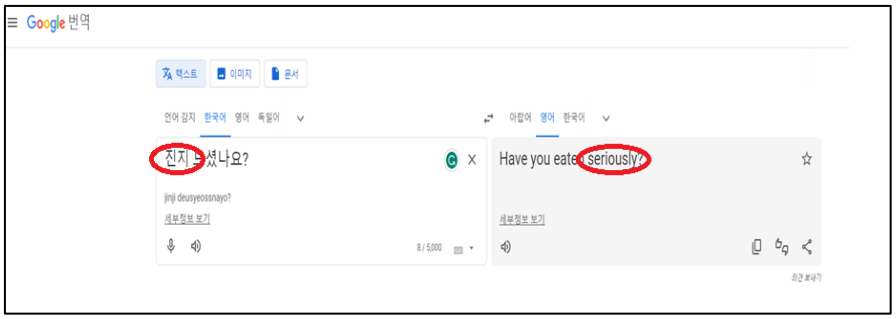

Figure 2. Example of a Google Translate Translation Error: Chinese-Derived Korean Words

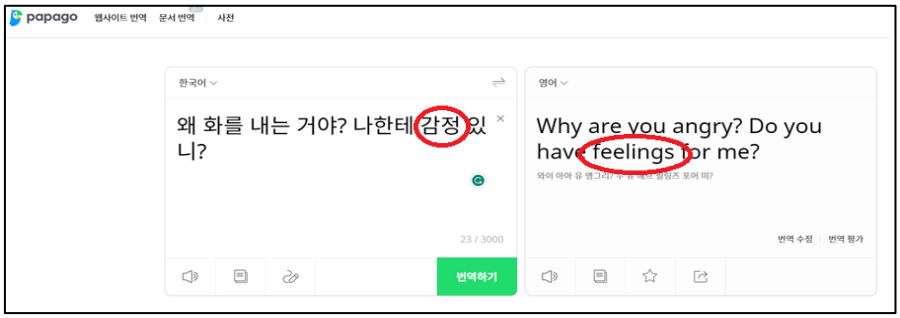

Figure 3. Example of a Papago Translation Error: Literal Translation

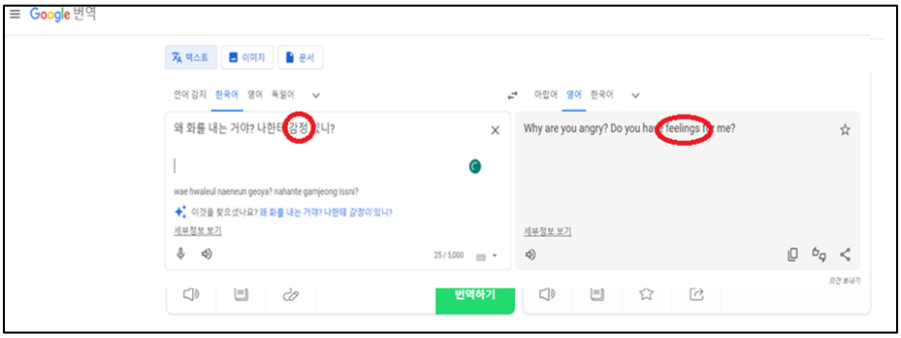

Figure 4. Example of a Google Translate Translation Error: Literal Translation

3.2.2 Strategies for effective use of machine translation

Before inputting Korean text into MT tools, students were instructed to consider the following strategies: First, clearly indicate the subject of the sentence since MT may add contextually inappropriate subjects when the subject is omitted (Kim 2017). Second, use correct spelling and punctuation in the Korean text. Third, avoid ambiguous expressions by using clear and simple sentences. The instructional models presented in this study begin with the instructor introducing these typical MT errors and strategies for effective use of MT.

3.3 Designing an English Writing Instructional Model

Two distinct MT-integrated instructional models were designed for this study. Model 1 uses Google Translate exclusively for back-translation from English into Korean, while Model 2 permits selective forward-translation from Korean into English at the word, phrase, or sentence level. As Table 1 shows, the primary difference between the two models is in Step 4 of the instructional sequence, highlighted in bold.

Table 1. Comparison of Instructional Model 1 and Model 2

	Model 1	Model 2
Key Features	Back-translation (English → Korean)	Selective MT use at word/phrase/sentence level (Korean → English)
Steps	1. Learning about MT errors & strategies for effective use of MT 2. Writing an essay in Korean 3. Translating the Korean essay into English (manual self-translation) 4. **Back-translating the English essay into Korean using Google Translate** 5. Comparing a Korean essay, an English essay, and a back-translated text to revise the English essay 6. Completing a reflection worksheet	1. Learning about MT errors & strategies for effective use of MT 2. Writing an essay in Korean 3. Translating the Korean essay into English (manual self-translation) 4. **Use Google Translate selectively up to seven times to translate specific words, phrases, or sentences from Korean into English** 5. Comparing a Korean essay, an English essay, and a machine-translated English text to revise the English essay 6. Completing a reflection worksheet

Model 1 utilizes Google Translate to back-translate student-written English essays into Korean. This instructional model consists of six sequential steps. The process begins with a lecture in which the instructor introduces common errors found in MT and explains strategies for its effective use. Students first wrote an essay in Korean for 30 minutes. They then translated their Korean essay into English themselves, without using machine translation. After completing their English draft, they used Google Translate to translate their English text back into Korean. This back-translation was used solely as a reflective tool to help students identify discrepancies between their intended meaning and their English expression. Students compare the original Korean essay, the English draft, and the back-translated Korean version. Based on this comparison, and with the aid of an online dictionary, they revise their English drafts. Finally, each student completes a reflection worksheet that includes the original Korean sentence, the initial English sentence, the back-translated Korean version, the revised English sentence, and a rationale for the revisions made.

