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Post-editing of machine translation while reading on English proficiency levels*

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Kim, Hea-Suk and Yoonjung Cha. 2023. Post-editing of machine translation while reading on English proficiency levels. *Linguistic Research* 40(Special Edition): 89-126. This study aimed to investigate the impact of post-editing with machine translation (MT) in reading classes on students' performance and perspectives across different English proficiency levels. Eighty-one students participated in the study and they were divided into two groups: 39 students in the lower proficiency group and 42 students in the higher proficiency group. The research addressed two main questions: firstly, it explored how MT usage affects learners with varying English proficiency levels; secondly, it examined whether learners' perspectives on MT use in reading classes differ based on their proficiency. Both quantitative and qualitative analyses were conducted using exam scores and questionnaire data. To address the first research question, pre- and post-reading test scores were analyzed. The findings revealed a substantial enhancement in reading comprehension for both groups. Moreover, there was a significant difference between the two groups. Regarding the second research question, a pre- and post-questionnaire was conducted. Both low and high proficiency groups acknowledged numerous advantages associated with MT use, with the low proficiency group exhibiting improvements across all aspects evaluated. Convenience and reduced burdens received the highest scores in both groups, positively influencing their active class participation. The research emphasized the advantages of incorporating machine translators into English reading classes, shedding light on positive outcomes for L2 reading. **(Seoul Women's University · Hanshin University)**

Keywords machine translation, post-editing, English reading, proficiency levels, perspectives

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1. Introduction

Machine translation (MT) has undergone rapid development, attracting significant attention from foreign language learners and L2 language instructors. The availability of MT services has made it easy and convenient for learners to access translations from anywhere and at any time. Furthermore, the continuous advancement of artificial intelligence (AI) and deep learning technologies has greatly improved the quality of translations provided by MT tools. Google adopted Neural Machine Translation (NMT) in 2016, marking a departure from traditional methods that focused on individual words or phrases in a discrete and localized manner. Modern Neural Machine Translation (NMT), can learn from vast amounts of internet-based examples and analyze the context of entire sentences. This allows them to generate translations that better capture the semantic nuances of language, going beyond mere word-to-word translations (Kim 2017). The advancement and ease of use provided by MT tools have revolutionized the way language learners approach their L2 learning (Lee 2019; Kim 2020). Therefore, most of the L2 language learners have embraced MT as a valuable tool in their language learning. For example, learners can simply input a word, phrase, or entire sentence into the MT tool and receive an instant translation, eliminating the need for time-consuming manual translation efforts. As these tools continue to evolve, they are likely to play an increasingly prominent role in supporting language learners in their quest for language proficiency and cross-cultural communication.

However, L2 educators express concerns regarding the potential drawbacks associated with excessive reliance on MT. They worry that learners might become overly dependent on automated translations, hindering their natural language acquisition and understanding of language structures. Moreover, instructors have expressed apprehensions regarding the preservation of academic integrity, as there is a possibility that certain students could resort to utilizing MT to plagiarize or evade the effort necessary in language learning (Jolley and Maimone 2015).

In spite of these concerns, recent studies have shed light on the importance of striking a balance in MT usage for language learners. Instead of outright prohibition, researchers and educators advocate for preparing learners in using MT responsibly and effectively. They emphasize that MT can be a powerful supplementary tool for language learning, aiding comprehension, vocabulary acquisition, and language practice (Rushwan 2017; Lee 2020; Tsai and Liao 2021). Properly guided usage can enhance learners' overall language

skills and foster a deeper understanding of the target language (White and Heidrich 2013; Groves and Mundt 2015; Jolley and Maimone 2015; Henshaw 2020).

Most of the existing research has primarily focused on learners' perceptions (White and Heidrich 2013; Chandra and Yuyun 2018; O'Neil 2019; Kim and Cha 2020; Youn and Lee, 2020; Baek and Rha 2022) and writing skills (Whilte and Heidrich 2013; Briggs 2018; Chung and Ahn 2022; Tsai 2022), which have shown the positive impact of MT on these aspects of language learning. Nevertheless, studies related to reading are still limited (Tsai and Liao 2021; Oh 2022), and there is a dearth of research proposing specific methodologies for incorporating MT in university-level reading classes. Significantly, MT has the potential to generate translations that are inelegant or contain errors due to its limitations in capturing contextual subtleties. Taking these factors into account, the incorporation of post-editing subsequent to machine translation in L2 reading practice becomes imperative and can additionally play a role in enhancing reading proficiency (Besacier and Schwartz 2015; Chung 2020; Jolly and Maimone 2022; Park and Choi 2023).

The level of language proficiency has a profound impact on learners within a classroom setting, and this crucial interaction must be considered when integrating MT into language instruction. As Lee (2020) asserted, foreign language proficiency plays a crucial role in shaping how learners perceive and engage with MT in language learning. It is in line with existing research that highlights the significant impact of language proficiency on various aspects of language learning, including the use of technology (Kim 2020; Youn and Lee 2020; Yoon and Chon 2022). By acknowledging the individual differences in learners' proficiency levels, educators can gain a deeper understanding of how MT usage may vary among students, enabling them to provide tailored support and guidance accordingly.

However, despite the potential benefits of incorporating MT into reading classes for language learners, there has been a limited number of studies examining its effectiveness based on learner proficiency levels. The scarcity of research in this domain leaves substantial gaps in comprehending the true impact of MT implementation across diverse proficiency levels. As such, it is incumbent upon current scholarship to undertake an empirical endeavor aimed at exploring the ramifications of MT utilization in reading classes concerning students' performance and perception across varying levels of linguistic proficiency.

The study will investigate two research questions.
1. What is the influence of post-editing Machine Translation (MT) in reading classes on learners with varying levels of English proficiency?
2. What is the impact of the learner's English proficiency on their perspective regarding the use of Machine Translation (MT) in reading classes?

2. Theoretical background

2.1 L2 reading and machine translation post-editing

L2 reading is not merely a solitary process but rather an interactive process (Coady 1979; Bernhardt 1991; Grabe and Stoller 2002). It is defined as an interactive approach where learners synthesize information from multiple sources simultaneously (Rumelhart 1977). Eskey (1988) further elaborated on this concept, explaining that it involves the interaction between top-down decoding and top-down analysis, which rely on prior knowledge and specific information processing technology. However, it is crucial to distinguish this type of interaction from Vygotskyian socio-cultural theory, which places emphasis on the interaction between learners and encourages them to investigate the relationship between reading and two essential concepts: mediation and the zone of proximal development (ZPD).

Vygotsky defines the zone of proximal development (ZPD) as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky 1978: 86). Vygotsky (1978) proposed that learners have the capacity to solve problems or accomplish tasks that surpass their current abilities when they receive suitable assistance within a socially interactive environment.

When L2 readers engage in co-constructed reading activities, new strategies emerge that differ from solitary reading but still recognize the interaction between readers and texts. Moreover, this perspective extends to encompass the social mediation facilitated by interactions among learners who collaboratively construct meaning. In essence, this approach underscores the interconnectedness between language learners, the text, and the supportive environment in which they learn.

With the development and rapid nature of NMT (Neural Machine Translation), language learners have the potential to reach their ZPD when provided with suitable facilitators, such as technological tools (Mohammed Qadir and Yousofi 2021). In addition, in the digital era, the concept of "digital competence" has become increasingly important as technology continues to play a significant role in various aspects of our lives, including education and communication.

Walker and White (2013) identified four key dimensions that constitute digital competence. Procedural competence refers to the technical skills and knowledge required to effectively navigate and use digital tools and platforms. In addition to technical skills, socio-digital competence involves the ability to engage in social interactions and collaborative activities in digital spaces. Digital discourse competence focuses on effectively understanding and creating digital content, while strategic competence involves strategic thinking and problem-solving in a digital context. As technology continues to advance, fostering digital competence becomes crucial in preparing individuals to thrive in a digitally connected world. Educators and institutions play a vital role in promoting digital competence among learners, equipping them with the necessary skills and knowledge for the challenges and opportunities presented by the digital age.

