機械翻訳と言語学習の研究概要

Machine translation and language learning research summaries

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Abstract

To assist instructors and scholars interested in research related to Machine Translation (MT) in language teaching and learning, this paper briefly summarizes the methods, findings, and conclusions of 20 major published papers on the topic of MT use among language instructors and learners. Papers looking at the methodology of effective use of MT in teaching and learning, how students use MT, the opinions of students and instructors towards MT and systematic reviews of MT use are all included in this paper. As these summaries focus on studies published in English, many of the papers focus on the English language learning classroom in a variety of locales around the globe, however other papers focused on the learning of Romance languages, and Spanish, French, Finnish, and Hungarian are also included. Google Translate was the most often cited MT tool used in the studies. It is hoped that this compilation will be a helpful resource for those with an interest in MT and/or MT related research.

Keywords

CALL, Machine Translation, Language Learning

Introduction

Machine translation (MT) has been available for public use for over 40 years and its place in the language learning classroom has been debated since its inception (Garcia & Pena, 2011; Niño, 2008). Those debates often relate to whether MT should be viewed as a tool for

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learning that needs to be harnessed effectively to the degree that it impacts academic integrity and should be discouraged. For this reason, scholars have studied MT from numerous perspectives including its effectiveness as a learning tool, accuracy and precision, benefits and shortcomings as well as student and instructor perceptions about its use. This paper will briefly summarize the methods, findings, and conclusions of 20 major published articles on the topic of MT use among language instructors and learners. Many of the studies focus on English language learning, however papers published in English have also reported on research related to the learning of other languages. For example, Clifford, Merschel, & Munné (2013) published findings related to the learning of Romance languages and Valijärvi & Tarsoly (2019) looked at how effective MT assistance can be in the learning of Finnish and Hungarian. It should also be noted that Google Translate was the most often cited MT tool used in these studies. The authors feel that this compilation of research related to MT could provide a useful resource for instructors and scholars who have an interest in this topic and help them to source pertinent information for both teaching and further research.

Note- The authors recognize that dozens of respected works have been published on the topic of MT and language learning and teaching. We have made an attempt to summarize the major works on the topic. Due to the nature of this endeavor, however, it is possible that we may have neglected to include some important works. Because of the rapidly evolving nature of MT technology, we have chosen to direct most of our focus towards recent articles (within the past 5 years) although we have also included several well-cited articles from years past. All papers are listed in chronological order with full source information.

Niño, A. (2008). Evaluating the use of machine translation post-editing in the foreign language class. *Computer Assisted Language Learning*, *21*(1), 29-49. https://doi.org/10.1080/09588220701865482

Niño investigated the task of post-editing, modifying and/or correcting text that has been machine-translated from one language to another. The study involved 32 native English speaking advanced Spanish learners who were divided into two groups: an experimental group

tasked with post-editing, and a control group tasked with translating identical source texts from English to Spanish. The study found that both groups created translated texts that contained very similar errors. The results reveal that engaging in post-editing activities in the foreign language is suitable for advanced learners of the target language. Additionally, the experiment indicates that the types of errors present in MT output are similar to those found in translation into the same target language. This implies that the raw output from MT can serve as a meaningful source of errors for advanced students to correct, fostering error awareness and providing opportunities for improvement in grammatical and lexical accuracy through focus on form and negotiation of meaning.

Niño, A. (2009). Machine translation in foreign language learning: Language learners' and tutors' perceptions of its advantages and disadvantages. *ReCALL, 21*(2), 241-258. https://doi.org/10.1017/S0958344009000172

The author highlights four uses of MT in the language classroom: (1) MT as a bad model or a source of language errors for students to correct, (2) MT as a good model for students to build on (3) MT for professional translators and (4) MT as a CALL tool to test students' language abilities. They also discuss the beneficial and detrimental points of MT in language teaching along with some practical examples of using MT for language pedagogy. Furthermore, they present a survey on language learners' and language tutors' perceptions of MT for language learning. Overall, both tutors and learners felt positive with regard to MT's potential, although some teachers expressed concern over its possible overuse or misuse.