Model 2 involves limited use of Google Translate to assist students in translating their Korean essays into English at the word, phrase, or sentence level. This instructional model also consists of six sequential steps. It begins with a lecture in which the instructor discusses common MT errors and strategies for its effective use. Students then write an essay in Korean for 30 minutes, followed by their own translation of the Korean essay into

English, also within 30 minutes. After that, students are allowed to use Google Translate to translate parts of their Korean essay into English. Full-text translation is not permitted; instead, they may use the tool up to seven times to translate individual words, expressions, or sentences from Korean into English. Students then compare their Korean essay, the English draft, and the machine-translated segments, and revise their English essays using an online dictionary. Finally, they complete a reflection worksheet as an individual task, documenting the original Korean sentence, the initial English draft, the machine-translated English version, the revised English version, and a rationale for the changes made.

3.4 Survey

The survey consists of three sections: (1) students' background information, (2) perceptions of the instructional model that incorporates machine translation in English writing classes, and (3) opinions on the use of such a model. It includes a total of 11 items. A detailed overview of the survey is presented in Table 2.

Table 2. Sections and Items of the Survey

Sections	Items
1. Background variables	1. Gender 2. English proficiency 3. Writing proficiency 4. TOEIC score
2. Perceptions of the MT-Integrated Instructional Model	5. Improvement in writing ability 6. Satisfaction with using MT 7. Usefulness of reviewing back-translated essays or Responses to ungrammatical MT-generated sentences 8. Useful aspects identified during back-translation review or Responses to MT-generated sentences that failed to convey the intended meaning 9. Overall satisfaction with the instructional model
3. Opinions on the MT-Integrated Instructional Model	10. Perceived usefulness of specific procedures of the instructional model 11. Suggestions for its improvement

The survey for Model 1 and Model 2 were identical except for Items 7 and 8, which differed between the two models. Section 1 gathers students' background information such as gender, self-reported overall English proficiency, self-reported writing proficiency, and TOEIC score. Section 2 asks about students' perceived improvement in writing ability, satisfaction with using MT, and overall satisfaction with the model. Items 7 and 8 differ between Model 1 (back-translation review) and Model 2 (responses to MT-generated sentences).

In Model 1, Item 7 used a Likert scale to ask how helpful students found the process of reviewing their back-translated essays (from English into Korean) in revising their English drafts. Item 8 asked students to select which aspects they found useful when reviewing the back-translated essay from a list of options. In contrast, in Model 2, Item 7 asked students to choose how they responded when encountering grammatically incorrect English sentences generated by machine translation from Korean into English, and Item 8 asked how they responded when the machine-translated English sentence did not convey the intended meaning. Section 3 asks students to describe the perceived usefulness of the instructional procedures and to provide specific suggestions for improving the MT-integrated model.

Of the 11 items, Items 5, 6, and 9 used a five-point Likert scale, where 1 indicated "Strongly disagree," 2 "Disagree," 3 "Neutral," 4 "Agree," and 5 "Strongly agree." In addition, two open-ended questions were included, allowing students to freely express their opinions about the MT-integrated instructional model for English writing.

3.5 Interview Procedures

Two participants volunteered to take part in interviews. The individual interview lasted approximately 20 to 30 minutes. All interviews were conducted in Korean, during which field notes were taken and audio recordings were made for subsequent transcription. The transcribed data were then examined through qualitative analysis, focusing on emerging themes related to participants' perceptions of the instructional models. While a larger sample was initially intended, recruitment was constrained by the timing of data collection at the end of the semester, resulting in only two students. Given that the interviews were designed to provide qualitative elaboration rather than statistical generalization, the data were considered sufficient to capture illustrative patterns in students' perceptions.

An interview protocol was developed based on the survey. While the survey included Likert-scale items on perceived effectiveness and attitudes, the interviews expanded on these items by asking participants to elaborate on their responses and provide specific examples. Sample questions included: (a) "How did the instructional model influence your revision process?", (b) "What were the advantages and disadvantages of using machine translation in this model?", (c) "Did your English proficiency affect how you used machine translation? If so, how?", and (d) "In what ways did back-translation help or hinder your writing?" Follow-up probing questions were used to clarify and expand participants' responses.

3.6 Data Analysis

All statistical analyses were conducted using the SPSS 26.0 statistical software. First, an independent-samples t-test was performed to compare the effectiveness of the two instructional models: Model 1, which incorporated back-translation from English into Korean, and Model 2, which involved limited use of machine translation from Korean into English. This analysis aimed to determine whether there was a statistically significant difference in students' responses regarding the effectiveness of the two instructional models. Second, a non-parametric Kruskal-Wallis test was conducted to examine whether students' perceptions of using machine translation varied within each instructional model according to their English proficiency levels. Because the sample sizes for the two sections were relatively small ($n = 23$ and $n = 24$), non-parametric statistical procedures were adopted. Accordingly, the Kruskal–Wallis test was conducted without assuming normal distribution of the data.