In the realm of education, there is ongoing research to explore diverse methods of leveraging technology to improve learning outcomes. Among these methods, machine translation (MT) holds a prominent position, especially in L2 language education. During the initial exploration of machine translation, researchers perceived MT as a possible origin of errors, especially related to lexico-grammatical aspects. To rectify these errors, a process called post-editing was necessary. Post-editing involves comparing the output of the MT system with the original source text and making necessary changes to ensure the translation is acceptable and accurate for its intended purpose. According to Allen (2003), "post-editing" means specifically correcting machine translation output by humans. It defines the post editor's task as editing, modifying, or correcting pre-translated text processed by an MT system from the source language into one or more target languages. Similarly, Pym (2011) defines post-editing as the process of making corrections or amendments to automatically generated text, especially from machine translation output.

Several studies delved into the post-editing process to understand its potential benefits and challenges in language learning and translation tasks. One of these studies was conducted by Belam (2002), who incorporated MT evaluation into a language teaching

course. Students were given specific tasks to evaluate the MT output, focusing on aspects like accuracy, readability, and coherence. Additionally, they examined practical issues, such as determining the amount of text that needed to be pre-edited or post-edited to achieve a suitable translation. Through these tasks, the students not only improved their understanding of MT evaluation but also enhanced their overall linguistic awareness.

Kliffer (2005) conducted an experiment to introduce MT through post-editing in a university setting for translating from French to English. In this study, students with different proficiency levels engaged in post-editing exercises. The results showed that while post-editing helped reduce the total number of errors, there was significant variation in error counts among weak, average, and strong students. Among weak and average students, word choice errors stemming from polysemy (multiple meanings of words) and homonyms (words with the same spelling but different meanings), as well as literal translations, were the most common types of errors observed.

Niño (2008) investigated the post-editing process with EFL students. The students were tasked with post-editing raw MT output by using various online resources. During this process, the students employed diverse post-editing strategies, such as rewriting, paraphrasing, self-correction, guessing, inferencing, reflecting, and utilizing synonyms. This study highlighted the creative and adaptive nature of post-editing strategies employed by language learners. Another study conducted by Garcia and Pena (2011) investigated how beginner and low-intermediate language learners utilize MT post-editing. The results indicated that while MT usage led to increased word count, the overall linguistic improvements were subtle and not easily noticeable. Although MT benefited beginners in expressing themselves more extensively with less effort, its actual impact on learning remained unclear.

On the other hand, Besacier and Schwartz (2015) examined the viability of employing MT to translate literature from English to French. Within this experiment, the Machine Translation (MT) output was subsequently subjected to post-editing by non-professional translators and then examined by a group of readers. Despite the researchers observing a decrease in perceived quality, they asserted that MT holds the capability to reduce the time required for translation and potentially serve as a facilitative tool in L2 reading. Engaging learners in learning activities involving post-editing of machine translation encourages them to focus on vocabulary, sentence structures, and distinctions between their native language (L1) and the target language (L2). As a result, it enhances their metalinguistic awareness and, in turn, accelerates language development (Jolly and

Maimone 2022). Consequently, the incorporation of machine translation into language learning holds the potential to support learners' overall language progression.

Related studies have been recently conducted within the EFL context in Korea. Chung (2020) investigated how second language (L2) proficiency influences learners' ability to post-edit machine-translated texts from their native language (L1) to English (L2). Korean university students with different levels of L2 proficiency took part in the study and were tasked with identifying and correcting errors in the translated text. The study found a clear impact of L2 proficiency on language learners' post-editing of machine-translated text. As proficiency levels increase, learners tended to make more corrections, particularly beyond the word level. Moreover, significant variations were observed in the post-editing patterns among different proficiency groups in relation to the machine-translated text.

Examining the viewpoints of Korean EFL learners, Park and Choi (2023) delved into the perception of Machine Translation (MT) and common errors in post-editing English-to-Korean translations. Survey outcomes and student reflections on MT use unveiled a consensus among learners that integrating MT into EFL education constituted an inventive and beneficial experience. The learners exhibited significant favor for MT's usage in reading and post-editing, acknowledging its stress-reduction and motivational influences on English learning. Additionally, they found value in recognizing limitations in freely accessible online MT output and enhancing their comprehension of linguistic structures.

These studies shed light on the effectiveness of MT post-editing in language translation tasks, demonstrating variations in error patterns based on different proficiency levels and diverse strategies employed by learners during the post-editing process. By understanding these dynamics, educators, and researchers can better explore the effective and responsible utilization of MT technology in language education. However, due to the limited scope and small sample size of this study, further research is needed to fully understand the advantages of MT for learners with various proficiency levels using MT post-editing and its impact on reading skills.

2.2 Machine translation in foreign language learning by learner proficiency

Previous research has demonstrated the advantageous effects of incorporating translation tools into L2 language classrooms. The use of machine translators by foreign

language learners has become increasingly prevalent as the accuracy of these tools has improved over time (Briggs 2018). With the advancement of technology, learners have found machine translators to be valuable resources for various language learning activities, including vocabulary, grammar, reading comprehension, writing exercises, and others.

Numerous research studies on machine translation (MT) have focused on exploring what learners think and believe about using MT tools in their language learning endeavors (Garcia and Pena 2011; Chandra and Yuyun 2018; O'Neil 2019). The findings from the review of foreign literature highlight the importance of actively integrating machine translators in educational settings. Additionally, the research emphasizes the positive aspects of incorporating these tools into foreign language learning curricula, offering valuable insights into how learners perceive and benefit from their usage (Garcia and Pena 2011; O'Neil 2019).

In recent years, there have been research papers that delve into the practical and efficient implementation of machine translation (MT) in language learning environments. Notably, Whilte and Heidrich (2013) undertook a comprehensive study to investigate learners' perceptions and strategies concerning MT usage. Through surveys, writing assignments, and in-depth interviews, they discovered that despite class policies discouraging MT usage and acknowledging its limitations, many learners actively relied on it as a language learning tool. In response to this observation, the authors emphasized the significance of providing proper guidance and education to learners on how to use MT effectively as part of their language learning process. Instead of imposing strict restrictions on MT use, fostering an informed and responsible approach to its utilization was deemed essential.

Similarly, Jolley and Maimone (2015) conducted surveys in a Spanish language class to explore both learners' and instructors' perspectives on MT usage. They found that learners frequently turned to MT without receiving adequate training or support on how to leverage it appropriately. As a consequence, the authors underscored the crucial role instructors play in facilitating MT usage in line with the specific goals of the language course. By assisting learners in utilizing MT effectively, instructors can empower their students to employ this tool as a complementary aid in language learning, rather than a crutch to rely on entirely.

Bagheri and Fazel (2011) also confirm that using translation positively impacts learners' motivation to study English, and improves reading comprehension, grammar

skills, and the appropriate use of expressions. Moreover, research supports the idea that translation can serve as an effective method for comprehending reading texts (Bagheri and Fazel 2011; Karnal and Pereira 2015).

Some studies have demonstrated that second language (L2) learners can improve their reading skills (Rushwan 2017; Tsai and Liao 2021; Oh 2022; Kim and Cha 2023), as well as influence positive perspectives by utilizing machine translation tools (Tsai and Liao 2021). In a recent study conducted by Tsai and Liao (2021), machine translation positively influenced language learning motivation and alleviated reading anxiety. Nevertheless, other research studies (Jolley and Maimone 2015; Bahri and Mahadi 2016; Briggs 2018) highlighted inconsistencies between learner perceptions and actual behavior, as some learners continued to use machine translation despite being aware of its limitations.

Studies by Rushwan (2017) and Tsai and Liao (2021) examined the use of translation tools among learners in Saudi Arabia and Taiwan, respectively, revealing that such tools positively impacted their English reading abilities. Additionally, Oh (2022) investigated the effectiveness of AI translation tools in foreign language reading learning for Korean university students, highlighting the positive influence of these tools on English reading proficiency.

