

**Machine Translation and Foreign Language Education:  
Advantages, Challenges, and Perceptions**

**Hitomi Shirahata**

## Contents

1. Introduction .....	31
2. Technological advancement in the language education .....	32
3. Integration of machine translation (MT) into educational field .....	32
3.1. History and the development of MT .....	32
3.2. MT in foreign language education .....	33
4. The actual conditions of MT in language learning and teaching .....	34
4.1. The actual use of MT and its effect on language learning .....	34
4.1.1. MT in L2 writing .....	34
4.1.2. MT in L2 reading .....	35
4.2. Learners' and teachers' perceptions of MT .....	36
4.2.1. How learners perceive the use of MT .....	36
4.2.2. Teachers' reactions for MT in language education .....	37
4.3. Impact of individual differences on the use of MT .....	38
4.4. Issues and concerns regarding the use of MT in foreign language education .....	39
5. Incorporation of Technology Acceptance Model (TAM) in MT research: Yang & Wang (2019) .....	40
6. Conclusion and implication for the future study .....	41
References .....	42

## 1. Introduction

In the context of rapidly evolving technology, the emergence of machine translation (hereafter, MT) has significantly impacted many aspects of our daily lives, particularly language education. Compared to other fields, the number of research in MT for foreign language education has gradually increased, and it is assumed that it will continue to attract more attention (Lee, 2023). It has been shown that the majority of learners frequently use MT in writing, mainly to look up words and short phrases (Briggs, 2018; Clifford et al., 2013; Jolley & Maimone, 2015; Niño, 2020). MT's features, such as its accessibility and immediate translations, can be useful for learning, but depending on how learners use MT, it might make them lazy and obscure the purpose of learning languages.

While learners recognize the limitations of MT, they consider MT to be a useful and beneficial aid to language learning (Briggs, 2018). Teachers, on the other hand, according to Clifford et al. (2013), oppose the use of MT by their students, but some of them acknowledged the pedagogical role of MT. This indicates that future research should shift towards how MT can be used effectively rather than exploring how MT affects language learning.

MT has increasingly become an integral part of the translation industry, and its use is gradually being recognized in English education (Gally, 2018). However, little research has been done about factors influencing learners' intention to adopt MT in their language learning process. Understanding these determinants would have a great effect on teachers seeking to effectively incorporate MT tools. Also, it could be speculated that the findings could be contributed to give the new idea for language teachers in Japan since the number of research in the Japanese context has rarely seen. Thus, this paper aims to clarify in what way MT might change language learning and teaching and find the gaps of MT studies by reviewing previous studies in order to give an insight for language education in Japan.

The Technology Acceptance Model (hereafter, TAM), a well-established model for predicting technology adoption and usage behavior, was introduced by Davis (1989). To better explain technology acceptance, Yang and Wang (2019) extended TAM by incorporating additional variables. Reflecting on what factors influence the use of technology through TAM may provide insights into the future implementation of MT by teachers and learners.

## **2. Technological advancement in the language education**

Language learners will now encounter new forms of learning through the use of technology (Chun, Kern & Smith, 2016). Technology enables them to engage in virtual conversations, more interactive tasks on online devices, and access multimedia content, contributing to a more dynamic learning experience (Idariyani, 2021).

The advancement of artificial intelligence (hereafter AI) and machine learning has also played a pivotal role in language education. AI-based language learning tools can personalize the learning experience for each learner. This approach allows learners to progress at their own pace and autonomously address difficulties or challenges without the intervention of a teacher (Iwanaka, 2023). Furthermore, they can extend learning opportunities beyond the classroom by selecting optimal learning activities (Yu, 2023).

Technology also enables teachers to provide learning content based on the learner's level and offer immediate feedback, benefiting learners (Zhao, 2003). However, a thoughtful approach to incorporating technology into language education seems essential. This is because technology should not be viewed as a purpose in itself but rather as a means to support specific learning goals (Chun et al., 2016). As technology advances, its role in language education would also change, bringing new possibilities and challenges for educators and learners. While technology integrates into our lives, the advancement of tools like MT makes us reconsider the need for language learning (Gally, 2018).