In addition to the quantitative analysis, the interview data were analyzed using thematic analysis. After transcription, the researcher repeatedly read the transcripts to become familiar with the data. Initial open coding was conducted to identify meaningful units related to students' perceptions of the instructional models and the use of machine translation. These codes were then grouped into broader categories based on conceptual similarities. Through iterative comparison and refinement, overarching themes were generated to capture common patterns.

4. Results

4.1 Research Question 1: Comparison of the Effectiveness Between the Two Instructional Models

To compare the effectiveness of Model 1 and Model 2 that incorporates machine translation in English writing classes, this section examines survey responses regarding improvements in writing ability, satisfaction with machine translation performance, satisfaction and perceived usefulness of the instructional procedures, and overall satisfaction with the instructional models. Specifically, the results of item 5, which asked whether the use of

machine translation ultimately helps improve English writing skills, are as follows. The descriptive statistics for perceived improvement in writing ability are presented in Table 3.

Table 3. Descriptive Statistics for Survey Item 5: Writing Improvement

	N	Min	Max	Mean	*SD*
Model 1	23	2	5	3.52	0.846
Model 2	24	2	5	3.54	0.721

The mean scores for perceived improvement in writing ability were similar: 3.52 for Model 1 and 3.54 for Model 2. A *t*-test result revealed that this difference in mean scores was not statistically significant ($t = 0.087$, $p = .931$). Across both models— Model 1 (back-translation) and Model 2 (selective Google Translate use)—students reported very similar improvements in their English writing attributable to MT.

The results of item 6 are as follows. The descriptive statistics on students' satisfaction with the performance of machine translation during the English writing class are presented in Table 4. The mean satisfaction score for machine translation performance was 4.17 for Model 1 and 4.08 for Model 2. Satisfaction with the performance of machine translation was slightly higher in Model 1, which incorporated back-translation from English into Korean. However, a *t*-test result revealed that the difference in means was not statistically significant ($t = .433$, $p = .667$).

Table 4. Descriptive Statistics for Survey Item 6: Performance of MT

	N	Min	Max	Mean	*SD*
Model 1	23	3	5	4.17	0.650
Model 2	24	2	5	4.08	0.776

The results for item 7[1] are as follows. Descriptive statistics regarding satisfaction with the instructional procedure—specifically, whether reviewing back-translated essays from English into Korean was helpful in revising the original drafts—are shown in Table 5. Students who received instruction through Model 1 perceived that reviewing back-translated essays was helpful for revising their drafts. The mean score was 4.13, with a standard deviation of 0.694.

Table 5. Descriptive Statistics for Survey Item 7: Satisfaction with Back Translation Procedures

	N	Min	Max	Mean	*SD*
Model 1	23	3	5	4.13	0.694

The results of item 8 are as follows. Item 8 asked students to choose which area—grammar, vocabulary, or sentence structure—was most helpful in revising drafts when reviewing back-translated essays from English into Korean. More than half of the students (52.2%) reported that reviewing back-translated essays was useful for correcting vocabulary errors, followed by sentence structure (34.8%) and grammar (13%), indicating that students found the instructional procedure most helpful for vocabulary revision.

The results of item 9 are as follows. Descriptive statistics regarding overall satisfaction with the instructional models are presented in Table 6. The mean satisfaction score for Model 1, which involved back-translation from

[1] Because of the manuscript length limitation, the response results for survey items 7 and 8 of Instructional Model 2 are not reported.

English into Korean, was 4.09, while that for Model 2, which involved limited use of Google Translate from Korean into English, was 4.25—0.163 points higher.

Table 6. Descriptive Statistics for Survey Item 9: Overall Satisfaction

	N	Min	Max	Mean	*SD*
Model 1	23	3	5	4.09	0.596
Model 2	24	3	5	4.25	0.794

These results suggest that students were more satisfied with using Google Translate to translate difficult words, phrases, or sentences from Korean into English than with checking whether their English writing was accurately translated into Korean. However, a *t*-test showed that this difference in mean scores was not statistically significant ($t = 0.793$, $p = .432$).

The results of Research Question 1 indicated that there were no statistically significant differences between Model 1 and Model 2 across survey measures, including perceived improvement in writing ability, satisfaction with machine translation performance, and overall satisfaction with the instructional models. Although minor differences in mean scores were observed, these differences were negligible and did not reach statistical significance. One possible explanation for this finding is that both instructional models provided meaningful opportunities for learners to engage with MT as a mediating tool in the revision process. In Model 1, students critically reviewed back-translated texts to identify discrepancies between their intended meaning and the translated output, thereby promoting metalinguistic awareness. In Model 2, students selectively used Google Translate to resolve lexical and structural difficulties during revising. Despite procedural differences, both approaches encouraged active interaction with MT output rather than passive reliance on translation, which may have resulted in comparable learning effects. Taken together, the findings suggest that both back-translation and selective MT use can be considered pedagogically viable approaches for integrating machine translation into L2 writing instruction, rather than one model being clearly superior to the other.

