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A Case Study on Integrating Google Translate into College EFL Writing Instruction*

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ABSTRACT

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This case study focused on integrating Google Translate (GT) and post-editing skills into English as a Foreign Language (EFL) writing instruction for Korean college students. Over a four-day writing class, twelve students completed four drafts, and the use of GT output, along with paraphrasing and error correction skills, was examined in detail. Surveys and interviews were utilized to gather student feedback. The findings revealed that initially, the students heavily relied on the output of GT. However, as they learned post-editing skills, they began independently changing expressions and correcting errors. In Draft 3, 54 out of 58 expressions were paraphrased, and 67 out of 80 errors were corrected based on the GT output. Yet, with the employment of post-editing skills in Draft 4, there was a noticeable decrease in reliance on the GT output, with students making more efforts to paraphrase and correct errors independently. They also expressed high satisfaction with the effectiveness of paraphrasing for writing. Nevertheless, they still faced challenges in grammar, vocabulary, and sentence structure, highlighting the need for teacher involvement in writing classrooms. The study concluded by addressing the implications, limitations, and providing suggestions for future research.

KEYWORDS

1. Introduction

Recently, machine translation (MT) has been widely appreciated and welcomed as a learning tool, offering sophisticated technology that benefits fields such as linguistics, foreign language education, and translation research (Jolley and Maimone 2015, Park 2018). According to Lee et al. (2016), MT achieves close to 90% accuracy in academic translations while continuously accumulating data to improve its precision. Among many areas, MT has been known to enhance writing quality and quantity (Garcia and Pena 2011, Lee 2020, Tsai 2019) but also promote error identification, metalinguistic awareness (Correa 2014, Kol et al. 2018, Williams 2006), or vocabulary expansion (Tsai 2019) in English as a Foreign Language (EFL) learning. It can also reduce language learners' anxiety, and, at the same time, enhance their confidence (Jin and Deifell 2013, Kim 2020, Niño 2009).

However, MT is not infallible. It frequently commits mistakes in grammar, syntax, vocabulary, or punctuation, leading to potential misunderstandings and a lack of genuine language proficiency (Chon et al. 2021, Kazemzadeh and Kashani 2014, Lee 2019). Therefore, while MT can provide immediate translations and aid comprehension, it is crucial for EFL learners to actively engage with the target language themselves. By gradually reducing their reliance on MT and focusing more on developing their own language skills, learners can achieve a deeper understanding and proficiency, which is essential for true independence in EFL learning. To facilitate this, proper guidance and training are necessary to avoid indiscriminate use of MT and to raise awareness of its limitations, thereby enabling EFL learners to become responsible and self-directed English writers (Ducar and Schocket 2018).

Currently, there is limited research on specific MT teaching strategies for EFL writing. Thus, further research is needed to explore effective methods for incorporating MT into various EFL writing courses, where the goal is to encourage students to become responsible and independent writers. To address this gap, this case study aims to investigate how machine translation can be effectively integrated into English writing instruction for Korean college students, with a particular focus on GT.

2. Literature Review

2.1 Machine Translation and Its History

Machine Translation or MT is the process of using computer software to automatically translate text from one natural language to another (Poibeau 2017). The initial patent for MT, an automatic bilingual dictionary, dates back to the 1930s. Since then, the technology has evolved from rule-based systems to statistical-based systems, and most recently, to neural machine translation (NMT). Rule-based systems function by analyzing the linguistic rules of both the source and target languages, requiring manual input of grammar-based sentence structure rules into a database. This was followed by the introduction of statistical-based systems, which analyze extensive datasets for each language pair instead of relying solely on pre-existing language rules. The latest advancement is NMT, which treats the entire sentence as a single unit for translation. This end-to-end approach considers both the input and output sentences to enhance the translation process (Lee et al. 2016).

Representative NMTs such as Google Translate[1], Papago[2], and Kakao i[3] have continuously improved in terms of translation quality and accuracy, making them reliable resources for students. Google Translate (GT), developed in 2006, has significantly enhanced its translation fluency and accuracy through the integration of artificial neural networks (Ducar and Schocket 2018). With its extensive collection of data, GT can analyze language and generate outcomes resembling human language. Papago, launched in 2016 by Naver Corporation in Korea, is equipped with Naver Neural Machine Translation (N2MT) and has been incorporated into Naver's services like *V* Live and *Line* (Kim 2017). Kakao i, introduced by Kakao Corporation in 2017, is a multilingual translation processing system that employs NMT and the Bilingual Evaluation Understudy (BLEU). BLEU uses deep learning to align learning data into sentence units, estimating the precision between the translated sentence and the target sentence, thereby enhancing the accuracy and quality of translations (Oh 2017). Initially offering translations in six languages, Kakao i has expanded to provide translations for 19 languages, including Korean, Dutch, and Turkish, as of 2021. More recently, DeepL[4], founded in 2017, has entered the field of MT, and it is even known to outperform GT in terms of translation performance (Avramidis et al. 2020, Macketanz et al. 2018). These NMT systems have been consistently enhancing their translation quality and precision, establishing themselves as dependable sources in various areas, including language learning.

2.2 Machine Translation in L2 Writing Instruction Research

Recently, the use of MT has been recognized as an effective supplementary tool for second language (L2) learning. Recent studies by Alhaisoni and Alhaysony (2017) and Tsai (2019) demonstrate the positive impact of GT on vocabulary acquisition and English language proficiency among EFL learners. The former found that Saudi EFL learners had a positive attitude toward GT, particularly for its role in vocabulary acquisition, suggesting its positive impact on learners' attitudes and vocabulary development. The latter study, involving 124 Chinese English majors, compared self-written drafts to GT translations and found that GT versions had more advanced vocabulary and fewer errors in spelling, grammar, and overall word usage. These studies collectively indicate that MT positively influences both the grammatical and lexical aspects of language learning.

However, L2 writing instruction greatly benefits from the integration of MT, encompassing various research interests from error recognition to effective strategies and motivation. First, previous research often revealed that MT contributed to EFL students' ability to recognize and revise their writing errors (Amin 2019, Lee and Briggs 2021). Amin (2019) conducted a study aimed at enhancing EFL students' awareness of syntactic and semantic errors to improve their translation performance through metacognitive strategies. The study involved 48 Saudi female college students enrolled in an Introduction to Translation course over a 13-week period. The results indicated that post-test mean scores for both syntactic and semantic aspects were higher than the pre-test scores, suggesting that the process of identifying and analyzing linguistic errors helped the students overcome their weaknesses. The course proved effective in improving the students' translation proficiency and overall performance. These findings imply that MT can be a valuable tool for L2 learners in recognizing and correcting writing errors. Lee and Briggs (2021) also examined the efficacy of using GT to assist in the L2 writing process, specifically in reducing lexico-grammatical errors. It involved 58 Korean EFL learners from a college, who were

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[1] https://translate.google.com/
[2] https://papago.naver.com/
[3] https://translate.kakao.com/
[4] https://www.deepl.com/en/translator

enrolled in general English courses and had English proficiency levels ranging from low-intermediate to high-intermediate. The results showed a decrease in the count of all types of errors in the revised texts, suggesting that students were able to effectively correct a significant number of errors, including those in articles, prepositions, insertions/deletions, and substitutions. Furthermore, it was observed that students who made fewer errors were more inclined to make corrections than those who made errors more frequently. Through the process of translation, error detection, and correction, the students enhanced their linguistic awareness and lexico-grammatical accuracy during revision.