Kim and Cha (2023) conducted a study with 113 participants, dividing them into three groups: control, first experimental (AI translators), and second experimental (AI translators with revision). All groups showed improved reading comprehension scores after the experiment, with no significant differences between them. Students perceived AI translators as helpful for understanding passages and reducing anxiety but showed lower interest and motivation for language learning. The study highlights the need to balance the benefits of AI translators in language learning while considering potential drawbacks.

However, despite these positive findings, the field of reading, particularly in foreign language learning, lacks comprehensive research on the use of translation tools. Lee (2020) conducted a meta-analysis on the use of AI translation tools in foreign language learning and underscored the necessity for further investigations into the effectiveness of these tools in enhancing learners' reading skills.

The overall findings suggest that learners generally hold a positive view regarding the incorporation of machine translation tools in their language learning, regardless of their proficiency in L2. Researchers (Kim and Cha 2020; Youn and Lee 2020; Baek and Rha 2022) have reported similar outcomes, indicating a widespread acceptance of AI

translation tools among language learners.

Language proficiency plays a pivotal role in determining the effectiveness of using machine translation (MT) for writing tasks (Lee 2020). Previous studies primarily focus on assessing whether the utilization of MT contributes to the improvement of writing quality across different levels of language proficiency (Garcia and Pena 2011; Tsai 2022) and exploring students' perceptions and attitudes towards MT usage (Kliffer 2005; Lee 2020; Tsai 2022).

Garcia and Pena (2011) conducted research with beginner and early intermediate-level Spanish learners and found that those with lower language mastery produced a higher word count when utilizing MT for writing tasks. Similarly, Tsai (2022) conducted a study in Taiwan, comparing the writing assignments of two groups: English majors with higher English proficiency and non-English majors with lower English proficiency. The results demonstrated that the revised compositions of non-English major students, after using MT for editing, were on a par with those produced by their English major counterparts. This led to the conclusion that integrating MT into English as a Foreign Language (EFL) writing could substantially enhance the writing performance of EFL students with lower English proficiency.

In addition, studies conducted by Kim (2020), Yoon and Chon (2022), and Youn and Lee (2020) have highlighted the importance of considering the learners' foreign language proficiency levels when integrating machine translation tools into language learning environments. These studies emphasize that different approaches and strategies should be employed based on learners' language proficiency to ensure the optimal and appropriate use of AI translation tools in their language learning process.

MT often produces overly literal translations that may not aid students in understanding the text effectively. Relying heavily on MT for comprehension can hinder genuine language acquisition as learners may become overly dependent on automatic translation. While MT is improving and can boost productivity, excessive reliance on it should be avoided. Learners are encouraged to use human translators to enhance their language proficiency (Niño 2009; Karnal and Pereira 2015; Hoi 2020).

Overall, the research in this area underscores the need for learners' proficiency levels approach when incorporating machine translation tools in L2 language education. It is vital for educators and curriculum designers to take into account learners' language proficiency levels to effectively harness the potential benefits of AI translation tools while avoiding overreliance and potential drawbacks. As technology continues to advance,

further research and practical implementation would be necessary to maximize the benefits of AI translation tools in enhancing language learning outcomes.

Therefore, while learners may be naturally drawn to the convenience of MT, educators must actively engage in providing guidance and context to ensure that MT serves as a supportive resource rather than a hindrance to genuine language acquisition. Striking a balance between traditional language learning methods and leveraging the benefits of MT can lead to more effective language learning outcomes and equip learners with the necessary skills to navigate today's multilingual world.

3. Methods

3.1 Participants

The study included eighty-one university students who were divided into two different Essential English classes. The first class consisted of forty-four students from the Artificial Intelligence (AI) and Software (SW) field as well as the Convergence Engineering field, while the second class had forty-three students from the Human Service field, and Business and Media field. They all took pre-reading tests and based on their proficiency levels, they were categorized into either low or high proficiency groups. Six students were excluded from the analysis as they did not take the pre- or post-tests nor did they fill out the questionnaires. In total, there were thirty-nine students in the low proficiency group (group one) and forty-two students in the high proficiency group (group two), as shown in Table 1. The gender distribution was similar in the low proficiency group, while there were more female students than male students in the high proficiency group.

Table 1. Demographic information

Group	Mode	Field	Female	Male	Number
1	Low Proficiency Level	AI & SW, Convergence Engineering Human Service, Business & Media	19	20	39
2	High Proficiency	AI & SW, Convergence Engineering	25	17	42

	Level	Human Service, Business & Media			

A pre-questionnaire was carried out to gather basic information about the student's learning background. In terms of their experience living in English-speaking countries, one student from the low proficiency group reported spending less than three months in the United States of America. As for the four English skills (reading, listening, speaking, and writing), the majority of the students from both groups commented that reading and listening skills were easier compared to other skills. Additionally, the students were asked to identify the aspects they found challenging when comprehending English texts, and they were provided with four options: vocabulary and expression, grammar and organization, main gist, and background information. Twenty-eight students from both groups pointed out that grammar and organization was the most challenging aspect. The second most difficult part was the 'vocabulary and expressions' chosen by ten students from both groups.

Table 2. Experience of using machine translators

		Low (Group 1)	High (Group 2)
Used Machine Translators Before	Yes	37	40
	No	2	2
Preferred Machine translator	Papago	36	40
	Google Translate	3	2
Direction of Translation	English to Korean	33	37
	Korean to English	6	5
Specific Use of Machine Translators	Search everyday expressions & vocabulary	8	8
	Check grammar & organization	6	9
	Pronunciation	3	2
	Spelling	2	0
	Definition of vocabulary or expression	11	10
	Translation	9	12
	Writing	0	1
	Total	39	42

Based on the data presented in Table 2, the majority of students from both groups

had previous experience using machine translators when comprehending English passages, with only two students from each group not having used them. Among those who utilized machine translators, most preferred Papago over Google Translate. Moreover, thirty students from the low proficiency group and thirty-seven from the high proficiency group primarily used them to translate English to Korean rather than the reverse. The questionnaire also inquired why students used machine translators, and their responses indicated that they commonly employed them for everyday expressions, vocabulary, and grammar checks, as well as for translation purposes.

3.2 Teaching procedures and instruments

The Essential English classes held during the spring semester of 2023 were compulsory and primarily focused on improving students' reading skills. The main goal of these classes was to elevate their reading comprehension abilities. At the start of the semester, every student underwent a reading comprehension test within the offline class session. Throughout the first half of the semester, students studied four different reading passages, and in the second half, they worked with additional four reading passages. The reading test questions were from those readings. From the initial set of four reading passages, the instructor carefully selected half of the texts from each reading and devised five multiple-choice reading comprehension questions. This resulted in a total of twenty questions, and students were given twenty minutes to complete the test. Before proceeding to the main experiment involving machine translators, the participants were asked to fill out a pre-questionnaire about their background and prior experience with machine translators. The questionnaire was conveniently administered through Google Forms during the class sessions.

Throughout the semester, students attended two 75-minute Essential English classes per week. Each reading class was structured into three distinct phases: pre-reading, main-reading, and post-reading. These phases spanned three to four class periods in total depending on the reading material. Usually, the main-reading phase took two class periods. Over the course of the semester, the students were exposed to a total of eight readings from Reading Explorer 3. The topics of these readings varied widely, covering subjects such as sports, skin markings, volcanoes, caffeine, energy solutions, drones, the human brain, and van Gogh. Reading Explorer 3 corresponds to the B2 level of CEFR

(Common European Framework of Reference). The length of each reading varied, but they generally ranged from approximately 600 to 700 words in length.