4.2 Research Question 2: Comparison of the Effectiveness of Models by English Proficiency Level

The second research question examines whether perceptions of the effectiveness of Models 1 and 2 differ according to students' background variables such as English proficiency. To assess students' perceptions of the effectiveness of the MT-integrated instructional models during the English writing class, three survey items (i.e., item 5, item 6, and item 9) were used as dependent variables: perceived improvement in writing ability, satisfaction with MT performance, and overall satisfaction with the instructional model. For English proficiency, the background variables included in the survey were self-assessed English proficiency, self-assessed English writing proficiency, and TOEIC scores. To determine whether there were significant differences in the perceived effectiveness of instructional models among high, medium, and low English proficiency groups, a non-parametric test—the Kruskal-Wallis test—was conducted. Students self-rated their English and writing proficiency on a 5-point Likert scale. Those who rated themselves as "very low" or "low" were categorized as the low proficiency group, "moderate" as the medium group, and "high" or "very high" as the high group. As for TOEIC scores, students scoring below 600 were classified as low, those scoring between 600 and 800 as medium, and those scoring above 800 as high proficiency.

The frequency analysis results based on self-assessed English proficiency, self-assessed writing proficiency, and TOEIC scores are presented in Tables 7, Table 8, and Table 9, respectively. For self-assessed English

proficiency, in Model 1, there were 2 students in the high group, 17 in the medium group, and 4 in the low group. In Model 2, there were 7 in the high group, 9 in the medium group, and 8 in the low group. For self-assessed writing proficiency, Model 1 had 1 student in the high group, 14 in the medium group, and 8 in the low group, while Model 2 had 5 in the high group, 8 in the medium group, and 11 in the low group. Overall, students tended to rate their writing proficiency lower than their general English proficiency. For TOEIC scores, Model 1 included 1 student in the high group, 12 in the medium group, and 9 in the low group. Model 2 included 4 in the high group, 6 in the medium group, and 5 in the low group. In Model 1, one participant reported having never taken the TOEIC test, whereas in Model 2, nine participants reported that they had never taken the test.

Table 7. Frequency of Self-assessed English Proficiency

Self-assessment	Model 1		Model 2	
	Frequency	%	Frequency	%
Very low	0	0	2	8.3
Low	4	17.4	6	25
Moderate	17	73.9	9	37.5
High	2	8.7	6	25
Very High	0	0	1	4.2
Total	23	100	24	100

Table 8. Frequency of Self-assessed Writing Proficiency

Self-assessment	Model 1		Model 2	
	Frequency	%	Frequency	%
Very low	0	0	2	8.3
Low	8	34.8	9	37.5
Moderate	14	60.9	8	33.3
High	1	4.3	4	16.7
Very High	0	0	1	4.2
Total	23	100	24	100

Table 9. Frequency of TOEIC Scores

TOEIC Scores	Model 1		Model 2	
	Frequency	%	Frequency	%
Never Taken	1	4.3	9	37.5
Below 500	5	21.7	3	12.5
500 - 600	4	17.4	2	8.3
600 - 700	8	34.8	3	12.5
700 - 800	4	17.4	3	12.5
800 - 900	1	4.3	1	4.2
Above 900	0	0	3	12.5
Total	23	100	24	100

The results of the Kruskal-Wallis test for self-assessed English proficiency are presented in Table 10. For both Model 1 (p = .447, p = .881, p = .833) and Model 2 (p = .352, p = .787, p = .612), no statistically significant

differences were found in students' perceptions of the effectiveness of the MT-integrated instructional models according to their English proficiency levels.

With respect to self-assessed writing proficiency, the results of the Kruskal-Wallis test are presented in Table 11. For both Model 1 ($p = .761$, $p = .835$, $p = .976$) and Model 2 ($p = .54$, $p = .782$, $p = .73$), students' perceptions of the effectiveness of the MT-integrated instructional model did not differ significantly across self-assessed writing proficiency levels. This finding contrasts with Lee (2019), who found that the perceived effect of machine translation on writing improvement was contingent on writing proficiency.

Table 10. Results of the Kruskal-Wallis Test: Self-assessed English Proficiency

Survey Item	*p*-value	
	Model 1	Model 2
Item 5: Writing improvement	.447	.352
Item 6: Satisfaction with MT performance	.881	.787
Item 9: Overall satisfaction with the model	.833	.612

Table 11. Results of the Kruskal-Wallis Test: Self-assessed Writing Proficiency

Survey Item	*p*-value	
	Model 1	Model 2
Item 5: Writing improvement	.761	.54
Item 6: Satisfaction with MT performance	.835	.782
Item 9: Overall satisfaction with the model	.976	.73

For TOEIC scores, the results of the Kruskal-Wallis test are presented in Table 12. For both Model 1 ($p = .750$, $p = .287$, $p = .069$) and Model 2 ($p = .153$, $p = .405$), no statistically significant differences were found in students' perceptions of the effectiveness of the MT-integrated instructional models based on their TOEIC scores.

Table 12. Results of the Kruskal-Wallis Test: TOEIC Scores

Survey Item	*p*-value	
	Model 1	Model 2[2]
Item 5: Writing improvement	.750	
Item 6: Satisfaction with MT performance	.287	.153
Item 9: Overall satisfaction with the model	.069	.405

To summarize the results of the second research question, this study examined whether students perceived the effectiveness of Models 1 and 2 differently depending on English proficiency, such as self-assessed English proficiency, self-assessed writing proficiency, and TOEIC scores. The results of the Kruskal-Wallis test showed no statistically significant differences.