Second, various studies have investigated effective strategies for using MT in L2 writing classrooms (Jo 2021, Lee 2020, Martínez et al. 2020). Jo (2021) conducted a 15-week study involving 17 EFL students in an English writing course. The course was structured into three parts: pre-writing the first draft in their native language (L1), translating the draft into English independently, and post-writing, which entailed translating the draft using either Google Translate or Papago, followed by composing the final draft. The students were asked to analyze both their own writing errors and those made by the MT system. The results indicated improvements in the students' writing ability and word count, suggesting that the use of MT contributed to both quantitative and qualitative enhancements in L2 writing. Lee (2020) carried out a three-stage study focusing on English writing with MT assistance. The students' final drafts showed quality improvements with the aid of MT, and there was a significant decrease in vocabulary and grammar errors. Additionally, the students employed more sophisticated word choices and authentic expressions. This implies that the effectiveness of MT can be augmented through the implementation of proper writing strategies. Martínez et al. (2020) observed a notable improvement in students' writing quality across a series of writing tasks. The students reported saving time in organizing their first drafts, and most noted a significant enhancement in their writing quality after the session. The drafting stage was also beneficial for their writing process. Overall, these studies indicate that MT can be a valuable tool in L2 writing classrooms, particularly when used alongside suitable writing strategies. By analyzing their own and the MT's errors, students can refine their writing skills and produce higher quality written work.

Lastly, MT has also been found to increase students' motivation and interest, but reduce anxiety when writing in English (Ahn and Chung 2020, Kim 2020, Yang and Wang 2019). Ahn and Chung (2020) explored Korean college students' views on using MT for L2 writing. Involving 17 participants, the study focused on their writing tasks and survey responses, considering their English proficiency and the writing genre. The findings indicated that students found MT helpful for vocabulary and expression lookup, often using it to check sentences and save time. They also expressed a willingness to continue using MT. The study highlighted that lower proficiency students primarily used MT for grammar, while those with higher proficiency used it for vocabulary. Moreover, satisfaction with MT varied by writing genre, with higher satisfaction observed in argumentative writing compared to narrative writing. Kim (2020) investigated EFL students' perceptions of MT and its validity. A total of 117 beginner-level L2 writing college students completed a survey on the necessity of MT in writing, with 11 participating in an interview for more detailed responses. The results showed that the satisfaction rate among students who used MT was higher than it was among those who did not. Additionally, learners who found L2 learning difficult and had low motivation could alleviate their learning challenges by using MT. The study also found that students compensated for their low English proficiency by using MT in the L2 writing process. Yang and Wang (2019) examined fundamental elements such as perceived ease of use, perceived usefulness, experience, and motivation, which could influence students' intention to use MT and the potential benefits of its use. The study involved 109 Chinese English major juniors with basic translation skills and language abilities. The results showed that the students appreciated the merits of using MT, and those with more experience in MT were better able to familiarize themselves with the types of translation and errors MT often produced. Through error correction

practice, the students maximized the benefits of MT, such as prompt production.

However, the use of MT in L2 writing has raised concerns about plagiarism (Mundt and Groves 2016, Stander 2020). Mundt and Groves (2016) suggested that the use of GT could lead to patch-writing or plagiarism in EFL learners' writing, which would be regarded as academic dishonesty. They highlighted the importance of establishing a code and guidelines for the use of MT in L2 writing. Stander (2020) investigated the effectiveness of explicit intervention strategies for English as a Second Language (ESL) learners to prevent plagiarism by improving their comprehension and paraphrasing skills. The study found that more than 80% of the students produced plagiarism in their initial writing, but this incidence was significantly reduced in their final drafts through interventions involving writing guidance and paraphrasing exercises. By providing guidance in writing strategies and paraphrasing exercises through various interventions, the students were able to better express their own words and ideas, thus helping to prevent them from copying the source text directly.

The studies discussed earlier have examined various potential benefits and concerns associated with MT in L2 writing, including error correction, strategy development, motivation, and plagiarism prevention. These aspects are interconnected in the writing process and should be integrated together in L2 writing instruction. Until now, there has been a scarcity of studies exploring special teaching methods for EFL writing utilizing MT. In light of this, this case study aimed to investigate the effects of integrating GT and as post-editing skills in English writing tasks over a four-day period. The study focused on Korean EFL college students and sought to answer the following two research questions:

1. How do Korean EFL college students utilize and perceive GT in their English writing?
2. How do Korean EFL college students revise their English writing using post-editing skills and perceive its use in their English writing?

3. Method

3.1 Participants

Twelve undergraduate students from a private university in Gangwon Province, Korea, participated in this study. Their profiles, including gender, year, major, and English proficiency level, are detailed in Table 1. The group comprised three males and nine females, aged 20 to 24. Their academic years ranged from freshmen to seniors, with diverse majors such as Software Engineering, Global Studies, Humanities, Social Sciences, Natural Sciences, and English. Notably, nine students were majoring or double-majoring in English. None had lived in English-speaking countries, and most self-rated their English proficiency as intermediate or beginner.

In particular, English proficiency was assessed through writing tasks, as only a few had official English test scores such as TOEIC. Students who could not complete the initial writing task within the set time were classified as beginners or intermediates. Beginners were identified as those who omitted words or expressions from the original text in their second draft. The remaining students were categorized as advanced. This led to a final distribution of four beginners, five intermediates, and three advanced students.

Table 1. Profiles of Participants

Student	Gender	Academic Year	Major (Double Major)	Proficiency
B1	Female	Freshman	Audiology	Beginner
B2	Female	Junior	Contents Information Technology	Beginner
B3	Female	Freshman	English	Beginner
B4	Female	Freshman	English	Beginner
I5	Male	Junior	Russian (English)	Intermediate
I6	Male	Sophomore	English	Intermediate
I7	Male	Junior	Social Welfare (English)	Intermediate
I8	Female	Freshman	English	Intermediate
I9	Female	Freshman	English	Intermediate
A10	Female	Senior	Humanities (English)	Advanced
A11	Female	Freshman	Humanities (English)	Advanced
A12	Female	Senior	Software Engineering	Advanced

In addition, seven participants had previously enrolled in either Korean writing or English writing courses at college, but most of them reported that they lacked experience in writing one-paragraph writing. They also expressed dissatisfaction with their English writing skills and reported that they relied most on MT for assistance with their English writing assignments. They specified reasons for relying on MT, such as its 'greater precision than their own writing,' 'struggles with interpreting English,' and 'aid in navigating the more challenging parts of the text.' They also pointed out unnatural translations as a notable limitation of using MT.[5]

3.2 Materials

The materials developed and used in this study comprised teaching materials and surveys and interview questions. Due to space limitations, key points of the teaching materials development are provided (see Kim 2022 for more details). First, we developed instructional materials for four teaching sessions, including slides of directions and explanations, and student practice exercises for post-editing skills, and four writing tasks. Table 2 lists the writing topic for the writing tasks along with a one-paragraph original text in Korean and its translation via GT (GT output). The topic was *"Some students prefer to study and do homework alone. Others prefer to study and work on class assignments with a group of fellow students. Which do you prefer? Use specific reasons and examples to support your answer.",* which asks the students to express their preference between studying and doing homework alone or with a group of fellow students. This topic, drawn from a set of prompts typically used in the Test of English as a Foreign Language (TOEFL), was a concept familiar to college students. Next, both the original text and the GT output were used during the writing process. The original text about the topic was written by the researchers and GT was used to generate its translation.

The four writing tasks in this study were mainly developed to see if GT and post-editing skills influenced student writing performance. The first two drafts (Drafts 1 and 2) allowed the students to write on the topic along with an original Korean text. In doing so, the influence of individual differences in content development or idea creation

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[5] All the information about the participants was based on the responses to a pre-survey questionnaire.

on their writing was expected to be minimized. This controlled writing approach also proved useful in addressing time constraints in class and in alleviating students' anxiety regarding their writing abilities. Then, they revised their Draft 2 and composed Draft 3 based on the GT output. Notably, the 161-word GT output is mostly grammatically correct, but exhibits spoken language features such as the use of vague terms (e.g., things) and contractions (e.g., couldn't), which affect its clarity and formality and necessitate further revision. Finally, the students revised their Draft 3 and composed Draft 4 by applying two types of post-editing skills: paraphrasing and error correction (see Appendix A for Writing Tasks, Drafts 2 and 4).