In both groups, the pre-reading phase followed the same procedures. Students engaged in various activities aimed at enhancing their understanding and preparation for the main-reading phase. During the main-reading phase, students were encouraged to employ machine translators to aid in comprehending the reading passages. However, it was acknowledged that even with the advancements in machine translation technology compared to the previous year, these translators were not flawless and could still make errors. Some machine translations might be awkward or even incorrect. As part of the learning process, students were tasked with reviewing the machine-generated translations and identifying any mistakes or inaccuracies. If they came across any errors in the Korean translations provided by either Papago or Google Translate, they were expected to discuss these findings within their groups and collaborate to make necessary revisions. That is, as suggested in the literature by Allen (2003) and Pym (2011), they were supposed to go through a post-editing process. This reading task aimed to sharpen their critical thinking skills and also improve their understanding of the reading material by actively engaging with the translations and correcting any inaccuracies they encountered.

After working on their respective reading passages, students from both groups were required to give presentations on the content they had worked on using machine translators. These presentations had to be documented on the Learning Management System (LMS), where they could include machine-translated versions, students' versions, or the revised versions they had collaborated on. Once students completed their work on comprehending the reading passages, the instructor would go through the reading material with detailed explanations, emphasizing complex sentences and expressions, difficult contexts, and inferred meanings. While listening to the instructor's explanations, students would once again verify whether their comprehension of the English text using machine translators was accurate or not. In the post-reading phase, the primary focus shifted towards summarizing the reading passages and working on textbook-based questions related to the readings. This phase aimed to reinforce their understanding of the material and ensure a thorough grasp of the content covered during the class.

Both groups of students followed identical methods of the three reading phases: pre-reading, main-reading, and post-reading for the first four readings. Once they completed these phases for four readings, the students took a post-test for reading comprehension, which occurred just before the mid-term exam. The post-test utilized the

same format as the pre-reading tests, featuring twenty questions. Following the post-reading tests, the students were administered a post-questionnaire that mirrored the pre-questionnaire. The aim of the post-questionnaire was to collect feedback and insights from the students regarding their experiences employing machine translators. This allowed the researchers to gain valuable perspectives from the students, which could further inform and enrich the study's findings.

3.3 Analysis

The pre-and post-tests, along with the pre-and post-questionnaires, were collected and subjected to analysis using SPSS 20.0. Paired sample *t*-tests were conducted to compare the improvement within each proficiency group between the pre-and post-reading tests.

Before implementing the experimental intervention, the pre-tests for reading were administered, and the results revealed significant differences between the two groups. As a result, a one-way analysis of covariance (ANCOVA) was employed to examine the effects of using machine translators on reading comprehension across the two different proficiency levels. The reading tests consisted of twenty questions, with each question carrying five points, resulting in a maximum score of one hundred points for the entire test. This scoring system allowed for a comprehensive evaluation of the student's performance and progress in reading comprehension throughout the study.

The questionnaires used in the study were adapted from previous research by Kim and Cha (2020, 2023) and comprised two sections, each consisting of eight close-ended items. The first section focused on measuring students' attitudes toward using machine translators, while the second section assessed the perceived usefulness of machine translators. To explore potential differences between the two proficiency levels, independent *t*-tests were conducted on the questionnaire responses. The six-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = agree, 6 = strongly agree) was used for the close-ended items in this questionnaire. Additionally, students were asked to respond to two open-ended questions, in which they were encouraged to share their thoughts on the benefits and drawbacks of using machine translators. These responses were carefully categorized and analyzed to gain deeper insights into the students' perspectives.

4. Results and discussion

4.1 Post-editing of machine translators by proficiency levels on reading performance

The purpose of this study was to examine whether the use of machine translators could enhance students' reading comprehension. The first research question explored any improvements in reading scores between the pre- and post-tests. Table 3 shows the results of the pre-and post-reading scores for the low proficiency group. The mean score on the pre-reading test was 26.92 (*SD* = 8.63) while the mean score on the post-reading test was 44.74 (*SD* = 13.81). A statistically significant difference was observed in the reading scores (t = -9.48, $p < .01$). The significant difference in reading scores suggests that employing machine translators during the main-reading activities had a notable impact on the low proficiency group's reading comprehension abilities.

Table 3. Result of pre & post tests (low proficiency group)

		M	*SD*	*t*	*p*
Reading	Pre	26.92	8.63	-9.48	.00**
	Post	44.74	13.81		

**$p < .01$

Regarding the high proficiency group, Table 4 displays the results of the pre-and post-reading scores. The mean score on the pre-reading test was 53.69 (*SD* = 11.48) while the mean score on the post-reading test increased to 74.29 (*SD* = 11.48). Notably, a statistically significant difference was found in the reading scores (t = -10.47, $p < .01$). The significant improvement in reading scores for the high proficiency group indicates that utilizing machine translators during the reading exercises had a substantial positive impact on their reading comprehension abilities. This finding further supports the notion that machine translators can be beneficial in enhancing reading comprehension (Rushwan 2017; Tsai and Liao 2021; Oh 2022), even for students who already possess a higher proficiency level in English.

Table 4. Result of pre & post tests (high proficiency group)

		M	*SD*	*t*	*p*
Reading	pre	53.69	11.48	-10.47	.00**
	post	74.29	11.48		

**$p < .01$

Tables 5 and 6 both display the results of an ANCOVA (Analysis of Covariance) conducted on the post-reading test. The purpose of this ANCOVA was to investigate whether there are any significant differences in mean scores between the two proficiency levels within the group. Table 5 presents the mean and adjusted mean scores of both levels on the post-reading test. The adjusted mean scores were 54.99[a] in the low proficiency group and 64.77[a] in the high proficiency group.

Table 5. Result of post-reading test (low vs. high proficiency groups)

	Group	M	SD	Adjusted-Mean	SE
Reading	Low	44.74	13.81	54.99[a]	2.67
	High	74.29	14.46	64.77[a]	2.53

Covariates appearing in the model are evaluated at the following values: Pre-test = 41.11.

Table 6. Result of ANCOVA of post-reading test by groups

Source	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*
Corrected Model	22138.22a	2	11069.11	76.16	.00
Intercept	4221.48	1	4221.48	29.05	.00
Pre-test	4489.54	1	4489.54	30.89	.00
Proficiency	700.39	1	700.39	4.82	.03*
Error	11336.47	78	145.34		
Total	325675.00	81			
Corrected Total	33474.69	80			

a. R Squared = .661 (Adjusted R Squared = .653) *$p < .05$

Table 6 demonstrates that the difference in mean scores between the two proficiency levels was statistically significant, as shown by the ANCOVA results ($F = 4.82$, $p = .03$). This finding implies that there is strong evidence to suggest that the mean scores of the two proficiency levels differ significantly from each other. In other words, the

performance on the post-reading test was notably different between the low proficiency group and the high proficiency group. Therefore, the finding suggests that the student's English proficiency level has a significant impact on their performance in the post-reading test, even after using machine translators.

Contrary to Tsai (2022), where the use of MT bridged the gap in writing proficiency between lower and higher proficiency level students, the current study showed that students with a higher proficiency group improved more than those with lower proficiency. Kliffer (2005) and Chung (2020) support that students who engaged in MT post-editing reduced their errors, but there were differences between lower and higher proficiency students. As a result, the current study indicates that post-editing was somewhat more beneficial for students with higher proficiency, although it did not extensively analyze the specific post-editing errors.

4.2 Post-editing students' perspectives on machine translators in English reading

4.2.1 Questionnaire (Close-ended)

Regarding the last research question, pre- and post-questionnaires were conducted to investigate students' perspectives on utilizing machine translators during English reading classes. Participants from both groups completed pre-questionnaires at the beginning of the semester and post-questionnaires just before the mid-term exam, enabling us to assess their inclinations toward employing the tool for comprehending reading passages. The questionnaire consisted of two distinct parts, with each section containing eight items. One part explored the participants' attitudes, while the other gauged the perceived usefulness of machine translators.