Garcia, I., & Pena, M. I. (2011). Machine translation-assisted language learning: writing for beginners. *Computer Assisted Language Learning, 24*(5), 471-487. https://doi.org/10.1080/09588221.2011.582687

The authors argue that existing research on MT often overlooks its potential application for beginning language learners. To explore how MT aids in the development of learners' L2 writing skills, the authors conducted tests where participants were instructed to

write directly in L2 in one instance and in L1 in another. Additionally, participants pre-edited the L1 writings and post-edited the L2 writings. Analysis revealed that MT proved beneficial for beginners, enhancing their communication, particularly when their language mastery was less advanced. Writing in the L2 demanded more effort, as indicated by the number of pauses, and involved greater task engagement, as measured by the frequency of editing interventions. The authors cautioned, however, that although MT assists novices in producing more content with reduced effort, this might not necessarily lead to increased learning. They compare MT to a Global Positioning System (GPS) which helps in reaching destinations, but does not teach the skills needed to navigate independently from point A to point B.

Clifford, J., Merschel, L., & Munné, J. (2013). Surveying the landscape: What is the role of machine translation in language learning?. *@ tic. revista d'innovació educativa*, (10), 108-121. https://doi.org/10.7203/attic.10.2228

    The researchers surveyed over 900 undergraduate Romance language students and over 43 language instructors about their perceptions of MT use among students. They found that students commonly used MT tools to aid their language learning by looking up single words, translating instructions, and verifying their work. Students found MT beneficial, particularly for vocabulary acquisition, but were aware of its error-prone nature. Students critically evaluated the output of MT tools. In contrast, faculty members are generally skeptical about the positive impact of MT on language learning and a large majority disapproved of its use by students for their coursework. However, the instructors did not consider it a threat to their profession. While some professors see greater utility in advanced-level courses, opinions varied regarding the integration of MT and what constitutes academic dishonesty.

Case, M. (2015). Machine translation and the disruption of foreign language learning activities. *eLearning Papers*, (45), 4-16. https://du.diva-portal.org/smash/get/diva2:874792/FULLTEXT01.pdf

The author conducted a survey of 35 teachers at a Swedish foreign language university to determine their attitudes toward MT use. According to responses gathered through questionnaires and through observing group discussions, there was a prevailing consensus among the teachers that while the utilization of MT by students may be perceived as a form of cheating, students are likely to employ it nonetheless. Respondents recommended that teachers shift their focus towards identifying and teaching the specific skills that students require when using MT. They further proposed that teachers should design assignments and examinations that allow students to practice and demonstrate these skills. The author advocates a re-examining of the roles of both teachers and students in an educational landscape where many of the competencies needed for effective interaction in a foreign language can be addressed by this developing technology.

Briggs, N. (2018). Neural machine translation tools in the language learning classroom: Students' use, perceptions, and analyses. JALT Call Journal, 14(1), 2-24. https://doi.org/10.29140/jaltcall.v14n1.221

This study explored the attitudes and beliefs of 80 Korean undergraduate university students concerning the use of web-based machine translation (WBMT) tools for the learning of the English language. The findings indicated that a significant proportion of students utilize these tools to aid their language studies, both in daily life and academic settings. However, most students expressed limited confidence in the accuracy of the tools' output. Additionally, students evaluated the output of two popular WBMT tools, revealing limits in their ability to critically assess the accuracy of the translations.

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

This article investigates ongoing research regarding MT use among language students and "aims to advance the theoretical discussion surrounding MT." The authors argue that due

to their power, ease of use, and ubiquitousness, the use of MT tools among language learners cannot be stopped or even effectively limited or monitored. The authors recommend 5 courses of action for teachers: (1) assess their familiarity with existing and emerging tools, (2) explicitly instruct learners on responsible technology use, (3) reassess their attitudes toward students utilizing supportive technologies, (4) acquaint themselves with their institution's academic honesty policies, and (5) determine their approach to handling policy violations. All of this should be done while providing instruction and assignments designed primarily to motivate students and increase their willingness to communicate in the target language.