Table 2. Writing Topic, Original Text, and GT Output

Writing Topic: Some students prefer to study and do homework alone. Others prefer to study and work on class assignments with a group of fellow students. Which do you prefer? Use specific reasons and examples to support your answer.

Original Text	GT Output
모든 사람마다 그들 자신이 좋아하는 공부 방법이 있습니다. 어떤 학생들은 또래들과 함께 공부하고 숙제 하는 것을 선호하는 반면, 다른 학생들은 혼자 공부하기를 선택합니다. 저는 혼자 공부하는 것이 더 낫다고 생각하며 여기에는 크게 두 가지 이유가 있습니다. 제가 신입생이었을 때, 저는 중요한 시험을 준비하기 위해 제 친구들과 공부를 한 적이 있습니다. 하지만 어떤 부분을 가장 많이 공부해야 할 지 정하는 것이 어려웠습니다. 왜냐하면 조원들 모두가 공부하고 싶은 부분이 다 달랐기 때문입니다. 결국, 저희는 개별적으로 공부를 하였습니다. 이 뿐만 아니라, 저희는 공부하는 동안 너무 쉽게 산만해졌습니다. 대부분의 시간을 농담을 하거나 시험과 관련 없는 이야기들을 하였습니다. 이로 인해 저는 공부에 집중하지 못했고 낮은 점수를 받았습니다. 결론적으로, 조원들 간의 다른 의견들과 산만한 환경은 공부하기 어렵게 만들며 이런 이유로 저는 함께 공부하는 것보다 혼자 공부하는 것이 훨씬 낫다고 생각합니다.	Everyone has their own favorite way to study. Some students prefer to study and do homework with their peers, while others choose to study alone. I think studying alone is better, and there are two main reasons for this. When I was a freshman, I used to study with my friends to prepare for an important exam. However, it was difficult to decide which areas to study the most. This is because all the members of the group had different interests in what they wanted to study. After all, we studied individually. Not only that, but we were too easily distracted while studying. Most of the time we joked or talked about things that were not related to the exam. As a result, I couldn't concentrate on my studies and got low grades. In conclusion, different opinions and distracted environments make it difficult to study, and for this reason, I think it is much better to study alone than study together.

We focused on paraphrasing and error correction as key post-editing skills, recognizing their role in enhancing the quality and integrity of student writing (Mundt and Groves 2016, Stander 2020). Paraphrasing, defined as "reshaping the original source with different grammar structures and vocabulary while maintaining the original meaning" (Han and Shin 2017, p. 178), is not only fundamental for avoiding plagiarism in academic writing but also pivotal in improving writing skills, including vocabulary, sentence structure, and the ability to express ideas effectively. As outlined in Table 3, four specific types of paraphrasing, synonyms and antonyms, written language, transitions, and sentence restructuring, were targeted based on previous research (Campbell 1998, Han and Shin 2017, Lee and Cha 2019, Shi 2012). For example, for the type of written language, informal phrases (e.g., 'a big problem') are transformed into more academic expressions (e.g., 'a significant issue'). As shown in Figure 1, practice exercises were designed to help students grasp these concepts and apply them effectively in their writing.

Table 3. Paraphrasing: Type, Description, and Example

Type	Description	Example
Synonym/Antonym	Replacing words with their synonyms or antonyms without altering their meanings	significant advancements -> considerable progress
Written Language	Transforming informal or spoken language into formal academic writing	a big problem -> a significant issue
Transitions	Using transitional words and phrases to connect ideas and improve the flow of writing	The solution is effective. It is cost-efficient. -> The solution is effective; moreover, it is cost-efficient.
Sentence Restructuring	Altering the sentence structure, such as changing voice or pattern	Pollution is increasing rapidly. -> There is a rapid increase in pollution.

Figure 1. A Practice Exercise of Paraphrasing

Materials for error correction, another type of post-editing skills, were also developed and used. We focused on six most common writing errors identified in the students' initial drafts (Drafts 1 and 2), including issues with countable noun, preposition, tense, indefinite pronoun, adverb, and capitalization. Figure 2 displays a practice exercise about countable noun, featuring students' incorrect expressions alongside the GT output, where the students identified and corrected their mistakes by comparing them with the GT output. In doing so, the students had chances to raise their awareness of these frequent mistakes and assist them in correcting them.
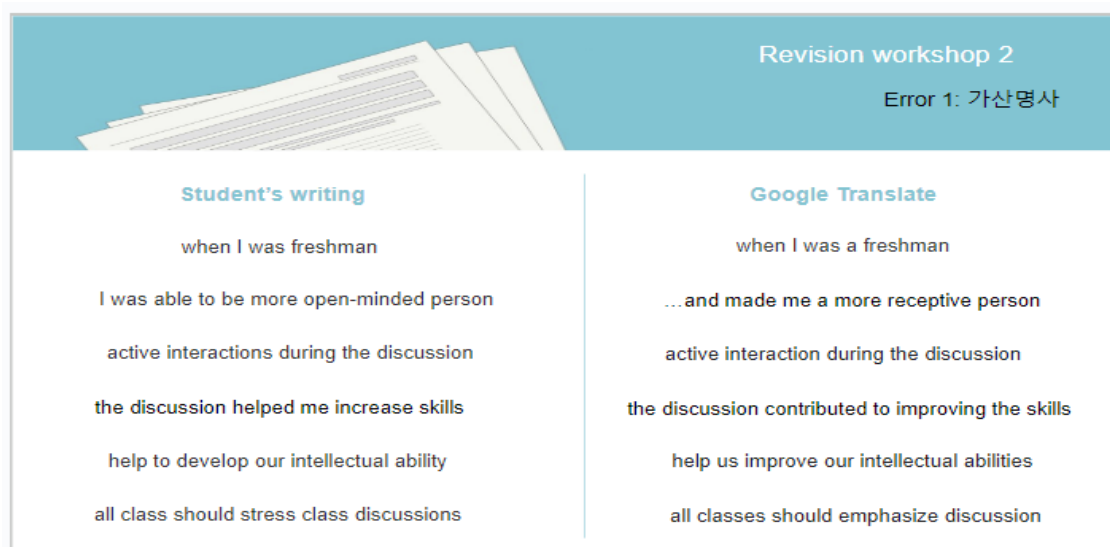
Figure 2. A Practice Exercise of Error Correction (Countable Noun)

Finally, to gather the students' perspectives and opinions about the instruction, data was collected through a pre-survey, a post-survey, and a semi-structured interview. The pre-survey, conducted via Google Form, consisted of 26 questions divided into four sections: demographic information, English writing skills, machine translation usage, and the relationship between their Korean and English writing skills. The responses from this pre-survey were instrumental in tailoring the difficulty level of the teaching materials and instruction. The post-survey, also conducted using Google Form, contained 15 questions across four sections, focusing on GT, Revision Workshops 1 and 2, feedback from the researcher, and the students' personal views on the study (see Appendix B for more details).

Table 4 lists eight questions used in the semi-structured interview, addressing topics such as the advantages and disadvantages of controlled writing, the helpfulness of the teaching sessions, error recognition and correction, writing anxiety, novel or interesting learning, and expectations for ongoing and future studies. Insights from these interview responses were used to understand student perspectives and suggest better teaching methods or materials in the research domain.

Table 4. Questions of Semi-Structured Interview

Interview Questions
Q1. What are the advantages and disadvantages of the controlled writing method used in this study?
Q2. How did the teaching sessions help your English writing?
Q3. Were you able to identify and correct errors independently? Which parts did you find challenging?
Q4. Did the teaching sessions help reduce your anxiety about writing in English?
Q5. What new information did you learn or find interesting during the teaching sessions?
Q6. What were your learning expectations for the teaching sessions?
Q7. Are there specific topics or content that you want to learn in future class?
Q8. Is there anything else you want to say?