Table 7 shows the findings of the pre-questionnaire for the students' attitudes between low proficiency groups and high proficiency groups when employing machine translators for comprehending reading passages. The mean score of the first item, "Using a machine translator for English reading is convenient," was 4.72 (*SD* = 1.02) in the low proficiency group and 4.74 (*SD* = 0.88) in the high proficiency group. For the second item, "Using a machine translator for English reading helps learn English," the mean score of the low proficiency group was 4.54 (*SD* = 0.85), and that of the high proficiency group was 4.43 (*SD* = 1.08). As for the third item, "Using a machine translator for English reading

increases my interest in studying English," the mean score of the low proficiency group was 4.15 (*SD* = 1.16), and that of the high proficiency group was 4.00 (*SD* = 1.25). Regarding the fourth item, "Using a machine translator for English reading builds confidence in reading comprehension," the mean score of the low proficiency group was 4.21 (*SD* = 1.05), while that of the high proficiency group was 4.38 (*SD* = 1.08). The mean score of the fifth item, "Using a machine translator for English reading helps alleviate any sense of burden," was 5.02 (*SD* = 0.78) in the low proficiency group and 5.07 (*SD* = 0.74) in the high proficiency group. The sixth item, "I actively participate in class activities when using a machine translator for English reading," had a mean score of 4.54 (*SD* = 1.02) in the low proficiency group and 4.45 (*SD* = 0.97) in the high proficiency group. The mean score of the seventh item, "I become a self-directed learner when using a machine translator for English reading," was 4.43 (*SD* = 0.99) in the low proficiency group and 4.05 (*SD* = 1.15) in the high proficiency group. As for the last item, "I become dependent on a machine translator when using it for English reading," the mean score of the low proficiency group was 4.23 (*SD* = 1.11), and that of the high proficiency group was 4.02 (*SD* = 1.14). Since the last item was a negative statement, it has been coded in reverse.

Table 7. Pre-questionnaire: Attitude for machine translators (low vs. high proficiency group)

Attitude		*M*	*SD*	*t*	*p*
1. Using a machine translator for English reading is convenient.	Low	4.72	1.02	-.09	.92
	High	4.74	0.88		
2. Using a machine translator for English reading helps learn English.	Low	4.54	0.85	.50	.61
	High	4.43	1.08		
3. Using a machine translator for English reading increases my interest in studying English.	Low	4.15	1.16	.57	.57
	High	4.00	1.25		
4. Using a machine translator for English reading builds confidence in reading comprehension.	Low	4.21	1.05	-.74	.46
	High	4.38	1.08		
5. Using a machine translator for English reading helps alleviate any sense of burden.	Low	5.02	0.78	-.27	.79
	High	5.07	0.74		
6. I actively participate in class activities when using a machine translator for English reading.	Low	4.54	1.02	.39	.70
	High	4.45	0.97		
7. I become a self-directed learner when using a	Low	4.43	0.99	1.62	.11

machine translator for English reading.	High	4.05	1.15		
* 8. I become dependent on a machine translator when using it for English reading.	Low	4.23	1.11	.83	.41
	High	4.02	1.14		

* negative statement

Overall, the results presented in Table 7 indicate that no statistically significant differences were found in all the items for both groups. At the beginning of the semester, even though they might not have had much experience using machine translators in reading classes, students had high expectations of the potential benefits in terms of increasing reading competence. The scores for all items demonstrated that students held a positive attitude toward using machine translators for reading comprehension. It is worth noting that item 5, "Using a machine translator for English reading helps alleviate any sense of burden," received the highest score in both groups. This suggests that reducing the burden of comprehending texts on their own might have been a crucial factor in boosting confidence in reading comprehension. The second highest score was item 1, "Using a machine translator for English reading is convenient," for both groups as well. As described in the responses for the advantages in the open-ended questionnaires, the convenience of using machine translators has significantly improved due to advancements in technology compared to previous years.

In short, it is essential for educators and students to remain aware of potential limitations and consider the appropriate integration of these tools to ensure a balanced approach to language learning. As technology continues to advance, machine translators can offer valuable assistance, but fostering students' language skills and critical thinking remains crucial for achieving meaningful language proficiency.

Table 8. Pre-questionnaire: Usefulness for machine translators (low vs. high proficiency group)

Usefulness		*M*	*SD*	*t*	*p*
1. Using a machine translator for English reading facilitates learning sentence structure.	Low	4.28	1.10	.09	.93
	High	4.26	0.91		
2. Using a machine translator for English reading assists in learning grammar.	Low	4.08	1.22	.37	.71
	High	3.98	1.24		
3. Using a machine translator for English reading helps with learning new vocabulary and improving expression.	Low	4.74	0.96	.68	.50
	High	4.60	0.99		

4. Using a machine translator for English reading helps improve reading comprehension.	Low	4.79	0.89	.36	.72
	High	4.71	1.09		
5. Using a machine translator for English reading ensures accurate comprehension.	Low	3.84	1.06	-.26	.80
	High	3.90	0.98		
6. Using a machine translator for English reading makes me translate quickly.	Low	4.67	0.95	.32	.75
	High	4.60	1.06		
7. Using a machine translator for English reading helps me check where I make mistakes.	Low	4.56	0.99	-1.10	.28
	High	4.81	1.02		
8. Using a machine translator for English reading makes it easier for me to understand the context.	Low	4.59	0.85	-1.06	.29
	High	4.79	0.81		

Table 8 demonstrates the results of the pre-questionnaire on the usefulness of utilizing machine translators for reading comprehension for both proficiency groups. Regarding the first item, “Using a machine translator for English reading facilitates learning sentence structure,” participants in the low proficiency group had a mean score of 4.28 (*SD* = 1.10) and 4.26 (*SD* = 0.91) in the high proficiency group. For the second item, “Using a machine translator for English reading assists in learning grammar,” the mean score in the low proficiency group was 4.08 (*SD* = 1.22), and in the high proficiency group, it was 3.98 (*SD* = 1.24). Moving on to the third item, “Using a machine translator for English reading helps with learning new vocabulary and improving expression,” participants scored 4.74 (*SD* = 0.96) in the low proficiency group and 4.60 (*SD* = 0.99) in the high proficiency group. Concerning the fourth item, “Using a machine translator for English reading helps improve reading comprehension,” the mean score of the low proficiency group was 4.79 (*SD* = 0.89), and that of the high proficiency group was 4.71 (*SD* = 1.09).

The fifth item, “Using a machine translator for English reading ensures accurate comprehension,” received a mean score of 3.84 (*SD* = 1.06) in the low proficiency group and 3.90 (*SD* = 0.98) in the high proficiency group. For the sixth item, “Using a machine translator for English reading makes me translate quickly,” the mean score of the low proficiency group was 4.67 (*SD* = 0.95), and that of the high proficiency group was 4.60 (*SD* = 1.06). The mean score of the seventh item, “Using a machine translator for English reading helps me check where I make mistakes,” was 4.56 (*SD* = 0.99) in the low proficiency group and 4.81 (*SD* = 1.02) in the high proficiency group. Regarding the last

item, “Using a machine translator for English reading makes it easier for me to understand the context,” the mean score of the low proficiency group was 4.59 (*SD* = 0.85), while that of the high proficiency group was 4.79 (*SD* = 0.81).

The findings in Table 8 revealed that there were no significant differences in all the items. Similarly, students’ attitudes toward employing machine translators were influenced by their limited understanding of how the machine-translated version could impact their reading comprehension in actual reading classes. Notably, item 5, “Using a machine translator for English reading ensures accurate comprehension,” and item 3, “Using a machine translator for English reading assists in learning grammar (*M* = 3.98),” for the high proficiency group, scored below 4.00. However, the overall mean scores for other items were above 4.00, indicating positive expectations regarding the use of machine translators. It appears that students anticipate these tools to be beneficial in enhancing their language learning experience.