From a pedagogical perspective, the results indicate that the instructional design is robust and inclusive, functioning consistently for lower-, mid-, and higher-proficiency learners. Moreover, the absence of proficiency-

2 For survey item 5, statistical significance could not be calculated due to an insufficient number of valid cases.

based differences supports the feasibility of applying the models broadly in English writing courses rather than tailoring them only to advanced or struggling students. Therefore, instructors may focus more on pedagogical integration rather than learner proficiency when adopting these instructional models. Therefore, it can be concluded that it is not necessary to design different instructional models based on students' English proficiency levels when using machine translation. This suggests that separate instructional designs tailored to proficiency levels may not be necessary when integrating MT into writing instruction; a single, unified instructional procedure can be applied to all students.

4.3 Research Question 3: Students' Perceptions of the MT-Based Instructional Models

The third research question aims to explore students' specific opinions regarding the instructional models and procedures that incorporated MT in English writing classes, through a qualitative analysis of their responses. Students' perceptions of the MT-integrated English writing instruction were examined by analyzing open-ended responses concerning the usefulness of Model 1 and Model 2, as well as their suggestions for improving instructional models. For Model 1, students were asked to comment on whether the instructional procedure that involved back-translation from English into Korean was helpful or not. For Instructional Model 2, students provided feedback on whether the instructional procedure that involved the limited use of Google Translate from Korean into English was helpful or not. Table 13 provides representative open-ended responses related to the usefulness of two models.

Table 13. Representative Open-ended Responses Regarding the Usefulness of Two Models

Model 1	Model 2
● I've always translated from Korean into English, but translating from English into Korean helped me realize what kinds of grammatical errors I commonly make in everyday writing. ● Before writing the revised version, I used to assume that the machine translation was always correct. However, I discovered that there were more errors than I expected. ● It gave me a chance to recognize which vocabulary I tend not to use and why my sentence structures were incorrect. ● I tried to use a variety of vocabulary, and I was surprised when the words I intended didn't get translated the way I expected. ● The translated output made it easy to identify which sentences needed revision and gave me a clear direction on how to revise them. However, I was a bit disappointed that the machine translation sometimes translated grammatically incorrect sentences without correction, which caused me to overlook some errors. ● I was able to clearly identify the mistakes in the vocabulary I had used.	● It was beneficial to be able to revise the sentence in English so that it aligned with my intended meaning. ● When revising from Korean into English, I often struggled to express my intended sentences and had to simplify them, which frequently reduced the meaning. Using a machine translator—which renders Korean directly into English—helped preserve the intended meaning to a considerable extent. ● The translation tool helped me write in a more formal and polished style. ● When I was unsure about which sentence structures or vocabulary to use while writing, the tool was helpful in that it provided illustrative examples to guide my writing. ● By combining my English skills with the help of the translation tool to revise my writing, I had the opportunity to reflect more deeply on grammar and word choice. ● It helped me learn by modifying unfamiliar vocabulary and sentence structures in a way that was easier to understand.

In the case of Model 1, students responded that the back-translation procedure from English into Korean was particularly helpful in identifying vocabulary errors. Regarding grammar, some students noted that the procedure was useful for recognizing sentence structure; however, since grammatically incorrect English sentences were often translated into correct Korean, opinions were divergent on whether the model was helpful for detecting grammatical errors. This aligns with the responses to survey item 8, which indicated that students found reviewing

essays translated into Korean to be most helpful for vocabulary (52.2%), followed by sentence structure (34.8%), and then grammar (13%).

These survey results were corroborated by the interview findings. Student A commented on the usefulness of the back-translation procedure as follows. The procedure of translating from English into Korean was generally perceived as helpful; however, the student believed that in order to produce grammatically appropriate sentence structures based on the back-translated output, a basic command of grammar was necessary.

> "I think referring to the output translated from English into Korean was extremely helpful. When I first wrote the English essay, I thought it was perfect and clearly conveyed what I wanted to say. However, when I read the back-translated Korean version, I realized that the nuance of the text wasn't properly captured, or that the translator often rendered the meaning in an overly simplistic or binary way, failing to convey my intended meaning. Through this comparison, I was able to revise my writing in a more specific and nuanced way, which I believe was the most important thing I learned. Of course, simply referring to the back-translated version is not enough to independently come up with accurate sentence structures; I believe this requires a solid understanding of grammar and syntactic structures."

Student B, on the other hand, responded that the back-translation procedure from English into Korean was not helpful for identifying grammatical errors, and emphasized the need to review the written essay multiple times to detect such errors.

> "I don't think using the translation tool helped me identify grammatical mistakes. When I first translated my writing, the Korean output generated by Google Translate was so natural that I didn't recognize any grammar issues. It was only after I reviewed my original writing several times that I noticed the grammatical errors."

As for Model 2, in which students used Google Translate in a limited way to translate from Korean into English, students reported that the procedure helped them write more accurate sentences and choose more appropriate words.

The word frequency analysis for open-ended responses regarding the usefulness of two models using WordSift was visualized in Figure 5 for Model 1 and Figure 6 for Model 2, respectively.