3.3 Data Collection Procedure

All data collection was carried out online by the first author of this study, using various Google Applications, including Google Docs, Google Form, Google Classroom, Gmail, and Zoom. The majority of students were already accustomed to using these online tools. The data collection process was divided into three phases: pre-treatment, treatment, and post-treatment. In the pre-treatment phase, students were recruited and asked to sign a consent form to participate in the study, followed by completing a pre-survey questionnaire. Additionally, a pilot study was carried out with two students, one at the beginner level and the other at the intermediate level. This pilot study aided in refining the teaching materials and plans.
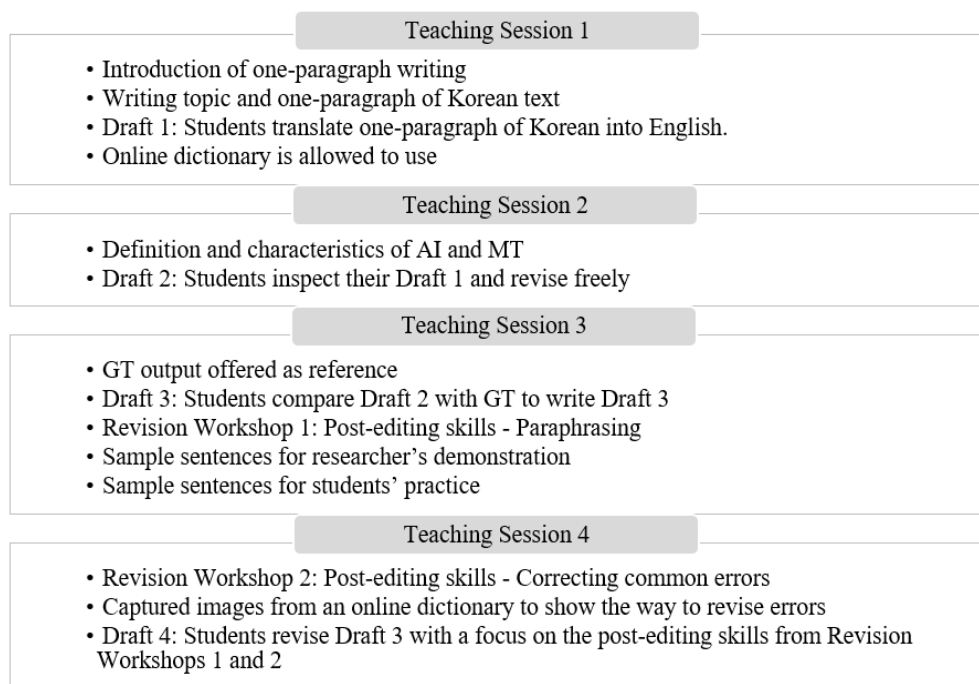
Throughout the treatment phase, the participants attended each of the four teaching sessions over four consecutive days, connecting via Zoom. Each session was approximately 50 minutes long. However, students who wished to continue working on their writing after the class were given the option to submit their writing tasks by 9 p.m. on the same day.

Figure 3 shows the procedure of each of the four teaching sessions during the treatment phase. In Teaching Session 1, the focus was on introducing the structure and development of one-paragraph writing. The students were then asked to translate the Korean text (see Table 2) into English on their own and to submit their Draft 1. The students could use the Naver online dictionary if needed, for mirroring the real-world learning environment where Korean students frequently use such tools. When the first session was over, it was observed that students at the beginner level struggled to complete their writing tasks within the allotted time; some even found it challenging to start writing in English, despite the original text in Korean. To enhance their motivation for writing in English, the researcher offered feedback on Draft 1 with a focus on improving sentence structure and grammar.

During Teaching Session 2, the students were first introduced to the basic concepts of Artificial Intelligence (AI) and MT. Following this, each student reviewed his or her Draft 1 and proceeded with a Korean-to-English translation task, subsequently submitting Draft 2. Notably, most students completed and submitted it more quickly than expected at this stage.

During Teaching Session 3, the students focused on comparing their Draft 2 with the GT output. They used the GT output as a reference point for composing their Draft 3, marking sections where they had either copied, referenced, or researched from the GT output by underlining them. Then, Revision Workshop 1 followed, where the students were introduced to the four paraphrasing skills to enhance their writing: synonyms and antonyms, adjustments to written language, the incorporation of transition, and the restructuring of sentences or phrases. The students were then given an opportunity to apply these paraphrasing methods in an exercise task.

The final teaching session, Teaching Session 4, commenced with Revision Workshop 2. This workshop was dedicated to discussing the six most common errors identified in the students' writings to guide their revision process: countable nouns, prepositions, tenses, indefinite pronouns, adverbs, and the use of capital letters. Examples of student writing were compared with the GT output, enabling the students to notice any discrepancies between their own writing and the GT translation. In this way, the students understood how to correct errors using GT. Additionally, the class reviewed examples from an online dictionary, learning how to identify and rectify writing errors using online resources if needed. Following this, they applied the post-editing skills they had learned and submitted their Draft 4.

Teaching Session 1
• Introduction of one-paragraph writing • Writing topic and one-paragraph of Korean text • Draft 1: Students translate one-paragraph of Korean into English. • Online dictionary is allowed to use

Teaching Session 2
• Definition and characteristics of AI and MT • Draft 2: Students inspect their Draft 1 and revise freely

Teaching Session 3
• GT output offered as reference • Draft 3: Students compare Draft 2 with GT to write Draft 3 • Revision Workshop 1: Post-editing skills - Paraphrasing • Sample sentences for researcher's demonstration • Sample sentences for students' practice

Teaching Session 4
• Revision Workshop 2: Post-editing skills - Correcting common errors • Captured images from an online dictionary to show the way to revise errors • Draft 4: Students revise Draft 3 with a focus on the post-editing skills from Revision Workshops 1 and 2

Figure 3. Four Teaching Sessions of Treatment

Figure 4 illustrates the revisions made by an intermediate-level student in composing Drafts 2, 3, and 4. In particular, the underlined parts in Draft 3 highlight the student's enhanced ability to accurately express the intended meaning of the original text or improve sentence structure. This improvement was achieved through the use of more complex grammar and structures, facilitated by the guidance from the GT output. In Draft 4, the parts that are bold-faced show the changes made by the student utilizing the post-editing skills learned during the two workshops.

During the post-treatment phase, we collected the students' perceptions and opinions using a post-survey questionnaire and a semi-structured interview. These data collection methods aimed to investigate the students' perceptions of GT, teaching sessions, and the two Revision Workshops. Upon completing the post-survey, each participant received 30,000 won electronically transferred to their bank account as compensation for their participation. The interview schedule was arranged at the participant's convenience, with no time restrictions imposed to ensure that the six interviewees could express their opinions freely. Each interview lasted 30 minutes, and the responses were simultaneously transcribed on Google Docs due to their brevity. Following the interview, each participant received a voucher coupon worth 10,000 won via text message.

In the post-treatment phase, the study gathered feedback from the students through the post-survey questionnaire and semi-structured interview. These methods were designed to assess the students' views on the use of GT, the effectiveness of the teaching sessions, and their experiences in the two revision workshops. As a token of appreciation for their participation, each student who completed the post-survey received a financial reward of 30,000 won. Then, the interviews followed. Out of the 12 students, six freely participated in the interviews, with each lasting approximately 30 minutes. The responses were transcribed in real-time on Google Docs. After the interview, each participant was sent a voucher coupon worth 10,000 won via text message.