Table 9. Post-questionnaire: Attitude for machine translators (low vs. high proficiency group)

Attitude		*M*	*SD*	*t*	*p*
1. Using a machine translator for English reading is convenient.	Low	5.02	0.93	.66	.51
	High	4.88	1.04		
2. Using a machine translator for English reading helps learn English.	Low	4.72	0.86	1.32	.19
	High	4.45	0.94		
3. Using a machine translator for English reading increases my interest in studying English.	Low	4.33	1.22	1.14	.26
	High	4.05	1.03		
4. Using a machine translator for English reading builds confidence in reading comprehension.	Low	4.61	0.96	-.23	.82
	High	4.67	1.03		
5. Using a machine translator for English reading helps alleviate any sense of burden.	Low	5.23	0.93	.65	.51
	High	5.09	0.93		
6. I actively participate in class activities when using a machine translator for English reading.	Low	4.74	0.96	.14	.89
	High	4.71	0.89		
7. I become a self-directed learner when using a machine translator for English reading.	Low	4.51	0.94	1.46	.15
	High	4.17	1.17		
*8. I become dependent on a machine translator when using it for English reading.	Low	4.23	1.09	.87	.38
	High	4.02	1.05		

* negative statement

Table 9 presents the results of the post-questionnaire, which aimed to compare the attitudes of students in low proficiency groups and high proficiency groups when using machine translators for comprehending reading passages. For the first item, “Using a machine translator for English reading is convenient,” the mean score was 5.02 (*SD* = 0.93) in the low proficiency group and 4.88 (*SD* = 1.04) in the high proficiency group. Regarding the second item, “Using a machine translator for English reading helps learn English,” the mean score for the low proficiency group was 4.72 (*SD* = 0.86), while for the high proficiency group, it was 4.45 (*SD* = 0.94). As for the third item, “Using a machine translator for English reading increases my interest in studying English,” the mean score for the low proficiency group was 4.33 (*SD* = 1.22), and for the high proficiency group, it was 4.05 (*SD* = 1.03). Moving on to the fourth item, “Using a machine translator for English reading builds confidence in reading comprehension,” the mean score of the low proficiency group was 4.61 (*SD* = 0.96), while that of the high proficiency group was 4.67 (*SD* = 1.03). The mean score for the fifth item, “Using a machine translator for English reading helps alleviate any sense of burden,” was 5.23 (*SD* = 0.93) in the low proficiency group and 5.09 (*SD* = 0.93) in the high proficiency group. For the sixth item, “I actively participate in class activities when using a machine translator for English reading,” the mean score of 4.74 (*SD* = 0.96) in the low proficiency group and 4.71 (*SD* = 0.89) in the high proficiency group. As for the seventh item, “I become a self-directed learner when using a machine translator for English reading,” the mean score of the proficiency group was 4.51 (*SD* = 0.94) and that of the high proficiency group was 4.17 (*SD* = 1.17). Lastly, for the negative statement, “I become dependent on a machine translator when using it for English reading,” the mean score in the low proficiency group was 4.23 (*SD* = 1.09), and in the high proficiency group, it was 4.02 (*SD* = 1.05). Please note that this last item has been coded in reverse due to its negative nature.

Compared to the results of the pre-questionnaire for the low proficiency group, the mean scores for all items increased except for the last item 8, “I become dependent on a machine translator when using it for English reading.” Moreover, items 1 and 5 scored over 5.00, indicating a higher level of agreement with the statements “reducing the burden of translating the reading content” (*M* = 5.23), and “convenience of using machine translators” (*M* = 5.02). These high scores might have influenced the higher scores in item 2 (*M* = 4.72) for facilitating learning English and item 6 (*M* = 4.74) for active participation in class activities.

On the other hand, for the high proficiency group, only item 5 scored above 5.00 (M = 5.09), while the second-highest score was for item 1 (M = 4.88), representing the convenience of machine translators, followed by item 6 (M = 4.71) for active participation. Both groups displayed similar patterns in their responses. However, the mean scores for all items in the low proficiency group were higher than those of the high proficiency group, indicating greater positivity towards using machine translators among students with lower proficiency levels.

Table 10. Post-questionnaire: Usefulness for machine translators (low vs. high proficiency group)

Usefulness		*M*	*SD*	*t*	*p*
1. Using a machine translator for English reading facilitates learning sentence structure.	Low	4.41	1.02	-.61	.54
	High	4.55	0.99		
2. Using a machine translator for English reading assists in learning grammar.	Low	4.10	0.99	.52	.60
	High	3.98	1.18		
3. Using a machine translator for English reading helps with learning new vocabulary and improving expression.	Low	4.92	0.90	.33	.74
	High	4.86	0.87		
4. Using a machine translator for English reading helps improve reading comprehension.	Low	5.13	0.66	1.38	.17
	High	4.86	1.05		
5. Using a machine translator for English reading ensures accurate comprehension.	Low	4.28	0.97	.29	.77
	High	4.21	1.09		
6. Using a machine translator for English reading makes me translate quickly.	Low	5.26	0.85	1.28	.20
	High	5.02	0.78		
7. Using a machine translator for English reading helps me check where I make mistakes.	Low	4.82	0.82	-.72	.47
	High	4.95	0.82		
8. Using a machine translator for English reading makes it easier for me to understand the context.	Low	5.08	0.74	.44	.66
	High	5.00	0.83		

Table 10 displays the results of the post-questionnaire on the usefulness of employing machine translators for reading comprehension for both proficiency groups. Regarding the first item, “Using a machine translator for English reading facilitates learning sentence structure,” participants in the low proficiency group had a mean score of 4.41 (SD = 1.02) and 4.55 (SD = 0.99) in the high proficiency group. As for the second item, “Using a machine translator for English reading assists in learning grammar,” the mean score was

4.10 (*SD* = 0.99) in the low proficiency group, and 3.98 (*SD* = 1.18) in the high proficiency group. Concerning the third item, "Using a machine translator for English reading helps with learning new vocabulary and improving expression," the mean score of the low proficiency group was 4.92 (*SD* = 0.90), and that of the high proficiency group was 4.86 (*SD* = 0.87). For the fourth item, "Using a machine translator for English reading helps with learning new vocabulary and improving expression," the mean score of the low proficiency group was 5.13 (*SD* = 0.66), and that of the high proficiency group was 4.86 (*SD* = 1.05). Moving on to the fifth item, "Using a machine translator for English reading ensures accurate comprehension," participants scored 4.28 (*SD* = 0.97) in the low proficiency group and 4.21 (*SD* = 1.09) in the high proficiency group. The mean score of the sixth item, "Using a machine translator for English reading makes me translate quickly," was 5.26 (*SD* = 0.85) in the low proficiency group and 5.02 (*SD* = 0.78) in the high proficiency group. As for the seventh item, "Using a machine translator for English reading helps me check where I make mistakes," the mean score was 4.82 (*SD* = 0.82) in the low proficiency group, and 4.95 (*SD* = 0.82) in the high proficiency group. Regarding the last item, "Using a machine translator for English reading makes it easier for me to understand the context," the mean score of the low proficiency group was 5.08 (*SD* = 0.74), while that of the high proficiency group was 5.00 (*SD* = 0.83).

The findings of the post-questionnaire for the low proficiency group revealed an increase in mean scores for all items. Particularly noteworthy were the high scores for items 4, "improving reading comprehension" (*M* = 5.13), item 6, "quick translation" (*M* = 5.26), and item 8, "making it easier to understand" (*M* = 5.08), all of which scored above 5.00. Machine translators were found to be beneficial for learning vocabulary (item 3, *M* = 4.92) and identifying mistakes in their translations (item 7, *M* = 4.82). However, the lowest mean score was for (*M* = 4.10), "Using a machine translator for English reading assists in learning grammar." This could be attributed to translations being self-explanatory, instantly providing translations into students' native language without grammatical analysis of sentence components. Overall, the reason for the higher average scores in the low proficiency group appears to be that they rely more on and receive more assistance from using machine translators.

As for the high proficiency group, there was an overall increase in mean scores for all items, except for item 2, "learning grammar" (M = 3.98), which maintained the same score. Item 6, "quick translation" (M = 5.02), received the highest score, followed by

item 8, "making it easier to understand" (M = 5.00), and item 7 (M = 4.95), “figuring out how they made mistakes.” These results suggest that machine translators were perceived as valuable aids in various aspects of language learning by the high proficiency group.