Gally, T. (2018). Machine translation and English education in Japan. *Komaba Journal of English Education*, *9*, 43-55.

https://repository.dl.itc.u-tokyo.ac.jp/record/2000973/files/KJEE09_043-055.pdf

In this paper, Gally discusses the impact that the improvement in translation quality generated by MT tools may have on English education in Japan. Gally discusses the two main justifications given for universal English education in Japan, namely *kyōyō* which relates to English education for building knowledge and developing character, and *jitsuyō* which has to do with learning English for practical reasons such as intercultural communication. Gally asserts that it is the latter that will be more significantly impacted by the improvement in translation quality from digital tools as they allow for communication to be done more quickly and effectively when needed without the laborious process of years of study. Gally also outlines major debates around these justifications and the official reasons for why all students must study English in Japan. It is also explained that due to the compulsory study of English in Japan many students' motivation for studying English is neither strictly for *kyōyō* nor *jitsuyō* reasons, but merely to score well on tests and university entrance tests. Gally declares that as English is unnecessary in daily life for many Japanese people, reliable machine translation will likely impact the necessity of its study in schools, however, it will likely

continue for some time and the benefits of its study for building knowledge and character will be less impacted by this technology.

Lee, S. M. (2019). The impact of using machine translation on EFL students' writing. *Computer Assisted Language Learning*, *33*(3), 157-175. https://www.tandfonline.com/doi/full/10.1080/09588221.2018.1553186

This study explores the application of MT as a Computer-Assisted Language Learning (CALL) tool in EFL writing. Thirty-four university students were tasked with translating their native language (L1) writing into their second language (L2) without MT assistance, and then utilizing MT translations for comparison while correcting their L2 writing. Analysis indicated that MT contributed to a reduction in lexico-grammatical errors and improvements in student revisions. Using MT for revisions also positively influenced student writing strategies, fostering a conceptualization of writing as a dynamic process. Insights from interviews and reflection papers showcased a positive perception of MT integration during the writing process among students. This study highlights the potential utility of MT in language learning; however, it underscores the importance of teachers being aware of its limitations and offering appropriate guidance for optimal results.

O'Neill, E. M. (2019). Training students to use online translators and dictionaries: The impact on second language writing scores. *International Journal of Research Studies in Language Learning*, *8*(2), 47-65. https://doi.org/10.5861/ijrsll.2019.4002

In this study, the writing of 310 American university students of intermediate Spanish or French was analyzed. The author compared over 1,000 student compositions from 5 randomized groups: those using an online translation tool (Google Translate) with and without training, those using an online dictionary (WordReference) with and without training, and those writing without using online tools. The findings showed that students who used online translation achieved higher scores on writing assignments compared to those who relied on an online dictionary or neither tool. Results also showed that brief training sessions covering the

use of online dictionaries or translation tools led to higher writing scores. However, when students took a post-test without the use of any tools, scores for all groups were similar. The author concludes that online translation tools and dictionaries can improve student writing but may not lead to increased learning.

Valijärvi, R-L. & Tarsoly, E. (2019). Language students as critical users of Google Translate: Pitfalls and possibilities. *Practitioner Research in Higher Education, 12*(1), 61-74. https://files.eric.ed.gov/fulltext/EJ1212983.pdf

The researchers in this paper report their findings after conducting action research into how Google Translate is used by students and how it can be integrated into the Finnish and Hungarian language learning classrooms in higher education. They also conducted interviews with students to gain an understanding of their experiences and perceptions of the different activities, and surveys further helped them to reflect and refine the best ways to incorporate Google Translate into the classroom. The researchers explained that due to differing morphological complexities between Finnish and English, and Hungarian and English, translations can often be poor between the languages and therefore requires critical analysis when being used to assist language learning. Students ranged in level from post-beginner to advanced and participated in activities that were categorized into three groups: analytical tasks, discovery method, and awareness raising. Findings showed that the analytical tasks using Google Translate (similar to dictionary-based exercises and identifying word parts) were beneficial for learners, as were the awareness raising tasks (error corrections, analysis of errors at text-level, and guided essay writing). However, the discovery method tasks (elicitation and problem solving) were not found to be effective due to the inconsistent and unreliable results from Google Translate. Overall, the authors found that students all use tools like Google Translate and competence in the use of such tools will become a natural part of linguistic expertise in the future. Therefore, incorporating Google Translate into language classrooms can help learners become more critical learners, especially

when translations for the language being studied are yet to yield reliable and consistent results.