Draft 2
Everyone has their favorite study method. Some students prefer to study and do homework with friends. On the other hand, others want to study alone. I think studying alone is better. And there are two primary reasons. When I was freshman, I studied with my friends to prepare for an important exam. However, it was difficult to choose which part to study most. Because the part that members wanted to study was different from group members. Finally, we studied individually. Furthermore, we became distracted easily during study. Most of time, we joked and talked about unrelated things. So I could not concentrate to study and got a low grade. Consequently, different opinions among members and distracted situations make it hard to study. Because of this reason, I think studying alone is better than studying together.
Draft 3 (Underlined parts using GT Output)
Everyone has their <u>own</u> favorite method <u>to study</u>. Some students prefer to study and do homework with friends<u>, while</u> others want to study alone. I think studying alone is better<u>, and</u> there are two <u>main</u> reasons. When I was <u>a</u> freshman, I <u>used to study</u> with my friends to prepare for an important exam. However, it was difficult to <u>decide which areas</u> to study most. Because <u>all the members of the group had different interests in what they wanted to study</u>. Finally, we studied individually. <u>Not only that, but we were</u> too <u>easily distracted while studying</u>. Most of <u>the</u> time, we joked and talked about things <u>that were not related to exams.</u> <u>As a result,</u> I could not concentrate <u>on my studies</u> and got low <u>grades.</u> Consequently, different opinions among members and distracted situations make it hard to study. Because of this reason, I think studying alone is better than studying together.
Draft 4 (Bold-faced parts using the post-editing skills)
Everyone has their **favorite** method to study. Some students prefer to study and do homework with friends. **On the other hand,** others want to study alone. I think studying alone is better, and there are two main reasons. When I was a freshman, I **studied** with my friends to prepare for an important exam. However, it was difficult to **choose** which **part** to study **the** most. **Because the part that members want to study was different from group members.** Finally, we studied individually. Not only that **but** we **became distracted easily during** studying. Most of the time, we joked and talked about things that were **unrelated** to **the** exam. As a result, I could not concentrate on **studying** and got **a low grade**. Consequently, different opinions among members and distracted situations make it hard to study. Because of this reason, I think studying alone is better than studying together.

Figure 4. Student Sample of Drafts 2, 3, and 4 (An Intermediate Student)

3.4 Data Analysis

The data collected from the writing tasks, surveys, and interview in this study were thoroughly analyzed by the researchers. Descriptive statistics were computed with frequency counts and open-ended responses were qualitatively examined to summarize and interpret the results. To ensure accuracy in data coding or classification, any discrepancies were addressed and resolved through collaborative discussions among the researchers.

First, given the study's objective to examine the influence of the GT output and post-editing skills, the analysis primarily focused on comparing (1) Drafts 2 and 3 to evaluate how the GT output was utilized, and (2) Drafts 3 and 4 to assess the application of two types of post-editing skills in the revision process. For each student, we began by identifying and classifying modifications between Drafts 2 and 3, and then between Drafts 3 and 4. Changes observed in Draft 3 were further categorized to understand the influence of the GT output. Second, all modifications in Drafts 3 and 4 were categorized according to the four paraphrasing types used for Revision Workshop 1 as seen in Table 3: synonyms, written language adjustments, transitions, and sentence restructuring. Lastly, these changes were scrutinized to determine if they were erroneous. Inaccurate expressions were also classified into a set of error types based on previous research (Chon et al. 2021, Lee 2019).

Table 5 presents the error classification used in this study, dividing errors into two primary categories: form-based errors and meaning-based errors. Each category is further broken down into various subtypes with their descriptions. Form-based errors include issues related to articles, mechanics, word choice, word form, and transition errors. Conversely, meaning-based errors encompass errors of omission, mistranslation, sentence structure, and redundancy.

Table 5. Error Classification: Error Type and Description

Type	Subtype	Description
Form-based Error	1. Article	Cases where an article is missing
	2. Mechanics	Errors in spelling, punctuation, capitalization, spacing, and line break
	3. Word Choice	Lexical errors for incorrect word choice or unclear messages or awkward expressions
	4. Word Form	Incorrect part of speech or ill-formed word
	5. Transition	Improper usage of transitions
Meaning-based Error	1. Omission	Omission of a part or the whole of the original text
	2. Mistranslation	Incorrect translations of words or expressions
	3. Sentence Structure	Errors in sentence structure such as run-on sentences, fragments, word order, and phrase order
	4. Redundancy	Unnecessary repeated or redundant words or expressions

Figure 5 presents a coding sheet screenshot for Drafts 2 and 3, illustrating the four-step coding process. First, all changes between the two drafts for each student were recorded in a Google spreadsheet. Second, each word/expression in Draft 2 was evaluated for errors, categorized as form-based or meaning-based, along with their subtypes (refer to Table 5 for details). Third, those words/expressions in Draft 3 were assessed for GT influence (modification based on the GT output), copy of GT (copy of the GT output), and accuracy (correct or appropriate use of word/expression). For example, Student I5 corrected a form-based error ('study themselves' to 'study alone') in Draft 3 by copying from the GT output. Conversely, Student A1 modified 'what part' to 'which part,' influenced by the GT output ('which areas'), but did not directly copy it. Lastly, the correct changes were further classified into the four types of paraphrasing (see Table 3). The same process was applied to categorize changes between Drafts 3 and 4, focusing on the influence of post-editing skills. This approach enabled the researchers to closely monitor students' use of GT and post-editing skills, and to identify any specific challenges they encountered.

Draft 2 & Draft 3								
Level	Student	word/expression		Draft 2		Draft 3 (Y: Yes, N: No)		
		Draft 2	Draft 3	Error Type	Subtype	GT Influence	Copy of GT	Accuracy
Intermediate	I5	study themselves	study alone	Form	word choice	Y	Y	Y
Intermediate		-	for this	Meaning	omission	Y	Y	Y
Advanced	A1	what part	which part	Form	word choice	Y	N	Y
Advanced		because the parts that we want	This is because all the member	Meaning	mistranslation	Y	Y	Y
Advanced		opinions from each other	opinions	Meaning	mistranslation	Y	Y	Y
Advanced	A2	-	their own	Meaning	omission	Y	Y	Y
Advanced		a prefered study method	prefered study method	Form	article	N	N	Y
Advanced		freshman	a freshman	Form	article	Y	Y	Y
Advanced		prepare	prepare for	Form	word form	Y	Y	Y
Advanced		important test	an important test	Form	article	Y	Y	Y
Advanced		We made joke	We joked	Form	word form	Y	Y	Y
Advanced		topic	topics	Form	word form	N	N	Y
Advanced		opinion	opinions	Form	word form	Y	Y	Y
Advanced	A3	do homework	do homework with their peers	Meaning	omission	Y	Y	Y
Advanced		because each team member ha	This is because all the member	Form	word form	Y	Y	Y
Advanced		separatly	individually	Form	word choice	Y	Y	Y

Figure 5. A Screenshot of Coding Sheet for Drafts 2 and 3

Lastly, we also entered the responses from the post-survey and interview into a Google spreadsheet. Descriptive statistics were computed for the responses to the Likert-scale questions. The answers to open-ended questions were carefully examined to identify recurring themes or particularly significant responses.

4. Results and Discussion

In this section, we present our analysis of the paraphrased expressions, error changes, and remaining errors between Draft 2 and Draft 3 and between Draft 3 and Draft 4, in turn, which were informed by the output of GT and post-editing skills. The post-survey and interview data were analyzed to gather additional information and feedback from the participants on the study. Subsequently, significant differences observed among the three proficiency levels were also examined. Key findings are reported below alongside with discussion.

4.1 Changes in Writing Performance with the GT Output

All students were able to produce more words in Draft 3, when provided with the GT output, compared to Draft 2. The average word counts of Draft 2 and Draft 3 were 139.7 and 150.7, in turn. The average word count changes varied for lower and intermediate level students, increasing from 145 to 161 for the beginners, 141.6 to 152.8 for the intermediates, and 149.3 to 153.3 for the advanced learners. The following subsections provide an analysis of the qualitative changes observed between Draft 2 and Draft 3.

4.1.1 Paraphrasing between Draft 2 and Draft 3

A total of 58 expressions were paraphrased between Drafts 2 and 3, and it was observed that the GT output influenced 54 of these. The students often modified their original wording to align with the GT suggestions. For example, the phrase 'Studying alone is better' was altered to 'It is better to study alone,' and 'a low score' was replaced by 'low grades.' Except for four instances, all paraphrases were accurate.

When categorizing these 58 paraphrases, the use of synonyms and antonyms emerged as the most common technique (38 occurrences, representing 65.5%), followed by sentence or phrase restructuring (14 occurrences, or 24.1%). There were only six instances of using transitions, and none involved written language. Regarding the average number of paraphrases per student, intermediates produced 7, beginners 4.6, and advanced learners 3.2.