## **3. Integration of machine translation (MT) into educational field**

### **3.1. History and the development of MT**

Among the technologies, MT may eliminate language barriers and enable meaningful communication across various cultures. MT is defined as the process of translating from a source text to a target text without human intervention (Slocum, 1985). In other words, MT users can easily access MT tools online or on their own devices, allowing them to understand another language without the need for effort.

MT has evolved through rule-based, phrase-based, and neural-based approaches over time

and with the evolution of technology (Steding, 2009). With regard to Neural Machine Translation (hereafter, NMT), it made possible to provide a suitable translation in each context from a neural network (Ducar & Schocket, 2018). Then, Google's introduction of this system in 2016 was a major turning point for MT. Its capabilities and accuracy are said to be still increasing, and it is now capable of translating even colloquial language (Alm & Watanabe, 2021; Jolley & Maimone, 2022).

### **3.2. MT in foreign language education**

The roots of MT go back to the 1950s, but initially faced accuracy limitations that hindered its potential as an educational tool (Briggs, 2018). However, the advent of NMT system has sparked renewed interest and research into the impact of MT on language teaching. According to Jolley and Maimone (2022), the proliferation of Wi-Fi networks in schools, increased use of internet-enabled devices by students, and the emergence of Google Translate have combined to accelerate research on learners' use of MT and its impact on language teaching and learning. In language classrooms, the increasing accuracy of MT poses a challenge to educators because, as Lee (2023) noted, students may experience a decrease in their motivation to learn a foreign language, because as MT improves, students may perceive MT as a convenient alternative and the need to learn a foreign language may diminish. On the positive side, a study by Murtisari et al. (2019) suggests that as MT becomes more widespread in educational settings, students' perceptions may change and the use of MT may no longer be seen as unethical. Thus, while MT accuracy continues to improve, educators face the twin challenges of maintaining student motivation in language learning and navigating the evolving ethical considerations surrounding the use of MT in educational settings.

However, the proliferation of MT is not an issue that can be ignored. It is no longer an inevitable fact that language learners use MT (Jolley & Maimone, 2022). Rather, it is more useful for future research to consider why they use them and how they can be used effectively (Briggs, 2018; Zu, 2020). In considering aspects, several previous studies have shown how learners use MT and their perceptions of it.

## **4. The actual conditions of MT in language learning and teaching**

### **4.1 The actual use of MT and its effect on language learning**

In studies examining the use of MT, learners use MT most frequently in L2 writing situations (Briggs, 2018; Clifford et al., 2013; Jolley & Maimone, 2015; Jolley & Maimone, 2022). According to Chung and Ahn (2022), most participants indicated that MT was beneficial for vocabulary development in L2 writing, with time savings and convenience cited as reasons for using MT. When it comes to vocabulary, Niño's (2020) study also revealed that students view MT as a dictionary. Although the use of MT in writing and reading has improved learner performance and had positive psychological effects, none have evaluated the long-term effects of MT on FL learning, and more longitudinal studies are needed (Jolley & Maimone; Lee, 2023).

#### **4.1.1. MT in L2 writing**

Previous research has focused on whether MT is beneficial for L2 learners or not and on MT outputs that learners produce to see the effectiveness of it. However, recent studies have also taken new approaches, focusing on how learners translate from their native language to L2 without MT and then use it to correct the translation. Then, it was found that MT reduces lexical and grammatical errors and provides some assistance to learners in error correction (Lee & Briggs, 2021). However, questions about the accuracy of MT have also emerged. In particular, it has been noted that ungrammatical expressions and out-of-context direct translations can be found, requiring learners to be careful (Kawazoe, 2019). This issue is addressed in a later section (See 4.3).

A study conducted by Garcia and Pena (2011) aimed at determining whether MT helps beginner and intermediate language learners improve their writing skills in their second language (L2). The study included a test in which participants wrote directly in L2 and a test using the MT interface. It was found that participants wrote more words with the help of MT, whereas writing directly in L2 required more effort and commitment to the task. Participants believed that they were able to express more in L2 with the help of MT, which led to increased motivation to learn, while concerning that the reliance on MT could make learners idle in the long run.

According to more recent study by Lee (2020), it was investigated the role of MT as a CALL tool in EFL writing. 34 university students in Korea were selected as a participant. They translated L1 writing into L2 writing without MT and then used MT to make corrections. Analysis of those two types of writing showed that MT reduced lexical and grammatical errors and improved students' ability to revise. The use of MT for revision had a positive impact on students' writing strategies and helped them think about writing as a process. While there are positive aspects of MT, questions about its accuracy, especially with ungrammatical expressions and colloquial translations, were also raised, which suggests room for MT's improvement.