Niño, A. (2020). Exploring the use of online machine translation for independent language learning. *Research in Learning Technology*, *28*. https://doi.org/10.25304/rlt.v28.2402

　　The author presented 37 independent language learners of English with 4 learning tasks involving reading and listening from the target language of study into English, and written, audio and voice translation from English into the target language. They then observed how the learners used Online Machine Translation (OMT) to complete the tasks. The author concluded that for these (mostly advanced) students the utilization of OMT technology appeared to assist in written comprehension, understanding vocabulary in context, and serving as a language checker for brief written or oral expressions. The subjects' critical use of OMT tools combined with peer work enhanced their digital literacy, reinforced prior learning, and provided opportunities for discussing intercultural and linguistic questions. The author concluded that participants gained awareness of their language learning capacities and the strengths and limitations of Online Machine Translation (OMT) as an independent language learning resource. The study suggests integrating OMT into language classes and offering usage recommendations for independent language learning beyond the classroom.

Zhu, 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

　　This relatively short article explains the author's researched opinions concerning the motivations behind learners resorting to MT, the effective application of MT in learners' writing, and potential pedagogical approaches to reconcile the use of MT in language learning classrooms. The author stresses the need to incorporate proper use of MT tools into the language learning curriculum, calling them "the fifth macro-skill" in addition to speaking, listening, reading and writing. The author believes that instructors should prioritize the

understanding of these tools as part of their professional development and that instructors lacking proficiency in these tools may not be able to fully engage and motivate language learners.

Benites, A. D., Kureth, S. C., Lehr, C., & Steele, E. (2021). Machine translation literacy: A panorama of practices at Swiss universities and implications for language teaching. In N. Zoghlami, C. Brudermann, C. Sarré, M. Grosbois, L. Bradley, & S. Thouësny (Eds), CALL and professionalisation: Short papers from EUROCALL 2021 (pp. 80-87). Research-publishing.net. https://doi.org/10.14705/rpnet.2021.54.1313

This brief paper outlines the findings from an online survey of 3,713 Swiss university students and teaching staff regarding their utilization of MT. The survey contained 248 questions and was conducted in 3 different languages. The authors drew three initial conclusions concerning language educators and learners: MT is a firmly established yet tacit practice within Swiss universities, it is not perceived as a substitute for language learning, and it is recognized and currently employed as a tool to enhance language proficiency.

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

Lee states that in the past the use of MT tools has been viewed negatively due to the possibility they may detract from student learning and motivation. However, in this study Lee reports how guided MT use can effectively be used by Korean EFL students with low level proficiency in the writing classroom. The writing process in the class consisted of 32 EFL students using MT at the following stages: 1. planning, 2. drafting with the aid of MT, 3. revising MT output and 4. completing the writings with the help of MT for four writing tasks over 12 weeks. Lee also noted that consistent discussions and negotiations about meaning during peer editing, along with guidance from the instructor were also important steps that aided lower-level students reach a suitable level for their comprehension and learning as well as offer emotional support and encouragement. Findings showed that the guided use of MT

enhanced student learning by increasing students' metalinguistic awareness during revision of MT output and allowing them to become more confident autonomous learners. Therefore, Lee espouses that with effective implementation, the use of MT in language learning classrooms should no longer be considered taboo but harnessed to enhance student learning and motivation.

Handayani, M. U., Mubarokah, L., Karimatunisa, M. F., & Hidayah, N. I. (2022). The role of Google Translate as a learning medium for EFL students: Systematic review. *Conference on English Language Teaching 2*, 182-192.
https://www.academia.edu/94994664/The_Role_of_Google_Translate_as_a_Learning_Medium_for_EFL_Students_Systematic_Review?f_ri=22023

The authors use Systematic Literature Review (SLR) to analyze 14 different journal articles related to the keywords "Google Translate", "EFL", and "learning activity". Of these, they found that nine articles highlighted the favorable outcomes of employing Google Translate, three expressed a neutral stance, and two took a negative perspective. To summarize their findings, the beneficial impacts of incorporating Google Translate into EFL education include enhancements in writing skills, the augmentation of vocabulary, and the facilitation of effective teaching and learning activities. Conversely, some negative issues involve a tendency to become reliant on Google Translate, leading to a reduction in personal translation efforts, and occasional misuse of the tool for cheating in assignments or exams.