4.1.2 Error Changes between Draft 2 and Draft 3

A total of 80 errors were identified in Draft 2, which were further examined to determine how they were changed in Draft 3 with the assistance of the GT output. As presented in Table 6, out of the 80 errors, 67 were found to have been changed due to the GT output while 13 were not. Among the 67 GT-based error changes, 61 were borrowed exactly from the GT output (e.g. *Conclusionally* vs. *In conclusion*) and 64 accurate changes were made. Of the 13 changes that were not influenced by the GT output, 9 errors were corrected accurately. Overall, 73 out of 80 errors were revised correctly in Draft 3, indicating the crucial influence of the GT output on the writing performance.

Table 6. Error Changes from Draft 2 to Draft 3

GT Output	Total Count (%)	Copy of GT*		Accuracy		Example	
						Draft 2	Draft 3
Yes	67 (83.8)	Yes	61	Yes	64	*Conclusionally*	*In conclusion*
		No	6	No	3	*taking*	*talking or joking*
No	13 (16.2)	Yes	0	Yes	9	*freshman*	*a freshman*
		No	13	No	4	*spent*	*have spent*

*Exactly from the GT output.

4.1.3 Classification of Errors in Draft 3

In Draft 3, 139 errors were found in total, possibly due to new errors made during revision with the GT output. Table 7 presents the classification results of the errors by type (form-based or meaning-based error) and its subtypes along with the counts and examples. Out of the 139 errors, 93 (66.9%) were form-based errors whereas 46 (33.1 %) were meaning-based errors. Subtypes of the form-based errors such as mechanics and word form were largely unfixed. For the meaning-based errors, mistranslation (*We didn't focus on studying* vs. *we became distracted easily*) and omission of key components (*prefer to study* vs. *prefer to study and do assignments*) were the major sources of errors.

Table 7. Classification of Errors in Draft 3

Type	Subtype	Count (%)	Example
Form-based Error	1. Article	4 (2.9)	got low score < got a low score
	2. Mechanics	30 (21.6)	We < we
	3. Word Choice	11 (7.9)	personally < separately, not together
	4. Word Form	46 (33.1)	was unrelated exam < was unrelated to the exam
	5. Transition	2 (1.4)	because there are two big reasons < two reasons for this
Total (%)		93 (66.9)	
Meaning-based Error	1. Omission	10 (7.2)	prefer to study < prefer to study and do assignments
	2. Mistranslation	29 (20.9)	we didn't focus on studying < we became distracted easily)
	3. Sentence Structure	2 (1.4)	I think studying alone is much better than studying together. Because … make studying hard. < Disarranged opinions among team members and a distracting environment make it hard for them to study. For these reasons…
	4. Redundancy	5 (3.6)	I think studying alone is much better and there are two reasons for this argument. (*thesis repetition*)
		46 (33.1)	
Total (%)		139 (100)	

The results of this study clearly demonstrated that the use of GT significantly reduced errors while improving both the quality and quantity of students' writing. This finding is in line with prior research, which has shown that MT aids L2 learners in identifying and revising errors as part of the writing process (Amin 2019, Jo 2021, Lee and Briggs 2021). Although many students tended to replicate the GT's output, this practice was seen as a valuable initial step as it allowed them to recognize grammar and expressions they were unsure about and use GT as a reference tool. Plus, the students actively attempted to paraphrase words, phrases, or sentences based on the GT

output in Draft 3, leading to a high rate of correction. This reflects a real-world writing situation where EFL learners often directly use words or expressions from MT tools such as GT and Papago. Lastly, the use of MT was also found to contribute to an expanded vocabulary in English writing (Alhaisoni and Alhaysony 2017, Tsai 2019). Notably, the average word count in Draft 3 was higher than that in Draft 2 across all proficiency levels. Sentences that the students could not write in Draft 2 also appeared in Draft 3 with the assistance of GT.

However, students with weaker grammar skills faced challenges in recognizing and revising errors on their own. A notable example was the incorrect phrase 'a distracted environment' suggested by GT, which should have been 'a distracting environment.' Many students could not identify this error and simply copied it into their writing. This underscores the importance of teacher involvement in discussing the limitations of MT and providing targeted feedback. As Han and Shin (2017) and Lee and Briggs (2021) suggest, teaching students to use online dictionaries or corpora for revising can also be an effective strategy alongside the use of MT in EFL writing instruction.

4.2 Changes in Writing Performance with Post-Editing Skills

Paraphrasing and error correction as post-editing skills were utilized for revising Drafts 3 and 4, respectively. The average word counts for these drafts were nearly identical, with Draft 3 containing 149.6 words and Draft 4 having 150.7 words. Although beginners used slightly more words in both drafts compared to other proficiency levels, the average word counts across all proficiency levels showed no significant differences: 161 and 160 for beginners, 152.8 and 149.6 for intermediate learners, and 153.3 and 153.0 for advanced learners. In total, 107 changes were implemented, comprising 85 paraphrases and 22 error corrections. The subsequent subsections will present a qualitative analysis of the modifications between Drafts 3 and 4.

4.2.1 Paraphrasing between Draft 3 and Draft 4

During the revision from Draft 3 to Draft 4, a total of 85 paraphrases were made, which were then classified into four types of paraphrasing. As depicted in Figure 6, the most commonly employed method was the use of synonyms or antonyms, accounting for 35 occurrences (41.2%). Notably, a majority of the paraphrased expressions in Draft 4 were not directly copied from the GT output: 80% of them (68 occurrences) were independently created by the students, despite some inaccuracies. Across all paraphrasing types, the students endeavored to revise the expressions in Draft 3 instead of merely copying from the GT output. This approach, however, led to inaccuracies, predominantly in the use of synonyms or antonyms and sentence or phrase restructuring. For example, some students incorrectly used synonyms such as 'varying' and 'disparate' as substitutes for 'different' and 'contrasting,' respectively.
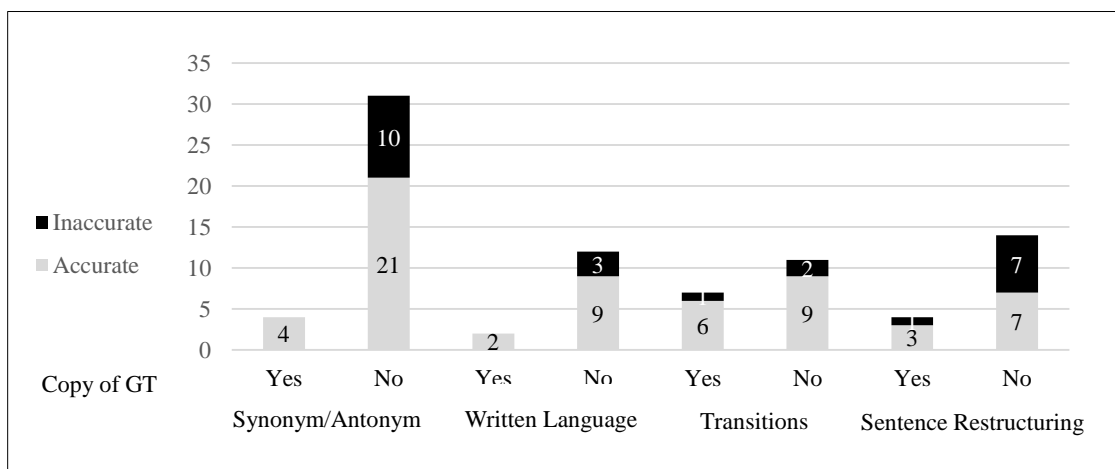
Figure 6. Paraphrasing between Draft 3 and Draft 4 (*N* = 85)

4.2.2 Error Correction between Draft 3 and Draft 4

The remaining changes between Draft 3 and Draft 4 consisted of 22 error corrections, classified into one of six common error types. Figure 7 shows that the most frequently revised error type was tense, followed by countable noun and preposition errors. Interestingly, the students more often attempted to correct errors on their own (19 occurrences) rather than copying from the GT output (3 occurrences). Importantly, those students at beginner and intermediate levels also made error corrections. For instance, beginners corrected phrases such as 'much more better' and 'study together' to 'much better' and 'studying with,' respectively. Intermediate students made four changes, such as revising 'spent most of the time in making…', 'Most', 'Not only that, but', and 'concentrate on my studies' in Draft 3 to 'spent most of the time making…', 'the most', 'Not only that but', and 'concentrate on studying' in Draft 4.