Lee and Briggs (2021) also examined mistranslations made by 58 Korean university students by comparing their original texts with MT output. Students were divided into three distinctive groups according to their proficiency level, and differences between students in terms of the frequency of errors in the text were examined. T-test results revealed that in all groups, the number of errors in the revised version was significantly lower for most error types. This is consistent with the results of Lee (2020).

Another study was conducted that envisions the incorporation of MT into educational settings (Lee, 2021). This attempted to determine the effects of introducing MT in a university-level EFL writing class in South Korea over one semester under the guidance of a teacher, especially for low-level proficiency writers. Through feedback from peers and teachers, participants became aware of the awkwardness and inaccuracy of MT-assisted writing and actively engaged in revision and improvement. From the perspective of emotion, being allowed to use MT brought a sense of security and stability to the students, which contributed to increased motivation and confidence. Correspondingly, it was observed that the application of MT had a positive impact on the students as they worked in small groups and were provided peer feedback.

#### **4.1.2. MT in L2 reading**

Bavendiek (2022) conducted a study that examined the effectiveness of reading activities utilizing parallel texts of a German song and English translation generated by Google Translate. It involved some small groups of German language learners whose level was varied from

beginner to advanced. The study aimed to make them aware of the differences between the grammar and vocabulary of their first and second language. Student reflections on the activities showed a deeper understanding of dialect and colloquialism through the comparison of British and German cultures and led them to engage in closely reading the relevant sections of the L2 source text. The opportunity to improve upon MT output by comparing multi-layered literary texts would be a motivating activity for language learners, and Bavendiek (2022) claimed that learners can develop digital literacy by acknowledging the shortcomings of MT. In other words, he suggests that MT can be used not only in writing but also in the reading process, especially with students who do not have high proficiency in that language. In addition to literary texts, the use of MT which allows learners to utilize their L1 reading skills may help them to manage complex L2 reading texts more effectively (Oh, 2022).

## **4.2. Learners' and teachers' perceptions of MT**

### **4.2.1. How learners perceive of using MT**

Using MT led to positive attitudes among learners in terms of improving motivation and perceiving it as a useful learning tool (Bahri & Mahadi, 2016). Students also perceived MT as helpful for language learning, especially vocabulary acquisition, but seemed to doubt its accuracy (Clifford et al., 2013; Briggs, 2018). On the other hand, despite skepticism about MT accuracy and low confidence in their translations from their L1 to English simultaneously, more than half of the students held conflicting beliefs about the value of MT and the need to actively incorporate it into language learning (Briggs, 2018). This raises the question of how MT can be integrated into foreign language education in the future. Niño (2020) also found that while many students use MT, they recognize that it makes no sense not to use it to its fullest extent. The fact that students critically evaluate the output of MT tools suggests that this does not indicate their dependence on MT.

There is also a qualitative study of Japanese university students that was focused on how these students perceived the usefulness of one of the NMT tool called "DeepL" after using it to prepare English manuscripts for English presentations (Sakamoto, 2020). Participants positively rated the ease of use of DeepL when converting Japanese manuscripts into English for English presentations. However, some participants reacted negatively to DeepL and were



divided into three groups.

The first group consisted of those who found the English sentences generated by DeepL difficult, possibly due to a lack of English proficiency in using machine translation or a lack of understanding of how to use DeepL. The second group, while able to use DeepL effectively, noted the limitations of this tool. Some participants belonged to this group due to technical problems, the need to check the generated English text, and the realization that DeepL alone cannot handle this entirely. The third group indicated that DeepL did not help them learn English. They seem to understand that using DeepL is different from writing on their own, and that language learning requires effort. As Case (2015) pointed out, the acceptability of using a machine translator seems to depend on the nature of the task and the learner's level.

#### **4.2.2. Teachers' reactions for MT in language education**

Case (2015) and Hellmich and Vinall (2021) have discussed the importance of providing FL instructors with strategies for approaching MT tools in the classroom. That indicates that it should be necessary to clarify the perceptions of MT not only by learners but also by teachers.