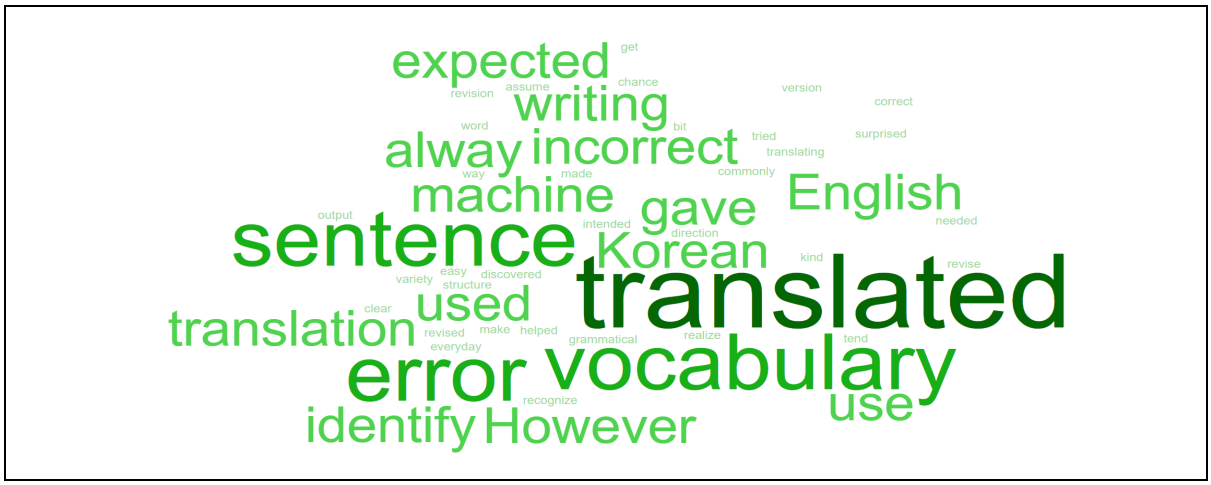

Figure 5. Word Cloud for Open-Ended Responses Regarding the Usefulness of Model 1

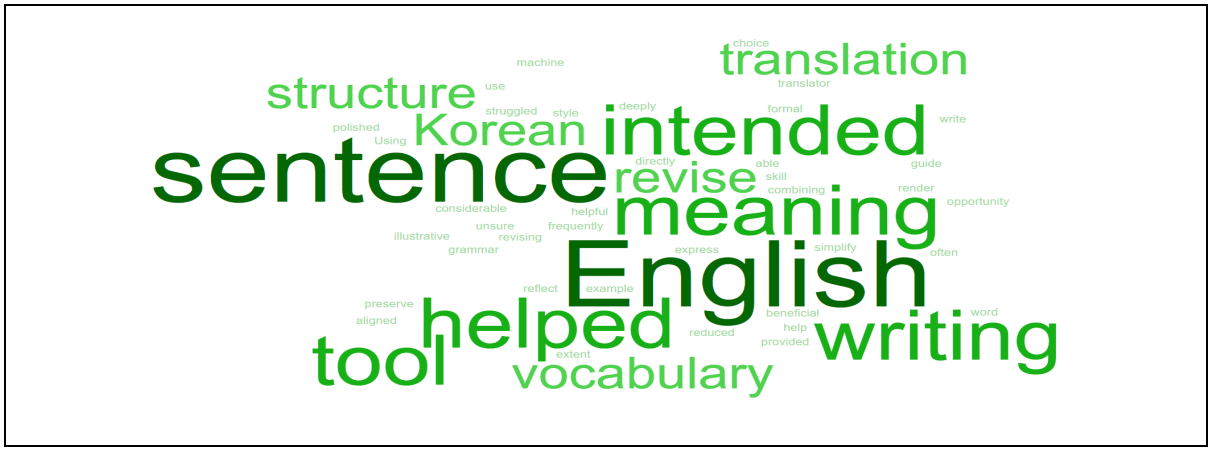

Figure 6. Word Cloud for Open-Ended Responses Regarding the Usefulness of Model 2

The results of the open-ended survey responses regarding suggestions for instructional models using machine translation are shown in Table 14.

Table 14. Representative Open-ended Responses Regarding Suggestions for Instructional Models

Model 1	Model 2
● Simply using MT to translate Korean directly into English may not improve writing skills; a back-translation approach like today's activity would be more effective. ● If machine translation is used, back-translation activities should definitely be included. ● Emphasizing back-translation rather than forward (standard) translation in class is likely to be more effective for improving students' writing proficiency. ● I would like to have opportunities to use machine translation more freely. ● As in today's class, a range of activities—such as back-translation and sentence revision—would be beneficial.	● Time felt tight. Assigning a Korean essay as homework and then, during the workshop, giving more time to write in English and compare with Google Translate could be one option. ● I hope to have a class that uses several MT systems so we can see the differences among them. ● It would be good to write an essay ourselves first and then correct the errors, as we did today. ● As we did today, it seems best to first write in Korean, then translate it into English on your own, and finally use machine translation to compare with your version and revise it.

For Model 1, most students perceived the back-translation procedure as useful and responded that they would like to see such activities incorporated into regular English writing classes. However, some also expressed the opinion that students should be given more freedom to decide how and to what extent they use machine translation. In the case of Model 2, several students noted that it was difficult to complete all six steps of the model during class time, and suggested that writing the Korean essay before class would be more effective. Additionally, some students expressed interest in using not only Google Translate but also other platforms such as Naver Papago, so that they could experience the differences among various machine translation tools.

In the final step of the instructional model, students completed an individual reflection worksheet in which they documented and compared their writing with Google-translated version, and articulated their reasoning for the revisions. Examples of the reflection worksheet are presented in Table 15. It shows an example in which a student used Google Translate to back-translate their English essay into Korean, and then referred to the Korean version to revise vocabulary errors in the original English text.