4.2.3 Classification of Errors in Draft 4

Table 8 presents types of 57 errors identified in Draft 4, which were not corrected despite the two revision workshops. Meaning-based errors, with 33 occurrences (57.9%), were slightly more prevalent than form-based errors, which had 24 occurrences (42.1%). Of the 24 form-based errors, 19 were primarily related to word choice (e.g., 'wander' vs. 'difficult to focus'). In contrast, a diverse range of subtypes characterized the meaning-based errors, ranging from omission to redundancy. Omission errors, for example, often involved neglecting to include certain words (e.g., 'own' or 'favorite'), reflecting a lack of detail. Meanwhile, mistranslation errors were more complex, frequently stemming from insufficient knowledge of English grammar, vocabulary, and sentence structure.
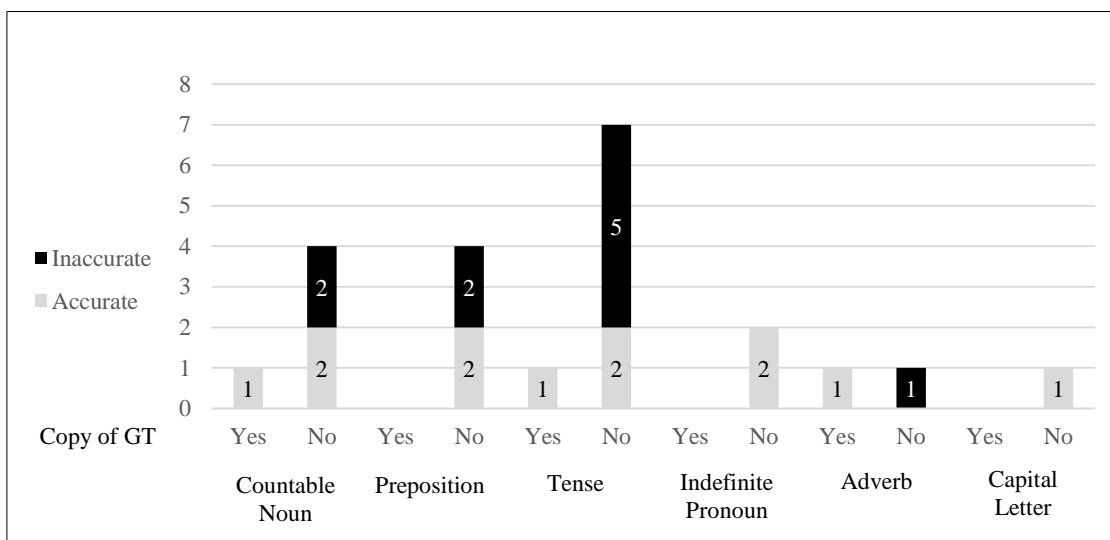
Figure 7. Error Correction between Draft 3 and Draft 4 (*N* = 22)

Table 8. Classification of Errors in Draft 4

Type	Subtype	Count (%)	Examples
Form-based Error	1. Article	-	-
	2. Mechanics	1 (1.8)	most of the time < most of the time,
	3. Word Choice	19 (33.3)	distractful < distracting, wander < difficult to focus)
	4. Word Form	4 (7.0)	are choose <are chosen, study alone is <studying alone is
	5. Transition	-	-
Total (%)		24 (42.1)	
Meaning-based Error	1. Omission	11 (19.2)	their favorite method < their own favorite method
	2. Mistranslation	12 (21.1)	which part we required to study hard < which part we study the most
	3. Sentence Structure	3 (5.3)	The group of members have < The group of members has
	4. Redundancy	7 (12.3)	I believe … there are … for this argument (*thesis repetition*)
Total (%)		33 (57.9)	
Total (%)		57 (100)	

Overall, the two revision workshops focused on post-editing skills successfully taught the students to revise their drafts independently. While they tended to replicate the GT output in Draft 3, they showed significant improvement and originality in Draft 4. This mirrors findings from Stander (2020), indicating a decrease in plagiarism from initial to final drafts. The students also demonstrated effective paraphrasing skills, as noted in studies by Park and Lee (2010), Stander (2020), and Sung (2011). Regarding error correction, the students faced more challenges with meaning-based errors, such as keyword omission and mistranslation, compared to form-based errors. The beginners, in particular, struggled more with error identification and correction, emphasizing the necessity for personalized, direct feedback. In this sense, although the workshops improved writing skills through self-review, continuous and varied teacher involvement, especially in addressing meaning-based errors, remains crucial.

4.3 Responses of Post-Survey and Interview

Due to space limit, only the key results of the post-survey and interview data analysis are presented. The first section of the post-survey focused on students' perceptions of the study in relation to GT and writing performance. The level of acceptance of GT varied widely, ranging from 20% to 80% across the different English proficiency levels. Half of the 12 students believed that the GT output completely captured the meaning of the original text, while the other half felt it only partially did so. In terms of the support provided by GT, the majority of students found it beneficial for grammar and sentence structure. Specifically, grammar was identified as the most helpful aspect of MT, chosen by five participants. Four students found assistance with sentence structure most useful, two selected vocabulary, and one favored spelling. Responses varied more among the beginner-level students: two chose grammar, one spelling, and another vocabulary. Among the intermediate students, who formed 60% of those accepting the GT output, the majority favored grammar, with one opting for vocabulary and two for sentence structure. The advanced-level students predominantly focused on sentence structure and grammar. Additionally, 10 out of 12 students expressed a strong intention to use MT in their future English writing.

Next, the second part of the post-survey addressed the two revision workshops. All students agreed or strongly agreed that the workshops were beneficial in teaching them how to revise their English writing. They appeared to learn how to create meaningful writing by utilizing paraphrasing skills and correcting errors, instead of depending solely on the GT output.

The semi-structured interviews with six students revealed three main findings. First, using the GT output and applying the post-editing skills helped in vocabulary acquisition, as well as in identifying and correcting grammar errors, ultimately enhancing writing ability. Four students reported that the teaching sessions lessened their burden of writing in English. An intermediate-level student highlighted that the sessions were particularly helpful in identifying areas in her writing that were uncertain and required revision. The following were from their responses:

There were limitations in revising the writing because I only depended on the GT output. In the teaching sessions, my writing became primary, and the GT output played just a reference through using various revision skills. (An intermediate-level student)

If I use MT right away, I rarely used to check the grammar errors. Through the session, I was able to inspect my wrong grammar knowledge. In addition, I could improve my English proficiency and writing quality. GT output was only used for reference. (An advanced-level student)

Secondly, the students still emphasized the importance of teacher feedback in learning writing, even though teacher feedback was not the primary focus of this study. They noted as follows:

The way to utilize AI. The researcher's feedback was informative, so direct assistance in terms of vocabulary and content for writing will be helpful. (An intermediate-level student)

Giving more teachers' feedback would be advantageous. (ex. Choosing appropriate vocabulary in the context) It would be challenging for students who could not recognize the errors to revise constantly without teachers' feedback. (An advanced-level student)

Lastly, the students expressed conflicting views and attitudes towards using MT. A beginner-level student

showed enthusiasm for employing various MT tools in future writing, while an advanced-level student raised concerns about the potential negative impacts of indiscriminate AI use. Additionally, one student underscored the significance of teachers guiding students in effectively utilizing MT tools for learning writing. The students' opinions are detailed further below:

It would be useful to learn how to use various MTs because I used MT rather than searching dictionaries for English writing. (A beginner-level student)

Through the teaching session, I thought that people's dependence on AI will increase, and unconditional reliance on it would be a problem. (An advanced-level student)

Using MT in an effective way will be emphasized in the future. Therefore, teaching the way to use AI more wisely to students will be the role of teachers. (An advanced-level student)

5. Conclusion

This case study explored the integration of GT and post-editing skills into the writing instruction of Korean EFL college students, focusing on how these tools and techniques affect their writing performance and attitudes. Over a four-day program, 12 students wrote four drafts, using the given GT output and learning paraphrasing and error correction skills. The results showed that while the students initially depended heavily on the GT translation, they gradually became more independent in revising and correcting errors. While many students benefited from using GT and post-editing skills in learning English writing, challenges remained. Specifically, students, particularly those with lower proficiency, struggled to choose appropriate words and faced difficulties in identifying errors in the GT output. Despite these challenges, the post-survey and interviews reflected overall satisfaction with GT as a learning tool and the effectiveness of the post-editing skills they acquired.