Examining the question of how language teachers view MT, Case (2015) concluded that teachers acknowledged that it is inevitable for students to use MT and sometimes they use it for a huge unit of text which tends to be considered cheating. Hellmich and Vinall (2021) similarly found that whether or not the use of MT is acceptable depends on the length of the text, skill, and type of task. Moreover, teachers admitted that MT were widely used for a variety of motives, including learners' concerns about evaluation or lack of confidence in their language abilities.

Teachers had mixed views about the incorporation of MT into language learning (Clifford et al., 2013). However, teachers' perceptions of MT highlighted the need for pedagogical interventions that demonstrate learners how to use MT effectively, as well as the importance of recognizing the role of instructors in the digital age (Klimova et al., 2023). It is noted that providing each learner with an appropriate introduction should be critical in the future when incorporating MT in the classroom (Sakamoto, 2020; Jolley & Maimone, 2022).

### **4.3. Impact of individual differences on the use of MT**

Learners differ from one another in many aspects. Factors of individual differences that influence second language acquisition include aptitude, cognitive style, personality, and learning strategies (Dörnyei & Skehan, 2003).

Few previous research has focused on how these individual differences affect the use or effectiveness of MT. Alm and Watanabe (2021) discussed the accuracy of MT output, effectiveness of MT in language learning, and academic integrity. The survey was conducted with 12 faculty members and 150 students at a New Zealand institution of higher education, focusing on five different languages and three proficiency levels. The results showed that MT use increased as language proficiency improved. Advanced learners use a variety of MT tools, and they tend to use MT tools based on the L2 corpus and language-specific online dictionaries in addition to Google Translate. Because of the convenience of MT, MT tools replace traditional dictionaries in the writing process for most language learners (Clifford et al., 2013). Students have demonstrated that using MT improves their writing in practical and grammatical ways.

Chung's (2020) study identified the effect of learners' language proficiency on their use of MT, as it was still unclear what MT benefits learners of lower proficiency levels. The focus of this study was divided into two categories. On the effect of L2 proficiency on the ability to post-edit MT output and on the pattern of error correction after editing.

The results suggest that different proficiency groups exhibit different patterns in error correction, with better detection and correction for larger error units as proficiency increases. Word-level corrections were particularly frequent, with the number of corrections increasing with proficiency. Furthermore, low-proficiency learners who are unable to discern the accuracy of MT texts tend to simply accept and adopt MT output without critical analysis. This is consistent with the result described by Chung and Ahn (2022), who found that different proficiency levels affect how students use MT and their acceptance of MT output. High-proficiency learners were less likely to accept MT output than low-proficiency learners. In contrast, low-proficiency learners were less likely to view outputs critically and more likely to accept them. The general conclusion is that learners' L2 proficiency has a significant impact on their post-editing of texts using MT, especially for low-proficiency learners, who may have difficulty assessing the accuracy of MT outputs and may lack critical analysis. Thus, the results

provide teachers with the insight that MT use and related activities should be carefully tailored to learners' proficiency levels.

As to what personal factors besides proficiency level influence learners' MT use, Jolley and Maimone (2022) stated the following: "However, to the best of our knowledge, the role of affective and cognitive factors among learners and their MT use has not yet been explored." (Jolley & Maimone, 2022, p. 30) Among the personal factors, the effectiveness of MT has not yet been studied focusing on the emotional aspects of learners (Sakamoto, 2020).

#### **4.4. Issues and concerns regarding the use of MT in foreign language education**

The use of MT in foreign language teaching has raised several issues and concerns. Although "translating" using machine translation seems at first glance to be a perfect task, Kawazoe (2019) states that "even when the semantic content is translated almost exactly, the interpretation of what "intention" it is impregnated with can be influenced by differences in the cultural background" (Kawazoe, p. 67). Furthermore, one of the reasons why it is dangerous to view MT as a helpful tool is caused by the difference in the quality of output between language pairs; for example, Google Translate seems to work better for translations between English and Swedish than between English and Japanese (Case, 2015). It is also pointed out the importance of using MT with caution, as it can lead to plagiarism problems and deprive learners of chances to think autonomously in the target language (Garcia & Pena, 2011).