The study highlights the advantages of integrating machine translators into L2 reading classes. The students have a positive perspective of using machine translators for English reading, as it aids in learning sentence structure, grammar, vocabulary, and expression. It also improves reading comprehension, ensures accurate comprehension, allows for quick translation, helps in error checking, and facilitates understanding the context of the text.

Ultimately, the research emphasizes the benefits of incorporating MT into foreign language learning. The research findings demonstrated the advantages of integrating these tools into foreign language learning (Garcia and Pena 2011; O'Neil 2019). Moreover, the study further supports the positive effects of including translation in language learning, as it enhances reading comprehension, grammar skills, and expression (Bagheri and Fazel 2011; Karnal and Pereira 2015).

4.2.2 Questionnaire (Open-ended)

To investigate how students’ perspectives on machine translation change when using machine translators during the reading tasks, the results from two open-ended questions regarding the advantages and disadvantages were demonstrated. All students from both groups responded to the two questions, the results of the advantages for both low and high proficiency groups are shown in Tables 11 and 12, respectively. Students’ responses were categorized and presented using frequency and percentage.

Table 11 presents the benefits of machine translators for the low proficiency group. Among the participants, thirteen students (33%) expressed that machine translators greatly aided them in better comprehending the reading content. Specifically, the machine translators proved to be particularly helpful when they encountered parts they were uncertain about. For eight students (21%), using machine translators allowed them to quickly analyze sentence structures and grasp sentence meanings efficiently. Six students (15%) mentioned the convenience of machine translators, as they could easily translate the reading passages. Additionally, five students (13%) found machine translators to be beneficial for vocabulary learning. One student mentioned that machine translators

assisted them in participating and preparing for class, as they could effectively find words and even improve grammar. Four students (10%) reported that machine translators helped them enhance their writing skills and accurately understand word pronunciation. Lastly, three students (8%) pointed out that machine translators provided precise translations, which significantly contributed to better comprehension of the reading passages. Furthermore, the machine translators surpassed students' initial expectations by generating superior translations.

Table 11. Benefits of machine translators (low proficiency group)

No.	Response	N	%
1	Help with understanding the content - I can figure out the parts that I don't know. - It is possible to comprehend the content to some extent.	13	33
2	Quick comprehension - I can quickly analyze sentences. - I can understand the content quickly.	8	21
3	Convenience - It is convenient. - I can easily translate reading passages.	6	15
4	Help with learning vocabulary - I can find out the meanings of unknown words. - It's helpful for regular class participation and preparation because I can effectively find words and grammar.	5	13
5	Help with learning composition, pronunciation, and translation - It helps with writing. - I can accurately find out English pronunciation.	4	10
6	Accurate translation - I can accurately translate reading passages. - I can confirm a more precise and better translation than what I had initially thought.	3	8
Total		39	100

Table 12 demonstrates the benefits of machine translators for the high proficiency group, which yielded findings similar to those of the low proficiency group. Among the 42 participants, fourteen students (34%) expressed that machine translators helped them with understanding the general context of the reading content. They found that without the assistance of machine translators, comprehending the content could be challenging. Eleven students (26%) reflected that machine translators were particularly helpful in learning unfamiliar words and uncovering multiple meanings of a word. Moreover, eight

students (19%) noticed that using machine translators allowed them to quickly grasp the overall content of the reading passages, facilitating their understanding. Three students (7%) observed that machine translators provided convenience and significantly eased the process of reading comprehension, which otherwise would have taken them much more time. Another three students (7%) pointed out that machine translators contributed to improving English composition skills, enhancing word pronunciation comprehension, and enabling better translation. One student even mentioned that machine translators helped them identify errors in their translations, enabling them to revise incorrect parts of the sentences effectively. Finally, three students (7%) commented on the accurate translations provided by the machine translators, which helped them obtain sentences with high precision. Moreover, when students faced difficulties in translation due to word order issues, machine translators analyzed the sentences, enabling students to learn from their mistakes and understand why they were encountering problems.

Table 12. Benefits of machine translators (high proficiency group)

No.	Response	N	%
1	Help with understanding the content - I can translate sentences otherwise understanding word meanings or paragraph translations becomes difficult. - I can understand the general context of the sentence, even vaguely.	14	34
2	Help with learning vocabulary - I can instantly know unfamiliar words. - I can find out multiple meanings of a word.	11	26
3	Quick comprehension - I can quickly understand the content. - It's easy to grasp the content quickly.	8	19
4	Convenience - It is convenient. - Reading comprehension becomes easier.	3	7
5	Help with learning composition, pronunciation, and translation - I can understand how my translation is incorrect. - It helps revise any possible mistakes.	3	7
6	Accurate translation - I can easily obtain sentences with high accuracy. - Word order plays an essential role in conveying meaning in English. Often, I encounter difficulties in translation because of that. However, machine translators explain this well.	3	7

Total	42	100

These advantages shed valuable light on the benefits of machine translators for both the low and high proficiency groups of students. It is evident that a significant portion of the participants found these AI-powered tools to be highly advantageous in enhancing their reading comprehension. Also, the results indicated the positive impact of machine translators in aiding their comprehension process. Additionally, the ability of machine translators to assist in vocabulary learning suggests their potential as valuable language learning aids. The comments from the participants regarding improved writing skills and accurate pronunciation understanding further reinforce the potential benefits of incorporating machine translators in language learning environments. It is worth noting that some students also emphasized the precision of the translations provided by these tools, which contributed to a better overall comprehension of the reading material. However, it is important to consider the limitations and drawbacks, as identified in the study, to ensure a balanced and informed approach to integrating these tools into educational settings.

These findings provide partial support to the earlier research conducted by Bahri and Mahadi (2016), which showed that incorporating Google Translate (GT) in the language learning process contributes to establishing a comfortable and secure environment for learners. The integration of GT as a machine translation tool in foreign language learning has been found to enhance students' analytical skills and language proficiency (Valijärvi and Tarsoly 2019).

The second question in the open-ended questionnaire focused on the drawbacks of using machine translators. In addition to their benefits, it is important to acknowledge that machine translators also have certain disadvantages. Table 13 and 14 display the drawbacks of machine translators for the low and high proficiency group, respectively. Regarding the low proficiency group, Table 13 shows their perspectives on the drawbacks of using machine translators.

Table 13. Drawbacks of machine translators (low proficiency group)

No.	Response	N	%
1	Using machine translators excessively can reduce learning ability. - Learning ability decreases as dependence increases. - I think I could rely too much on the machine translators,	17	43

	and it may make writing on my own more challenging.		
2	Translation errors / Low translation accuracy - It is not accurate. - There are some errors.	13	33
3	Translation that doesn't match the context - Sometimes the sentences are awkward. - There are times when the context doesn't match.	5	13
4	Nothing	3	8
5	Miscellaneous - I can quickly translate, but it doesn't stay in my mind.	1	3
Total		39	100

Seventeen students (43%) acknowledged that excessive use of machine translators could lead to over-reliance, causing them to lose interest in comprehending the reading passages on their own. Thirteen students (33%) pointed out encountering errors in the translations, resulting in reduced translation accuracy. Additionally, a smaller group, comprising less than 30% of the students, noted that at times, the translations felt awkward and did not align well with the context of the reading passages (5 students, 13%). Three students (8%) mentioned that machine translators were so helpful that they couldn't identify any drawbacks associated with them. Lastly, one student (3%) expressed appreciation for the time saved in translating content but raised concerns that due to the machine translators doing the job for them, the translated content might be easily forgotten. These valuable insights provided by the participants shed light on the limitations and potential negative consequences of relying heavily on machine translators.