Table 15. Reflection Worksheet: Self-correction of a Lexical Error

Korean sentences	Student's English translation	Back-translation from English into Korean	Revised English translation	Rationale for revision
이 세 가지의 자격이 충분히 갖춰져 있다면	if these qualities be contented	그러나 이러한 자질이 만족스럽다면	if you have these three qualifications	I couldn't think of an expression like 'have the qualifications,' so I changed it to 'be satisfied' and used 'contented,' which conveyed a different meaning. I had intended to express 'obtain qualifications and become satisfied,' but it simply meant 'become satisfied.' I was able to come up with the verb 'qualify' and changed it to the noun 'qualifications.'

When writing the phrase "이 세 가지의 자격이 충분히 갖춰져 있다면 (I se gajiui jagyeogi chungbunhi gatchwojyeo itdamyeon)" in English, the student could not recall how to express "갖춰져 있다(gatchwojyeo itda)" and used "be contented" instead. Google Translate rendered this as "그러나 이러한 자질이 만족스럽다면 (Geureona ireohan jajiri manjokseureopdamyeon)" in Korean. After realizing that the translation did not reflect the intended meaning, the student independently revised the phrase to "if you have these three qualifications."

Table 16 presents an example in which a student revised grammatical errors by referring to the back-translated output.

Table 16. Reflection Worksheet: Self-correction of a Grammar Error

Korean sentences	Student's English translation	Back-translation from English into Korean	Revised English translation	Rationale for revision
내가 더욱 발전될 수 있는 좋은 계기를 만들어 준 것이다.	She creates a good opportunity for more develop to me.	그녀는 나에게 더 많은 발전을 위한 좋은 기회를 만들어 줍니다.	She creates a good opportunity for me to develop.	Reviewing the back-translated Korean revealed the ungrammatical and unnatural phrase "for more develop to me". I changed from 'for more develop to me' to 'for me to develop.'

The student initially wrote the phrase "내가 더욱 발전할 수 있는(Naega deouk baljeonhal su inneun)" as "for more develop to me" in their draft, and Google Translate rendered it as "나에게 더 많은 발전을 위한(naege deo maneun baljeoneul wihan)." In the final column of the worksheet, the student explained that he revised the phrase to "for me to develop" in order to make it sound more natural and grammatically correct. During the interview, the researcher asked the student to elaborate on the revision process, and he responded as follows.

> "Reading the back-translated Korean version helped me identify the grammatical mistake. In the case of "for more develop to me," it sounded awkward and translated as "나에게 더 많은 발전을 위한," which was both unnatural and grammatically incorrect. I tried to find a better alternative that made sense both in meaning and structure, and decided that "for me to develop" clearly conveyed the intended message and was grammatically correct, so I revised it accordingly."

The Korean version produced by Google Translate did not read smoothly, which helped him recognize the grammatical error. This illustrates how back-translation facilitates error detection and precise revision.

5. Conclusion

This study developed two models for English writing incorporating MT and examined students' perceptions of these models through both quantitative and qualitative analyses. Model 1 implemented back-translation from English into Korean, whereas Model 2 allowed restricted use of Google Translate from Korean into English at the lexical, phrasal, and sentential levels. The survey consisted of 11 items divided into three sections: (1) students' background information, (2) perceptions of the instructional model using MT in English writing classes, and (3) open-ended responses regarding the MT-integrated instruction. The following three research questions were addressed in the study. First, using a t-test, it examined whether there was a statistically significant difference in effectiveness between Model 1 and Model 2. Second, the Kruskal-Wallis test was used to determine whether students' perceived usefulness of each model differed depending on their English proficiency level. Third, qualitative data from open-ended survey and interview responses were analyzed to explore students' specific opinions on the instructional models and procedures involving MT.

The findings can be summarized as follows. Models 1 and 2 differed in their use of Google Translate. In Model 1, students used Google Translate exclusively for back-translation—translating their English-written essays into Korean. In Model 2, students selectively used Google Translate at the word, phrase, and sentence levels when translating their Korean-written essays into English. Regarding the first research question, the mean satisfaction score for Model 1 was 4.09, while that for Model 2 was slightly higher at 4.25, indicating a preference for the instructional model that allowed the limited use of MT from Korean into English. Students reported greater satisfaction when they could selectively use Google Translate to translate difficult words or expressions into English, rather than simply reviewing how their English text was translated into Korean. The t-test results, however, revealed no statistically significant difference ($t = 0.793$, $p = .432$) in the effectiveness of the two models. The survey results were also supported by the interview findings. The positive perceptions toward MT-integrated instruction observed in this study align with the findings of Lee (2019) and Ahn and Chung (2020), who reported that Korean university students generally find MT tools effective for enhancing vocabulary acquisition and overall writing efficiency.

For the second research question, the Kruskal-Wallis test showed no statistically significant differences in students' perceptions of model effectiveness across English proficiency levels. This suggests that there may be no need to develop separate instructional models based on students' English proficiency. Regarding the third research question, open-ended responses indicated that many students found the back-translation procedure helpful for identifying vocabulary errors, though opinions were divided on its usefulness in detecting grammatical errors.