Language teachers expressed skepticism about the quality and effectiveness of MT. In particular, they are concerned about the accuracy of MT and its pedagogical impact in terms of ethical issues and the potential for students to become overly dependent on MT (Case, 2015). Students perceive MT as a valuable tool for language learning, but teachers are hesitant to use it in the classroom. Furthermore, the lack of instructional design for integrating MT into FL education has been identified as a concern. The impact of MT on student motivation and its potential are also concerns of language teachers. These issues highlight the need to better understand the strengths and weaknesses of MT and the need to develop appropriate pedagogical approaches for its integration into FL education.

## **5. Incorporation of Technology Acceptance Model (TAM) in MT research: Yang & Wang (2019)**

Yang and Wang (2019) stated that the trend toward increased use of MT tools in the translation learning process is unavoidable. The purpose of their study was to develop a comprehensive model in the context of MT adoption based on TAM, a model developed by Davis (1989) that organizes the factors affecting the acceptance of technology by users. This model emphasizes the importance of “Perceived Usefulness” (hereafter PU), which refers to the degree to which individuals believe that using a particular system will enhance their performance, and “Perceived Ease of Use” (hereafter PEU), which indicates the degree to which individuals believe that using a system is neither too difficult nor too complicated, as important determinants of user acceptance (Davis, 1989).

What was different from TAM model advocated by Davis (1989) was two specific hypotheses were added to the TAM in Yang and Wang’s study (Yang & Wang, 2019): experience and motivation. It is hypothesized that students with MT experience will perceive its benefits and may be more proficient in MT use. It was also assumed that PEU may increase student motivation, given MT’s characteristics such as accessibility and rapid production of output. Participants were 109 third-year Chinese English majors who took a translation course. The results showed that PEU and PU were important predictors of behavioral intention, with PU having a stronger influence on behavioral intention than PEU. Interestingly, experience using MT was an important predictor of PU, with more experience using MT confirmed that perceptions of usefulness improve. As a result, PEU appears to promote student motivation in translation learning, with stronger motivation leading to more experience of using MT.

In addition to personal factors such as motivation, various factors such as the environment surrounding the learner and the content of the task may influence the intention to use MT. In other words, a unidirectional relationship might not be established in TAM, as sometimes low motivation leads to MT use, or sometimes anxiety leads to MT use. This is what Yang and Wang (2019) claimed as saying, “This finding implies a circular influential relationship among the constructs.” (Yang & Wang, 2019, p. 123).

## **6. Conclusion and implication for the future study**

Language education and the use of technology in Japan have been discussed in a column titled “Multimedia guide” in the journal “The English Teachers’ Magazine” since 2002 (Shirakawa, 2002). However, there have not been adequate studies conducted in the Japanese context on the impact of MT, including in relation to TAM. This may be due to the fact that NMT has been introduced recently, and its accuracy has significantly improved since 2016. To maximize the benefits of technologies such as MT, teachers’ education is needed to prepare them for their new role in a technology-based learning environment (Taghizadeh & Yourdshahi, 2019).

The policy called “GIGA School Program” was administered by the Ministry of Education, Culture, Sports, Science and Technology which tries to realize that each student has their own digital devices in secondary education level (The Japan Times, 2021). That means not only teachers but also students will have more opportunities to use digital devices both inside and outside of classroom, and it is presumed that the accessibility of MT would accordingly increase. Thus, one suggestion for further research is to find out what kind of perceptions Japanese English teachers have about the adoption and effective application of MT. In addition to this, given the fact that students might use MT in various ways and have different perceptions and reasons for the use of MT, an important next step is a systematic and well-documented study of how and why students use MT and what they are learning from its use (Hellmich & Vinall, 2021). Besides, as Riasati et al. (2012) pointed out, some learners may not necessarily be positive about the introduction of technology. Therefore, it would be significant to clarify the perceptions and backgrounds of learners who express such negative views in the future research. Under the theme of the impact of MT on English education in Japan, it would also be desirable to investigate what factors influence the use of MT based on perceptions, actual conditions, and TAMs.

