Exploring Machine Translation as a Potential Tool for Aiding Second Language Instruction

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Abstract: *The prevalence and usability of machine translation make it a contentious language learning tool. This study explores the previous studies about using MT in second language classrooms to assess its potential as an effective tool for aiding L2 instruction. It found significant evidence for MT superiority and effectiveness in aiding L2 instruction. The findings also reveal that a greater exposure to MT in L2 classrooms may increase the likelihood that L2 learners will be more engaged to a second language. It concluded that MT has a great potential to function as a tool for aiding L2 instruction.*

Keywords: Machine translation and Second language

1. Introduction

The usage of machine translation goes beyond translation and multilingual communication. It includes economic, social, and educational implications (Ducar and Schocket, 2018; Dorst, 2022; Kasperė et al., 2021; Lee, 2020). 100-140 billion words are being translated every day into 103 languages by a machine translation (MT) tool (Greenleaf and David 2019; Jandt2021). One of MT's educational and emerging implications is language instruction (Mundt and Groves, 2016; Musk, 2022). Thus, the benefits and shortcomings of using of machine translation in language learning context have been increasingly discussed in recent years (Kasperė et al., 2021, Mirzoyeva, 2023). The incorporation of machine translation (MT) tools in second language (L2) or foreign language (FL) classrooms require the usage of a computer program, a mobile application, or a website to translate from a source language to a target language (Kasperė et al., 2021; Lee, 2020; Nguyen et al., 2018). Such a toolseems be usefulfor aiding teaching and learning second language alike (Bavendiek, 2022; Klekovkina and Denié-Higney, 2022; Lee, 2021; Xu, 2022). It allows L2 instructors to include MT as a meaningful learning activity in classrooms such as browsing free online machine translation webpages, analyzing the translation errors, learning new vocabulary (Abdelaal and Alazzawie, 2020; Chung, 2020; Lee and Briggs, 2021). For instance, MTcan help L2 learners to complete their writing and reading assignment (Bavendiek, 2022; Briggs, 2018; Lee, 2020; Mundt and Groves, 2016; Musk, 2022). It is also used in L2 classes to help learners to practice their speaking and learning new vocabulary (Alamri and Hakami, Bavendiek, 2022; Lo, 2022; Nguyen et al., 2018). Although MT can be a valuable tool for L2 learners, it needs intense teachers' supervision to guide learners on how to utilize MT effectively inside and outside classroom (Chung, 2021; Nguyen et al., 2018; White and Heidrich, 2013). This is due to its limitations, including translation errors, inaccuracy, and the adopted educational school policy (Chung, 2022; Lee, 2019; Levy and Steel, 2015; White and Heidrich, 2013). It is significant to be aware that machine translation tools are still developing and unsophisticated due to their errors (Chung, 2020; Mirzoyeva, 2023). The point is, it is meaningful to explore whether MT tools are useful to address L2 learners needs, or they are destructive for learninga second language to help L2 learners and instructors to achieve their educational objectives. Therefore, this study surveys previous literature, which addresses MT from language learning perspective to assess the nature of MT impacts on L2 learning. This is necessary to examine the likelihood and effectiveness of integrating MT to L2 learning and teaching environment based on natural classroom setting.

This paper will discuss research questions, literature review, methodology, finding, and conclusion respectively. This paper aims to address the following research questions:

1) Is the relationship between using MT in L2 classrooms and L2 learning statistically significant?
2) Do the benefits of using MT in L2 classrooms outweigh its disadvantages for learning L2?

2. Literature Review

The previous literature about adopting MT in L2 instruction reveals three issues. Its accessibility to its users, its educational concerns, and its educational benefits. Many studies concluded that MT has become a de facto multipurpose tool for speakers of world languages, international students, educators, and educational policy makers nowadays (Raad, 2020; Raheem, 2020; Ducar and Schocket, 2018; Lee, 2020; Mundt and Groves, 2016). As a language learning tool, MT is already accessible to second language learners and free to use (Ata and Debreli, 2021; Mundt and Groves, 2016; Saputra et al., 2022). Most significantly, the prevalence of MT does not make it useable to be integrated as a meaningful classroom activity to aid L2 education (Ata and Debreli, 2021; Klekovkina and Denié-Higney, 2022; Mirzoyeva, 2023). MT can impedeL2 learning due to its inadequacies, inaccuracy, and ethical issues. For instance, MT can decrease L2 ability to think in a second language, and it may be used by L2 learners to promote plagiarism due to its capacity to produce fast translations, which saves time comparing to human translation (Mirzoyeva, 2023; Organ, 2023; Saputra et al., 2022). Specifically, the time factor increases the likelihood that L2 learners become more dependent on MT tools and less interested in enhancing their language learning skills (Saputra et al., 2022; Winiharti and Sudana, 2021). It is also likely that L2 learners misuse MT tools and plagiarize others' works in their writing classes (Ata and Debreli, 2021; Mundt and Groves, 2016). For instance, they may translate a text from a foreign language into English or other languages to submit the translated works as their authentic works (Ata and Debreli, 2021Mulyani and Afina, 2021;