Table 14. Drawbacks of machine translators (high proficiency group)

No.	Response	N	%
1	Using machine translators excessively can reduce learning ability. - I rely too much on the machine translators. - Excessive reliance on machine translators can lead to a decline in practical reading comprehension ability.	22	52
2	Translation errors / Low translation accuracy - It can be translated with an inaccurate meaning. - There are occasional translation errors.	10	24
3	Translation that doesn't match the context - Many times, it is translated differently from the original meaning. - There is a discrepancy between the translated sentence and the actual sentence.	7	17

4	Nothing	2	5
5	Miscellaneous - If there are errors in grammar or vocabulary, I can't find them.	1	2
Total		42	100

Table 14 illustrates the drawbacks of machine translators for the high proficiency group, with results that closely resembled those of the low proficiency group. More than half of the students (52%) admitted that excessive reliance on machine translators could lead to a reduction in their practical reading comprehension ability. Ten students (24%) indicated that there were occasional translation errors. Additionally, seven students (17%) expressed concerns about sentences being translated differently from their original meaning. In other words, these students were able to identify discrepancies between the translated sentences and the actual content. On the other hand, two students mentioned that they perceived no disadvantages associated with machine translators. Lastly, one student acknowledged that identifying grammar or vocabulary errors in the translations could be challenging.

The findings from both groups have revealed various concerns raised by students regarding the drawbacks of using machine translators. One prominent issue is the occurrence of translation errors, which can lead to inaccuracies and mistakes. This poses a challenge as it may hinder the goal of enhancing English skills. Improper use of translation tools can indeed impede progress in English proficiency. Moreover, students emphasized that depending too much on these tools may prove ineffective in enhancing their second language (L2) proficiency, aligning with previous research findings (Karnal and Pereira 2015; Hoi 2020).

Overall, these findings emphasize the importance of promoting critical thinking and discernment among students when utilizing machine translators as valuable language learning aids. By being aware of both the benefits and drawbacks, educators can guide students in making more informed decisions on integrating these tools effectively in the future.

5. Conclusion

This study aimed to explore the influence of post-editing when using Machine

Translation (MT) in reading classes on students' performance and perspectives at different proficiency levels. The research encompassed two main questions: firstly, it sought to examine the impact of post-editing Machine Translation (MT) in reading classes on learners with different levels of English proficiency. Secondly, it aimed to investigate how the English language proficiency level of learners influences their attitudes and perspectives regarding the integration and utilization of MT in English reading classes.

To address the first research question, an examination of the pre-and post-reading test scores for both the low and high proficiency groups was conducted. The analysis revealed a noteworthy enhancement in reading comprehension among the low proficiency group. Likewise, the high proficiency group demonstrated significant progress, corroborating the notion that proficient learners can also derive benefits from machine translators in augmenting their reading comprehension abilities. In line with the arguments presented by Chung (2020) and Kliffer (2005), post-editing machine translation proved beneficial for error reduction across all proficiency levels. Additionally, the results showed a significant difference in mean scores between the low and high proficiency groups, indicating that English proficiency level significantly influences post-reading test outcomes when utilizing post-editing with machine translators. In general, higher proficiency students appear to derive more advantages from post-editing; however, specific errors encountered were not extensively analyzed within the scope of this study. The present study's findings deviate from those of Tsai (2022), who demonstrated machine translation's ability to bridge the writing proficiency gap. In contrast, the current research evidenced more pronounced enhancements among higher proficiency students in comparison to their lower proficiency counterparts. This outcome substantiates the claims made by Chung (2020) and Kliffer (2005), underscoring the significance of acknowledging the variations that arise between distinct proficiency groups.

The second research question in this study was addressed through the administration of pre- and post-questionnaire, aimed at investigating university students' perspectives of machine translators for English reading among students with varying proficiency levels. Derived from the analysis of the pre-questionnaire data, no statistically significant differences were observed in any of the items pertaining to attitudes and perceived usefulness between the two groups. Both groups exhibited predominantly favorable perspectives regarding the utilization of translation tools.

Following the experiment, when examining the attitudes of the low and high proficiency groups towards machine translators for reading, both groups recognized the

benefits, but the low proficiency group scored higher in most aspects. Notably, convenience and reduced workload received the highest ratings in both groups, leading to increased active class participation. Furthermore, the low proficiency group showed improved scores in all areas, except for reliance on the machine translator. On the other hand, the high proficiency group exhibited lower mean scores overall, indicating a relatively less positive perception of machine translators.

With regard to the perceived usefulness of Machine Translation (MT), the findings unveiled no significant disparity between the two groups after experiment. Both groups predominantly manifested positive opinions concerning the efficacy and utility of translation tools. Subsequently, after conducting the experiment and examining the attitudes of the low and high proficiency groups toward the usefulness of machine translators, it became evident that they recognized numerous advantages associated with the utilization of these tools. Particularly, the low proficiency group exhibited improvements across all items while the high proficiency group expressed satisfaction with machine translators' ability to facilitate quick translation and enhance context comprehension. However, the item pertaining to "learning grammar" obtained the lowest score, potentially due to the machine translators' limited grammatical analysis.

The present analysis focused on the responses obtained from open-ended questions that addressed the advantages and disadvantages of incorporating machine translators in language learning. These responses were meticulously categorized, leading to the following research findings. For the low proficiency group, approximately one-third of the participants expressed great appreciation for machine translators, highlighting their significant contribution to comprehending reading content. Additionally, machine translators were deemed helpful in analyzing sentence structures and offering convenience in translation. Notably, these tools surpassed initial expectations by providing precise translations. Similarly, the high proficiency group recognized the benefits of machine translators in understanding reading content, learning unfamiliar words, and quickly grasping the overall context. Moreover, machine translators were perceived as convenient and effective in improving composition skills, offering accurate translations, and aiding in error identification and correction during translation. Overall, the study underscored the valuable advantages of machine translators for both low and high proficiency groups, enhancing reading comprehension and supporting language learning endeavors. This finding aligns with previous research that has also corroborated the positive influence of machine translation tools on language proficiency (Bahri and Mahadi 2016; Valijärvi and

Tarsoly 2019).

As for the limitations of machine translators, the responses from the low proficiency group revealed concerns related to over-reliance, which led to reduced interest (43%), translation errors affecting accuracy (33%), and some participants finding translations awkward (13%). These insights highlight the potential limitations associated with excessive dependence on machine translators among lower-level students. On the other hand, the high proficiency group's responses concerning machine translator drawbacks were comparable to those of the low proficiency group. Excessive reliance on these tools was reported to reduce practical reading comprehension by 52%, occasional translation errors were acknowledged by 24% of the participants, and 17% noticed discrepancies in translated sentences. These findings underscore the importance of avoiding heavy reliance on machine translators, even among high proficiency students. Both groups expressed concerns about the drawbacks of machine translators, particularly concerning translation errors and the hindrance they may pose to language skill improvement. In light of these findings, promoting critical thinking among students becomes crucial for effective language learning when utilizing machine translation tools.

In summary, the study highlighted the considerable advantages of integrating post-editing with machine translators for learners across both low and high proficiency groups. The adoption of this approach was observed to enhance reading comprehension and fortify language learning endeavors, irrespective of students' proficiency levels. Moreover, higher proficiency students exhibited greater effectiveness in comparison to their lower proficiency counterparts. Additionally, the study demonstrated its capacity to elicit diverse viewpoints on machine learning in English reading among learners at various proficiency levels. It can be concluded that educators play a pivotal role in guiding students toward making informed decisions regarding the appropriate and discerning use of machine translation (Karnal and Pereira 2015; Hoi 2020).

The study possesses limitations that should not be generalized. Firstly, the study was conducted exclusively with one university student in Korea, and the sample size was relatively small, which might restrict the broader applicability of the results to a more diverse population. Secondly, the absence of error analysis on post-editing poses a challenge in pinpointing the specific areas where post-editing interventions occurred for each learner level. As a result, the full extent of the impact of post-editing on language learning remains less clear. To address these limitations, future studies can explore more extensive educational implications by conducting post-editing activities using machine

translators and subsequently investigating how students perceive and benefit from such interventions. More diverse and representative participants could also be considered to enhance the external validity of the research. Additionally, employing rigorous error analysis methodologies can offer valuable insights into the efficacy of post-editing interventions across different language proficiency levels and shed light on areas for potential improvement in language learning outcomes.

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