## References

- Alm, A., & Watanabe, Y. (2022). Online machine translation for L2 writing across languages and proficiency levels. *Australian Journal of Applied Linguistics*, 5(3), 135-157. DOI:[10.29140/ajal.v5n3.53si3](https://doi.org/10.29140/ajal.v5n3.53si3)
- Bahri, H., & Mahadi, T. S. T. (2016). Google Translate as a supplementary tool for learning Malay: A case study at Universiti Sains Malaysia. *Advances in Language and Literary Studies*, 7(3), 161-167. <http://dx.doi.org/10.7575/aiac.alls.v.7n.3p.161>
- Bavendiek, U. (2022). Using machine translation as a parallel text to access literature for modern language learning. In C. Hampton & S. Salin (Eds), *Innovative language teaching and learning at university: Facilitating transition from and to higher education* (pp. 57-67). Research-publishing.net.
- Briggs, N. (2018). Neural machine translation tools in the language learning classroom: Students' use, perceptions, and analysis. *JALT CALL Journal*, 14(1), 3-24. <https://doi.org/10.29140/jaltcall.v14n1.221>
- Case, M. (2015). Machine Translation and the Disruption of Foreign Language Learning Activities. *eLearning Papers*, 45, 4-16.
- Chun, D., Kern, R., & Smith, B. (2016). Technology in Language Use, Language Teaching, and Language Learning. *Modern Language Journal*, 100(1), 64-80. <https://doi.org/10.1111/modl.12302>
- Chung, E. S. (2020). The effect of L2 proficiency on post-editing machine translated texts. *The Journal of Asia TEFL*, 17(1), 182-193. <http://dx.doi.org/10.18823/asiatefl.2020.17.1.11.182>
- Chung, E. S., & Ahn, S. (2022). The effect of using machine translation on linguistic features in L2 writing across proficiency levels and text genres. *Computer Assisted Language Learning*, 35(9), 1-26. <https://doi.org/10.1080/09588221.2020.1871029>
- Clifford, J., Merschel, L., & Munné, J. (2013). Surveying the Landscape: What is the Role of Machine Translation in Language Learning? *The Acquisition of Second Languages and Innovative Pedagogies*, 10, 108-121. <https://doi.org/10.7203/attic.10.2228>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13, 319-340.
- Dörnyei, Z., & Skehan, P. (2003). Individual differences in second language. In C. J. Doughty & M. Long (Eds.) *The handbook of second language acquisition*. (pp. 589-630). Oxford.
- Ducar, C., & Schocket, D. H. (2018). Machine translation and the L2 classroom: Pedagogical solutions for making peace with Google translate. *Foreign Language Annals*, 51(4), 779-795. <https://doi.org/10.1111/flan.12366>
- Gally, T. (2018). Machine translation and English education in Japan. *Komaba Journal of English Education*, 9, 43-55.
- Garcia, I., & Pena, M. (2011). Machine translation-assisted language learning: Writing for beginners. *Computer Assisted Language Learning*, 24, 471-487. <https://doi.org/10.1080/09588221.2011.582687>
- Hellmich, E., & Vinall, K. (2021). FL instructor beliefs about machine translation: Ecological insights to guide research and practice. *International Journal of Computer-Assisted Language Learning and Teaching*, 11(4), 1-18. DOI: 10.4018/IJCALLT.2021100101
- Idaryani, I. (2021). The Influence of digital technology on students' motivation in learning English-specific purpose. *Journal of English and Language Education*, 6(1), 69-81. <https://doi.org/10.31004/jele.v6i1.96>
- Iwanaka, T. (2023). Use of artificial intelligence in English language education: A consideration of its potentials and the future of university English education. *Academic Archives of Yamaguchi Prefectural University: Bulletin of the Faculty of Intercultural Studies*, 16, 109-119.
- Jolley, J. & Maimone, L. (2015). Free online machine translation: Use and perceptions by Spanish students and instructors. In A. J. Moeller (Ed.), *Learn Languages, Explore Cultures, Transform Lives* (pp. 181-200). Central States Conference on the Teaching of Foreign Languages.
- Jolley, J., & Maimone, L. (2022). Thirty years of machine translation in language teaching and learning: A review of the literature. *L2 Journal*, 14(1), 26-44.