Mundt and Groves, 2016). In this regard, L2 educators seem to approach MT with skepticism due to inaccuracy of its outputs and its negative impacts on L2 leaners (Ata and Debreli, 2021; Lee, 2019; White and Heidrich, 2013). Thus, MT is restrictedly used in the language learning settings due to its unreliability (Chung, 2020; Mirzoyeva, 2023). MT linguistic errors include lexical, wrong synonyms, sentence structures (Abdelaal and Alazzawie, 2020). Hence, itis significant then to note that principals, L2 educators, and policymakers should reassess the current educational policies and practices to address the issue of using MT tools in L2 classrooms adequately (Ata and Debreli, 2021, Mundt and Groves, 2016; White and Heidrich, 2013). However, the accuracy of MT outputs has been developed significantly during the past decade (Kasperė et al., 2021, Lee, 2020; Mirzoyeva, 2023).

Additionally, MT might be an advantageous tool to promote L2 learning. L2 learners use MT tools, such as Google Translate, Microsoft Bing, Papago, Yandex, Reverso, to complete their reading, writing, speaking and vocabulary assignments (Ata and Debreli, 2021; Nguyen et al., 2018; Musk, 2022; Winiharti and Sudana, 2021). Such an easily accessible and free tool can help L2 learners to communicate, learn, and produce their second language effectively (Nguyen et al., 2018; Winiharti and Sudana, 2021). L2 learners use MT tools outside classrooms more than they do in classroom (Levy and Steel, 2015; Nguyen et al., 2018). L2 Learners reported that they benefit from MT tools in their vocabulary, grammar, reading, and writing classes (Ata and Debreli, 2021; Lee, 2021; Saputra et al., 2022; Winiharti and Sudana, 2021). For example, English language learners found MT useful in correcting their English pronunciation, sentence structure and word selection (Sujarwo, 2020; Tsai, 2019). Another study by Lee 2021, found that MT outperformed participants in most aspects under examination (i.e., lexical, and grammatical accuracy). These findings can be perceived as an opportunity to practice L2 skills beyond language classrooms and enhance L2 instruction practices (Nguyen et al., 2018; Sujarwo, 2020; Tsai, 2019). The importance of using in L2 instruction cannot be denied due to its advantages. As an MT tool, online Google translation tool can be used an effective language teaching aid due to its capacity to translate to 103 heterogenous languages (Greenleaf and David 2019; Jandt2021; Organ, 2023). Thus, L2 teachers and education policymakers can guide L2 learners on how to benefit from MT inside and outside their L2 classes to practice their L2 skills (Ata and Debreli, 2021; Nguyen et al., 2018). It can be concluded from this literature review that the discussion for integrating MT in the second language classes remains undecided. Therefore, this study aims to quantitatively analyze the previous literature to address the research questions.

3. Methodology

I employed ordinary least square regression (OLS) to explore the impact of using MT tools in language classrooms on L2 learning. This helped to find evidence for the nature of the relationship between using MT tools and L2 learning. Additionally, the data for this study drew on 19 articles retrieved from various sources such as Eric, Google scholar, Taylor & Francis, ProQuest, and Wiley. The analyzed articles covered 11 languages and nine online MT tools. The articles were conducted between 2013 and 2023, and they comprised a total of 1641 participants. Furthermore, this study included empirical articles that discussed incorporating MT in L2settings and excluded qualitative articles, conference proceedings, and studies, which lacked human subjects who participated as L2 learners or educators. Moreover, MT tools refer to any type of the nine machine translation tools employed in previous studies. MT tools were coded as 0 to measure the impact of using MT on L2 classrooms regardless of its type. The level of education was divided into graduate (the articles only included graduate participants), undergraduate (the article only undergrad participants), and mix (if the article included graduate and undergrad participants). Graduate, undergraduate, and mix were coded as 0, 1, and 3 respectively. Participants refer to all participants, who participate as educators or learners, in the articles under investigation. To validate the results of this study robustness test (standard error) was used.

4. Findings

I employed Ordinary Least Squares (OLS) regression, both before and after applying standard error. The findings of this study provide evidence for the positive impact of machine translation (MT) tools on (L2) learning in the classroom context. The regression analysis revealed a statistically significant positive relationship between MT tool usage and L2 outcomes. The coefficient for MT tool usage was 0.485 before standard error, indicating a moderately strong positive correlation at the 5% significance level as shown in Table 1.