From a pedagogical standpoint, this study provides several key insights for English for Academic Purposes (EAP) instruction. First, the study provides concrete instructional procedures for incorporating MT into English writing in EAP classes, and similar procedures can be applied to similar writing classes as well. In the initial stage of the instructional model, students were introduced to the limitations of MT and strategies for its effective use. As suggested by Yoon and Chon (2022), helping students recognize key differences between Korean and English and offering opportunities for guided practice is essential for the effective use of MT in writing instruction. Just as peer review requires prior training before implementation in writing classrooms, instruction on how to use MT effectively must precede its integration into the curriculum. Therefore, this study underscores the necessity of 'MT literacy' training. Instead of prohibiting these tools, instructors should focus on teaching students how to critically evaluate and strategically refine machine-generated outputs, thereby ensuring that MT serves as a catalyst for developing autonomous and critical writing skills. Second, the findings offer a practical and pedagogically sound instructional model that incorporates MT into university-level English writing courses. The study provides a

guideline on how MT can be meaningfully planned and applied in such contexts. Third, the finding that MT was perceived as equally beneficial across different proficiency levels suggests its potential as a versatile 'scaffolding' tool that can reduce cognitive load for lower-proficiency students while offering stylistic alternatives for advanced learners. Fourth, this study is expected to contribute to the growing body of research on MT in English writing education. Although MT has often been restricted in writing instruction, this study highlights its potential as a valuable educational tool. It is hoped that these findings will encourage further research and pedagogical applications of MT in English writing in academic contexts.

Despite the pedagogical implications of the present study, several limitations should be acknowledged, which also suggest directions for future research. First, instructional effectiveness in this study was evaluated primarily based on students' self-reported perceptions collected through survey and interview data, rather than objective measures of learning outcomes. While learners' perceptions provide valuable insights into the usability and pedagogical acceptability of MT-integrated instructional models, they may not fully reflect actual improvements in writing ability. Therefore, future research should incorporate objective performance-based measures, such as pre- and post-instruction writing assessments, analytic rubric scores, or linguistic analyses of students' written texts, in order to examine whether MT-integrated instructional models lead to measurable gains in writing proficiency. Second, the relatively small sample size may have limited the statistical power of the inferential analyses conducted in this study. Although statistical comparisons were performed to examine differences between the two instructional models, the modest number of participants in each group may have reduced the likelihood of detecting statistically significant differences. Future research should include a larger number of participants to enhance the statistical power of statistical analyses. Third, the qualitative component of this study was based on interviews with only two participants. While these interviews provided useful insights into individual learners' experiences, the limited number of interviewees restricts the extent to which the findings can represent the full range of learner perspectives. Future studies should include a greater number of interview participants in order to obtain more comprehensive qualitative data and to better understand how learners interact with and perceive different MT-integrated instructional approaches.

References

Ahn, S. and E. Chung. 2020. Students' perceptions of the use of online machine translation in L2 writing. *Multimedia-Assisted Language Learning* 23(2), 10-35.

Bowker, L. and J. Ciro. 2019. *Machine Translation and Global* Research*: Towards Improved Machine Translation Literacy in the Scholarly Community*. Bingley, UK**:** Emerald Publishing.

Briggs, N. 2018. Neural machine translation tools in the language learning classroom: Students' use, perceptions, and analyses. *JALT Journal* 14(1), 3-24.

Byun, H. 2020. Machine translator: A better way to improve extended writing. *The Journal of Interpretation and Translation Education* 18(4), 193-210.

Cancino, M. and J. Panes. 2021. The impact of Google Translate on L2 writing quality measures: Evidence from Chilean EFL high school learners. *System* 98, 1-11.

Chon, Y. and D. Shin. 2020. Direct writing, translated writing, and machine translated writing: A text level analysis with Coh-Metrix. *English Teaching* 75(1), 25-48.

Chung, E. 2020. The effect of proficiency on post-editing machine translated text. *The Journal of Asia TEFL* 17(1), 182-193.

Im, H. 2017. The university students' perceptions or attitudes on the use of the English automatic translation in a general English class. *Korean Journal of General Education* 11(6), 727-751.

Kim, S. 2017. Utilization of MT in translation classroom. *The Journal of Interpretation and Translation Education* 15(3), 5-37

Lee, S-M. 2019. Korean college students' perceptions toward the effectiveness of machine translation on L2 revision. *Multimedia-Assisted Language Learning* 22(4), 206-225.

Lee, Y. and D. Lee. 2020. A study on the use of machine translator and its effects on high school students' English writing. *Journal of the Korea English Education Society* 19(2), 159-180.

Park, H. and J. Choi. 2023. Post-editing in an EFL reading class: Focusing on learners' perception and error analysis. *The Journal of Translation Studies* 24(1), 71-107.

Shin, D. and Y. Chon. 2022. Machine translation errors and the effect of post-editing on the appropriateness of revised L2 texts. *Journal of the Korea English Education Society* 21(1), 121-140.

Shin, D., S. Kwon. and Y. Lee. 2021. The effect of using online language support resources on L2 writing performance. *Language Testing in Asia* 11(4), 1-23.

Tsai, S.-C. 2019. Using google translate in EFL drafts: A preliminary investigation. *Computer Assisted Language Learning* 32(5-6), 510-526.

Weaver, W. 1955. Translation. In W. N. Locke and A. D. Booth, eds., Machine Translation of Languages, 15-23. New York: Wiley.

Yoon, C. and Y. Chon. 2022**.** Machine translation errors and L2 learners' correction strategies by error type and English proficiency. *English Teaching* 77(3), 153-175.

Examples in: English
Applicable Languages: English
Applicable Level: Tertiary