The findings of this study lead to four important implications. First, the integration of machine translation tools into the learning process can be enhanced by also using additional online resources such as dictionaries, corpora, Grammarly, and ChatGPT. The study highlighted that GT, while useful, is not infallible and can produce errors. This is particularly problematic for students with lower English proficiency, who may struggle to identify these errors. Therefore, pairing MT tools with other educational resources can help mitigate this issue by offering students a wider range of tools to cross-check and understand language nuances, ultimately leading to a more effective writing process. Second, the study highlights the importance of differentiated instruction for students at various proficiency levels. Tailoring support and resources to meet individual needs is crucial, especially for lower proficiency students, to ensure they all benefit from using MT tools and post-editing skills in their writing learning. Third, given the difficulties many students encountered in selecting appropriate words and identifying errors in the GT translation, there is a clear need for a stronger focus on vocabulary acquisition and error recognition in the EFL curriculum. This could involve more in-depth vocabulary exercises, context-based learning, and specific training in recognizing and correcting common errors in machine translations. Lastly, this study suggests that teachers should play an active role in writing instruction. Teachers are key to effectively incorporating machine translation (MT) tools into teaching, while also acknowledging their limitations. Adequate instruction and feedback in writing classes can help students develop their skills and reducing reliance on MT (Marzec-Stawiarska 2019).

This study has limitations, which can serve as opportunities for future research. First, a larger sample of participants will offer more robust evidence for the findings of this study. We invited students outside of classrooms, so it was quite challenging for recruiting participants. Research with a more diverse range of students from various learning environments will further validate and enrich the conclusions of this study. Second, conducting long-term research can provide diverse perspectives on using MT tools in L2 writing contexts. The duration of this study was only four days, leading some students to express a need for more practice time to improve their learning experience. Thus, research over a longer period should be conducted to allow for a deeper understanding of how continuous exposure to MT influences L2 writing learning. Lastly, future research should focus on the effective integration and use of various AI tools in L2 writing instruction. With the rapid advancement of MT and the development of other AI tools such as Grammarly, Virtual Writing Tutor, and ChatGPT, it is necessary to explore optimal methods for incorporating these technologies. This includes understanding the benefits and limitations of their use, and creating comprehensive teaching materials that leverage AI's capabilities. Such research will provide educators with insights on effectively using AI tools to enhance L2 writing experiences and support student success.

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

Appendix A
Sample of Writing Tasks: Drafts 2 and 4

Draft 2
Name:

Directions: Read the topic below and translate the given Korean original text into English. Revise Draft 1 and Compose Draft 2.

Topic: Some students prefer to study and do homework alone. Others prefer to study and work on class assignments with a group of fellow students. Which do you prefer? Use specific reasons and examples to support your answer.

Korean Original Text
모든 사람마다 그들 자신이 좋아하는 공부 방법이 있습니다. 어떤 학생들은 또래들과 함께 공부하고 숙제 하는 것을 선호하는 반면, 다른 학생들은 혼자 공부하기를 선택합니다. 저는 혼자 공부하는 것이 더 낫다고 생각하며 여기에는 크게 두 가지 이유가 있습니다. 제가 신입생이었을 때, 저는 중요한 시험을 준비하기 위해 제 친구들과 공부를 한 적이 있습니다. 하지만 어떤 부분을 가장 많이 공부해야 할 지 정하는 것이 어려웠습니다. 왜냐하면 조원들 모두가 공부하고 싶은 부분이 다 달랐기 때문입니다. 결국, 저희는 개별적으로 공부를 하였습니다. 이 뿐만 아니라, 저희는 공부하는 동안 너무 쉽게 산만해졌습니다. 대부분의 시간을 농담을 하거나 시험과 관련 없는 이야기들을 하였습니다. 이로 인해 저는 공부에 집중하지 못했고 낮은 점수를 받았습니다. 결론적으로, 조원들 간의 다른 의견들과 산만한 환경은 공부하기 어렵게 만들며 이런 이유로 저는 함께 공부하는 것보다 혼자 공부하는 것이 훨씬 낫다고 생각합니다.

Draft 1 (Copy Draft 1 below)

Draft 2

Draft 4
Name:

Directions: Read the topic below. Revise Draft 3 by applying the post-editing skills (paraphrasing and correction), and compose Draft 4.

Topic: Some students prefer to study and do homework alone. Others prefer to study and work on class assignments with a group of fellow students. Which do you prefer? Use specific reasons and examples to support your answer.

Google Translated Text (GT Output)
Everyone has their own favorite way to study. Some students prefer to study and do homework with their peers, while others choose to study alone. I think studying alone is better, and there are two main reasons for this. When I was a freshman, I used to study with my friends to prepare for an important exam. However, it was difficult to decide which areas to study the most. This is because all the members of the group had different interests in what they wanted to study. After all, we studied individually. Not only that, but we were too easily distracted while studying. Most of the time we joked or talked about things that were not related to the exam. As a result, I couldn't concentrate on my studies and got low grades. In conclusion, different opinions and distracted environments make it difficult to study, and for this reason, I think it is much better to study alone than study together.

Draft 3 (Copy Draft 3 below)

Draft 4

Appendix B
Post-Survey Questionnaire

Questions		Options
Section 1: Machine Translation		
Q1	How well do you think the results of the MT reflect the meaning of the original text?	1. All 2. Somewhat 3. Hardly 4. Never
Q2	To what extent did you accept the results of the automatic translator? (Please indicate in %)	
Q3	From what part of your English writing did you receive help in MT?	1. Grammar 2. Vocabulary 3. Orthography 4. Sentence structure 5. Other.
Q4	Are you willing to use MT in the future?	1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
Section 2: Revision Workshops		
Q1	Was the Revision Workshop 1 (paraphrasing skills) helpful to revise your English writing?	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
Q2	Do you think you achieved meaningful writing by applying paraphrasing skills without copying the MT output?	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
Q3	Are you willing to apply paraphrasing skills actively when you use MT or write English writing?	1. Yes 2. No
Q4	Was the Revision Workshop 2 (fixing writing errors) helpful to revise your English writing?	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
Q4	What was the most difficult part of revising English writing?	1. Grammar 2. Vocabulary 3. Sentence structure 4. Natural expression 5. Paragraph structure 6. Other
Section 3: The Researcher's Feedback		
Q1	Was the teacher's feedback helpful to your English writing?	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
Q2	If it was, in what part was it useful to your English writing?	1. Searching for topics and developing the opinions 2. Structure and form of the writing 3. Selecting the proper vocabulary and expressions.4. Inspection and revision of the errors 5. Other
Section 4: Open-ended Questions		
Q1	What did you like about the class?	
Q2	What was the difficult part of the class? Do you have suggestions?	
Q3	What do you think is the role of the teacher if students can use MT effectively?	
Q4	Are you willing to participate in the class if it proceeds in a more organized way in the long term?	1. Yes 2. No