Table 1: Regression without standard error

Analyzed Factor	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
MT Tool	.485	.166	2.92	.012	.126	.844	**
Participants	-.002	.007	-0.22	.829	-.017	.014	
Language	-.526	.381	-1.38	.191	-1.349	.298	
Level of Education	-.289	.157	-1.84	.088	-.627	.05	*
Constant	.042	.231	0.18	.859	-.458	.542	

Mean dependent var	0.632	SD dependent var	0.496
R-squared	0.627	Number of obs	19
F-test	4.375	Prob > F	0.015
Akaike crit. (AIC)	19.466	Bayesian crit. (BIC)	25.132

*** p<.01, ** p<.05, * p<.1*

After I employed the standard error, the coefficient remained 0.485 and the relationship was significant at the 1% level as presented in Table 2. This suggests that any increased usage of MT tools in classroom is associated with greater L2 learning experience. This finding is applied even after controlling for standard error.

Table 2: Regression with standard error

Analyzed Factor	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
MT Tool	.485	.096	5.03	0	.277	.694	***
Participants	-.002	.005	-0.30	.766	-.013	.009	
Language	.005	.005	1.02	.326	-.006	.017	
Level of Education	-.526	.201	-2.62	.021	-.96	-.092	**
MT Tool	-.289	.063	-4.61	0	-.424	-.153	***
Constant	.042	.22	0.19	.852	-.434	.518	
Mean dependent var	0.632		SD dependent var		0.496		
R-squared	0.627		Number of obs		19		
F-test	36.511		Prob > F		0.000		
Akaike crit. (AIC)	19.466		Bayesian crit. (BIC)		25.132		

*** $p<.01$, ** $p<.05$, * $p<.1$

5. Discussion of findings

The first question discusses the nature of the relationship between MT and learning L2. This study found evidence for the superiority of integrating MT to L2 classrooms. This evidence revealed a significant relationship between MT and L2 at 5% level and lower. This significant relationship showed a positive impact of MT tools on learning L2.

The second question addresses the benefits and shortcomings of MT from L2 learners' perspective. The findings of this study showed that the usage of MT in L2 classrooms seems to aid L2 learning. This finding may be attributed to several factors. MT facilitates learners' exposure to different L2 inputs (Ata and Debreli, 2021; Lee, 2021; Saputra et al., 2022; Winiharti and Sudana, 2021). It also allows students to compare MT outputs with human translations to help them learn new vocabulary, grammar, and sentence structures (Alamri and Hakami, Bavendiek, 2022; Lo, 2022; Mirzoyeva, 2023; Nguyen et al., 2018; Organ, 2023; Saputra et al., 2022). When used carefully, MT tools are more likely to complement and aid second language learning.

These results align with previous research demonstrating benefits of MT for L2 learners. For example, studies by (Bavendiek, 2022; Briggs, 2018; Chung, 2021; Lee, 2019, Nguyen et al., 2018). These studies concluded that MT tools can aid vocabulary acquisition, reading comprehension, and writing skills. The findings of this current study provides additional empirical evidence about potential of MT as L2 pedagogical tool.

In conclusion, this study's finding confirmed the incorporation of MT into L2 classrooms is more likely to aid L2 instruction. It showed a significant positive relationship suggesting that MT tools may provide cognitive and linguistic benefits for L2 learners and instructors. Further, the empirical evidence found in this current study reveals MT's potential to enhance L2 pedagogical practices. Thus, educators are encouraged to consider integrating MT into their classrooms to take advantage of this accessible tool to promote L2 instruction.

6. Conclusion

As MT has become prevalence in L2 language classrooms and accessible to many language learners, it is necessary to explore its usefulness for L2 leaners (Briggs, 2018; Ducar and Schocket, 2018; Lee, 2019). The purpose of the present study was to analyze the previous studies on using MT in second language classrooms to explore its potential as an effective tool to aid L2 education. It found statically significant evidence for MT superiority in L2classrooms. Specifically, one of the major findings was a greater exposure to MT in L2 classrooms may increase the likelihood that L2 learners will be more engaged in learning a second language. This indicates that MT has a great potential to aidL2education.

Additionally, this study has its implications, limitations, and recommendations for future studies. Educational policymakers and educators should reassess their policies about banning the usage of MT in L2 classrooms. L2 and FL instructors also can use MT as a meaningful classroom activity to make their students engaged in L2 learning. In FL setting, where the first language preponderates, instructors can use MT as a means of practicing foreign language.

This study has its limitations. It does not explore MT impact on learning specific L2 skills. As this study examined only the usage of MT regardless of its type, it would be more insightful to explore which MT tools are more advance and reliable to be used in L2 classrooms in the future works. Although this study advocates the usage of MT in classrooms, it included 11 language pairs. Therefore, future works may replicate this study to examine the impact of MT on acquiring specific languages.

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