Jolley, J. R, & Maimone, L. (2022). Thirty years of machine translation in language teaching and learning: A review of the literature. *L2 Journal: An electronic refereed journal for foreign and second language educators, 14*(1). https://doi.org/10.5070/L214151760

This review highlights the well-established and expanding field of research connecting MT with language teaching and learning. The authors found that learners commonly use MT for writing tasks, primarily to find words and phrases, despite recognizing its limitations. Instructors and learners hold varied opinions on MT's suitability in L2 classrooms, with some

instructors advocating its pedagogical role. While research doesn't definitively establish MT's benefits for language learning, it suggests it aids metalinguistic knowledge and improves translation and L2 writing. Strategies for addressing MT use align with instructor's ethical views, leaning towards detection and prevention, as MT's effectiveness and shortcomings are observed. The author suggests exploring pedagogical MT use due to its inevitable use by students.

Can, S. (2023). Instructors' perceptions of students' Google Translate use in language learning. *Söylem Filoloji Dergisi* (*Çeviribilim Özel Sayısı*)*,* **474-482.**
https://doi.org/10.29110/soylemdergi.1186593

The author explores the attitudes of teachers on the use of Google Translate in language classes at Turkish university prep schools, with a focus on Google Translate's perceived effectiveness, ethicality, frequency of use and reasons for student use. In this mixed-methods investigation Can received 46 responses to a survey and conducted eleven semi-structured interviews to gain better understanding of the survey results. Pertinent results indicate that students often use Google Translate in class, and though there were concerns about its use and impact on student learning, instructors did not think it should be banned. Regarding student use, it was found that students utilize Google Translate in both writing and reading classes. However, the perceived ethicality of use in each class differed, with 57% declaring use in reading activities ethical, but 73% considering it unethical in writing classes. Instructors reported that students mostly use Google Translate for shorter segment lengths such as single words or phrases, but that it is also used for longer segments such as sentences, paragraphs, and entire texts. However, as segment size increased so too did the perceived ethicality of use as well as its effectiveness. Can closes by acknowledging that teachers seem to understand that the pervasiveness and ubiquity of tools such as Google Translate mean that they will be used by students and thus, policies, frameworks, and effective strategies are needed to ensure they do not negatively impact student learning.

Klimova, B., Pikhart, M., Benites, A. D., Lehr, C., & Sanchez-Stockhammer, C. (2023). Neural machine translation in foreign language teaching and learning: A systematic review. *Education and Information Technologies, 28*(1), 663-682. https://doi.org/10.1007/s10639-022-11194-2

This systematic review gathered English peer-reviewed experimental studies published from 2016 to 2022 which dealt with the impact and role of neural machine translation (NMT) on foreign language learning. The findings of the examined articles generally suggested that NMT tools hold significant potential as learning aids, particularly in enhancing students' post-editing and writing abilities. The authors stress that it is crucial for foreign language teachers to offer appropriate guidance and training to students regarding its utilization, particularly emphasizing post-editing practice. While NMT tools are particularly well-suited for advanced learners of a second language who can engage in critical reflection on the output of NMT texts more effectively compared to beginners or lower-intermediate learners. For the latter group, NMT may actually have a negative impact.

Lee, S. M. (2023). The effectiveness of machine translation in foreign language education: A systematic review and meta-analysis. *Computer Assisted Language Learning, 36*(1-2), 103-125. https://doi.org/10.1080/09588221.2021.1901745

This study involved the systematic review and meta-analysis of 87 MT-related studies in foreign language (FL) education, spanning from 2000 to 2019. The findings indicated a notable increase in publications in this domain in recent years, accompanied by a significant improvement in MT quality. Most studies highlighted the positive impacts of MT on FL learning, particularly in the context of writing. However, the research also identified mixed student sentiments toward MT and disparities in perceptions between instructors and students. The author also identified a dearth of well-structured pedagogical frameworks for the integration of MT in foreign language education and warns that more accurate MT technology might have a "profound impact on FL education".

Conclusion

This review of the literature is meant as a resource for scholars with an interest in MT and foreign language learning and teaching. Many of the papers summarized stated that MT can be an effective tool for language learning but stressed the importance of guidance from instructors to exploit its potential and highlight its limitations. In research that investigated the perceptions of instructors and students towards MT, varying levels of acceptance were found, and even when its use was viewed unfavorably, learners still often reported employing it. Other articles also discussed the impact that these tools will have on the profession of language teaching and whether they will potentially make it redundant. Various systematic reviews of the literature related to MT were also summarized, displaying the breadth of scholarship currently in this field. We hope that these summaries will serve to enlighten instructors and inspire further research into this ever-widening topic of study.