- <https://doi.org/10.5070/L214151760>
- Kawazoe, A. (2019). *AI gijutsu to gaikokugo gakushuu no mirai [4]: Kikaihonyaku no genjo to tenbo (Kohen)* [AI technology and future for language learning [4]: Current situation and prospects of machine translation (Part 2)]. *The English Teachers' Magazine*, 68(4), 66-67.
- Klimova, B., Pikhart, M., Delorme Benites, A., Lehr, C., & Sanchez-Stockhammer, C. (2023). Neural machine translation in foreign language teaching and learning: A systematic review. *Education and Information Technologies*, 28, 663-682. <https://doi.org/10.1007/s10639-022-11194-2>
- Lee, S. M. (2020). The impact of using machine translation on EFL students' writing. *Computer Assisted Language Learning*, 33(3), 157-175. <https://doi.org/10.1080/09588221.2018.1553186>
- Lee, S. M., & Briggs, N. (2021). Effects of using machine translation to mediate the revision process of Korean university students' academic writing. *ReCALL*, 33(1), 18-33. <https://doi.org/10.1017/S0958344020000191>
- Lee, S. M. (2023). The effectiveness of machine translation in foreign language education: a systematic review and meta-analysis. *Computer Assisted Language Learning*, 36(2), 103-125. <https://doi.org/10.1080/09588221.2021.1901745>
- Lee, Y. J. (2021). Still taboo? Using machine translation for low-level EFL writers. *ELT Journal*, 75(4), 432-441. <https://doi.org/10.1093/elt/ccab018>
- Li, K. (2023). Determinants of college students' actual use of AI-based systems: An extension of the Technology Acceptance Model. *Sustainability*, 15(6), 1-16. <https://doi.org/10.3390/su15065221>
- Murtisari, E., Widiningrum, R., Branata, J., & Susanto, R. (2019). Google Translate in language learning: Indonesian EFL students' attitudes. *The Journal of Asia TEFL*, 16(3), 978-986. DOI:10.18823/asiatefl.2019.16.3.14.978
- Niño, A. (2020). Exploring the use of online machine translation for independent language learning. *Research in Learning and Technology*, 28, 1-32. <https://doi.org/10.25304/rlt.v28.2402>
- Oh, E. (2022). Exploratory Study on the Use of Machine Translation for Reading in College English Classes. *Multimedia-Assisted Language Learning*, 25(4), 66-92. DOI: 10.15702/mall.2022.25.4.66
- Riasati, M. J., Allahyar, N., & Tan, K. (2012). Technology in language education: Benefits and barriers. *Journal of Education and Practice*, 3(5), 25-30.
- Sakamoto, K. (2022). Japanese university students' reflections on machine translation used as part of an English presentation activity. *School of Human Cultures the University of Shiga Prefecture*, 53, 33-45. <http://usprepo.office.usp.ac.jp/dspace/handle/11355/788>
- Shirakawa, T. (2002). *Maruchimedea gaido: Chumoku no bajonappu seihin* [Multimedia guide: Featured upgraded products] *The English Teachers' Magazine*, 51(1), 85.
- Slocum, J. (1985). A survey of machine translation: Its history, current status and future prospects. *Computational Linguistics*, 11(1), 1-17.
- Steding, S. (2009). Machine translation in the German classroom: Detection, reaction, and prevention. *Die Unterrichtspraxis*, 42(2), 178-189. <https://doi.org/10.1111/j.1756-1221.2009.00052.x>
- Taghizadeh, M., & Yourdshahi, Z. H. (2019). Integrating technology into young learners' classes: Language teachers' perceptions. *Computer Assisted Language Learning*, 33(8), 982-1006. <https://doi.org/10.1080/09588221.2019.1618876>
- The Japan Times. (2021, March 22). Japan's GIGA School Program equips students for digital society. <https://www.japantimes.co.jp/2021/03/22/special-supplements/japans-giga-school-program-equips-students-digital-society/>
- Yang, Y., & Wang, X. (2019). Modeling the intention to use machine translation for student translators: An extension of Technology Acceptance Model. *Computers & Education*, 133, 116-126. <https://doi.org/10.1016/j.compedu.2019.01.015>
- Yu, L. (2023). A comparison of the autonomous use of technology for language learning for EFL university students of different proficiency levels. *Sustainability*, 15(1), 1-18.

<https://doi.org/10.3390/su15010606>

Zhao, Y., & Frank, K. A. (2003). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal*, 40(4), 1-61.

<https://doi.org/10.3102/00028312040004807>

Zu, X. (2020). Machine translation in foreign language learning classroom-learners' indiscriminate use or instructors' discriminate stance. *English Linguistics Research*, 9(4), 1-5.

<https://doi.org/10.5430/elr.v9n4p1>